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Doctoral Dissertation

The opinions of science and mathematics teachers about beliefs, practices, and implementation of meaningful learning in Israel. *A case study of Arab middle school(s).*

by

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Abstract

The opinions of science and mathematics teachers about beliefs, practices, and implementation of meaningful learning in Israel. A case study of Arab middle schools.

The introduction of a new reform potentially challenges teachers' beliefs and practices about teaching. This case study explores these challenges in the context of a new reform in Israel, where major educational reform has been undertaken.

A considerable body of research, alternatively, advocates that teachers' beliefs about teaching and learning affect their teaching practices and many aspects of their professional work. These beliefs and practices influence many factors on the contextual and teacher levels (Ernest, 1988).

Thus, this study aimed to investigate and understand Arab middle school science and mathematics teachers' beliefs, practices, and implementation of meaningful learning in Israel.

Meaningful learning occurs when students engage actively with concepts and problems in a dialogic process where ideas are shared, discussed, and assimilated. The phenomenon of implementing a new reform was explored in a qualitative method. The qualitative data were collected from twenty teachers at three government middle schools in Arab society. The data comprised of classroom observations, semi-structured interviews, documents (lesson plans, tests, worksheets), and field notes.

The resulting data served to construct a background picture regarding teachers' beliefs on meaningful learning, classroom practices, and identifying situations that teachers perceived as the implementation of meaningful learning.

Regarding teachers' beliefs, the study revealed that the participating teachers had favorable beliefs on all aspects of teaching and learning (teaching strategy**,** teacher role, student role, learning environment, and learning content). The interviews indicated that teachers tended to focus on what they do and not on what students do. It implies an authoritarian conception of teaching and that teachers possess the knowledge that can be transferred through monologues talk.

It was found that although the beliefs of most participating teachers were consistent with the new reform, their teaching practices were not consistent with these beliefs. This finding was explored further through classroom observations, document analysis, and artifacts collected through the study. It was observed that most participating teachers had problems delivering the intentions of the new reform.

The results regarding teaching practices revealed in this study are entirely the opposite of what is stated in the new reform of meaningful learning. It is found that these teachers' teaching practices were unable to involve learners in the learning process, even though learners' active involvement in the learning process is the core of the meaningful learning reform. Evidently, teachers communicated with the students primarily through lecturing; they asked many low-order questions, which triggered a single word or phrase type of response, corrected student's wrong responses, and praised correct responses in a noninteractive and monologues discourse manner. The results indicate that the participating teachers employed a didactic (teacher-centered) instruction where students' participation in the process of learning was negligible.

Exploring teachers' perceptions regarding the implementation of Meaningful Learning revealed that teachers do not understand the new reform and that they had difficulty to operate without clear guidelines and detailed instructions.

In addition to that, the study found that curricular demands, teacher perceptions of their students, pressures of time, assessment, crowded classrooms, lack of resources, workload, and inadequate teacher understanding of the components of meaningful learning inhibited student-centered instruction. Thus, along with the reformation of teachers, there should also be a reformation in the context of the learning atmosphere and infrastructures in tune with the new reform's intentions.

Keywords: Meaningful learning, Teachers' beliefs, Instructional practices, Reform implementation.

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INTRODUCTION

Research Context

This dissertation focuses on the Meaningful Learning Reform, which was launched in the Israeli school system in the 2014-2015 academic year and is still being implemented

In a document titled "Policy for advancing meaningful learning in the education system" (cms.education.gov.il/EducationCMS/Units/LemidaMashmautit/mashmautit), it is written:

"Meaningful learning is a personal process of knowledge building during which the learner raises questions, locates sources of information, processes information and creates new knowledge relevant to his world and the life in the technological era of the 21st century."

Meaningful learning (also known as active learning or query learning) belongs to the constructive approach domain. In the constructivist approach, the student is the principal agent of the learning process and not the instructor. It is a student-centered learning paradigm, in which the student is engaged in activities to construct new information (Prince, 2004).

In Israel, as in many other countries, large-scale education reforms that focus on reorganizing the entire school system have become one of its main characteristics. The Meaningful Learning Reform was not a single reform; it was part of a succession of reforms launched in the Israeli school system. However, most of these reforms were based on a top-down authoritarian relationship, with the schools being required to follow detailed instructions.

Usually, teachers received clear instructions as to what should be done and how it should be conducted, for example, the reform in the teaching of reading (2002) and the reform in teaching mathematics in middle schools (2008). The Meaningful Learning Reform was unusual in this regard, as there were no specific guidelines.

The Israeli Ministry of Education expects schools to implement the Meaningful Learning Reform. However, it did not instruct them as to specific ways in which this should be done. Instead, it presented a pedagogical framework to stimulate professional discussion among the various stakeholders, to serve as a basis for various work programs at the staff level, and to provide some examples of meaningful learning as well as several tools as it allowed school leaders to exercise considerable discretion about how to meet the broad policy goals.

Generally-outlined education reform can be very challenging for school leaders in general and teachers in particular, as the latter need to find a way to realize the reform principles, exercising discretion about how to meet the program's goals (Louis & Robinson, 2012). Thus, it is vital to explore teachers' beliefs and practices while implementing generally-outlined education reform.

The national school system in Israel serves about 1.6 million students, with approximately 73 percent in the Hebrew-speaking sector and 27 percent in the Arabic-speaking sector (Israeli Central Bureau of Statistics, 2013).

According to the Gini Index that measures distributive inequality within a nation, Israel is among the countries with the broadest gap between rich and poor, alongside the United States and Mexico (OECD, 2018).

Statement of the Problem

This study was conducted in the Arab sector in Israel, where teachers and learners have long been familiar with lecture-based traditional learning (Arar & Abu-Asbah, 2013). Previous research in other countries (for example, China and Japan) has shown that implementing an unfamiliar inquiry-based learning approach has proven difficult because their science classrooms have been typically set up with the teacher as the information deliverer and the student as a passive observer (Choi, Nam, & Seung, 2011). In Israel, despite an official push towards a student-centered learning approach that has been going on for several years (Harpaz, 2014), many teachers still function as traditional instructors; they act as lecturers and knowledge transmitters.

The current study was limited to science and math teachers. Internationally, in the last two to three decades, significant efforts have been undertaken to improve science education. Countries are much concerned about how their students perform on international tests, such as Trends in International Mathematics and Science Study (TIMMS) and Program of International Student Achievement (PISA) (BenDavid-Hadar, 2016).

On the 2018 PISA assessment, Israel scored lower than the international average on science (OECD). A notable portion of socio-economically disadvantaged students received much lower scores than their wealthier counterparts (OECD). Disadvantaged students tended to display less engagement and motivation in learning (OECD, 2018).

Low performance and great diversity among school populations pushed the Education Ministry in Israel toward a new reform, particularly in curriculum and instruction (Harpaz, 2014). The main concern that led them to make this decision was their thought that methods aligned with the traditional (also referred to as teacher-led) instruction are the reason for the low scores in high-stakes tests. New ways were required to change teachers' views and practices if Israeli student-centered reformed education goals are to be met.

The problem has different dimensions in Arab society. The Arab educational system in Israel operates under conditions of inequality in inputs; hence it suffers from inferiority in its outputs. Furthermore, this system suffers from poor physical infrastructures, in the same manner as it suffers from formal inequality, let alone a substantive inequality in issues that concern budgeting school hours for classes and pupils, educational staff quality, and supportive services quality (Arar & Abu-Asbah, 2013).

The typical instructional method in Arab schools is still the traditional frontal teaching (Abu-Asbah, 2007). This traditional method contrasts any meaningful learning (according to the Ministry of Education's meaningful learning document).

Under these circumstances, is it rational to think about meaningful learning? What do teachers, the executive arm of the education system, think of this type of learning, and how do they virtually behave? Clearly, for that to happen, a change in teachers' views and practices was required. These questions motivated this study's design, aiming to provide an overall picture of Israeli Arab teachers' beliefs and actual practices regarding the meaningful learning reform.

Research aims and questions

As was stated in several studies, teachers' views are closely related to their implementation of new teaching approaches (Levitt, 2002; Tsai, 2002; Verjovsky & Waldegg, 2005; Markic & Eilks, 2010). Before the meaningful learning reform can be successfully employed in Arab classrooms, we should understand the processes by which teachers' practices and views of learning can be shifted. A significant point of interest in this study was determining how meaningful learning can be implemented in Arab society. First, it is necessary to understand what views teachers are holding, how they can shift their ideas, and what concerns they might have about implementing the new approach.

The purpose of this study is to investigate how teachers changed their practices and views about learning along the implementing stage, four years after the reform has begun. It was

accomplished through a specific focus on their views concerning teacher and student roles, problem-solving and reasoning, and the establishment of a supportive learning environment.

This study attempts to investigate and understand Arab Middle school teachers' beliefs and practices in implementing the new reform of meaningful learning. In line with this, the following research questions were formulated:

1. What beliefs regarding meaningful learning are held by Arab middle school science and math teachers?
2. What are the classroom practices of Arab middle school science and math teachers?
3. What kind of situations do teachers perceive as being an implementation of meaningful learning?

The research questions allowed the study to explore the beliefs, perceptions, and actual instructional practices of science and math teachers throughout the implementation stage of the meaningful learning reform. The research questions also afforded opportunities to discover situations that impacted the implementation of meaningful learning.

The first research question intended to explore and explain math and science teachers' beliefs in Israeli Arab middle schools. The second research question sought to investigate and document the prevailing practices of middle school teachers. The third Research Question sought to explore the teachers' implementation of the new reform and its intentions. An outcome of this study was to identify the affordances and constraints for teachers regarding the implementation of the new reform, thereby helping them improve their practice and, ultimately, student learning outcomes.

A greater understanding of what occurs in a typical middle school classroom can be discovered and better understood by delving into these research questions. This research will be beneficial in providing information and insight into the current instructional practices employed in science classrooms and their basis, potential impediments to effective and meaningful instructions; teacher beliefs regarding meaningful learning; and how to adapt to the correct implementation of meaningful learning reform.

In order to answer these research questions, the following methodology was adopted.

Methodology Overview

A case study approach was the appropriate methodology for this study because it aimed to explore in-depth and detailed descriptions of participants' views on learning and the implementation of the meaningful learning reform.

The study was conducted in Israel with twenty science and math teachers. Data collection included documents (lesson plans, activities, worksheets, examinations), classroom observations, and semi-structured teacher interviews.

Significance of The Study

Meaningful Learning presents a shift from teacher-centered instruction to student-centered learning, in which students build their content knowledge and problem-solving skills by solving real-world problems that may not be well defined (Corrazo, 2011). In teacher-centered instruction, the teacher or tutor provides students with resources and instructions only when necessary, and challenges students by questioning their ideas (Armstrong, 2012; Corrazo, 2011). Students learn by knowing and doing, and students are given opportunities to apply newly acquired knowledge in settings that they may encounter in the real world (Armstrong, 2012). The current study described various factors that influence teachers to design and implement Meaningful Instructions in their school classrooms, which will be significant to educators and administrators at the Middle school level. Classroom teachers can benefit from the study because it makes them aware of an instructional approach built upon constructivist principles. The discussion of the factors influencing the participating teachers in implementing the meaningful learning reform in their classrooms and the challenges these teachers face, provided in this study, will help other educators to plan, design, and implement meaningful instruction in their classrooms.

Research into teachers' beliefs, values, and understanding regarding the learning process is vital, as it relates to and can reveal much about their instructional practices (Leatham, 2006). As documented in several studies (Levitt, 2002; Tsai, 2002; Chou, 2008; Shun, 2008), teachers' views about learning in relation to their practices are particularly noteworthy when they consider adopting a new teaching practice in their classroom. However, most studies that focus on changing teachers' learning perspectives and classroom practices have been conducted in the western world; such research in the Arab context is rare. This study is significant in that it aims to fill this gap.

In addition to the research trends mentioned above, the majority of the studies to date have focused on the shift of perspectives and practices found among preservice teachers (Savasci-Acikalin, 2009). Few studies attempt to elucidate this shift among experienced teachers, and especially among science teachers. Thus, this study was centered on in-service teachers at a middle school level, and its aim was an in-depth investigation of teachers' learning perspectives, classroom practices, and concerns while managing a reformed instructional program. According to Vaughan (2002), teachers' concerns impact their comfort level with participation. Thus, teachers' concerns, particularly during a period of innovation, was also significant.

Knowledge about beliefs regarding teaching-learning aspects and knowledge about teaching practices will inform teachers on how their beliefs impact their teaching practices. This study will also inform science teachers from the Arab Society about their current beliefs regarding teaching, learning, and instructional practices.

To bring any changes to education, teachers should know about their present status regarding teaching and learning. Clear examples of their current teaching practice will give them a chance to look into whether they are on the right track, as suggested by the new reform of meaningful learning.

Policymakers, educational advisors, curriculum implementers, and other stakeholders in the education system will be informed about the components of teaching strategies for effective teaching and learning of science.

Structure of The Thesis

This research study is divided into five chapters. Chapter One is an overview of the study and includes the research context, statement of the problem, the significance of the study, study's purpose, methodology, and research questions. Chapter Two provides theoretical frameworks that guided the study: teachers' beliefs and practices, approaches to learning, factors that promote or prevent teachers from implementing the new reform. This chapter also reviews the relevant literature on shifts in teachers' views and practices concerning meaningful learning and the education system in Israel in general and in the Arab sector in particular.

Chapter Three focuses on the methodological framework, research design, data collection, and analysis procedure. At the end of the chapter, there is a justification for the study's trustworthiness. Chapter Four presents the study's findings regarding teachers' beliefs,

pedagogical practices, and perceived implementation situations. Chapter Five is a discussion of the findings concerning the research questions. The main emergent themes of this study are also discussed. In addition, the study's limitations and implications for future research are provided. Finally, the overall conclusions of the study are presented in Chapter Six.

Chapter 1 – LITERATURE REVIEW

1.1 Teachers' Beliefs And Practices

This subchapter attempts to explore contemporary research literature on teachers' beliefs and practices. It includes the definition of beliefs, the nature of teachers' beliefs regarding teaching and learning, the relationship between beliefs and practices, the role of the socio-cultural context in forming beliefs, factors that influence beliefs and practices, sources for teachers' beliefs, and previous research on beliefs and practice.

1.1.1. Definition of beliefs

Anthropologists, social psychologists, and philosophers agree upon a commonly accepted definition of beliefs; "beliefs are thought of as psychologically held understanding, premises, or propositions about the world that are felt to be true" (Richardson, 1996, p.103). In the educational settings, Haney, Lumpe, and Czerniak (2003) defined beliefs as "one's convictions, philosophy, tenets, or opinions about teaching and learning" (p.367).

Abelson (1979) defined beliefs in terms of people manipulating knowledge for a particular purpose or under a necessary circumstance. According to Brown and Cooney (1982), beliefs are dispositions to action and major behavior determinants.

Rokeach (1972) defined beliefs as "any simple proposition, conscious and unconscious, inferred from what a person says or does, capable of being preceded by the phrase 'I believe that'" (p.113). According to Nespor (1987), beliefs are closely related to what we think and what we know but provide an affective filter which screens, redefines, distorts, or reshapes subsequent thinking and information processing. Loucks-Horsely et al. (1998) wrote, "beliefs are more than opinions: they may be less than truth, but we are committed to them" (p.27). Rokeach (1968) identifies five types of beliefs based on their source: primitive beliefs with 100% consensus, primitive beliefs with 0% consensus, authority beliefs, derived beliefs, and inconsequential beliefs. Primitive beliefs with 100% consensus are beliefs one has in common with close friends and colleagues. These core beliefs are seldom discussed and remain entrenched unless specific events compel an individual to confront them. Primitive beliefs with 0% consensus evolve from personal experiences and may or may not be shared with other close acquaintances. Authority and derived beliefs have their sources in the beliefs held by authority

figures and influential groups with which an individual associate. Inconsequential beliefs, Rokeach explains, are more akin to personal preferences.

Pajares (1992) posits that beliefs are intangible; they are evident only through one's actions and words. According to Richardson (1996), the relationship between beliefs and actions is exceedingly convoluted. She explains that the "perceived relationship between beliefs and actions is interactive. Beliefs are thought to drive actions; however, experiences and reflection on action may lead to changes in or additions to beliefs" (p.104). According to Pajares (1992), beliefs change through a process which results when a person questions existing belief or perceives new truths to be incompatible with preconceived ideas. Beliefs may change, but the ease with which they are altered is thought to be dependent upon the type of belief under question. Core beliefs are deeply rooted in the psyche and highly resistant to change (Rokeach , 1968; Pajares, 1992). Rokeach explains that these strong beliefs are closely tied to one's sense of identity because they arise from experiences early in life and are used when evaluating later experiences (Pajares, 1992). Pajares' synthesis of empirical studies on beliefs leads to the supposition that core beliefs rarely change in adults. However, according to Rokeach (1968), authority and derived beliefs may change if the source of the belief loses credibility. According to Rokeach (1968), a group of related beliefs gives rise to attitudes and values, which, together with the beliefs, form a belief system. He compares a belief system to the structure of an atom. Anchoring the belief system, like the nucleus of an atom, is the set of strongly entrenched core beliefs, while on the periphery are the more easily changed beliefs (primitive beliefs with 0% consensus, authority beliefs, derived beliefs, and inconsequential beliefs). While Rokeach does not speak explicitly about teacher beliefs, Pajares (1992) reviewed 35 empirical studies on teachers' beliefs and concluded that "individuals develop a belief system which houses all the beliefs acquired through the process of cultural transmission" (p.325). Pajares also adds that belief systems are formed early and reinforced by subsequent experiences. They are ranked according to their affiliation with other beliefs, and belief systems influence perceptions, behavior, and decisions. Furthermore, according to Kagan (1992), core beliefs about teaching affect the processing of new information about teaching.

Pajares (1992) argued that belief constructs do not offer themselves up easily to empirical investigation. "Beliefs cannot be directly observed or measured but must be inferred from what people say, intend, and do" (p.316). In other words, to study beliefs, researchers must not stop with self-report questionnaires (a common practice) but use a variety of methodologies,

including interviews, observations, and other practices, to discover the consistencies and inconsistencies of teachers reported and actual beliefs and practices.

1.1.2 Teacher's beliefs about teaching and learning

Pajares (1992) notes that the construct of teacher beliefs is plagued with "…definitional problems, poor conceptualizations, and differing understandings of beliefs and belief structures" (p. 307). However, Pajares concludes that because all people have beliefs regarding all things they have knowledge about, teachers have beliefs regarding elements of their profession such as pedagogy, student learning, and teacher roles and responsibilities. Furthermore, Pajares recommended that researchers distinguish between teachers' broader, general belief systems and their educational beliefs. In addition, he recommended that educational beliefs be narrowed further to specify what those beliefs are about, for example, educational beliefs about the nature of knowledge, perceptions of self and feelings of self-worth, confidence to perform specific tasks, and so on.

The difficulty in defining teacher beliefs centers on the difficulty and ambiguity of differentiating beliefs from knowledge (Pajares, 1992; Richardson, 1996; Calderhead, 1996). For example, Calderhead (1996) asserted that teacher beliefs, as well as teacher knowledge and teacher thinking, comprise the broader concept of teacher cognition. Yet, Kagan (1990) noted that the term teacher cognition "is somewhat ambiguous, because researchers invoke the term to refer to different products, including teachers' interactive thoughts during instruction; thoughts during lesson planning; implicit beliefs about students, classrooms, and learning; [and] reflections about their own teaching performance . . . ." (p.420). Rokeach (1968) argued that all beliefs include a cognitive component representing knowledge, an affective component arousing emotion, and a behavioral component guiding actions. Therefore, knowledge is a component of belief. However, Roehler et al. (1988) stated that knowledge structures are the main force driving teacher behavior in a classroom.

Clark and Peterson (1986) assert that teachers' beliefs involve primarily two domains: teacher cognition (teachers' knowledge); and teacher behaviors (teachers' instructional decisions). Essentially, these authors defined teachers' instructional beliefs in terms of looking at how teachers derive their decision making, problem-solving in the classroom, and lesson plans for students in relation to classroom practices. All these factors could be observed in interaction with students in the classroom.

Nisbett and Ross (1980) assert a similar focus on teachers' beliefs being comprised of general knowledge of objects, people, events, and their characteristic relationships that impact their lesson planning, classroom decisions, and classroom behaviors. Both studies were concerned with what teachers believe, know, or understand about what they teach and what can be observed from teachers' instructional practices in the classroom. Kagan (1990) decided to use belief and knowledge interchangeably because evidence showed that a teacher's knowledge is expressed in highly subjective terms.

Although knowledge and beliefs are "inextricably intertwined" (Pajares, 1992: p.325), Nespor (1987) suggested that beliefs are distinguished from knowledge because the propositions or the concepts of belief systems do not require consensus between the belief holder and the outsider and because beliefs are usually disputable.

Shulman (1986) reports an alternative view concerning teachers' beliefs and knowledge. In this study, Shulman defines teachers' instructional beliefs as having to do with subject area knowledge, knowledge of pedagogy, and curriculum knowledge. This definition contrasts with previous definitions of teachers' beliefs that focus on lesson plans, instructional decisions, and observed teaching practices.

Fives and Buehl (2012) define teachers' beliefs as a construct or idea made up of various characteristics that are defined within the research literature such as implicit (implied) and explicit (expressed) beliefs; situated (situational) or generalized beliefs; the relationship of beliefs to knowledge; the existence of individual beliefs or larger systems; and the stability of beliefs over time.

As described, the existing definitions of teachers' beliefs focus on a myriad of factors that help to comprise teachers' beliefs. Fang (1996) asserts that there is no set definition of teachers' beliefs that can be found in the research literature. Fives and Buehl's (2012) definition regarding instructional beliefs was also chosen for the current research.

In educational research, researchers usually assign teacher's beliefs into specific categorizations, either behaviorist (transmissionism) or constructivist beliefs (Fulton, 1999; Tsai, 2002; Woolley et al., 2004; Mansour, 2009; OECD, 2009; Markic & Eilki, 2010). These two beliefs categories are variously termed as direct transmission versus indirect transmission; conventional versus contemporary; teacher-centered versus student-centered; constructivist versus behaviorist; mechanical versus dynamic approach to teaching and learning (Woolley et al., 2004; Mansour, 2009; Siddiquee & Ikeda, 2013). This dichotomy may be useful in being

able to categorize beliefs but may also be simplistic and misleading. Ernest (1994) says that learning theories such as constructivism are so diverse that it is questionable if the set of beliefs can be categorized in terms of a behaviorist or constructivist dichotomy.

Calderhead (1996) summarized teachers' beliefs that have something to do with teaching and learning into two categories by saying that part of the teachers see teaching as being a process of knowledge transmission, while other teachers see it as a process that guides children's learning, or as a developing social relationships process. He also distinguishes between teachers' beliefs based on their experiences. Some teachers begin with control-oriented beliefs that emphasize how important it is to maintain order and good discipline and guide the children's activities. During training, such attitudes become more liberal and child-centered. When teachers begin full-time teaching, they revert to a control-oriented belief system.

Bell and Gilbert (1996) emphasize two extreme positions related to the nature of teaching, which can happen in each classroom. They first state that the predominant belief is that the teacher's role as the expert in his knowledge is to present his knowledge directly to students in a logical sequence. The second position is based on the belief that knowledge is built by the individual (the idea of constructivist) and that the teacher's role is being a facilitator who lets students reconstruct, extend, or replace their existing knowledge.

A diverse set of beliefs concerning teaching and learning is reported in the literature (Pajares, 1992**;** Levitt, 2002; Prince, 2004). Through taking into consideration the teaching-learning aspects, teaching strategies, learning content, the roles of the teachers and the students and learning environment, most educators differentiate teaching beliefs into traditional and constructivist dimensions (Fulton, 1999; Levitt, 2002; Woolley et al., 2004; OECD, 2009). The most significant differences between the two belief dimensions concerning teaching and learning pertain to teaching strategies, teachers, students' roles, learning environments, students' interactions, and learning contents (curriculum), each of which will be discussed in the following paragraphs.

Teaching strategies

One central element of transmission based on the behaviorist approach to teaching and learning is the traditional teacher-centered classroom. The transmission metaphor sees the teacher as the main source and the students as receivers of knowledge. These beliefs were supported by three dimensions: an objectivist view of knowledge (Johnson, 1987), a mental model for teaching and learning, which is characterized by memorization, and the conviction that the teacher must have power over the student in most classroom situations (Tobin, 2000). Teachers were given more emphasis in this classroom. The teacher is the one who dominates the whole class and acts as an authority (Griffin 2006). Sometimes the teacher shows himself as the full knowledge which he delivers to the learners. The emphasis in such teaching is disseminating knowledge whose truth is delivered through texts written by famous writers with authority to 'know' (Preece & Griffin, 2006). What interests psychologists who work within this paradigm is the effect of reinforcement, practice, and external motivation on a network of associations and learned behaviors (Fosnot, 1996). An educator who uses such a behaviorist framework preplan a curriculum by breaking a content area (usually viewed as a finite body of predetermined knowledge) into an assumed component of "skill" and afterward sequencing these components into a hierarchy ranging from simple skills to more complex skills. In stark contrast to behaviorism, radical constructivism lets and encourages the building of models for cognition or mental process (Goldin, 2000). This social learning theory, perhaps the most current psychology of learning, undergirds much of the curricular and instructional decision making occur in education. Based on the work of Jean Piaget and Lev Vygotsky, among others, it is having major implications for the goals teachers set for the learners with whom they work, the instructional strategies teachers employ in working toward these goals, and the method of assessment used by school personnel to document genuine learning (Fosnot, 1996). In this view of learning, all knowledge is built by necessity from the knower's world of experience, and the "real world" is considered as existing but, in principle, unknowable (Von Glasersfeld, 1991b cited in Goldin, 2000). The contemporary theory of learning has dozens of brands (Geelan, 1997a, cited in Dawkins, 2004), each emphasizes a different aspect of learning; most agree that it involves a major change in the focus of teaching, putting students' own efforts to understand at the center of education (Prawat, 1992). There are two principles in modern learning theory that would be found in each: students construct their own understandings.

The new understandings that students construct rest on the foundations of the knowledge and understandings they already have (Dawkins, 2004, p.107).

The role of the teacher

In traditional teacher-directed teaching, the teacher sets the learning goals and objectives and then plans to have activities designed to help learners reach those goals (Pedersen & Liu, 2003) in a clear and exact manner. Because it is not expected from the learners to be capable of determining a process to meet the goals, it is the teachers' responsibility to direct students through the process, step-by-step, and make sure to solve any difficulty that may occur during the process (ibid). Covering the content is one of the highest priorities that concern teachers.

In modern student-centered teaching, the teacher presents the major questions, for example, issue, case, problem, and then facilitates the students as they determine their response (Pedersen & Liu, 2003). The teacher must ensure that students are getting the opportunities for quality learning experiences to provide a strong base for learning with understanding (Tobin et al., 1994). Teachers assist students in passing through difficulties they face by questioning them and assisting them in recognizing alternative ways or resources, but they do not solve these difficulties for the students (ibid).

In all modern teaching-learning scenarios, the traditional telling-listing relation between teacher and student is changed to one that is more complex and interactive (Prawat, 1992). The teacher must listen carefully to students' interpretation of data, paying particular attention to any individual puzzlement and confusion. By focusing on puzzlements and contradictions, the teacher establishes the notion that ideas are complicated and need time and consideration and that every student can formulate exciting ideas. The teachers acknowledge that "not knowing" is an important state that most of us experience most of the time (Fosnot, 1996, p.71).

The role of the student

In traditional teacher-directed instruction, students work to reach the goals set by the teachers (Pedersen & Liu, 2003). It is assumed that observations, listening to explanations from teachers who communicate clearly or engaging in experiences, activities, or practice sessions with feedback will result in learning and that proficient skills will quantify to produce the whole or more encompassing concept (Bloom, 1956; Gagne, 1965, cited in Fosnot, 1996, p.9). Learners are seen as passive, and they are just tested to see where they fall on the curriculum, and then expected to progress in a continuous, quantitative fashion as long as clear communication and suitable reinforcement are provided (Fosnot, 1996, p.9).

In a student-centered learning approach, the student works to respond to central questions. Because students sort out for themselves what they have to do and know in order to develop this response, student-centered approaches are more likely to promote student ownership over their process and learning (Pedersen & Liu, 2003) in a complex context of the classroom.

Fosnot (1996) draws an image of much more complex and interactive teaching-learning scenarios. According to her, the phenomenon students must think about needs to be interesting, worthy of engaging their time and attention. In addition, it has to offer many different avenues for exploring various routes of approach. Students are encouraged to express feelings related to work (frustrations and interests). Traditional teacher-directed approaches often depend on extrinsic motivators, like grades, degrees, or other rewards to motivate their learning efforts. In contrast, in student-centered approaches, teachers try to present a question that is interesting enough to motivate students to take ownership of the process of developing a response (Pedersen & Liu, 2003). Students' actions are driven by the objectives they have set for themselves rather than external rewards promised by a teacher or the institution (ibid). Increasing the amount of interaction among students throughout the teacher-directed instruction was asserted to succeed in cooperative learning (National Center for Educational Statistics, 1999). This instruction is under the teacher's control, with teachers deciding about group membership, the nature of the interaction between the group members, and even the roles played by the group members (Pederson & Liu, 2003). Teachers interfere in the group process when there are some difficulties and put the group in charge of individual learning. Bruffee (1995) says that the structure teachers provide during cooperative learning tends to undermine students' control over their own process. Modern teaching approaches are more aligned with collaborative learning than cooperative learning (Pedersen & Liu, 2003). Collaborative learning emphasizes students' self-governance of their interaction, allowing them to choose whom to work with and how (ibid).

Learning content (curriculum)

Literature makes two curricula available: popular view and dynamic view. Prawat (1992) said that the popular view of the curriculum (corresponds to the traditional view of the curriculum) as fixed agenda, a daily course to be run that consists of preset means (a certain material to cover) and predetermined ends (discrete set of skills or competencies).

As for the 'transmission view' of learning, the curriculum is the list of things to be taught (Mansour, 2009). The modern view of curriculum corresponds to constructivist ideas. It is believed that the curriculum should be viewed as a matrix of ideas to be explored over a period of time rather than as a road map. One would enter this matrix at different points depending on where students are in their current understanding (ibid). This view of the curriculum is relaxed and flexible and focuses on thinking and understanding through problem-solving rather than to cover the fixed content.

Learning environment

In traditional teacher-directed instruction, treating all the students equally and responding to the group as one (Prince, 2004). The teacher focuses on whole-class teaching, not paying attention to students' puzzlement and naïve conception in a quiet classroom context. On the contrary, understanding and responding to individual students' interests, strengths, experiences, and needs were asserted to modern student-centered instruction (Klichowski, 2017). Teachers in this modern and dynamic learning environment suggest various avenues for exploring different routes of approaches and where an unexpected classroom happening is anticipated by the teachers (ibid). In experimental research, Weimer (2002) depicted a clear picture of a student-centered learning environment:

My classes are louder and sometimes chaotic. People work in groups, others mil about, and sometimes a pair works something out on the board (p.31)

1.1.3 The nature of teachers' beliefs

There are different views about the concept of belief, depending on the theorist or researcher's point of view. Dewey (1938) developed a bipolar model within which there were two opposite dimensions: on the one pole, beliefs were characterized as traditional, and on the other as progressive.

These two poles formed a uni-dimensional system since the concept of belief consisted of traditional and progressive components that were negatively related. Thus, a person oriented towards the traditional pole would be expected to disagree with progressive ideas and vice versa. Dewey's definition oversimplifies the concept of beliefs and leads to an unrealistic understanding of its basic elements (Bunting, 1984). However, since the 1970s, researchers

have tried to identify the concept through a multi-dimensional system. Referring to the work of Wehling and Charter (1969) shows that the concept of beliefs is identified as consisting of eight dimensions. Two dimensions describe the subject matter and human adjustment matters, while the other six describe instrumental and impersonal processes affecting educational outcomes. Although Bunting's view is broader than that of Dewey and accepts the fact that individuality and idiosyncrasy play a substantial role in the development of beliefs, it fails to explain whether a belief component is considered as flexible or stable and how change can occur within this belief component. Answering this question, Pajares (1992) shows that beliefs are the main component of formulating theories since they are static and can exist beyond individual control or knowledge. He explains that they are non-flexible because they represent internal truths that remain unchanged in the teacher's mind, regardless of the situation.

However, Rokeach (1968) groups beliefs into five categories according to their connection with central beliefs and maintain that everybody has beliefs that belong to these five types. Type "A" formed earlier, involves the nature of oneself and one's physical and social world. Beliefs of this type are central. Due to their connection with societal norms, they are not prone to controversy and are thus hardly changeable. Type "B" beliefs differ from type "A," being private matters and independent of any social judgment. Type "C" beliefs share some characteristics with type "A" beliefs, which, to a certain extent, are reshaped through an individual's acculturation, education, and schooling. Type "D" involves a group of beliefs that individuals derive from reliable secondary sources such as books and the media. The type "E" beliefs consist of beliefs about taste, which is personal and not to be interfered with. These beliefs are far from the central belief and rarely connected with the other types. They are not changed and are considered insignificant.

The literature shows that beliefs exist in a complex interconnected system that is part of an individual's schemata. It is a web-like network of mental representations of reality (Pajares, 1992). A mental representation is information that is stored or represented in the mind in such a way that it can be used later during mental processes involving thinking, making decisions, and choices (Hutner & Markman, 2016). Some beliefs are core, while others are peripheral to the individual (Pajares, 1992). Core beliefs are strongly connected and related to other beliefs in the belief system. Strongly connected beliefs are those that individuals acquired through direct experience with 'belief object' while beliefs learned from other people are less connected. For example, teachers are more likely to believe in teaching approaches that they used to produce desired outcomes. Core beliefs give a sense of identity to an individual and can

be shared among individuals in a community, thus inherently crucial to individuals and the community (Hutner & Markman, 2016).

When frequently used in the cognitive processes, a belief becomes increasingly essential to a person. It allows the beliefs to occupy different loci in a belief network depending on the extent to which such a belief is vital to a person. For this reason, conflicting beliefs may co-exist in the belief system (Pajares, 1992; Hutner & Markman, 2016). Further, beliefs vary in the magnitude of vulnerability to change, with those assimilated earlier into the belief structure are the most robust and resistant to change than the newly acquired beliefs (Pajares, 1992). This is because pre-existing beliefs affect the perception, processing, and interpretation of subsequent information required to form new beliefs. In addition, individuals tend to turn conflicting evidence to support the well-established beliefs they already hold, contributing to the persistence of the older beliefs and the associated practices (Pajares, 1992). In short, people tend to reinterpret the contrasting evidence in ways that back up the beliefs they already hold. Since beliefs gradually become robust with their use, individuals tend to keep beliefs founded on flawed or incomplete information even when confronted with scientifically sound evidence. They tend to hold on to their beliefs even when they become aware of the falsity of such beliefs or evidence supporting them. Thus, people do not thoroughly revise older beliefs even when confronted with new evidence. In short, beliefs that individuals assimilate early into the belief structure are the most resistant to change. This is because older beliefs influence the perception (of new information), which prompts behaviors and actions which reinforce them (Pajares, 1992).

To clarify the meaning of "belief, "Pajares (1992) expresses the need to distinguish between belief and knowledge and explains that knowledge is based on objective fact, while beliefs are based on evaluation and judgment. Supplementary to this is Kagan (1992), who argues that most of a teacher's professional knowledge can be regarded as belief, claiming that knowledge is considered a belief that has been affirmed as true based on objective proof or consensus.

Knowledge is another concept widely discussed in the literature. The definition of knowledge as a term can be traced back to the time of Socrates. Plato suggested that knowledge has three components: beliefs, truth, and justification (Woolfolk-Hoy & Murphy, 2001). In traditional philosophical literature, knowledge depends on a "truth condition" that is being agreed upon in a community of people (Richardson, 1996). Based on this definition, knowledge is a belief that meets two conditions: (a) the truth of what is believed and (b) the justification someone has for believing it (Woolfolk-Hoy & Murphy, 2001). Alexander, Schallert, and Hare stated that beliefs

are a category of knowledge and define knowledge as "encompasses all that a person knows or believes in to be true, whether or not it is verified as true in some sort of objective or external way" (as cited in Woolfolk-Hoy & Murphy, p.146).

Several scholars have made a distinction between knowledge and beliefs. As stated by Pajares (1992), the problem is associated with the difficulty of finding the border where knowledge ends, and beliefs begin. Table 1.1 summarizes the differences between beliefs and knowledge, as discussed in the literature.

Table 1.1 The differences between beliefs and knowledge based on the literature

Beliefs	Knowledge
Refer to suppositions, commitments, and ideologies	Refers to factual propositions and the understandings that inform skillful action
Do not require a truth condition	Must satisfy "truth condition"
Based on evaluation judgment	Based on objective fact
Cannot be evaluated	Can be evaluated or judged
Episodically-stored material influenced by personal experiences or cultural and institutional sources	Stored in semantic networks
Static	Often changes

According to Calderhead (1996), beliefs generally refer to "suppositions, commitments, and ideologies, while knowledge refers to factual propositions and the understandings that inform skillful action" (p.715). Richardson (1996) distinguished knowledge from beliefs based on the notion of "truth condition." In her definition, knowledge must satisfy the "truth condition" or have some evidence, but beliefs do not require a "truth condition." Ernest (1989) proposed a distinction between knowledge and beliefs by identifying a case in which two teachers may have similar knowledge, but one can teach mathematics with a problem-solving orientation, while the other has a more didactic approach because of the different beliefs they hold. Nespor (1987) suggested four features of beliefs to distinguish knowledge from beliefs: (1) existential presumption, (2) alternativity, (3) affective and evaluative loading, and (4) episodic structure can be used. First, Pajares (1992) defined existential presumptions as "the incontrovertible, personal truths everyone holds" (p.309). They are profoundly personal and formed by chance, an experience, or an event. For example, a teacher may have beliefs about student "ability," "maturity," or "laziness," which are labels for entities about the students, rather than descriptive terms. Second, beliefs sometimes refer to "alternative worlds" or "alternative realities," which

are different from reality (Nespor, 1987; Pajares, 1992). Third, belief systems depend on affective and evaluative components more than knowledge systems. Nespor (1987) suggested that feelings, moods, and subjective evaluation based on personal preferences may significantly influence one's belief system. Unlike knowledge systems, belief systems do not require consensus regarding the validity and acceptability of beliefs. Individual beliefs do not even require internal consistency in the belief system.

According to Mansour (2009), a further distinction between beliefs and knowledge is that while knowledge often changes, beliefs are "static." In addition, whereas knowledge can be evaluated or judged, such is not the case with beliefs since there is usually a lack of consensus about how they are to be evaluated. Furthermore, there do not appear to be any clear rules for determining the relevance of beliefs to real-world events. Finally, Nespor (1987) differentiated these two terms based on the episodic structure. A knowledge system is stored in semantic networks, whereas belief systems consist of episodically stored material influenced by personal experiences or cultural and institutional sources.

While there are doubtless other distinctions that could be made between the two constructs, a better understanding may be gained by exploring the relationship between the two and by considering beliefs as a form of knowledge. This form of knowledge could be referred to as personal knowledge (Nespor, 1987). Kagan (1992) refers to beliefs as a "particularly provocative form of personal knowledge" and argues that most of a teacher's professional knowledge can be regarded more accurately as belief.

According to Kagan, as a teacher's classroom experience grows, this knowledge grows richer and more coherent and forms a highly personalized pedagogy or belief system that controls the teacher's perception, judgment, and behavior.

Although teachers may have similar scientific knowledge, they are likely to teach in different ways because teachers' beliefs are more potent than their knowledge in influencing how they teach (Nespor, 1987). The discussion about the relationship between knowledge, beliefs, and practices indicate an apparent disagreement about whether knowledge control beliefs or beliefs control knowledge. To answer this disagreement, Mansour (2008a) carried out empirical research and found an interactive relationship between knowledge and beliefs. He asserts that the settled or developed teachers' beliefs act as an information organizer and priority categorizer, and in turn, control the way it could be used. He added that in the interactions

between knowledge and beliefs, beliefs control the gaining of knowledge, and knowledge influence beliefs.

1.1.4 The role of socio-cultural context on forming beliefs and practices

A growing body of research discusses that teachers' beliefs need to be studied within a framework that acknowledges the influence of culture. Other studies say that teachers' beliefs and practices cannot be tested out of context (Mansour, 2008b) but are always located in a physical setting in which constraints, opportunities, or external influences may root from sources at various levels, like the individual classroom, the school, the principal, the community, or curriculum. Olson (1988) stated that "what teachers tell us about their practice is a reflection of their culture and cannot be correctly understood without reference to that culture" (p.69).

Lederman (1992) says that the transposition of teachers' beliefs into classroom practices is mediated by a complex set of situational variables. Ajzen (2002) suggests that there are many elements that cause a mismatch between beliefs and practices. Real-life elements like learner behaviors, time, resources, and course contents influence the consistency between belief and practice.

Ernest (1988) suggested two reasons why teachers' beliefs did not always match their practices. First, there was the powerful influence of social context, resulting from others' expectations, including students, parents, and peers. It was also a result of the institutionalized curriculum: the adopted text or curricular scheme, the assessment system, and the overall national schooling system. These sources caused teachers to internalize a powerful group of constraints that affected the enactment of models of teaching and learning.

Secondly, the teacher's level of consciousness of his beliefs and how he reflects on his teaching practice should be considered. According to Mansour (2009), teachers' beliefs are based on knowledge, experience, and environment. Teachers are pragmatic and might establish their beliefs in context-specific environments where their instructional experience is successful.

Nespor (1987) explains how the context has a basic role in forming teacher's beliefs: "the contexts and environments within which teachers work, and many of the problems they encounter, are ill-defined and deeply entangled… beliefs are peculiarly suited for making sense of such context" (p.324). According to Nespor, the contexts and environments of teachers' work make beliefs especially potent for defining tasks and organizing the relevant knowledge.

Most of the research indicates that teachers' beliefs are not context-free (Fang, 1996; Pajares, 1992). That is why it is essential to take into consideration the contextual factors which have formed certain beliefs.

Reading, analyzing, and interpreting the relevant study with teaching contexts, Cornbleth (2001) produced five "climate" or contexts of constraints that he characterized as 1) a bureaucratic climate with an administrative emphasis on law and order; 2) a conservative climate intent on maintaining the status quo; 3) a threatening climate of external curriculum challenges and self-censorship; 4) a climate of perceived pupil pathologies and pedagogical pessimism; 5) a competitive climate dominated by student testing and public school ranking. From Cornbleth's point of view, constraints on teachers and teaching are not singular or individual as in a singular factor affecting an individual teacher. To understand the constraints on meaningful teaching and learning, the attention is directed to recurring patterns of contextual constraints that he called climates and how these climates are created to produce thinking that incorporates diverse perspectives.

1.1.5 Factors that influence beliefs and practices

Many researchers have argued that a complete understanding of the teaching and learning process is impossible without a full understanding of the constraints and opportunities that impact the teaching and learning process (Mansour, 2008b). Researchers have attempted to explain the mismatching between teachers' beliefs and practices through the external and internal constraints pressuring the teacher (Abell, 1990; Abell & Roth, 1992) .

Researchers in different fields define common external "stressors" that affect teachers' performance. These include work overload, time restraints, problems with child behavior, working conditions, relationships with colleagues, lack of resources, and the physical demands of teaching (Borg, Riding, & Falzon, 1991). Kelly and Berthelsen (1995) identified sources of constraints for teaching practices such as time pressures, children's needs, non-teaching tasks, personal needs, parents' expectations, and interpersonal relationships. Blasé (1986) carried out a qualitative study with elementary, middle, and high school teachers and emphasized that time was one of the most critical constraints and that it could not be understood independently of other constraints that were perceived as directly interfering with the teachers' instructional time. To counteract time constraints, lecturing and rote memorization were stressed as the primary instructional method.

Okebukola and Jegede (1992) identified five clusters of factors inhibiting science teaching effectiveness by placing stress on the teachers. These include student characteristics, such as "poor attitude of students to science lesson"; teacher characteristics, such as "having to teach a science subject for which one is not trained"; school environment characteristics, such as "difficulty of obtaining science teaching equipment," and condition of service, such as "lack of opportunities for professional improvement." The findings also revealed that the difficulty of obtaining science teaching equipment was the most stressful factor, given the science subject's experimental nature. "The necessity of coping with teaching difficult topics" ranked second on the list of top stress factors, while "difficulty in completing the syllabus in the time available" ranked third. The other two involved "the necessity of coping with the demands of new curricula" and "the obligation to teach large classes."

The OECD (2009) identify gender influence on teacher's belief and practices. It suggests that the beliefs and practices of female and male teachers may systematically differ. Female teachers are more likely than male teachers to see teaching as a direct transmission of knowledge and are most likely to adopt structuring and student-oriented practices and cooperate more with colleagues. Teachers who participate in professional development (in-service training) undertake a more comprehensive array of teaching practices and are more likely to cooperate with other teachers (ibid, 2009).

Goelz (2004) mentioned end-of-course tests as a stress factor facing teachers. Such tests force many teachers to maintain a strict schedule that does not allow for creative teaching methods requiring student-generated learning, reflection, and discussion. In a similar vein, Muskin (1990) also pointed out that because teachers must complete all the material required for the tests, they feel obliged to spend very little time on activities that promote constructivist-styled learning. It causes new teachers, who would otherwise like to focus on student-centered learning, to revert to the lecture style that many teachers hesitate to practice but often do.

The effects of gender on epistemological beliefs, as revealed by Belenky et al.'s (1986) study, were manifested in the forms of separate/objective knowing and connected/emphatic knowing, both of which belong to procedural knowledge. Using Belenky et al.'s framework, Schommer-Aikins and Easter (2006) recently reported a case where men scored significantly higher in separate knowing. Buehl et al. (2002) explored the domain-specificity of students' beliefs about academic knowledge by using a domain-specific beliefs questionnaire about mathematics and history. They found significant differences in students' beliefs about the effort required to gain knowledge in mathematics and history. Additionally, students believed that knowledge in

mathematics was more integrated with other domains than history. This suggests that subject matter domains may have exerted an influence on one's epistemological outlooks .

Maxion (1996) argues that teachers' beliefs are an integral part of classroom practices. When influencing factors (external and internal) complement teachers' beliefs, classroom practice, and beliefs are compatible. When these factors interfere with teachers' beliefs, classroom practice, and beliefs are disjointed. Maxion (1996) identifies certain external and internal factors affecting teachers' beliefs and practices. The former include life experience, educational experiences, classroom events, school curriculum requirements, students, administrative demands, theoretical knowledge, educational policy, family, and peers; the latter include personal practical knowledge, culture, values, and personality, and internalized external factor (i.e., positive school experience, life experiences and love of the subject) .

Mansour (2008a) revealed that teachers' pedagogical beliefs were strongly shaped by personal religious beliefs derived from the values and instructions inherent in the religion. He found that teachers' personal religious beliefs worked as a 'schema' that influenced what was perceived. According to McIntosh (1995), a schema is "a cognitive structure or mental representation containing organized prior knowledge about a particular domain" (p.2). He also noted that schemas were built via encounters with the environment "social context" and could be modified by experience. These beliefs, sequentially, work through the lens of past experiences since they are translated into teacher practices within the classroom's complex context.

The above discussion indicates more than one social/contextual factors that can shape teachers' beliefs and practices. These include work overload, time, work conditions, children's behavior, relationship with colleagues, lack of resources, year-end test, curriculum demands, administrative demands, educational policy, and large class size. Thus, there is more than one social factor that can affect or shape teachers' beliefs. These social structures in which teachers work profoundly shape their choices. The following section indicates some sources that shape teachers' beliefs and develop them.

1.1.6 Sources of teacher's beliefs

What is the source of teachers' beliefs? He and Levin (2008) attributed the sources of teacher candidates' beliefs to family backgrounds, past experiences in public education, and teacher education coursework. In recent research, Levin et al. (2013) concluded that teachers' beliefs

come from several sources, including teaching experiences, implicit teaching philosophy, personal values, stereotypes, and other professional colleagues.

According to Knowles (1992), teachers' beliefs are formed throughout their lives and are affected by different factors such as happenings, experiences, and other people in their lives. Part of the beliefs is directly adopted from culture; some are formed by experiences framed by culture (Mansour, 2009). McGillicuddy-De Lisi and Subramanian (1996) announced that part of the beliefs is adopted from culture, and some are shaped by experiences adjusted by culture. People have nearly similar experiences as children, as family members, and as parents or teachers. Such experiences shape their beliefs about learners and curriculum development.

Mansour (2008a) expressed that teachers' beliefs about their roles, learners' roles, aims of science, and teaching methods were shaped by their personal religious beliefs obtained from principles that exist in religion. The study maintained that teachers' religious beliefs worked as a 'schema' that influenced their perception. According to Richards and Lockhart (1994), learning or teaching experience is not the sole source of beliefs. Other sources also have to do with forming beliefs. They are established practice, teachers' personality factors, educational principles, research-based evidence, and principles originated from a method.

Lortie (1975) said that teacher's education and teaching experience contribute to the development of pedagogical content knowledge, while disciplinary knowledge in teacher education helps develop subject matter and curricular knowledge among prospective teachers. Shulman (1987) concluded that teachers' beliefs derive from four sources: content knowledge, educational materials, formal teacher education, and experience.

Experience plays a significant part in shaping teachers' beliefs concerning teaching and learning processes as individuals in society. According to Mansour (2008b), there are two types of experiences; formal: which is indicated by the formal education experience through which teachers have passed at school or university level. Informal: indicated in teachers' daily life contacts that might adjust, support, challenge, or change their beliefs and knowledge. Zeichner (1980) outlined that both formal and informal experiences are 'socialization influences,' saying that teachers' teaching at schools was more potent in impacting teachers' beliefs than their formal university experiences.

Experience seems to filter decisions made by teachers. The kind of experience a teacher has makes him/her act in a certain manner or conduct a certain classroom activity or even undertake

a professional development activity, which, ultimately, mirrors this experience. Similarly, beliefs were described as filters through which all new information needs to pass and that are used to interpret new experiences (Kagan, 1992). In this respect, Pajares (1992) indicates that beliefs are made through a process of enculturation and social construction. That is why classroom behaviors are resulting from belies filtered by experience (ibid, 1992).

1.1.7 Challenging beliefs

The subject of existing challenging beliefs is recurrent in the teacher cognition literature. Pajares (1992) says that unless beliefs are intentionally challenged, they might endure unaltered. He explains that beliefs are unlikely to be changed unless dissatisfactory is proved and that they are unlikely to be proven unsatisfactory unless they are challenged. Even when they are challenged, changing belief systems remains challenging because of their static nature. Pajares explains why beliefs are so resistant to change; beliefs help individuals identify with one another and shape groups and social systems. On a social and cultural level, they provide elements of structure, order, direction, and shared values. From a personal and cultural perspective, belief systems reduce dissonance and confusion, even when dissonance is logically justified by the inconsistent beliefs one holds. This is one reason why they acquire emotional dimensions and resist change. People become comfortable with their beliefs, and such beliefs become their "self" so that individuals become identified and understood by the nature of their beliefs, the habits they own (p.317).

Yero (2002) compares changing an old belief to try and open a window that was painted shut. It requires a great deal of prying, poking, and prodding before it loosens and breaks free from the frame. This is because of the comfort of established habits, which provide consistency and stability in people's lives. They are unwilling to leave that sense of identity, as changing beliefs is tantamount to changing who they are as individuals. Several studies showed this resistance to change (e.g., Kagan, 1992).

Some research shows that the teacher's belief system has the greatest impact on instructional practice (Fang, 1996; Errington, 2004; Binns & Popp, 2013). Whether or not a teacher will incorporate new teaching strategies and innovations or support educational reforms largely depends on his or her beliefs (Munby, 1982; Clark & Peterson, 1986; Fang, 1996; Golombek, 1998; Pecore, 2013).

The further the principles underlying the new strategy, innovation, or reform are from the teacher's beliefs, the more reluctant they are to change (Clark & Peterson, 1986; Fang, 1996; Richardson, 1996; Pecore, 2013). Therefore, teachers' beliefs can either support or impede change (Prawat, 1992).

Nisbett and Ross (1980) suggest that part of the beliefs might be more resistant to change than others. They propose that the earlier a belief is incorporated into someone's belief structure, the harder it is to alter it because such beliefs influence perception and strongly affect the processing of new information. With time, early beliefs become more robust, resulting in what is called "the perseverance phenomena of theory maintenance."

Woods (1996) proposes that the more central the belief and the more tightly interconnected network of beliefs, it will be almost impossible for a teacher to change one's belief without influencing others. For teachers to shift their beliefs to accommodate new ones, it would require them to develop new practices and leave well-established practices. Because of the personal nature of belief systems, Woods states that the belief changing process can lead to disorientation, and that is why change should only be encouraged and not mandated.

1.1.8 The relationship between beliefs and practices

In reviewing research literature about teaching and learning, it is noticed that the relationship between teachers' beliefs and their practices was open to debate. Several studies investigating the relationship between teachers' beliefs and practices have found that teacher beliefs are consistent with classroom practices. Through their work with the theory of planned behavior, Haney, Czernaik, and Lumpe (1996) determined that teacher beliefs are significant indicators of the behaviors that will be presented in the classroom. Teachers' beliefs about subject-matter have also been found to influence their day-to-day decisions about what to teach, what to skip, and how much class time they devote to the topic (Cronin, 1991).

Chou (2008) carried out a study about how teachers are affected by their beliefs. The researcher studied teachers' beliefs about teaching reading. Shun (2008) also investigated teachers' beliefs and their connections to educational methods. The results of both these studies revealed no significant differences between teachers' beliefs and the application of educational methods.

Some researchers researching science and mathematics education reported a high degree of agreement between teacher beliefs and the practice of teaching:

1. Hashweh (1996) conducted a study with 35 Palestinian science teachers to identify the relationship between their epistemological beliefs and classroom practices. The data was obtained using a three-part questionnaire consists of critical incidents, direct questions about strategies for conceptual change, and ratings of the use and importance of specific teaching strategies. The author characterized teachers as learning constructivists, learning empiricists, knowledge constructivists, and/or knowledge empiricists. He found that differences in epistemological beliefs influenced classroom teaching. According to the findings of his study, teachers holding learning constructivist and knowledge constructivist beliefs are more likely to detect students' alternative conceptions, have a richer repertoire of teaching strategies, potentially use more effective teaching strategies for inducing student conceptual change, and report about a more frequent use of effective teaching strategies compared to teachers having empiricist beliefs. Although Hashweh (1996) investigated the relationship between teacher beliefs and practice, he collected self-reported data from teachers about their classroom practice without observation. It is considered as one of the most significant weaknesses of this study.

2. Verjovsky and Waldegg (2005) explored a high school biology teacher's beliefs and practices through three interrelated theoretical frameworks: common knowledge, collaborative learning, and communities of practice. The data were obtained from the in-depth case study of Maria, a biology teacher from a Mexican public high school participating in a 4-year international science project using collaborative learning and information and communication technology.

   Her beliefs and practices were explored through questionnaires, semi-structured interviews, and non-participants observation of classes. The results indicated that the degree of coherence between practice and beliefs that guided the teacher's daily behavior become apparent, as well as the difficulties of incorporating innovations due to instructional constraints.

3. Tsai (2002) categorized student teachers' beliefs about teaching, learning, and science as traditional, process-oriented, or constructivist. Data was collected through interviews. In his study, the majority of 37 Taiwanese science teachers held traditional beliefs. More importantly, over half of these student teachers have beliefs about teaching, learning, and science that are closely aligned. Tsai (2006) evaluated the

relationship between different beliefs. He concluded that “adequate coherence” existed between the subjects’ scientific epistemological beliefs and their classroom teaching.

4. Levitt (2002) conducted a study to identify elementary teachers' beliefs regarding the teaching and learning of science and the extent to which the teachers’ beliefs were consistent with constructivism, which underlies science education reform. Sixteen teachers from two school districts involved in a local systemic project for science education reform participated in the study. Although data was collected via semi-structured interviews and classroom observations, each teacher was only observed teaching a single lesson from the program.

   The author concluded that although gaps still exist between the teacher beliefs and the principles of reform, the implication of teacher beliefs is that the teachers are moving in a direction consistent with science education reform. The author described teacher beliefs as incomplete when compared to the philosophy of teaching and learning underlying science education reform. On the other hand, the study's findings could not give in-depth information regarding teacher-classroom practices due to few classroom observation hours.

5. Chai et al. (2006) examined Singaporean pre-service teachers’ epistemological beliefs on teaching and learning. Data was collected through a questionnaire survey. The results indicated that Singaporean pre-service teachers were homogeneous in their beliefs; they placed much emphasis on learning effort. Although they seem to be inclined to believe that knowledge is uncertain, they also believe in experts. Generally, the profiles suggest that it may be necessary for Singapore teacher educators to foster more mature epistemological outlooks among its pre-service teachers.

6. Markic and Eilks (2010) described a broad and triangulated picture of the science student teachers’ beliefs on teaching-learning science from four different domains of science teaching. A mixed-method approach was adopted to conduct this research. The results suggest that beginning chemistry and, even more pronouncedly, physics student teachers profess quite traditional beliefs about teaching and learning science. Biology and primary science student teachers express beliefs towards teaching and learning in their subjects more in line with modern educational theory .

7. Zipf and Harrison (2003) conducted a qualitative case study of two Australian elementary science teachers and examined the relationship between these teachers’

belief and their teaching practices. Patty, a more traditional teacher, tended to use worksheets and emphasize content. Furthermore, Patty believed the textbook was the tool that allowed her to meet the wide variation in her students' abilities. In contrast, Tina wanted to use a textbook that would support her belief in teaching relationally and would allow her students to experience and actively participate in science. The differences between these two teachers' beliefs about teaching and learning were further translated into their assessment practices. Tina used open-ended formative assessments in her instructional unit to provide her with continuous feedback on student learning, whereas Patty "favored end-on marks-based assessment techniques focusing on science content and felt that she must have marks."

8. Yang et al. (2008) investigated the views about constructivist instruction and personal epistemology of the secondary earth science teachers in Taiwan. Participants were assessed through a paper-and-pencil survey and a Learning environment preference questionnaire (LEP) designed to explore personal epistemology. On a five-point Likert scale, teachers, on average, showed a neutral agreement on constructivist instruction. The content analysis suggested that teachers held alternative views about the nature of constructivist instruction. LEP scores were statistically associated with gender, education, current teaching level, and years of teaching; the score distribution indicated that most teachers had not developed a constructivist-compatible epistemology. By one-way ANOVA, it was suggested that views about the constructivist instruction were aligned with personal epistemology.

9. Uzuntiryaki et al. (2010) explore Turkey's pre-service chemistry teachers' beliefs about constructivism and the influence of their beliefs in their teaching practice. Data were collected through semi-structured interviews, observation notes, and lesson plans. Pre-service teachers' beliefs about constructivism were classified into three categories, which are weak, moderate, and strong conception of constructivism. For detailed exploration, three cases of pre-service teachers representing these three categories were selected. The study's findings showed that most pre-service teachers of this study did not have a strong conception of constructivism, and the relationship between the pre-service teachers' beliefs and practice was not clear-cut .

In a study on the relationship between thirty ESL (English as Second Language) teachers' beliefs and practices during literacy instruction, Johnson (1992 cited in Richards, 1998) identified three different methodological positions among these teachers: a skills-based

approach, which views language as being composed of four discrete language skills; a rules-based approach, which views language as a process of creative manipulation of grammar rules; and a function-based approach, which focuses on the communicative ability in real-life contexts. Most of the teachers in the study were found to hold beliefs which consistently reflected one of these approaches and perform their instructional practices conforming to the corresponding theoretical orientation. Woods (1991, cited in Richards, 1998) conducted a longitudinal study of two ESL teachers with different approaches to teaching, one of which was "curriculum-based" while the other "student-based." The teacher with the curriculum-based view tended to implement classroom activities primarily according to what is organized in the curriculum. On the other hand, the teacher with the student-based view took account of factors principally concerning the group of learners in a particular context when making decisions during instructional practices. Woods found that "the decisions made in planning and carrying out the course were internally consistent, and consistent with deeper underlying assumptions and beliefs about language, learning, and teaching" (p.4).

The OECD (2009) conducted an international survey for collecting data regarding teacher's beliefs on teaching-learning. Twenty-two countries participated in this study. The data was collected through a questionnaire survey. Results show that in all countries except Italy, the average endorsement of modern (constructivist) beliefs is stronger than direct transmission (traditional) beliefs. Regarding teacher's role, in most countries, teachers hold modern beliefs. They believe that their task is not simply to present facts and to allow their students the opportunity to practice. Regarding student role, in most countries, teachers hold modern beliefs. They believe that they should support students in their active construction of knowledge.

Besides this general agreement on beliefs about instruction, countries differ in the strength of teachers' endorsement of each of the two approaches. The preference for a modern view is especially pronounced in Austria, Australia, Belgium, Denmark, Estonia, and Iceland. Differences in endorsement strength are small in Brazil, Bulgaria, Italy, Malaysia, Portugal, and Spain. Hence teachers in Australia, Korea, north-western Europe, and Scandinavia show a stronger preference for a modern view than teachers in Malaysia, South America, and Southern Europe. Teachers in eastern European countries lie in between. Results indicate that there is a correlation between constructivist beliefs and student-oriented practice, and enhanced activities .

Yet, some researchers have described inconsistencies between teachers' beliefs and their classroom practices (Calderhead, 1996; Ertmer, Gopalakrishnan & Ross, 2001; Kane et al.,

2002; Judson, 2006). For example, Fang described several studies in which researchers found little relationship between teachers' beliefs and their instructional reading practices and suggested that contextual factors interfered with teachers' ability to consistently apply their beliefs in practice. Results from a study of technology-using teachers supported this as well. Ertmer et al. (2001) reported that teachers' visions for, or beliefs about, classroom technology use did not always match their classroom practices. Even though most of the teachers described themselves as having constructivist philosophies, they implemented technology in ways that might best be described as representing a mixed approach, at times engaging their students in authentic, project-based work but at other times asking them to complete tutorials, practice skills, and learn isolated facts.

Teachers' explanations for these inconsistencies often included references to contextual constraints, such as curricular requirements or social pressure exerted by parents, peers, or administrators.

According to Munby (1982), when beliefs about a subject area are inconsistent with a teacher's practice in that area, it may just be that "different and weightier" beliefs are the cause (p. 216). For example, although teachers may express the belief that technology is best used for high-level problem-solving activities, their day-to-day uses may include a large number of drill-and-practice applications because they hold a more central belief that teachers are responsible for assuring that their students learn foundational or prerequisite, skills.

1.2 Meaningful Learning

David Paul Ausubel was an American psychologist whose most significant contribution was in the fields of educational psychology, cognitive science, and science education. Ausubel believed that understanding concepts, principles, and ideas are achieved through deductive reasoning. Similarly, he believed in the idea of meaningful learning as opposed to rote memorization (see Figure 1.1; Table 1.2).

Table 1.2 Meaningful learning vs. Rote learning

Meaningful Learning	Rote learning
Non- arbitary, non-verbatim substantive incorporation of new knowledge	Arbitrary, verbatim incorporation of new knowledge
Deliberate effort to link new knowledge with other higher order concepts	No effort to link new knowledge with other higher order concepts
Learning related to experiences	Learning unrelated to experiences
Affective commitment to relate new knowledge to prior learning	No affective commitment to relate new knowledge to prior learning
Knowledge is retained much longer	Generally knowledge cannot be recalled after hours or days
Added capacity for subsequent learning of related materials	No added capacity, in fact may inhibit learning, for subsequent learning of related materials.
Can be applied in a variety of new problems or contexts (transferable)	Transferability to new problems or contexts is minimall

Adapted from Shunck D (2003) and Hassard J http://www.csudh.edu/dearhabermas/advorgbk02.htm

Ausubel and Robinson (1969) brought much-needed clarity to an often-confused area when they separated rote-meaningful learning from reception-discovery learning, seeing them as two completely unrelated dimensions (see Figure 1.1).

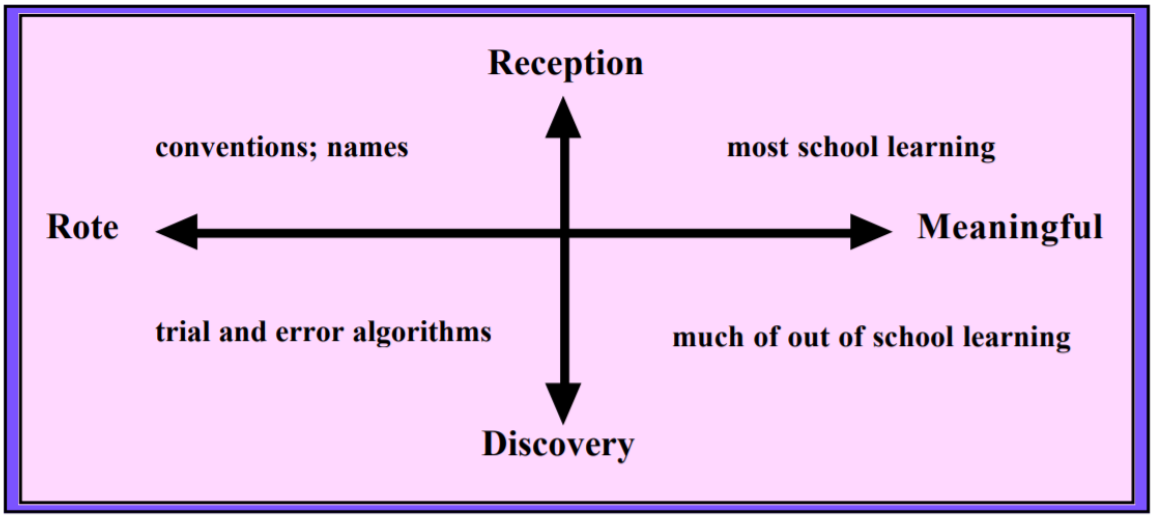


Figure 1.1 Dimensions of Learning (derived from Ausubel et al., 1969)

Ausubel and Robinson (1969) indicate that the essential feature of discovery learning is that the principal content of what is to be learned is not given but must be discovered by the learner before it can be meaningfully incorporated into the student's cognitive structure.

Discovery learning is commonly used in the classroom to apply or extend ideas, clarify, integrate, or evaluate the subject matter. Discovery, in a school setting, is usually not independent discovery on the part of the learner. While the principal content of what is to be learned is not given in its final form but must be discovered by the learner, the teacher may

well employ a form of ‘guided’ discovery. Thus, the teacher knows the outcomes desired but allows the learners to make the discoveries for themselves, setting them off on the road to discovery.

Reception learning is the opposite in that the teacher presents what is to be learned in its final form. The material is organized and made available to the learner. This requires the learner to relate the new material to existing ideas in some sensible fashion. Of course, much learning, whether reception or discovery, can end up not being related to previous knowledge and can hardly be described as meaningful. This is where Ausubel’s second dimension comes in: rote - meaningful. With rote learning, new ideas are memorized and not linked to previous knowledge and experience in any meaningful way, while meaningful learning implies that the new knowledge is linked to previous knowledge, enriching both.

Meaningful discovery learning will occur if the student formulates the generalization himself and subsequently relates it in a sensible way to his existing ideas. Rote discovery learning could occur if the learner, having arrived at the generalization himself (typically by trial and error), subsequently commits it to memory without relating it to other relevant ideas in his cognitive structure. Of course, there is also reception-rote learning and reception meaningful learning. Ausubel also makes it clear that the point which is necessary for meaningful learning is that the relationship between the new item to be learned and relevant items in cognitive structure be non-arbitrary.

Logical meaningfulness is clearly a property of the material to be learned and is not sufficient to guarantee that it will be meaningful to the learner. Thus, meaningful learning requires that these three conditions hold below:

(a) The material itself must be relatable to some hypothetical cognitive structure in a non-arbitrary and substantive fashion.

(b) The learner must possess relevant ideas to which to relate the material.

(c) The learner must possess the intent to relate these ideas to cognitive structure in a non-arbitrary and substantive fashion.’ (Ausubel, 1968, p.53)

Very often, reception learning is seen as rote, and the discovery learning is presented as inherently and necessarily meaningful. Both assumptions, of course, reflect the longstanding belief in many educational circles that the only knowledge one actually possesses and understands is the knowledge that one discovers by oneself, and this is, of course, not true (see

Ausubel et al., 1978). The key idea is the separation of the two dimensions, and this can be illustrated in figure 1.2.

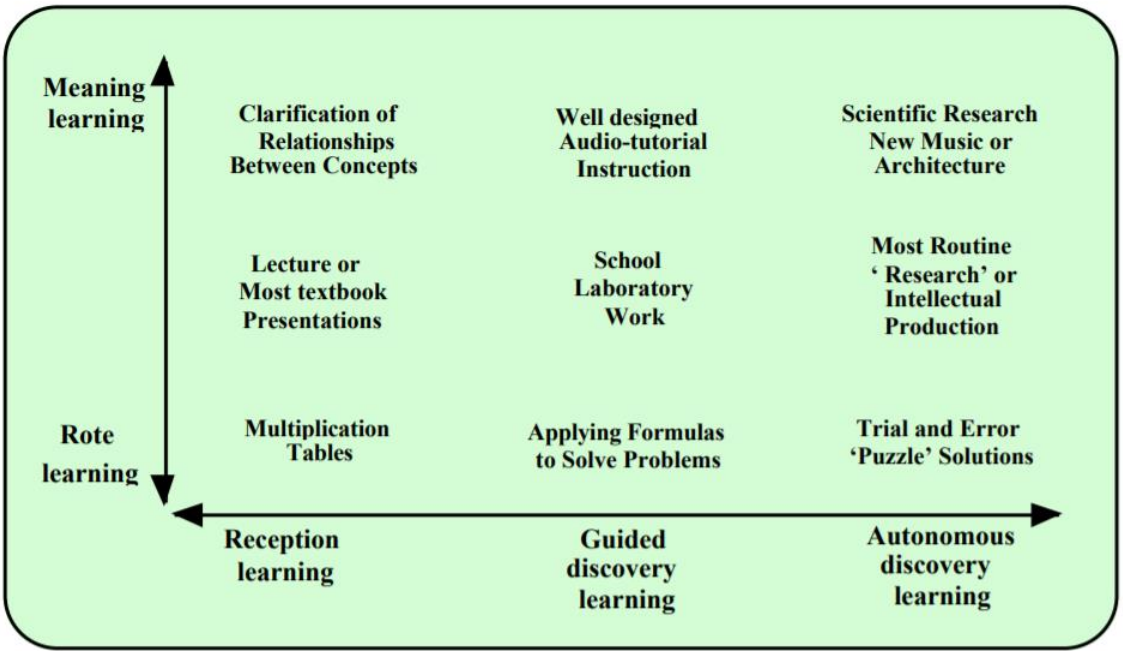


Figure 1.2 Reception Learning and Discovery Learning (Source: Ausubel et al., 1978, p. 25)

Ausubel et al. (1978, p.39) suggest that meaningful reception learning is important in education because it is 'the human mechanism par excellence for acquiring and storing the vast quantity of ideas and information represented by any field of knowledge.' Thus, Ausubel stresses the importance of reception learning in formal school situations, seeing discovery learning as much less important.

1.2.1 Ausubel's theory of learning

Ausubel was influenced by the teachings of Jean Piaget. Like Piaget's ideas of conceptual schemes, Ausubel related this to his explanation of how people acquire knowledge. According to his theory, to learn meaningfully, individuals must relate new knowledge to relevant concepts they already know. New knowledge must interact with the learner's knowledge structure.

Because meaningful learning involves a recognition of the links between concepts, it has the privilege of being transferred to long-term memory. The most crucial element in meaningful learning is how new information is integrated into the old knowledge structure. Accordingly, Ausubel believes that knowledge is hierarchically organized; that new information is meaningful to the extent that it can be related (attached, anchored) to what is already known.

He proposed the notion of an advanced organizer to help students link their ideas with new material or concepts.

Ausubel's theory of learning claims that new concepts to be learned can be incorporated into more inclusive concepts or ideas. These more inclusive concepts or ideas are advance organizers.

The advance organizer is a tool or mental learning aid to help students integrate the new information with their existing knowledge, leading to "meaningful learning" as opposed to rote learning (memorization). It is a means of preparing learners' cognitive structure for the experience about to take place by providing scaffolding or support for the new information. It is a device to activate relevant schema or conceptual patterns. So that new information can be more readily subsumed into the learner's existing cognitive structure. Advance organizers are helpful in the way that they help the process of learning when difficult and complex materials are introduced. This is satisfied through two conditions:

1. The student must process and understand the information presented in the organizer--this increases the organizer's effectiveness.
2. The organizer must indicate the relations among the basic concepts and terms that will be used.

Ausubel believed that it was important for the teacher to provide preview information to the learners (but a preview is not the summary or conclusion of the information). The teacher could do this by providing information that is closely related to what is presented as content. This would enable students to start with the "big figure" of upcoming content and link new ideas, concepts, and vocabulary to existing mental maps of the context area. In any case, the advance organizer is designed to provide what cognitive psychologists call the mental scaffolding" to learn the new information. Ausubel's theory of Advance organizers falls into two categories: comparative and expository.

Ausubel's theory of advance organizers falls into two categories: comparative and expository:

Comparative Organizers: The main goal of comparative organizers is to activate existing schemas and is used as reminders to bring into the working memory what you may not realize is relevant. A comparative Organizer is also used both to integrate as well as discriminate. It "integrates new ideas with basically similar concepts in cognitive structure, as well as increase discriminability between new and existing ideas which are essentially different but confusably similar."

Expository Organizers: "In contrast, expository organizers provide new knowledge that students will need to understand the upcoming information" (woolflok et al. 2010, p.289). Expository organizers

are often used when the new learning material is unfamiliar to the learner. They often relate what the learner already knows with the new and unfamiliar material—this, in turn, is aimed to make the unfamiliar material more plausible to the learner.

Ausubel Learning Model: Ausubel believed that learning proceeds in a top-down or deductive manner. Ausubel's theory consists of three phases. The main elements of Ausubel's teaching method are shown in the table below.

The Advance Organizer Model has three phases of activities (Table 1.3). Phase one is the presentation of the advance organizer, phase two is the presentation of the learning task or learning material, and phase three is the strengthening of cognitive organization.

Table 1.3 The Advance Organizer Model

Phase One Advance Organizer	Phase Two Presentation of a Learning task or Material	Phase Three Strengthening the Cognitive Organization.
Clarify the aims of the lesson. Present organizer.	Maintain attention. Present material.	Use principles of integrative reconciliation.
Identify defining attributes. Give examples.	Make organization explicit, Make a logical order of learning material explicit.	Promote active reception learning.
Provide context		Elicit critical approach to the subject matter.
Repeat.		Clarify.
	Prompt awareness of learner's knowledge and experience.	

(Source: Joyce & Weil, 1980, p.85)

Phase one comprises three activities,' clarifying the aims of the lesson, presenting the advance organizer, and prompting awareness of relevant knowledge.

Clarifying the aims of the lesson is meant for obtaining students' attention and orienting them towards learning goals. These are essential for meaningful learning. The second task is the presentation of the advance organizer. An advance organizer must be constructed very carefully and in such a way that students can make a distinction between the advance organizer and the learning task. It must be distinguished from summaries and overviews. While presenting an advance organizer, whether expository or comparative, the teacher should point out the essential features of it and explain it with examples. It is useful to illustrate the organizer in multiple contexts and to repeat it several times. Finally, to develop an integrative cognitive structure, it is important to prompt awareness of the learner's prior knowledge and experience that might be relevant to this learning task and organizer.

In phase two, the learning material in the form of lectures, discussions, films, experiments, or reading is presented to the students. There are three major concerns here, (a) to maintain students' attention. (b) to make the organization of the material explicit so that students have an overall sense of direction. (c) to make the learning material logical for students' comprehension.

In phase three, the learning material is anchored in the students' cognitive structure. Ausubel identifies four activities under this phase, (1) promoting integrative reconciliation; (2) promoting active reception learning; (3) eliciting a critical approach to knowledge; and (4) clarification. Some of these activities are also covered under phase two.

1.2.2 Definitions of meaningful learning

Meaningful learning approaches emerged from Ausubel's (1963) study of cognition and learning. According to Ausubel (2000), meaningful learning, which implies longer retention than memorizing, occurs when humans relate new concepts to pre-existing familiar concepts. Then changes are produced in our cognitive structure, concepts are modified, and new links are created. It is a useful tool because it enables real learning, generates greater retention, and facilitates transferences to other real situations.

Many researchers have adopted the concept of Ausubel that meaningful learning occurs only when there is a link between the new knowledge and the elements in the learner's consciousness(Novak, 2002; Horton-Deutsch & Sherwood, 2008; Schweitzer, 2008; Harpaz, 2014).

According to Harpaz (2014), meaningful learning is a learning in which the learner re-constructs his insights and creates the infrastructure for richer insights in the future. In other words, meaningful learning is a process that gives new meaning to contents, concepts, ideas, insights, and positions that were learned in the past and opens paths for learning of new, more complex contents in the future.

Darling-Hammond (2008) emphasizes the cognitive aspects of meaningful learning. She believes that meaningful learning occurs when learners learn beyond rote-memorizing of facts, interpret information, create connections between facts, regulate their understanding, apply an understanding of new concepts to new situations, employ creative thinking, solve problems, experience a change in attitudes and opinions, develop skills and construct knowledge.

According to Kaniel (2006), meaningful learning means that learners and teachers are reasoning their learning and giving it a meaning. The meaning is created by the power of answer the learning provides to the immediate or long-term needs of the learners; That is, what is relevant for the learners.

Williams and Cavallo (1995) define meaningful learning as "the formation of viable relationships among ideas, concepts, and information" (p.312).

Another definition of meaningful learning is "the integration, assimilation or construction and transfer of prior cognitive knowledge with new conceptual knowledge" (Schweitzer, 2008, p. 135).

Richard E. Mayer defines meaningful learning in terms of how acquisition is used in problem-solving and new contexts (Mayer, 2002). Among the cognitive categories that are correlated with a transfer in new contexts, Mayer mentions: understand, apply, analyze, evaluate, and create. Each of them includes some other cognitive processes; for example, in the category of understanding are included interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining; in the category of creating are included generating, planning, and producing (Mayer, 2002).

Ausubel, Novak, and Hanesian (1986) define it as a learning process where new concepts are associated with existing knowledge and experiences in a logical and meaningful way, symbolically or organizationally through verbal or pictorial representations. A central component of meaningful learning is the element of reflection, as it informs the relationship between what is new and what is known. Reflective learning is experiential, contextual,

problem-based learning that helps narrow the gap between theory and practice and puts learners in a continual learning cycle (Horton-Deutsch & Sherwood, 2008, p.947).

Novak and Gowin (1984) differentiate meaningful learning from training noting, "training programs can lead to desired behaviors, educational programs should provide learners with the basis for understanding why and how new knowledge is related to what they already know and give them the affective assurance that they have the capability to use this new knowledge in new contexts" (p.xi).

Recently, in Israel (toward the 2014-2015 academic year, to be more specific), the Minister of Education, Rabbi Shai Piron, launched a new reform program titled "Israel ascends a higher grade – shifting to meaningful learning " and is currently being implemented.

According to the Israeli Ministry of Education (2014a, p.2):

> *Meaningful learning is a personal process of knowledge construction whereby the learners arouses questions, locate sources of information, process information, and create new information that is relevant to them. Meaningful learning touches learners' innermost self by facilitating a multitude of mental, emotional, social, physical, artistic, and creative experiences. Such learning leads to the realization of students' potential, promoting excellence, personal growth, and development while assisting them in delving into subjects that interest them and meet their needs. Students' and teachers' meaningful learning occurs through their interaction with their surroundings and takes place in varied spaces. In meaningful learning processes, the pedagogical and psychological aspects of learning complement and reinforce each other.*

The Israeli Ministry of Education expects schools to implement the Meaningful Learning Reform. However, it did not instruct them as to specific ways in which this is to be done. Instead, it presented the pedagogical framework in order to stimulate professional discussion among various stakeholders and to serve as a basis for various staff levels' work programs, providing some examples of meaningful learning as well as several tools.

The primary structural change was in high schools, where the curriculum in most disciplines was divided into two components: (1) Knowledge base and skills: This part was mandatory, and it accounted for about 70% of the curriculum. It is measured by the customary external evaluation method (matriculation exams). (2) Broadening and deepening: This part was designed by teachers according to their interpretations of the Meaningful Learning Reform. This kind of learning accounts for 30% of the curriculum and is to be measured by varied

internal school evaluation methods (Israeli Ministry of Education, 2014b). Beyond this general division, there were no specific guidelines.

In Israel, as in many other countries, large-scale education reforms focused on reorganizing the entire school system, have become one of the main characteristics of this system. The Meaningful Learning Reform was not a single reform; it was part of a succession of reforms launched in the Israeli school system. However, most of these reforms were based on a top-down authoritarian relationship, with schools being required to follow detailed instructions. There was no room for tailored implementation or creative interpretation. The Meaningful Learning Reform was unusual in this regard, as it allowed school leaders to exercise considerable discretion about how to meet the broad policy goals.

In "The policy for advancing meaningful learning in the education system," mentioned above, it is written:

> *"Meaningful learning is based on three major principles: a value for the learner and the society, the involvement of the learner and the teacher, relevance for the learner (figure1.3).*

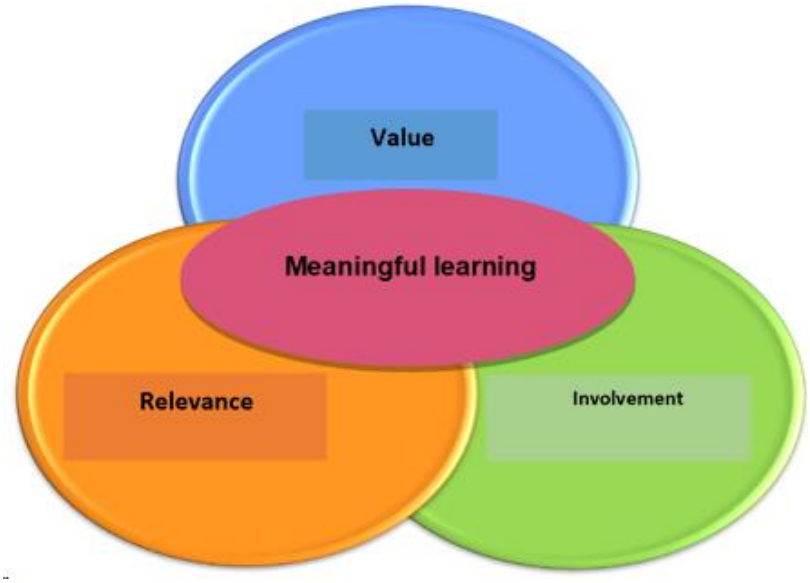


Figure 1.3 conceptions of Meaningful learning

Value: the learned content is perceived by the learner as challenging, arousing curiosity, valuable, and contributing for themselves and the society.

Involvement: the learner is active in the learning process, develops in-depth understanding, and constructs knowledge.

Relevance: the learning is adapted to the learner's characteristics and needs in a renewing and changing world, relies upon existing knowledge, and relates to the learner's curriculum, concept world, interests, and feelings. The learner feels that the subject matter being learned meets his various intellectual, emotional, social, and physio-motoric needs; he then can apply what has been learned on his needs on a theoretical level and in daily lives (p.10).

The assumption that learning that takes place in meaningful learning environments leads to deeper levels of understanding and is motivating for students is shared by different theories of teaching and learning (Mayer 2004; Loyens & Gijbels 2008; Wardekker et al. 2012). Even in more traditional teaching approaches, an important notion is meaningful learning that emphasizes the cognitive processes by which students incorporate new knowledge into their existing knowledge structures. Yet, despite consensus about the use of context to realize meaningful learning, cognitive, socio-constructivist, and sociocultural learning theories differ concerning the question in what types of 'contexts' meaning can emerge, as was pointed out by Van Oers (1998).

The cognitive approach emphasizes the importance of taking the existing cognitive structure of the learner into account. In this view, meaningful learning emerges in the context of what the learner already knows. Therefore, teachers need to prepare the learning environment in such a way that it offers learners some cues that relate to their pre-existing cognitive structures and that can be used as an 'anchoring point' for embedding the newly learned material in the cognitive structure (Ausubel 1968).

In socio-constructivist approaches, contexts are seen as everyday social situations that make sense to the learner and invite him or her to engage in an active process of knowledge construction. Roelofs and Terwel (1999) identified as characteristics of the context in a constructivist learning environment complete task environment, connectedness to students' personal worlds, and an evident value of the learning activities beyond school.

Many authors have elaborated on the themes distinguished by Roelofs and Terwel (1999). Some point at the value of working with 'real' problems that are experienced as relevant by students (Gijbels et al. 2006; Loyens & Gijbels, 2008). Others emphasize that school tasks are experienced as relevant and meaningful if they align with students' personal goals (De Corte et al. 2004; Boekaerts et al. 2006). Research has also shown that students find learning meaningful in contexts where they can choose and determine their own learning objectives (De Corte et al. 2004). Next to a concern with context, socio-constructivist approaches also emphasize social

interaction (i.e., communication and collaboration as conducive to creating meaningful learning contexts) (Roelofs & Terwel 1999; Roelofs et al. 2003).

Sociocultural approaches to learning define 'social learning' more radically; they do not see learning merely as acquiring knowledge and skills but as improving students' participation in social practices (Van Oers 1998). Contexts aimed at meaningful learning, therefore, should not be focused on specific problem-solving tasks but rather entail participation in actual or simulated 'social practices' (Volman & Ten Dam, 2015). Sociocultural approaches also emphasize the importance of learning being relevant to the image that students have of their own past, present, and future existence, while acknowledging that the acquisition of knowledge also could lead to changing this image (Wardekker et al. 2012). Through participation in socially meaningful activities, students acquire knowledge and skills that offer them possibilities to contribute to (and change) these activities, which in turn changes them as persons (Van Oers 2009; Vianna & Stetsenko 2011).

To learn meaningfully, students must be willfully engaged in a meaningful task whereby the task that the trainee teachers pursue should engage active, constructive, intentional, authentic, and cooperative activities (Jonassen et al., 2003).

1.2.3 Characteristics of meaningful learning

Different attributes to generate meaningful learning are interrelated, interactive, and interdependent. Meaningful learning is active and constructive, taking place when people develop knowledge in response to their environment, reflecting on activity and articulating what they have learned. It is authentic and intentional, situated in a meaningful context in which learners are motivated by working towards a goal. It is also cooperative, relying on socially negotiated understanding and the shared construction of knowledge (Jonassen et al., 2003). This ethos supported five key elements of meaningful learning. Furthermore, these five elements offer opportunities for the development and deployment of creativity, which include intentional, constructive, active, cooperative, and authentic (Jonassen et al., 2003).

Jonassen et al. (2003) believe that these attributes are synergetic. That is, learning activities that represent a combination of these attributes result in even more meaningful learning than the individual attributes would in isolation.

Fig 1.4 shows the interrelationship between the five characteristics of meaningful learning (Jonassen et al., 2003). What follows is an explanation of each characteristic.

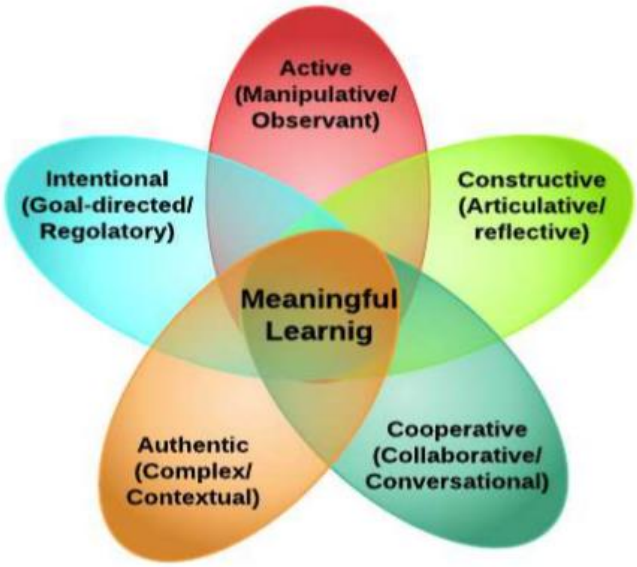


Figure 1.4 Characteristics of Meaningful Learning (based on Jonassen et al., 2003)

Active (Manipulative/Observant): For Jonassen, active learning means that "learners are engaged by the learning process in a mindful processing of information, where they are responsible for the result" (1995, p.60). Students are encouraged to ask questions, acquire information, critically evaluate information, express new ideas and models of thinking (Ruokamo et al., 2002), and use different productivity tools and cognitive tools (e.g., videos) in their learning environments (Jonassen, 1995, 2000).

Active learning is an instruction method in which students actively participate in their learning process (Bonwell & Eison, 1991) via learner-centered activities that exercise the higher-order thinking skills of analysis, synthesis, and evaluation (Bloom, 1956). rather than passively listening to a lecture. Learning is a natural, adaptive human process. When learning about things in natural contexts, humans interact with their environment and manipulate the objects in that environment, observing the effects of their interventions and constructing their own interpretations of the phenomena and the results of their manipulations (Jonassen et al., 2003). Meaningful learning requires learners who are active— actively engaged by a meaningful task in which they manipulate objects and parameters of the environment they are working in and observing the results of their manipulations (Jonassen et al., 2003).

Constructive (Articulative/Reflective): Constructive learning means that learners accommodate new ideas into their prior knowledge in a process of meaning-making, not of knowledge reception (Jonassen, 1995, 2002).

Activity is necessary but not sufficient for meaningful learning. Learners integrate their new experiences with their prior knowledge about the world or establish goals for what they need to learn in order to make sense of what they observe (Jonassen et al., 2003). Learners begin constructing their own simple mental models that explain what they observe with experience, support, and more reflection; hence their mental models become increasingly complex. Learners mentally represent their understanding in different ways using different thought processes. The active and constructive parts of the meaning-making process are symbiotic (Jonassen et al., 2003).

Intentional (Goal-Direct/Regulatory): Self-direction in learning refers to "a process in which a learner assumes primary responsibility for planning, implementing, and evaluating the learning process" (Brockett & Hiemstra, 1991, p.24). The concept is thus intertwined with the characteristics of activeness, goal orientedness, and reflection.

In a goal-oriented learning process, students work actively to achieve a cognitive goal and can define learning objectives of their own (Jonassen, 1995; Ruokamo & Pohjolainen, 2000). Intertwined with goal orientation is the process of reflection (Jonassen, 1995, 2000). In a reflective learning process, students express what they have learned and examine the thinking processes required during the process (Jonassen, 1995; Ruokamo & Pohjolainen, 2000).

Authentic (Complex/Contextual): Authentic learning is a learning concept that relates to giving and solving "real-world problems" to learners using role-playing exercises, problem-based activities, and case studies (Herrington & Oliver, 2000; Chang et al., 2010). Herod (2002) further adds that the implementation of authentic learning is framed around real-life learning contexts and materials. By providing real-life or "authentic" context and materials that are meaningful to the learners, they would become more motivated, and knowledge is processed in a deeper manner. In fact, learners immersed in authentic learning activities develop essential learning skills whereby they are capable of distinguishing relevant patterns in an unfamiliar learning context, the ability to distinguish reliable and unreliable information, and are able to work across diverse disciplines and cultures (Chang et al., 2010). Going beyond content, authentic learning intentionally brings into play multiple disciplines, perspectives, ways of working, habits of mind, and communities (Lombardi et al., 2007).

Cooperative (Collaborative/Conversational): Cooperative learning is a form of group work that aims to increase the learning skills of the students and their peers in the group for shared goals using different methods. Cooperative learning gives students opportunities to actively get

involved with the teaching and learning process and improve their skills of sharing, having feedbacks of their own learning, interacting with friends, using their own skills, being responsible and helping their friends to learn, solving problems, and thinking critically (Jonassen et al., 2003).

1.2.4 Conditions to generate a meaningful learning

Harpaz (2014) defines two types of conditions that need to exist to generate meaningful learning: internal conditions and external conditions.

Internal conditions are states of consciousness, which allow for learning and are "involved in a process and product understanding" (Harpaz, 2008). According to Harpaz (*ibid*), People learn well - giving new meaning to their experience and assume a more significant element in future experience - when they are involved in the learning process and understand the subject they are dealing with. In his opinion, task involvement is an expression of intrinsic motivation, and intrinsic motivation is the main road towards self-fulfillment. Task involvement gives students a positive experience in learning – an experience they will want to recreate during their lives.

However, task involvement is insufficient; one needs an understanding as well. When a person is involved in a task, but during which does not acquire an understanding that enriches his previous insights and lays the foundation for richer insights in the future, his learning is not meaningful (Harpaz, 2014).

Meaningful learning, thus, involves an understanding, which lays the infrastructure for further insights. However, in the context of the educational system and school, this understanding is not an understanding of any knowledge but of specific knowledge, valuable knowledge – which has a privileged status in a given society and culture; and mandatory knowledge – knowledge that the educational system and the school obligate the students to learn (Harpaz, 2014).

The biggest challenge of the educational system and of school that seeks to nurture meaningful learning, then, is to transform the knowledge that has value for the adults – knowledge that is included in the curriculum, is mediated by teaching, and evaluated by exams – into knowledge that has value for the students (Harpaz, 2014).

Harpaz (2014) claims that to have meaningful learning at school, the reality of school, and the vision of meaningful learning must be changed. He adds that to enable a degree of meaningful learning in school, the vision of meaningful learning must be reduced, and school capabilities should be expanded. As far as the vision for meaningful learning is concerned, one needs to

escape the pitfall of “all or nothing”: either formative meaningful learning or an estranging meaningless learning. Meaningful learning is a matter of extent. It is found somewhere on the scale between highly meaningful learning and totally meaningless learning.

In regard to the expansion of school capabilities, they should be reconstructed in such a way that will allow for as much as possible degree of meaningful learning. The guiding principle for expanding school capabilities is to provide external conditions for the internal conditions for meaningful learning. Namely, constructing an educational environment that increases the chances for students to produce a state of consciousness of “involvement in the process and product understanding.”

Here are, for example, some very basic guiding principles that can increase the level of task involvement of students in learning and the degree of their understanding during which.

The model: to transform meaningful learning into reality, Harpaz (2008) offered a new model, which he referred to as the third model. According to this model, it is neither the “curriculum” nor the “child” that are at the center but the encounter between them that is the center.

In the third model, the main educational effort is directed at creating optimal conditions for an encounter between the “child” and the “curriculum”; conditions that encourage meaningful learning of the “big understandings “embodied in the curriculum. Harpaz explains that there exists a conflict between the two entities of society and culture (which are represented in the curriculum) and the “child.” The society and the culture (the curriculum) want to impose, upon the “child,” contents that are extrinsic to his authentic individuality – to his genuine and original motivations. Thus, meaningful learning – learning that stems from the authentic motivations of the child – is possible only when the child regulates his learning independently and under conditions of maximum freedom (in schools of the second model - free/open/democratic schools). The third model suggests that society, culture, and the individual are integrated entities; the individual (“the child”) is an entity that is structured socially and culturally. Therefore, society and culture are entitled to demand from the individual to learn specific content without ruining his authentic individuality and sabotage his chances for meaningful learning – they should only do that wisely and in a decent manner.

The curriculum: the most basic principle of a curriculum that allows for meaningful learning is replacing a subject-matter for a domain of significance (Harpaz, 2012). The curriculum is organizing around learning subjects; learning subjects organize knowledge for teaching and learning in a way that does not support meaningful learning. Learning subjects divide and cut

the knowledge into chunks that are lacking any context, transfer an agreed-upon knowledge in an authoritative way, encourage memorizing towards exams, and establish the existence of classrooms and schools in their conservative and inefficient format (Karmon, 2010). A domain of significance is a domain of knowledge and creation that humans enter and find and reinvent themselves in it – it is learned in a formative-meaningful way while generating new knowledge and other "projects." The art domains – cinema, theatre, music, etc. – are easily become domains of significance; technological domains, such as robotics, also have a high-significance potential. In principle, every domain of knowledge and creation is a potential domain of significance, which can be materialized with the help of a suitable educational environment – an environment that shapes it for meaningful learning (Harpaz, 2014).

Teaching mode: the most basic principle of teaching that allows for meaningful learning is indirect instruction – an instruction that fuels and sustains an intrinsic motivation for learning. In direct instruction, the teacher conveys knowledge to students; in indirect instruction, the teacher encourages the students to engage in knowledge – to locate, process, criticize, and generate knowledge. The gist of teaching is "not what the teacher does but in what they cause students to do" (Harpaz, 2014, p. 44). Piaget told his students that "every time you teach a child something, you take away forever his chance of discovering it for himself." Only an active engagement in knowledge creates an understanding – connections between concepts and connections between their concepts and the learner's world (Harpaz, 2014).

This basic principle can be constructed through different models of "Teaching for Understanding" that was developed in recent years (e.g., Wiske, 2004; Wiggins & McTighe, 2013).

Teachers: in an era where it seems that the computer and the web will replace instruction and teachers, it should be stressed that at this historical stage, there is no substitute for human teaching. Good teachers – those who motivate their students for meaningful learning – have a great educational impact; they can be "influential others" that mediate, for the students, worlds of knowledge and values that help them to find and re-invent themselves (Harpaz, 2014).

Evaluation method: the basic principle of evaluation, which allows for meaningful learning, is rich, continuous, and mediating feedback.

Rich – provides the student with detailed information about his achievements and failures.

Continuous – it is being done throughout the entire learning process and not only at its peak moments (exams).

Mediating – also results from a product (academic research, work of art, movie production, etc.) that students produce (and not merely from direct evaluation of the teacher) (Harpaz, 2014).

Learning organization: the basic principle that guides the organization of learning that allows for meaningful learning is choice. A school that nurtures meaningful learning expands, as much as possible, the choice scopes of the students, based on the insight that people give meaning to a domain of knowledge and creation by the fact of actually choosing it; the choice in itself establishes a meaning. School needs to offer diverse domains of meaning and allow their choosing (after choosing, the severe standards of learning and creation in the chosen domain take effect) (Harpaz, 2014).

Physical structure and equipment: schools (like prisons) are physical environments that do not invite staying in them, certainly not staying in for the purpose of meaningful learning. New standards need to be invented for educational buildings and their equipment (also, for the digital means, which educators put exaggerated hopes on them) (Harpaz, 2014).

Ausubel postulates that "meaningful learning" is both a process and a result. The process of meaningful learning, according to Ausubel, exists on two conditions:

1. The learner reveals a tendency to produce the hidden meaning in the learned material.
2. The learned material is forcefully meaningful to the learner.

The first condition centers on the learner and his motivation for learning. The learner must be directed and motivated towards meaningful learning. If the learner has no incentive for meaningful learning, then "both the learning process and learning results will necessarily be mechanical and insignificant." (Ausubel, 1961, 1968)

The second condition centers on the characteristics of the learning material. In order for the learning material to be defined as "forcefully meaningful," meaning that it has the potential to be learned in a meaningful way by a certain learner, it must adhere to two criteria:

a. The material can be non-arbitrarily related to terms regarding it, and that already exist in the cognition structure – this is a logical, objective, and universal meaning of the learning material. The learning material must be related to a person's cognition structure due to it being based on logical ideas, theories, or observations. For example: during biology lessons, the learned claim that "the process of breathing happens in all living organisms" is relatable to humans' cognition structure, all of the words constructing this

claim are comprehensible to humans, and the entirety of the idea is based on theories and observations. Conversely, a sequence of syllables such as "aga-gaba-ka-da" is not meaningful because it does not have a meaning in English; the sequence is arbitrary and cannot be taught in a meaningful way; it can only be recited.

b. The material must have a "conscious meaning" for the particular learner – this meaning depends on the learner. In order for there to be meaningful learning, the learner must have the appropriate conceptual patterns and frames into and through which he can assimilate the learning material. In other words, it is necessary that the material is potentially meaningful for the specific learner (i.e., if, in the consciousness of the learner, there exists an idea that breathing occurs only through lungs and the term "cellular respiration" does not exist, then the idea that "the process of breathing occurs in all living organisms" cannot be meaningfully assimilated.

If the first condition set by Ausubel (1968)– motivation to study – does not occur, then normally there will not be any learning, for if the learner does not have a tendency to look for a connection between the new knowledge and the existing frame of knowledge in his consciousness (or alternatively, has a tendency to learn through memorization because that is how he was taught to learn) – then there would not be meaningful learning. (As the English proverb goes, "you can lead a horse to water, but you can't make him drink").

If the first condition (motivation) occurs, but the first criterion of the second condition (forceful meaning) does not – the learner might be able to assimilate the information. However, it will be insignificant from a disciplinary aspect (as the educational system aims for the students to learn meaningful information valuable to both the individual and the collective). To expand on this, if the learning material is presented in a disorganized way and without any logical development, it will be difficult for anyone to meaningfully learn that material (regardless of the learner's prior knowledge), and the result would be non-meaningful learning.

Ausubel mainly emphasized the second criterion of the second condition – a term or expression being cognitively meaningful to the particular learner. He claimed that if that criterion does not occur, the result is non-meaningful learning, Rote Learning. In other words, it will be defined as "meaningful" only if the learning material is successfully assimilated into the pre-existing conceptual system in the learner's consciousness (Figure 1.5).

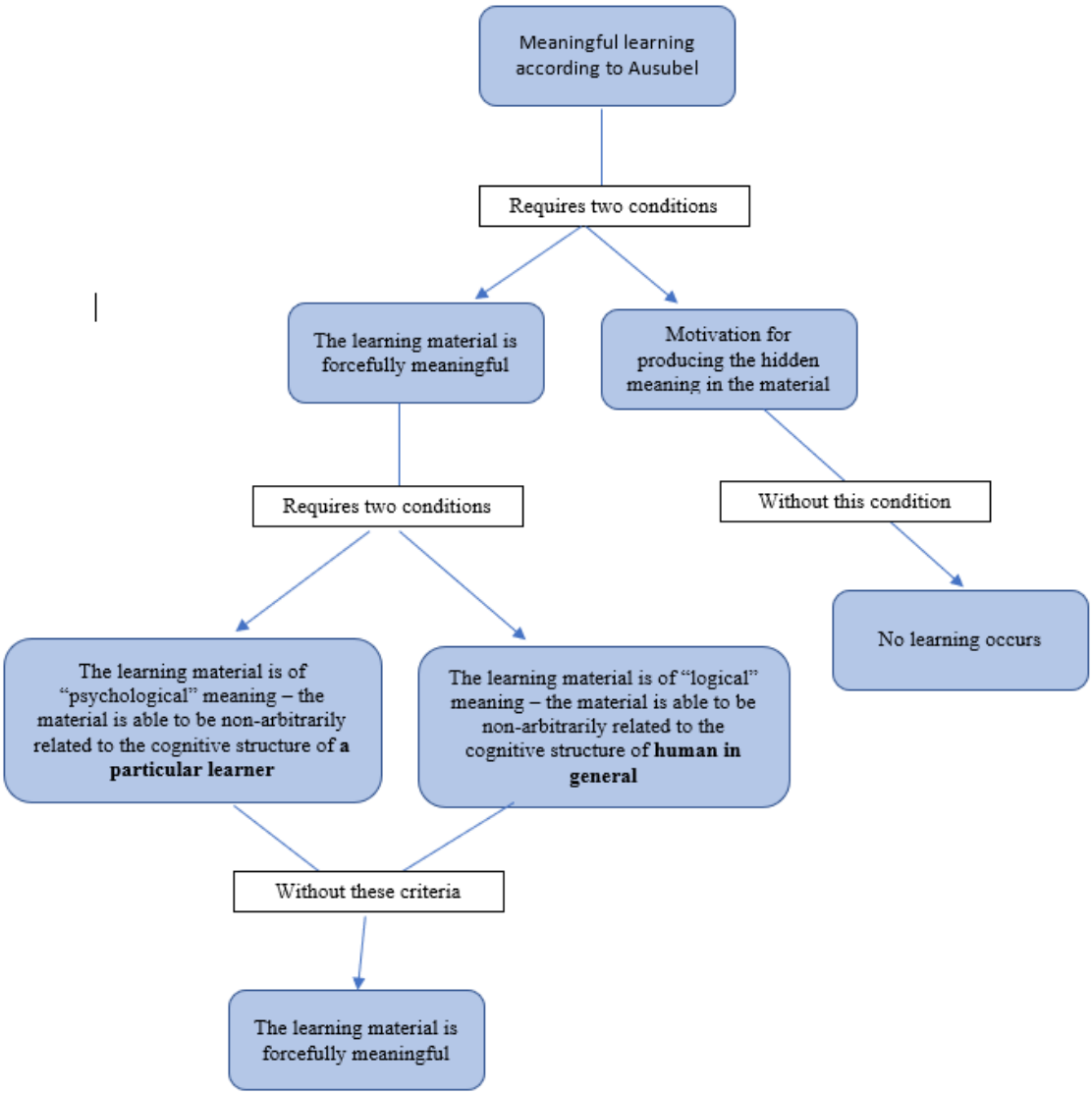


Figure 1.5 Meaningful and non-meaningful learning according to Ausubel (1968)

A comparison between Ausubel's remarks and the central principles upon which "meaningful learning" is structured shows that there is no complete fit between them.

The three principles written in the Ministry of Education's documents relate mainly to Ausubel's first condition (the learner will show a tendency to produce the hidden meaning in the learning material). This condition emphasizes the learners' motivation to learn, and all of the three principles displayed in the Ministry of Education's documents widely and explicitly focus on learning motivation: students will learn contents if they understand they are valuable to both the individual and the collective, only if they are involved in them, or if the contents are relevant to them.

As mentioned above, a lack of motivation to learn, whether internal or external, undoubtedly means that the students will not learn. Motivation alone, however, is insufficient. If the cognitive structure of learners is incapable of assimilating the learned content, and if the learners do not assimilate the newly learned content into their cognitive structure in a meaningful way, the result is non-meaningful learning (rote learning). Ausubel's distinction between meaningful learning and rote learning directs focalization toward the internal processes which learners undergo.

It seems that the Ministry of Education's principles do not address Ausubel's first criterion of the second condition, according to which the content is tailored to a non-arbitrary relation to terms which are relevant to it and can already be found in the cognitive structure. This is done from the (probable) assumption that the contents in the learning curricula are of logical significance and are able to be assimilated by the students, as in each subject taught in the education system, the contents are determined by professional committees which consist of people from the relevant disciplines.

Regarding the second criterion of Ausubel's second condition, according to which the topic must carry a cognitive meaning which is dependent on the learner's cognitive structure, the documents mildly address this condition in the third principle – relevance ("learning relies on existing knowledge and connects… to the conceptual world… of the learner").

From the review given above, it appears that Ausubel's remarks and the central principles upon which "meaningful learning" is structured are not fully compatible. These differences are particularly prominent in a position placed for traditional (frontal) learning. Ausuble (1968) claims that frontal learning can lead to both meaningful and non-meaningful learning, while

According to the meaningful learning reform Website, meaningful learning and frontal learning, these concepts are conflicting concepts.

The meaningful learning in Israel is built on this basic assumption, and the outline of action of the meaningful learning reform guides teachers to act and adopt meaningful learning and at the same time instructing them what not to do in order to stay away from traditional learning (Table 1.4).

Table 1.4 Meaningful learning VS Frontal Learning (Adaptive from the Website of the Ministry of Education)

In the traditional method	In the meaningful learning method
The major changes for the students	
The teacher is in the center	The student is in the center -discovers and creates new knowledge
The teacher and the book are the main sources of information	The sources of information are diverse , including peer learning and learning from the internet
Learning mainly in school	Learning everywhere and anywhere
The use of technology is limited	Interactive learning
Frontal learning	Active learning according to interest, choice, and personal style
The major changes for the teachers	
The teacher is the main source of knowledge	The teacher guides the student to the sources of knowledge
The teacher's job is to pass the knowledge	The teacher instructs in the learning process
The teaching style is mostly uniform and is usually designed to reach a uniform standard in the test	There is no uniformity in the products of knowledge, and there is legitimacy for diversity
Personal work of teachers	Working in teacher teams, in virtual communities, with peer learning and feedback
The classroom is the main learning space in the school	The learning also happens in museums, archives, historical sites, and more

In any case, this dissertation analyses the practices teachers used according to the central principles written in the Ministry of Education's documents in Israel, depending on the context of this study. In the next section, an explanation of passive learning will be provided.

1.2.5 Passive learning

Part of the characteristics of meaningful learning (active, constructive, and cooperative learning.) suggest that learners have to be physically active so that there will be active learning of any kind, and active learning is often described as the opposite of passive learning (Haidet et al., 2004). What passive learning implies is teacher-centered learning (Kain, 2003), where

students are not active participants but spectators, or ‘citizens of the learning environment’ (Rogers and Friedberg, 1994; p.9).

Some students focus and emphasize the remembering of facts, something that makes them more passive learners. Haidet et al. (2004) imply that passive learning is a concept that is negative and is associated with didactic lecturing and often gives the idea of learner’s dependency and weakness.

Interestingly, research carried out by Haidet et al. (2004) found that when one group of learners were taught using didactic lectures and another group taught in an active participatory way (group-based problem-solving tasks), their knowledge and performance in a related exam were almost the same. However, what they did find was that the group taught in the ‘active session’ perceived the experience to be of less benefit, and crucially, these learners also had lower perceptions of their ability to meet the learning goals.

These results show that although passive learning may have a bad reputation, it is often more comfortable because it is what learners are used to and what they expect. Also, the didactically taught group may have really enjoyed what they were learning and engaged with it without having to have discussions or activities.

Similar to Haidet et al. (2004), Struyven et al. (2010) conducted a research where a cohort of student-teachers was studied; the first half was taught by the lecture method, and the second half was taught by methods which activated the students (self -discovery learning by means of authentic tasks). What Struyven (2010) found was that the ‘active learners’ group did not want to go on with this approach in the workplace as soon as they are qualified.

A lot among the student-teachers figured out that the student-activating methods were not comfortable, something which led many of them to feel a lack of confidence. A major part was upset by other ‘freeloading’ students who let other students who were more dedicated to doing the group work. It could be discussed that one of the aims of learning is to give the students the opportunity to change their thinking; that is why learning must be challenging and less comfortable at certain points. Brookfield (1995) talks about the students’ needs to be challenged in order to experience new learning ways, and he says that it is the educator’s job to bring in new learning methodologies so they can have opportunities to develop. It is important for the educator as well to be capable of empathizing with learners so as not to push far outside their comfort zone.

Denicolo et al. (1992) and Mayer (2004) say that active learning might go further than the physical features (e.g., group work, discussion, collaborative projects) and deviates into more complicated areas like learner autonomy, learner agency, and developing critical thinking skills.

Some previously mentioned definitions introduce active learning as physical endeavors undertaken by teachers and students, e.g., discussions, projects, role-plays, pair-share activities (Chickering & Gamson, 1987; Bonwell & Eison, 1991; Prince, 2004; Berry, 2008). If active learning was just about being involved in 'activities,' then the integrity of the learning is endangered, which means that the activity itself becomes more important than the learning content. According to Mayer (2004), learners must be cognitively active, and like Kane (2000: p.5) suggests, "Passive countenance needn't reflect an inactive brain."

Students' participation in active learning can be considered as a step towards more progressive education. The best proof of that is the philosophy of Popular Education that the Brazilian Educator Paulo Freire founded, in which they value learning as equal sides in radical education.

The 'active versus passive learning' debate may be able to benefit from part of the popular education's philosophies since, within popular education, the active learning and the participatory techniques cannot be only defined by activities; the active learning should be an attempt to increase the greater good for the learners (Kane, 2004). Activities must have serious educational goals (Kane, 2004).

What Kane (2004) is suggesting here is at odds with the idea of 'edutainment' and the findings of Marsh and Ware (1982), who found that a teacher's performance could at times have a positive effect on learners even if what they were teaching was relatively meaningless.

From the point of view of popular education, the learning activities may be meaningless if they are not underlying principles. Active learning must be deeper than just some teaching tools; it must be interlocked with some guiding principles and aims. Addressing the previously discussed issue of power in learning, Kane (2004) says that participatory learning techniques may be manipulative if they are not more than a traditional method for teaching. Kane (2004) says that teachers can promote their own agenda during 'activities' and easily manipulate the learners; they let the students think that they are in control.

1.3 Teaching and Learning Approaches

There are numerous meanings for teaching. According to Oxford Dictionary, it is: to give systematic information to a person (about subject or skill); to practice this professionally; to

enable a person to do something by instruction and training (to swim, to dance); to be an advocate for a moral principle (my parents taught me forgiveness); to communicate, instruct in a moral principle; to induce a person by example or punishment to do or not to do a thing and; to make a person disinclined to do a thin (Jarvis, 2006, p.3). the actions of teaching are thought of as knowing–in–action (Schön, 1983) or observable pedagogical behavior (Fishbein & Ajzen, 1975; Good, 1996).

Teaching or instructional practices are actions done in class by teachers wanting to make any kind of change in the students' behaviors (Beccles, 2012). These are mainly the practice of the classroom (teaching and learning) of teachers throughout instruction, and they include teaching methods and strategies. Flanders (1970) defines teaching as a 'collection of interactions that consist of a series of events between teachers and taught.' Teaching is the action that ends up with sharing contacts between the students and the teacher, and this interchange is called teaching. That is why, in this current research, teaching or instructional practice will be considered as the range of interaction of teachers and students in the classroom that includes teaching strategies and methods.

1.3.1 Student-centered learning (SCL) vs. teacher-centered approach

Student-centered learning (SCL) is a term that is becoming familiar with education (Kain, 2003; O'Neil and McMahon, 2005; Richardson, 2005). Corrazo (2011) described student-centered learning as 'an active form of surrender' since due to his experiences as a tutor, he said that he felt that he had to surrender the traditionally established pedagogies of his project (graphic design) and give control over to the students. Armstrong (2012) says that in didactic teaching, teachers are the ones to direct the learning process, and students have the receptive role in their education and that in this type of situation, the responsibility of the learner is either ignored or suppressed. Educators have tried to change didactic teaching approaches to 'hands-on' activities and group work, in which the learners determine what they want to do in class (Armstrong, 2012). The key to progressive education is that students build their own learning.

Student-centered learning is radically different from traditional learning known from a typical school and called a teacher-centered approach, where it is the teacher who creates the process of learning and has a monopoly on knowledge – they play the role of a filter, and sometimes even a distributor, of information (Yusuf & Al-Banawi, 2013, cited in Klichowski, 2017**)**.

Teacher-centered approach refers to a teachers' domain teaching approach in which the knowledge transfer was from the teacher to students directly; the teacher played the decision-maker role, which determined the learning process and designed the learning environment **(**Opdenakker & Van Damme, 2006**;** Kahl & Venette, 2010; Vasileva-Stojanovska et al., 2015).

Figure 1.6 presents the differences between the teacher-centric oriented approach and the student-centric oriented approach.

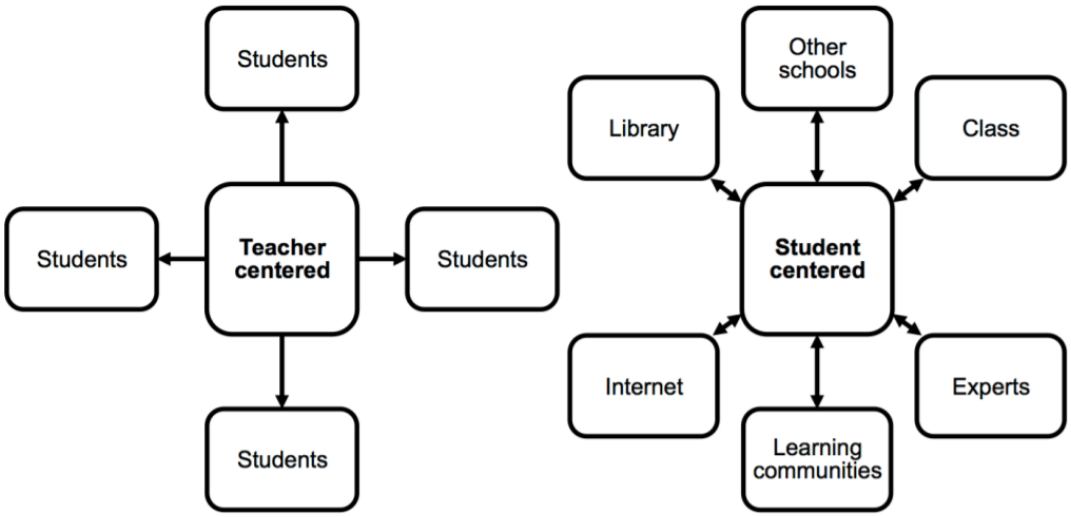


Figure 1.6 The process of learning in TCL & SCL (Source: Klichowski, 2017, p.41)

The use of technology that is applied in order to enrich the cooperation and enable access to social information resources provides another learner-centric framework (Chai, Wong, & King, 2016).

Networked learning involves the use of digital technologies to promote connections between learner-to-learner, learner-to-tutors, and learning community-to-its learning resources. It represents a theoretical framework for personal learning environment models that is an emerging concept and a new vision of learning inspired by constructivist and connectivist learning models. It puts the learner at the center and provides more autonomy and control over the learning experience (Klichowski, 2017).

The Cyberpark, which is a smart physical learning environment, enables learners to connect in context-aware scenarios to a wider network of knowledge, experts, and learning communities via their adaptive devices. In that way, it provides another learner-centric framework (Klichowski, 2017). such an approach contradicts the traditional, linear model of

education where the state of the student is not taken into account but where a previously drafted default plan is followed, and the focus is on mastering preselected content (ibid. p.42).

How is student-centered learning organized? Looi, Seow, Zhang, So, Chen, and Wong (2010) notice that in such an approach, "teachers act as a facilitator and learning partner rather than a sole expert of knowledge."

They also add that "the mobility and connectivity of technological tools enable students to become an active participant, not a passive receiver in learning activities."

"it can be stated that in the student-centric oriented approach, the student adopts three new roles (unknown in the teacher-centric oriented approach):

- Content producer role: the student can use technology to assess, search, modify, and create content.
- Socializer role: the student can use technology to search for help from others and cooperate with them.
- Decision-maker role: the student can use technology to search and consciously plan learning, including the choice of ways of learning." (Klichowski, 2017, p.40)

O'Neil and McMahon (2005) suggest that SCL is a shift in learning and teaching where power is moved from teacher to student. Blackie et al. (2010) say that SCL is not a different style of teaching; it involves a shift for the teacher from measuring how much material is covered to measuring how much and how deep the student understood what he was taught. This way, the teacher must focus on the learning of the students rather than transferring information and be concerned about the actual process of learning. If the focus is mainly on the process of learning rather than the transfer of information, then students will be greater at the process but have just a little knowledge of the content of what they are studying. Prosser and Trigwell (1999) say that it is important to have a balance between the content and the process. Teachers who adopt the SCL approach will encourage students to focus on meaning and understanding but not on empty reproduction of knowledge. Moreover, Kugel (1993) and Reinsmith (1992) suggest that teachers are more likely to go with SCL as they can gain more experience and become more mature and professionals.

SCL may appear an almost straightforward approach in which the teacher uses activities and gets the students to be active. O'Neil and McMahon (2005) say that some practitioners think that SCL is all about giving the students to choose in their education, whereas other practitioners think that SCL is about the student being more involved physically and cognitively than the lecturer. O'Neil and McMahon (2005) suggest a much wider definition of SCL that includes both ideas but also describes the shift in the student-teacher power relationship.

The word 'active' is used by many authors to describe SCL when they try to reach a suitable definition. Gibbs (1995) and Lea et al. (2003) say that SCL is a reflexive approach that relies on active learning rather than passive learning. They suggest that SCL is about: deep learning and understanding, responsibility and accountability on the part of the student; autonomy for the learner; interdependence between learner and teacher; and mutual respect. Brandes and Ginnis (1986) say that SCL: a) takes students' experience outside the course into consideration and focuses both on process and content, b) allows key decisions about learning to be made through negotiation between teacher and student, and c) allows the student to see themselves differently as a result of the learning experience.

It is hard to assume what SCL is like in practice from an educator's point of view. SCL may be explained in different ways. Firstly, educators may think that SCL just means to have group work, discussion in class, and avoid large lectures. For others, SCL is about transferring power and responsibility from teacher to student, something that can be more complex to understand and can happen both in a small group or a large lecture. O'Neil and McMahon (2005) and Blackie et al. (2010) say that SCL is beyond group activities; it is totally a different way of approaching and understanding learning and teaching. There might be certain approaches to SCL where students can be engaged in discussions and activities. SCL is about putting students' needs first in designing a course and not trying to add activities and discussions into an already established curriculum.

SCL has been criticized several times. Cousin (2009) says that for some teachers, it may be challenging to adopt SCL since it is shedding of the self as teacher and that SCL can rob ceremonial, ritual, and theatrical dimensions of teaching. Others argue that in spite of its popularity, SCL is too focused on the learner (Simon, 1999). Moreover, there are some difficulties to implement it, i.e., the resources needed to implement it in large classes (O'Neil & McMahon, 2005). O'Sullivan (2004) described SCL as a Western approach to learning that may not transfer to developing countries where there are only limited resources and different learning cultures, although later work suggested that some teachers may not easily understand

the shifts in thinking and practice needed for SCL in order to be implemented, regardless of their cultural and contextual background (Jordan et al., 2014). Furthermore, Prosser and Trigwell (2004) show their worry about the different belief systems that teachers and students hold; students who have experienced more teacher-centered approaches might reject the SCL approach since it is very different than what they are used to.

There are certain characteristics of SCL (e.g., the student being self-directed, teachers taking account of students' lived experiences, teacher-student interdependence) that appear like the characteristics of meaningful learning as shown in (figure 1.4). There is a host of teaching strategies that have their roots in SCL or vice versa in TCL. Several of these strategies are discussed below.

1.3.2 Didactic approach

This approach basically involves lecturing and is teacher-centered (Griffin, 2006). Lecturing is the regular classroom 'chalk and talk' (Das, 1985) and is used by the most employed teachers (Griffin, 2006). It is an economical way of transmitting information to a big audience, something that rarely raises any interest or attention among young people. This is where the teacher talks, and the class just listens, so the teacher is the only active one in the classroom, and the students are passive listeners (Das, 1985). Lecturing is the best feature to represent the non-interactive/ authoritative approach of teaching, in which teachers present ideas through a monologue (Mortimer & Scott, 2003). In 'direct lecturing,' almost no contribution is asked of or offered by students (Edwards & Mercer, 1987). They said that direct lecturing is one of the pedagogical interventions where the teacher's control is at a higher level. Griffin (2006) said that lecturing is a didactic method that relies on different forms of authority. Lecturing represents three types of authority: social authority (monopoly of knowledge and expertise), subject authority (knowledge authority), and professional authority (planning and structuring the lecture), which didacticism reflects (ibid. p.77). Moreover, the lecturer has complete control of the learning situation in lecturing, and he puts the learner in a completely passive role (Griffin, 2006). Lecturers who act according to this method see the task of the teacher to be an evaluation and correction of the learners' behavior; the lecturer asks a closed type of question, which implies the answer type of response (Wilen, 1991; Mansour, 2009). The most critical difficulty that lecturing raises is the 'one-way communication,' aside from other constraints

that involve rote learning, note-taking learning, potential boredom because the approach decreases and even limits the student's participation and reflection in class (Griffin, 2006).

1.3.3 Facilitative teaching approach

Radical pedagogies challenged the regular classroom practices in which students are only receiving new knowledge, and the teacher is the knower in class (Weimer, 2002). Teaching is not seen as imparting knowledge anymore, but it is redefined as facilitation of self-directed learning (Tight, 2002). Facilitation is related to student-centered learning. It is an old art, and it had someplace in spiritual and monastic tradition in the form of guides, spiritual masters, and spiritual educators (Gregory, 2006). Facilitation means literally "easing" by which pulling out the wisdom that is already there deep in the learner. It means re-a-wakening stored talents and wisdom. It is the art of helping learners realize their capacity to learn the hallmark of the facilitator, moving education from delivering static knowledge to a dialogical relationship in which knowledge is co-created (ibid, 2006, p .99). Facilitation is an educational skill to reach the phenomenological world of the individual and helping the learner to know his internal capabilities to learn and experience better.

According to Gregory (2006), facilitators are skilled people who can create conditions within other people; they can select and direct their own learning and development. The facilitative approach of teaching helps students "make sense" of experiences in relation to the events of the real world. Teachers must be competent, must have self-esteem, should have authority in the classroom, need to show compassion, must respect individuals, and be flexible in style and teaching methods to facilitate learning. They can be challenged and must be capable of forming a relationship between themselves and the students (Freeth & Parker, 2003). This relationship they form is side-by-side rather than face-to-face; they both can look out to the same world and have a conversation about their experiences and the way they make sense of those experiences (Gregory 2006). The role of the facilitator is to encourage the students to engage in intellectual analysis, critical thinking, problem-solving, describing experiences (Gregory, 2006), and challenge learning (Jarvis, 2006). Challenge meaning commensurate with transformational learning (Entwistle, 1997).

Different styles of facilitation were established, but critical pedagogy is the most facilitative one, and it hands over the responsibility of learning to the student as they debate intuitive and cognitive perception (Preece & Griffin, 2006). These features are commensurate with the

development of academic awareness and clinical reasoning skills in students and concur with the student's empowerment characteristics (Brookfield, 1996).

1.3.4 Socratic teaching approach

This method of teaching emphasizes student-centeredness and opposes didacticism. Socratic teaching is the oldest, most powerful model for the development of critical thinking. This teaching model was established by Socrates over 2,500 years ago, and it emphasizes the importance of having evidence, examining reasoning and assumptions, and analyzing basic concepts. With Socratic learning, it is focused on providing questions to the students rather than answers. Resulting in students developing the ability to reason in a disciplined, self-assessing manner. Students also gain from interacting with their peers via discussion in the classroom (Jarvis, 2006). Through questioning teachers: helping learners to remember preconscious learning or tacit knowledge and leading learners through a constructed series of questions towards a pre-determined conclusion (Jarvis, 2006). He specifies a minimum of four different ways in which a teacher can teach through questioning:

- Helping learners to recall what they have learned pre-consciously or their tacit knowledge.
- Leading learners through a carefully structured sequence of questions to a predetermined answer.
- Starting learners on a questioning process which is totally unstructured at the outset.
- Having question and answer tests to help memory recall (ibid, 2006, p.92).

The questions that the teacher asks must be clear and distinct but thought-provoking. The questions should not be very easy, nor very difficult, but should be suitable to the students' abilities (Das, 1985). Chin (2007) defines the Socratic questioning under the categories of pumping, reflective toss, and constructive challenge. By pumping, the teacher encourages the students to give more information through explicit request; by reflective toss, the teacher poses a question to prior utterance from a student, intending to give the responsibility back to the student; by constructive challenge, the teacher gives a question that stimulates the students' thinking rather than giving corrective feedback (Chin, 2007).

Jarvis (2006) said that there are numerous dangers when the teacher uses the questioning method: first, no one will answer; second, the teacher interferes and directs the question at a

student hoping to get an answer; third, that someone will dominate; fourth, that there will be some who do not take part and fear of embarrassing the student if asking him directly. If a teacher manages to handle those dangers successfully, then they can teach without communicating information.

The OECD (2009) defines teachers' pedagogical action in three dimensions: structuring practices (correspond to teacher-centered teaching), student-oriented practice (correspond to student-centered teaching); and enhanced activities (correspond to student-centered teaching). According to the OECD (2009), "structuring practices" include teacher's actions like "state learning goals; summary of earlier lessons; homework review; checking the exercise book; and checking student understanding during classroom time by questioning students." "Student-oriented practices" includes teacher's action such as "students work in small groups to come up with a joint solution to a problem or task; ability grouping; students self-evaluation; and student participation in classroom planning" while "enhanced activities" involves the actions such as "students work on projects that require at least one week completing; making a product; writing an essay; and debating arguments."

1.3.5 Problem-based learning

Problem-based learning (PBL) is a new concept as an approach to learning and teaching. Barrows (1986) and Menon (1997) argue that the PBL approach started with the educational pragmatism by Dewey (pragmatism means that knowledge only has meaning through the interaction between the learner and his/her environment). PBL is usually related to active learning since it relies on an alternative pedagogical model to that which relies on didactic delivery of content by the teacher (Greening, 1998). Students are trained to become self-directed learners when they face a real-life problem, and as a group (or individually), they must devise possible answers and solutions (Prince, 2004). Instead of the 'all-knowing' teacher giving the answers, students must find their own way through the problem and provide their own answers (Prince, 2004). Savin-Baden (2003: pp.2-3) describe PBL as a 'means of educating students to learn with complexity' and that it 'helps students to see that learning and life take place in contexts, contexts that affect the kinds of solutions that are available and possible.'

PBL was criticized since it is not 'real' enough, that the problems are too well-structured, that tutors may be very directive, and that PBL relies on the ability of students to work together

when actually many tutorial groups may be dysfunctional (Dolmans et al., 2005). Fenwick and Parsons (1997) say that PBL presumes the possibility of a detached knower and that PBL does not hold itself responsible for real-life situations, whereas other elements influence the decision making, e.g., time, social position, gender, and interpersonal relations. PBL could be a form of active learning since it de-centralizes the teacher's role and promotes the learner's independence and autonomy (characteristics of active learning, as outlined in Figure 1.4).

In summary, it is seen that PBL, as an instructional approach, begins with an authentic problem that students are likely to face in the real world. It is also seen that PBL allows students to work collaboratively and gain new knowledge that can be utilized to solve problems. Problem-based learning promotes critical thinking and student inquiry and motivation. Problem-based learning is student-centered, and it empowers students to be self-directed learners.

In a PBL environment, the teacher serves as a tutor, a facilitator, and a coach that must observe, question, challenge, motivate and redirect students (Edens, 2000; Savery, 2006) .

Teachers actively participate in thinking about the problem, and later act as cognitive coaches, questioning their students' thinking (Torp & Sage, 1998).

According to Edens (2000), PBL is a constructivist instructional model that prepares students for the job market of the 21st century due to the (a) genuine context around which the PBL problem is constructed, (b) ill-structured nature of the PBL problem, and (c) open-ended nature of the possibly controversial issue, which all facilitate the attainment of problem-solving skills that are required in the job market. The most important element of PBL is that students are responsible for owning the problem as well as solving it through investigation and research.

1.3.6 Inquiry-based instruction

Inquiry-based instruction can be described in more than one way. Inquiry has its theoretical roots in the work of John Dewey (Saunders-Stewart, Gyles, & Shore, 2012). It represents a bottom-up strategy, which is the opposite of traditional instruction (Ku, Ho, Hau & ,Lai, 2014).

Inquiry can be regarded as a teaching strategy and as a learning goal (Mumba, Mejia, Chabalengula & Mbewe, 2010). As a content area, inquiry can be viewed as how scientists perform their work or as a pedagogy when it is used to address concepts (Bybee, Heppner, & Kouttab, 2006; Capps & Crawford, 2013) .

Whitworth, Maeng, and Bell (2013) stated that inquiry is an "active process in which students answer research questions through data analysis."

In general, the elements of inquiry-based instruction include problem query, data collection, analysis and interpretation, and the development of conclusions based upon evidence (Song & Looi, 2012; Whitworth, Maeng & Bell, 2013). The elements of inquiry directly relate to the way that scientists go about solving problems (Song & Looi, 2012; Capps & Crawford, 2013).

Teachers who engage in inquiry-based instruction should hold the belief that this type of instruction is best suited to teaching science (Harwood, Hansen, & Lotter, 2006). To do this, teachers need to understand the work of scientists and how to apply inquiry strategies (Harwood, Hansen, & Lotter, 2006; Capps & Crawford, 2013; Gray, 2014).

Inquiry instruction has been documented to have a positive impact on students. Research has indicated that inquiry promotes students' conceptual understanding of the material (Capps & Crawford. 2013). Wilder and Shuttlesworth (2005) researched articles that confirmed that inquiry was effective and that students learned when they were actively engaged in meaningful instruction. Despite documented advantages of inquiry-based instruction, Capps and Crawford (2013) reported that some research found many teachers did not provide inquiry-based instruction. Mumba, Mejia, Chabalengula, and Mbewe (2010) stated some research found that some teachers did not understand how to implement inquiry, and sometimes when it was implemented, it was a lower level inquiry. Teachers may feel uncomfortable and uneasy about delivering inquiry-based lessons (Duran & Duran, 2004).

1.3.7 Interactive learning: collaborative versus cooperative learning

Those two terms- collaborative and cooperative learning, are associated with meaningful learning, as mentioned in the meaningful learning section in this chapter. Cooperative learning's basic premise is that students construct knowledge through interaction with other students (Johnson et al., 1991). In such cases, students work together to fill individual gaps that instructors may not recognize. The most critical element of cooperative learning is that students must work together to achieve common interdependent goals (Johnson et al., 1991).

Some teachers mistake cooperative learning for collaborative learning because both types of learning involve students working together. Although the two concepts share a student-centered discussion orientation, important distinctions exist between the two approaches. Collaborative

learning, on the one hand, is characterized by students working together to achieve individual goals (Bruffee, 1999; Panitz, 1997).

On the other hand, and as was stated before, cooperative learning requires task interdependence while working toward shared goals (Johnson et al., 1991). Therefore, each member under a cooperative learning model has an incentive to perform and to ensure that other members perform as well.

Collaborative learners work in teams but are rewarded for individual performance. Students benefit from interacting with each other, but unlike cooperative learning, there are no incentives to ensure that each individual student succeeds. Therefore, weaker students in collaborative groups may be left behind, whereas cooperative teams are more likely to support them in achieving learning outcomes.

In general, cooperative learning is more structured than collaborative learning. Cooperative learning generally consists of five primary components: (a) positive interdependence, (b) face-to-face promotive interaction, (c) individual accountability, (d) social skills, and (e) group processing (Johnson et al., 1991). Essentially, cooperative learning occurs when students work together positively to achieve group goals. Johnson et al. (1991) suggested that social skills and the promotion of positive interaction contribute to the success of cooperation among group members. Therefore, some students may be better suited to cooperative learning based on their ability to work with others.

Baker and Clark (2010: p.258) argue that cooperative learning is 'learning that takes place in a stable, formal group of two or more students who work together and share the workload equitably as they progress towards assessed outcomes.' They also suggest that if cooperative learning is not structured as it should and is not supported by the educator, then it may have a detrimental effect on learning, but if it is implemented properly, cooperative learning can increase intercultural understanding, improve interpersonal skills and prepare students for the modern workplace that encourages participation.

Sharan (2010) says that since cooperative learning needs pairs or small groups of students in order to exchange ideas and information concerning a certain topic or to plan the way they want to study something together, this lets the students make their knowledge and experiences a major and alive part of the learning process. He also argues that teachers have to give importance to the space which enables the learners to bring their lives and themselves into their learning, something which encourages them to make direct sense of what they are learning and

puts them at a level that is understandable to them. That is why, when there is a diverse student population, students need to be allowed to bring their own knowledge with them, something that helps them become more successful.

1.4 How Students Learn

This research explores the term of meaningful learning; therefore, it is important to try to define what is meant by the term 'learning' before putting the word 'meaningful' in front of it. It is surely almost impossible to try and synthesize all the studies exist on the topic of learning, so only a few selected theories that are most helpful were selected to define learning in education, and this selection includes: learning styles, deep and surface approaches to learning, students engagement and transformative learning.

1.4.1 Learning styles

One of the most widespread and wildly used classification of learning style is Fleming's (2001) Visual, Auditory and Kinesthetic (VAK) model, which was built upon the earlier neuro-linguistic model of Eicher (1987). Fleming (2001) defines learning style as the individual's characteristics and preferred ways of gathering, organizing, and thinking about information. Fleming (2001) claimed that there are three basic categories of learning styles: 1) Visual learners; those who prefer seeing (think in pictures; visual aids like slides, diagrams, hand-outs), 2) Auditory learners; those who learn best through listening (lectures, discussions, tapes) and 3) Kinesthetic learners or tactile learners; those who prefer to learn through an experience-moving, touching, and doing (active exploration of the world; science projects; experiments). The VAK model may be valuable when researching the term active learning since it offers a unique explanation of the way the students learn, and more specifically, it suggests being actively engaged in learning can be expressed through three different ways: looking, listening, and doing.

Honey and Mumford's (1982) Manual of learning styles identified four different kinds of learner: 1) Activist (prefers doing and experiencing), 2) Reflector (observes and reflects), 3) Theorists (wants to understand underlying reasons, concepts, and relationships), 4) Pragmatist (likes to have a go and try things to see if they work). Belonging to active learning, 'activist' learners can gain the most from learning that is physically 'active,' and it can be collaborative and participatory because according to Kanninen (2009), the 'activist' learner likes the work in

groups and learns best when they are involved in new experiences, problems, and opportunities. Honey and Mumford's learning styles model suggests that only 'activists' are predisposed to succeed in an active learning environment, while the three other types of learners are not. That is why trying to label a learner as an 'activist,' or a 'reflector' might be an unhelpful 'pigeon holding' exercise.

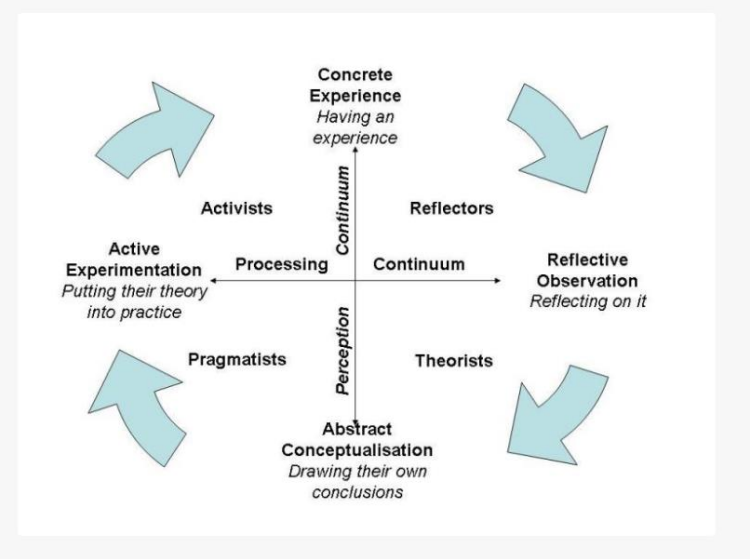


Figure 1.7 Honey and Munford's Manual of learning styles

Goldfinch and Hughes (2007) used Honey and Mumford's learning styles questionnaire in their research, and this suggests that those undergraduate learners who have activist learning style are most likely to drop out during the first year. According to Goldfinch and Hughes, this is because of didactic teaching.

Styles in higher education provide for 'listeners' and 'contemplators' rather than 'doers.' Bonwell and Eison (1991) say that teachers have to incorporate several strategies into their teaching so that they give a balance that matches the needs of all their learners. It was suggested (Fleming 2001) that all students have to be encouraged to evaluate their own learning style, and this has to be discussed in collaboration with the teacher so that everyone can get a chance to affect the way the learning and teaching process develops, and if this is conducted, then it can assist in producing better learning strategies (Nesbit et al. 2004).

Conversely, Coffield et al. (2004) criticizes the research of the learning styles and asserts that learning styles approaches can, in fact, hinder the individuals' learning experience by forcing them to categorize themselves into a certain category of learner. Coffield et al. say that learning

style inventories are not strict enough when they are tested, and therefore they are unreliable and unhelpful for students and for the teacher. University educators are aware that people learn in a variety of different ways. What Coffield et al. suggest is that teachers need to be careful not to label students as 'reflectors' or 'activists' and assume that they always learn this way regardless of the context/content of the learning. Hall and Mosley (2005) conclude that labeling students with learning styles is placing limits on their ambitions and other's expectations from them at risk. Hall and Mosley (2005) argue that learning styles are useful if they lead to effective learning strategies. Schank (1997: p.48) says that 'contrary to common belief, people do not have different learning styles. They do, however, have different personalities […] everyone learns in the same way [...] through failure and practice.'

Criticism of the concept of LS (Learning Styles) has been widespread (Curry, 1990; Coffield et al., 2004; Geake, 2008) and in 2002, the Organization for Economic Cooperation and Development (OECD), through its Centre for Educational Research and Innovation (CERI), pronounced LS a neuromyth (OECD, 2002).

Rayner (2007) refutes Coffield et al.'s critique by arguing that if learning styles are useful, then there needs to be more evidence into the relationship between learning styles and pedagogy, assessment, and curriculum content. Sternberg and Zhang (2001) also suggest that there is a difference between learning styles (how a person prefers to learn), thinking styles (how a person prefers to think while learning), and cognitive styles (which is how a person knows, perceives and recognizes what he is learning). Maybe it is ironic that learning styles are providing teachers with another way to stereotype and to damage students, expectations. Scott (2010: p.14) argues that learning styles are consistent with the value system of the individualist of western culture that the 'continuing endorsement of learning styles does not have a place in education theory and practice that claim to be scientifically based.

Despite the lack of evidence in support of the concept, LS remains ever popular with a great majority of educators. A study looking at teachers from the UK and the Netherlands showed that more than 90% of teachers believe there is an optimal delivery style for each learner **(**Dekker et al., 2012). Similar studies have found equally high numbers in Spain (Ferrero et al., 2016**)** and Portugal (Rato et al., 2013). In Greece, 97% of the practicing teachers believed that students' performance could be enhanced when the material is delivered in an individual's preferred LS **(**Deligiannidi & Howard-Jones, 2015), and 94% of student teachers agree on that (Papadatou-Pastou et al., 2017).

Just because a notion is popular, however, doesn't makes it true. A recent review of the scientific literature on learning styles found scant evidence to clearly support the idea that outcomes are best when instructional techniques align with individuals' learning styles. This has lead to Learning Styles being widely classified as a 'myth' (Geake, 2008; Lilienfeld et al., 2010; Riener & Willingham, 2010; Dekker et al., 2012; Pasquinelli, 2012; Rato et al., 2013; Howard-Jones, 2014).

Only a few empirical studies have sought to shed light on the rather obscure picture. For example, Rogowsky et al. (2015) investigated the effect of LS preference in text comprehension in an adult sample. According to the findings, no statistical significance was to be found in the relationship between LS preference, mode of delivery, and learning aptitude.

A search of the Educational Resources Information Center (ERIC) found almost 2,000 journal articles, approximately 900 conference presentations, and 700 books or book chapters on learning styles (Lilienfeld et al., 2010). With such a widespread belief in the merits of learning styles, surely there must be strong evidence to support the belief, right?

Evidence does not support the claim that students learn best when the teaching style is matched with the preferred learning style (Kratzig & Arbuthnott, 2006; Papadatou-Patou et al., 2018; Husmann & O'Loughlin, 2019). This, of course, shouldn't discourage educators from striving to improve teaching methods. Teaching beginners students in a specific area might require different strategies than teaching those with high levels of knowledge. Different teaching strategies might be required for teaching different things; strategies may depend on context. There is a large body of research on strategies to maximize learning, and educators and students are advised to review and use information from that line of research instead of spending time trying to identify their illusive learning style.

1.4.2 Deep and surface approaches to learning

The empirical research by Marton and Säljö (1976) says that there are two main approaches that students adopt in their learning- a deep approach and a surface approach. Ever since, this research has been elaborated upon by a few other researchers in education (Entwistle & Ramsden, 1983; Ramsden, 1992; Richardson, 2005). Marton and Säljö's (1976) theory about deep and surface approaches to learning was based on research about the various levels in which students process information. Ramsden (1992) says that in the surface learning approach, the student uses short-term memorizing and is concentrated on content and superficial aspects of

learning. Ramsden asserts that the surface learning aspect is not authentic; it is actually an exercise in memory and imitation, it encourages the students to study without reflecting on their goal and means and to treat knowledge as unrelated pieces of information. Ramsden (1992) says that a deep learning approach is more of a long term, in which there are understanding and internalization and possible application of concepts. In deep learning, there exists the creation of logical connections between pieces of knowledge so that the students are able to connect between this knowledge and his experiences.

Saljo's (1979) five classifications of learning add to the approaches to learning discussion. The five different conceptions of learning are as follows: 1) learning is a quantitative increase in knowledge; it is acquiring information and knowing a lot. 2) learning is memorizing and storing information that can be reproduced. 3) learning is about acquiring facts, skills, and methods that can be retained and used when necessary. 4) learning is to make sense, and it involves parts of the subject matter to each other and to the real world. 5) learning is explaining and understanding reality in a different way that involves understanding the world through reinterpreting knowledge. It is possible to say that conceptions one, two, and three relate more to surface learning approaches, whereas conceptions four and five relate more to the deep learning approach.

Entwistle and Ramsden (1983) found that what they believed to be the third approach to learning- a strategic learning approach. Richardson (2005) emphasizes a strategic approach to learning as one involving a very structured and organized approach, in which the learners are worried about and motivated by grades and only choose what is needed to gain maximum grades in the important assessments. Strategic learning can be explained as a logical approach to learning where there are important time pressures that have to be taken as part of the course but in which learners do have a specific interest.

Marton and Säljö (1976) argued that approaches to learning are dynamic and the content is specific, and similarly, Ricahrdson (2005) also says that it is important to make it clear that even though approaches are seen as deep, surface or strategic, they are all not fixed, and one person can use any of these different approaches at different times, it depends on certain factors like the context of learning and the motivation for learning.

There seems to be a relation between the way the learners approach their learning and the way they see the construct of knowledge (Land et al., 2008). Moreover, Baxter Magolda (2009) suggested that the development of students' beliefs concerning knowledge and learning is

totally important when checking the way students learn. William G. Perry's Developmental Scheme is also relevant when talking about the way students understand what knowledge is. Perry's scheme, which was published in 1970, is a model for understanding students' conceptions of knowledge, which suggests that students experience a sequence of predictable positions epistemological growth. Perry (1970) mentions clearly in this Developmental Scheme that there are various ways that the learner sees knowledge through 1) knowledge as answers, known as dualism- where knowledge is either right or wrong. 2) knowledge as answers that can always be reached, but those answers are contestable. 3) knowledge is not about answers- it is always reconstructed and never static. There might be parallels between the Developmental Scheme of Perry (1970) and the deep and surface approaches to learning by Marton and Saljo (1976). Firstly, if knowledge is understood to be 'getting the right answer' as Perry (1970) suggested, then this may correspond to a surface approach to learning. Secondly, if knowledge is about getting the correct answer but with some flexibility, then this may respond to a strategic approach to learning. Finally, if knowledge is always reconstructed and cannot 'be learned,' then this can correspond to a deep approach to learning. Making links between Perry and Marton and Saljo is tentative since Perry's scheme suggests that students develop through their way of thinking about knowledge, whereas there is no implied development in the surface, strategic and deep model; these are approaches adopted in different times responding to the context.

Mann (2001) talks about the issue of alienation and the way it affects the way students learn, and she argues that entering higher education for the first time might be like entering a foreign land with unfamiliar customs, languages, and bureaucracy. She says that students might use the surface or strategic approach in their learning, and both can lead to alienation since both approaches rely on external responsibility and that responsibility of the self (Mann 2001). She adds that it is not so risky for the students to use the surface or the strategic approach in their learning since these approaches are less likely to expose them to anything that can trouble them or upset the way they see the world. Mann also argues that higher education often targets to develop the critical being- that has a deep transformative approach to their learning, and that universities have to promote an engaging experience of learning instead of an alienated one for students.

Brookfield (1995) and Hooks (1994) agree that adopting a critical approach to teaching might be a mean that educators could use to encourage their students to adopt a deep learning approach to learning. Hooks (1994) suggests that the learners build knowledge in their minds, and it

depends on the context they are in. Hooks (1994) also states that the teacher who encourages critical thinking also encourages reflectiveness in students by asking questions, which stimulate thinking that is important to the building of knowledge.

1.4.3 Student engagement

Meaningful learning and student engagement are related since the two imply commitment to improving students' learning experiences. In recent years, there was much research that seeks to explain the meaning of the term students engagement (Coates, 2007: 2009; Kuh et al., 2007: 2008; Kuh, 2009; Trowler, 2010; Trowler & Trowler 2010; Bryson & Hardy, 2011).

Kuh (2009: p.683) defines student engagement as 'the time and effort students devote to activities that are empirically linked to desired outcomes of school and what institutions do to include students to participate in these activities.' Coates (2007) marks active and collaborative learning as one of the basic factors that shape student engagement, and he explains that active and collaborative learning was one of the basic facets that formed the basis for the National Survey of Student Engagement (NSSE). As Bryson and Hardy (2011: p.3-4) highlighted, active and collaborative learning means that 'students actively construct their knowledge' that includes 'asking questions in class and contributing to class discussion; making presentations, working with other students on projects during and outside of class; tutoring or teaching other students; and discussing ideas from reading outside class.'

Bryson and Hardy (2011: p.1-2) say that student engagement is a socially built concept since it encompasses 'perceptions, expectations, and experience of being a student.' Moreover, Bryson and Hardy (2011) emphasize Fromm's (1978) notion that education has to offer students an opportunity of 'becoming not having,' this means that learning is more than developing knowledge about a subject; it is about the way the student changes as a result of learning. With a lot of emphasis on the importance of the educational 'experiences' and 'purposeful activities' (Kuh et al., 2008), student engagement and meaningful learning might intersect. This intersection is also outlined by Trowler (2010), who argues that a progressive conception of teaching, as associated with meaningful learning, implies for students' engagement since it involves a conceptual shift for educators to a student-centered approach in which the autonomy and self -direction of students are paramount.

Biggs (1985) describes self-direction as 'Meta-Learning.' He explains Meta-Learning as an awareness and understanding of learning itself as opposed to subject knowledge. Biggs' work on Meta-Learning says that the perception of the learner of the learning context is as crucial as the knowledge of the specific expectations of the subject and related learning tasks. Using Biggs' theory, Norton et al. (2005) held research that questioned what students thought made a good student. Norton et al. (2005) discovered that learners who have a high level of Meta-Learning could assess the effectiveness of their learning approach and regulate it accordingly, while learners who have low Meta-Learning awareness cannot reflect on their learning approach and consequently will not be capable of successfully adapting when studying gets more difficult and demanding.

The signs of student engagement that Purnell (2006) identified (cited in Knox & Wyper, 2008) and some of the meaningful learning characteristics might be linked. Purnell (2006) said that student engagement is evident when students share similar values and approaches to learning, when their lecturers spend enough time and energy on educational tasks, learn with other outside and inside the classroom, investigate ideas actively with other people, and learn to appreciate perspectives of others and not only their own. Some of the signs of Purnell correspond with meaningful learning characteristics like reflective thinking and cooperation.

Marsh and Ware (1982) checked and tested the role of expressiveness (how interesting a person is to listen to) in effective teaching and discovered that when motivating students to learn content for the goal of passing tests and getting good grades, expressiveness had little influence. They also found that if the students' motivation is just to be entertained while listening, then expressiveness is much more important, even if the content of the teaching is meaningless. They suggested that if students were motivated, the way they are taught has little significance. This shows that the learning and teaching process is in the learner and the learner's motivation's hands; this may render the teacher powerless if he tries to control what happens in the classroom. Biggs (1995) says that in order to overcome the feeling of powerlessness, a teacher has to work with their students on an extrinsic motivation level through offering rewards, and then with time, develop positive relationships in a way they can assist their students to move through various stages of motivation, like social (pleasing others), achievement (competing against a fellow student) and intrinsic (personal curiosity).

1.4.4 Transformative education

There is a body of research in education literature (originating from the work of Mezirow, 1997) that suggests that education needs to be about beyond skills acquiring knowledge but it has to emancipate people, and the goal of education must be challenging what the learner thinks and the way he sees the world (Rogers in Nesbit et al., 2004). This kind of claim using transformative language might seem ambitious to part of the teachers who work in the regulated school education world; it might be that the aim of working in school education is to fundamentally change the learner (developing new skills or acquiring knowledge, something resulting for them in seeing the world in a new way.

Jarvis (2010) says that learning can be done either in a reactive or proactive way. In the situation of reactive learning, students learn through adaptation, imitation, and instruction. Jarvis argues that in the proactive learning situation, students learn through practice, planning, exploration, and experimentation. For a learner to have agency, he has to choose between the passive 'me' and the proactive 'I'- associated with self-determination and autonomy. Learners have to keep themselves distant from the 'me' who is reactive and receives knowledge and information and to move towards the 'I' who is proactive and brings new understanding and meaning.

Learning is not only about memorizing contents but is an experience; it may be transformative and is beyond the sum of all course readings (Bonwell & Eison, 1991). The extent to which learning can be transformative depends on the content of what is being taught, and the way it is taught, and the predisposition of the learner. Mezirow (1997) explains that transformative learning is a process of effecting change in the frame of reference and that adults acquired a coherent body of experience- associations, concept, values, feelings, conditioned responses- frames of reference which define their life world. One of the basic characteristics of meaningful learning is critical thinking (Bonwell & Eison, 1991; Denicolo et al., 1992; Rogers & Freiberg, 1994; Berry, 2008), and if students are encouraged to adopt a critical approach to what they learn, then this can be a way to achieve Mezirow's transformation in which there is change the way a student understands the world.

1.5 Implementing Generally Outlined Education Reforms

Some reforms do not include specific improvement programs; instead, a broad policy framework is provided, allowing school leaders to exercise discretion as to how they intend to meet its goals (Peurach, 2011; Youngs, Holdgreve-Resendez, & Qian, 2011). The US

Comprehensive School Reform (CSR), for example, stated Adequate Yearly Progress (AYP) targets, against which schools would be evaluated and funded. It was up to school leaders to shape their own educational programs, integrating their own school's values and priorities with meeting the challenging state academic achievement standards (Patterson et al., 2013). Similarly, the British government recently initiated a curriculum innovation named 'the school improving, school-led system' (Greany, 2014, 2015), maximizing school autonomy while raising the accountability bar for schools, increasing diversity and choice for parents, and reducing the role of central and local government where possible. This reform initiative has been affecting almost every aspect of school life, depending on the capacity and confidence of school leaders to shape a school-led innovative curriculum in the face of England's sharp accountability system (Lupton & Thomson, 2015).

These generally-outlined education reforms, also known as inside-out or bottom-up reforms (Elmore, 2004; Birkland, 2010; Louis & Robinson, 2012), were designed to address the problem of policy incoherence, where there is a gap between the reform policy and school preferences, or where multiple reform initiatives are competing with one another. Policy incoherence often affects school improvement in a negative way, increasing cynicism and generating stress. Moreover, it waters down school leaders' and teachers' efforts, influencing educators' interpretation of the reform policy, which in turn may have implications for how they enact it (Russell & Bray, 2013). In this regard, policymakers around the world are widely advised that school autonomy balanced by accountability will lead to improved outcomes (Organisation for Economic Co-operation and Development, 2015). Indeed, the tensions between autonomy and accountability have been described as "part of the human condition and the political and economic environments of public education" (Bogotch, 2014, p. 319). The literature about reform implementation reveals that generally outlined education reforms may endow teachers with a sense of connectedness and ownership of the reform, but they may also fail to create a commitment to its goals (Birkland, 2010). When school leaders cannot create an "organizational self" that is minimally coherent, integrated, and self-consistent (Kraatz, 2009), a broad-policy reform will not help them establish a clear internal agenda. Even those school leaders who can create an "organizational self" are not necessarily able to integrate it with the external policy purpose (Datnow, 2002). Generally outlined education reforms may also fail when district leaders do not make the shift from a top-down authority relationship to a more collegial one, in which school leaders and policymakers work together to interweave internal

and external agendas (Coburn, 2003). Generally-outlined education reforms may falter in implementation if there is no shift in policymakers' roles that might enable school change.

Over time, policymakers tend to favor venues consistent with traditional top-down, rather than bottom-up, policymaking. Instead, policymakers should use implementers' decisions rather than their own preferences. In this conceptualization, policymakers work with implementers to clarify implementers' goals, strategies, and experiences, collaboratively determining which resources, policies, and other supports might enable implementation (Honig, 2004).

1.5.1 Factors influencing teachers' implementation of educational reform

It is widely agreed that the success and sustainability of educational reform implementation rely on the ability of teachers to change their beliefs and teaching practices to align with the reform (Spillane et al., 2006; Wyss et al., 2017). However, transforming teaching practices is a complex process that is influenced by various factors (Fullan, 2001; Buabeng-Andoh, 2012; Thurling et al., 2015). Fullan (2001) derived nine factors that influence the implementation of curriculum innovation. They are categorized into three groups: characteristics of change (need, clarity, complexity, quality/practicality), local characteristics (district, community, principal, teacher), and external characteristics (governments and other agencies). Spillane, Reiser, and Reimer (2002) proposed the "six P" model to explain teachers' various levels of reform implementation. The first P is the policy sector, including formal district, school, and informal policy. The second P is professional, referring to formal and informal contact between educators and teachers. The third P is pupils. The fourth P is the public, which includes people in the community, such as parents. The fifth P represents private companies, such as textbooks and curriculum publishers. The sixth P is personal resources, including knowledge, beliefs, and dispositions. These models try to broadly cover factors including the reform itself, the context, the educational system, and even the society. With a focus on teachers, Thurlings et al. (2015) reviewed the literature on factors that influence teachers' innovative behavior and proposed a preliminary model including demographic, individual, and organizational factors. Demographic factors include years of education and teaching experience and job functions as a teacher.

Individual factors consist of teacher beliefs, attitudes, and self-efficacy. Organizational factors refer to colleagues, organizational culture, facilities, and resources. Buabeng-Andoh (2012) reviewed factors related to teachers' adoption and integration of information and

communication technology and put them into three categories: personal factors (e.g., feelings, knowledge, and attitudes), institutional factors (e.g., training and facilities), and technological factors (e.g., ease of use, experience, and needs). The reviewed literature shows that the main factors related to teachers' implementation of curriculum reforms can be grouped into individual factors, including teacher beliefs, attitudes and self-efficacy, and contextual factors, such as school culture, training support, and resources.

Some researchers claim that individual factors have a more direct influence on teachers' behavior than contextual factors (Spillan & Zeuli, 1999; Cloud, 2014; Thurlings et al., 2015). Thurlings et al. (2015) suggest that "proximal factors, such as traits and motivation, are more closely related to behavior. Distal factors, such as environmental and organizational factors, act from a longer distance to behavior and are mediated by proximal variables" (p. 461). Spillane and Zeuli (1999) point out that in the six P model, the sixth P, personal resources (knowledge, beliefs, and dispositions) plays a central role. The other five Ps provide support and external resources for teachers to learn about reform and support their changing practice through personal factors.

Most of the literature on teachers' reactions to reform shows that their attitudes and perceived behavioral control are strong predictors of their behavior, while subjective norms are a relatively weaker predictor (Pynoo et al., 2012; Alhendal et al., 2016). For instance, Pynoo et al. (2012) analyzed responses from 919 teachers on their acceptance and use of an educational portal and found that the strongest predictors of behavioral intention were attitudes and perceived usefulness. Alhendal et al. (2016) also suggested that attitude and perceived behavioral control are the main predictors of intention and that subjective norms are not a significant predictor. Relevant studies have also found that although teachers may have positive attitudes, they can fail to implement necessary changes due to contextual factors such as time, resources, materials, and a lack of professional development (Milner et al., 2012). In addition, students play a key role in influencing teachers' reactions to reform. Sadaf, Newby, and Ertmer (2012) examined pre-service teachers' intention to use Web 2.0 technologies and suggested that "pre-service teachers were relatively more motivated by the value of this technology to facilitate students' learning and participation and address their future students' expectations regarding the use of web 2.0 technologies" (p.944). Alhendal et al. (2016) pointed out that professional development should provide evidence of students' learning outcomes and help teachers reflect on that learning, as their improvement is a considerable concern for teachers.

1.6 Education Policy and The Structure of The Education System in Israel

1.6.1 Educational policy in Israel and its influencing factors

In education policy, the main issues are related to the allocation of resources, the level of academic achievements, and the influence of various external factors. External factors include the role of the local education authorities as opposed to the national authorities, the role of parents in determining the educational content and the choice of school, and the influence of the political parties on the education system, including the appointment of supervisors, principals, and teachers. Other factors are civic society organizations, the courts and the media, the nature of the regime, its degree of centralization, and the size of the country (Kashti & Bar-On, 2003; Shmueli, 2003; Rash & Kfir, 2004).

Since its establishment, Israel has adopted a mostly declaratory educational policy, which has not been thoroughly discussed in government meetings and has never been formulated in a binding document. The law determined the structure of the education system and the distribution of powers, such that the Minister of Education and the Director-General of the Ministry of Education are the policy-makers appointed by law to supervise educational work in all its components. However, there are other factors which influence education, the pedagogic secretariat under the auspice of the Ministry of education, the Knesset (Israeli Parliament), professional organizations, the media, the Minister of Finance and his officials, the State Comptroller and the Academia (Shmueli, 2003). The education system in Israel has a centralized structure, and education policy is determined mainly by the Ministry of Education. Nonetheless, all Ministers of Education have had relied on academic experts. Later, the Chief Scientist became a subordinate to the minister and a partner in the shaping and formulation of educational policy (Shmueli, 2003, p.29). The Knesset also influences education policy in Israel within the framework of two forums: the plenum and the permanent committees, especially the Education and Culture Committee and the Finance Committee (Elboim-Dror, 1985). Education policy is discussed at the Education Committee in the Knesset, through direct queries to representatives of the Ministry of Education and of the Ministry of Finance in ongoing discussions on a variety of issues on the committee's agenda, as well as intervention in the ministry's work and policy formulation (Shmueli, 2003).

1.6.2 Structure of the education system in Israel and the state education law (1953)

The state school aims to create the shared social, cultural, and national basis of its future citizens. Therefore, it is characterized by class or ethnic integration to form social cohesion, a

joint curriculum aimed at transferring the shared cultural heritage, as well as national citizenship in order to convey a shared national vision that includes national values and social values. The operation of a state school model necessitates a decision at several important junctions in educational policy. Questions such as what is the system of authority for determining curricula? What is the role of parents in this context? How to ensure a certain level of equality? Must be addressed (Inbar, 1994). When discussing these questions, the diverse composition of Israeli society should be considered since the social reality in Israel includes various cultural worlds that coexist, though with many confrontations. The various layers of Israeli society link the past and present, East and West, tradition and modernity, and entail different national identities, leading to religious and cultural conflicts (Elior, 2000).

Until the State Education Law was enacted in 1953, State education was provided in the Jewish sector, not through state-run schools, with a uniform curriculum but through several streams of education that were connected to political streams. The primary goal of the State Education Law was to abolish the streams of education and to create statehood in education. Despite this declared purpose, the currents in education were not eliminated (Goldstein & Walderer, 1994). The State Education Law of 1953 recognized the split between the religious and the secular Jews, allowing the religious to maintain within the Ministry of Education a State Religious Education Division, alongside a smaller "education ministry" of independent education affiliated with the Agudath Israel Party and financed mainly by the state (Savirsky, 1995). The State Education Law, which recognized the autonomy of state-religious education, established a separate framework for institutions as well as the authority to determine policy. This autonomy is expressed in an independent administration within the framework of the Ministry of Education, which has no organizational equivalent in the non-religious state education system. Its authority is derived directly from the Council for State Religious Education.

Autonomy is also granted to the unofficial religious education sectors, both regarding their pedagogical content and their pedagogic supervision. However, similar autonomy was not given to the Arab population, and most of its educational institutions are included in the category of state education (Ben-Elia, 2000). In other words, state schools in Israel are divided so that national and religious groups are primarily separated, while the various Jewish ethnic groups are combined to create a joint Jewish national base. Arab and Druze educational systems were established in Arabic, and Circassian schools operate in their own language (Lam, 1996). However, unlike the approach towards the Jewish religious and ultra-Orthodox sectors, the state did not recognize the right of the Arabs to educate according to their cultural preferences within

the state education system. Therefore, the Israeli educational system in Arabic does not enjoy pedagogic or management autonomy, and the state controls the curricula and appointments (Al-Haj, 1998; Walzer, 2007).

1.6.3 Education Policy in Israel since the establishment of the state until the 1970s- the melting pot and integration policy

Despite the different ethnic and religious groups that make up Israeli society, since the establishment of the State of Israel, an attempt was made to shape the identity of the members of the Jewish group. This identity excludes the Arab group from the Israeli identity (Mautner, Sagi, and Shamir, 1998). The roots of this policy can be found in the 1950s' "melting pot" approach, which aimed at assimilating the new Jewish immigrants and form a new homogeneous Jewish national identity in the education system. In practice, the melting pot policy referred to Jews only, while at the same time, the Arabs in Israel were excluded from the discussion of education. When the melting pot vision and the integration of cultures failed, as the inequality between Mizrahim and Ashkenazim increased, the integration policy was introduced in 1968. The integration policy was inspired by the relationship between blacks and whites in the United States and by the mass migration of Europeans to the United States.

The integration policy was raised as a means of reforming high school education, which consisted mainly of transitioning from a system of eight elementary and four high school classes to a system of six years, three junior high, and three high school grades. This method, which was designed to provide high school students six years of preparation for the university, was met with much resistance on the grounds that it promoted the social elite only. Only after the notion of integration was introduced, whereby the students of immigrant neighborhoods were able to join the students of the veteran neighborhoods of the junior high school, did the reform receive broad public support and Knesset approval. Although the integration program also referred to the Arabs, in practice, they remained excluded. Once again, it became apparent that the education policy and the public debate on education in Israel are only Jewish, valued solely by their contribution to the building of the nation (Savirsky, 1995; Levy, 2005).

1.6.4 The 1970s and onwards - the influence of neo-liberal ideology on education

Since the 1970s, neoliberal ideology has gradually taken the place of Keynesian economic thought in the United States and European countries, at the center of which was the commitment to the establishment of a welfare state and the provision of social services to all. The neoliberal

ideology emphasizes the "weak" state, that is, a state with limited powers and minimal involvement in the social and economic life. Nonetheless, in the field of education, the neoliberal state applies a dual approach. On the one hand, the weakening of the country is manifested in the reduction of its involvement in the management of the education system, in the decrease in public resources, and the introduction of market mechanisms. On the other hand, the state is strengthening its involvement in the formation of citizens with the skills required by neo-liberal globalization, who are loyal to the national collective and its goals. In its efforts to promote these conflicting objectives, the state acts indirectly and develops a tight system of remote control and regulation (Dahan & Yona, 2005).

A neo-liberal policy leads to inequality, alienation, poverty, and other anti-social phenomena. Therefore, the state's unwillingness to take steps to correct the anti-social consequences of the policy leads to social unrest and a potential threat to the regime's public legitimacy. To solve this crisis of legitimacy, the state transferred the responsibility for state education to local authorities and schools, thereby avoiding the possibility of social failures and damage. Consequently, the state creates market-like arrangements, inter alia, by privatizing the provision of services from the public sector to private entities, regarding schools as autonomous units economically and administratively, as well as adopting policies that encourage competition over the students between the schools (Dahan & Yona, 2005). Under the influence of the rise of international neoliberal ideology, a change took place in Israel in the 1980s. The change was reflected in the fact that education policy was no longer directed to preserve social cohesion but rather to a strategy aimed at promoting the potential of the individual pupil (Yogev, 2007).

According to Agbaria (2007), the neoliberal ideology of globalization dislocates the Arab education system in Israel from moral, social, and national education. The state is tightening its indirect and covert control over the Palestinian minority in Israel. Studies of neoliberal reforms in education in Western countries have shown that they primarily affect the disadvantaged groups in the education system. The challenge facing the underprivileged groups is to cope with the implications of the power gaps created by globalization and to oppose the hegemony it establishes by imposing uniform standards of language, ethics, politics, and consumerism. The same applies to Arab education. The change in educational ideology has, in fact, exacerbated the marginalization of Arab education. When the school defines its role as primarily responsible for the achievements of its students and less for their moral education, it reduces its weight in the moral socialization of its students. Moreover, the urgent pursuit of

outstanding accomplishments and meeting standards generates a situation in which there is apparently not enough time and space for discussions on values and education for national and cultural identity. The result is an increasing trend of de-politicization of education in schools. Consequently, pressing questions relating to the collective character of Palestinian society in Israel are pushed aside for "more important" purposes. Essential issues for the Arab student, such as natives, religion, secularism, ethnicity, and more, are overcome by the desire to "succeed." In other words, through the practices of the neoliberal discourse, the state succeeds in exercising effective indirect control, which replaces direct control by the security forces and other forces and marginalizes the value of education. Furthermore, focusing on achievement expresses the parents' expectation that the school will be a tool for social mobility. However, given the structural barriers of the higher education and employment systems, this mobility is no more than an illusion. According to Agbaria, this illusion enables the state to maintain its control of the minority (Agbaria, 2007).

Thus, especially in the 1980s, the education system reflects a structural social change taking place in Israeli society, which symbolizes the intensification of liberalization processes combined with the strengthening of a market economy. Accordingly, the education system has become one of the leading social action areas of various civic groups, who seek to promote social and political interests by challenging the state education system. In this context, two processes are prominent: the expansion of sectoral education streams and the intervention and supervision of parents in the educational process (Levy, Lomsky-Feder, & Harel, 2007). The demands of the parents are, in fact, part of a general cultural change that emphasizes the rights of the individual above all. The economic discourse of a free market and open competition is introduced into the field of education as a lever for streamlining the school (Rasisi, 1997; Rash & Kfir, 2004).

Further to the process of democratization in Israel, the free market, and the return to the communal structure following the events in Britain and the United States, local processes joined of the decade known as "73-83" contributed to educational reforms. This decade began with the 1973 Yom Kippur War, continuing with the first political upheaval (1977), Peace with Egypt (1978), and the end of the Peace for Galilee War in 1982. These events, which in the 1980s led to a change in socioeconomic trends and ideological goals, have transformed Israeli society into a divided nation characterized by economic development among certain strata, return to religion and tradition among other strata, multiculturalism, the deepening of the Jewish-Arab rift, as well as the deepening dispute over Greater Israel. These processes have

affected the education system, and it seems that decentralization, privatization of public education services, and autonomy are their primary outcome (Givaton, 2003; Kashti & Bar-On, 2003).

Givaton (2003) found that during the 1980s, educational systems and schools with characteristics were established in Israel (such as Ma'ayan Hahinuch Hatorani, Kedma, democratic schools, immigrant schools, autonomous schools, community schools, Humanistic education). The characteristic feature of those establishments is that their founding was not accompanied by primary or secondary legislation. Some of them were established without the approval of the Ministry of Education, who even fought them over time until their existence was at some point excepted. In other words, about one-third to one-half of the state education system is in various stages of distancing itself from the main streams determined by the law.

In the 1990s, under the influence of similar discourses in the Western world, ideas for improving the education system, which included the "striving for excellence in education," grew stronger, as well as the demand to allow parents to become actively involved, including choosing the school in which the children would study. Furthermore, the discourse on multiculturalism, which is gaining momentum, has been integrated into the critical approaches that view the integration as a repressive strategy that ensures the preservation of the primacy of the established group (Rasisi, 1997; Yinon & Noy, 1997; Rash & Kfir, 2004).

1.6.5 Transition from collective values to multicultural values and the reform in the goals of education in law (2000)

As a result of the solidification of liberal values among leading groups in Israeli society, a discourse of rights arose in Israel. Various cultural groups (such as Mizrahim, immigrants, religious groups) have become more aware of the rights granted to them or learned how to use the discourse of rights to obtain their goals. These groups were no longer content with the characteristics of the collective identity and began to make demands to protect their identity and achieve the conditions for the further development of this identity (Mautner, Sagi, & Shamir, 1998). Increasing the legitimacy of multiculturalism, stemming from the awakening of cultural groups that promote the politics of sectors such as feminist groups, Palestinian, Mizrahi, immigrants, and so forth, also has an impact on Israel's education policy (Yona & Shenhav, 2000).

For most of the twentieth century, curricula in Hebrew education were derived from the goals of Zionism, which sought to build a modern nation, and the ideology that underlay the plans was national, central, and collectivist. The demand for uniform educational programs increased with the mass immigration due to the fear among the veteran settlers that Israel might become a conflagration of languages and heritages. Therefore, the first curricula reflected the social hegemony of the founders who won the battle for the establishment of the state. However, the process of ideological and political polarization in the 1970s and 1980s and the development of identity politics in the 1990s influenced education (Matiash & Zabar Ben-Yehoshua, 2004).

Among the critics of the melting pot, there are voices of those wishing to turn Israel into a multi-cultural state, based on the assumption that every citizen has the right to live according to his culture., as this is one of the fundamental rights of a democratic state. While defending the country's minority cultures, this critique justified the demand of disadvantaged minorities to shape their unique curriculum, which would free them from the oppression of the existing symbolic order. Under the influence of the critique of the hegemonic education policy in Israel and the impact of the changes as mentioned earlier in Israeli society, a new education policy has been formulated. The new policy encompassed two directions: the education system continues to advance the national project of nation-building on the basis of the Zionist ethos, and multi-cultural demands of ethnic and national minority groups to recognize their right to cultivate their heritage are addressed. Accordingly, Israel's education system is currently in transition, in which nationalism is still anchored in the constitutional basis of state education. However, it contains arrangements designed to satisfy diverse cultural and social needs (Matias & Sabra Ben Yehoshua, 2004).

One manifestation of these changes materialized in February 2000 when the goals of education were redefined (section 2 of the State Education Law). The origins of the amendment are rooted in an attempt to adapt the old educational goals to today's reality to reach common goals for all three streams in the state education system: general state education, state-religious education, and Arab education while taking into account the needs of each sector. The explanatory notes to the law state that the goals of state education in section 2 were written more than forty years ago with the establishment of the state education system. However, in the meantime, changes have taken place in Israeli society and, in recent years, criticism has repeatedly been voiced regarding the unsuitability of the goals of today's educational reality.

This bill, submitted by the government in the 13th Knesset (1993), underwent a long process of consolidation and was finally approved after eight years. In the eight years since the

amendment to the law was proposed, during the tenure of Amnon Rubinstein as Minister of Education, until his final approval, during the tenure of Yossi Sarid as Minister of Education, two ministers of education from the National Religious Party (NRP) also served in office. The Bill proposal was approved for the first time in 1993, underwent a process of amendments for several years, and did not reach final parliament approval. In 1999 the bill was reintroduced by several members of Knesset and passed the second and third reading until it was finally approved as aforesaid in 2000. Knesset Education Committee Chairman Zevulun Orlev commented regarding the long process: "In the Knesset, this is perhaps the oldest bill that had undergone several transformations…this law was actually on the verge of a second and third reading in the previous Knesset, but for some reason, this did not happen…" (Protocol of the Education Ministry in the Knesset, November 1999, p.3).

One of the explanations for the long process is related to the questions raised regarding whether educational goals should be defined for each sector separately and the problematic nature of determining separate goals for Arab education. This dilemma is reflected in the words of former Minister of Education Amnon Rubinstein: "I say what is the main dilemma in this law [...] We have three streams in the state education system [...] We were struggling whether to decide on different goals for the three streams. To try to reach common goals [...] We knew that if separate goals were set for the Arab education and the Jewish state education, we would be entangled in complicated matters, in ideological disagreements, and we would not be able to pass the bill at all." Additional statements from Rubinstein reflect the in-depth examination that was required in order to formulate the amendment: "I will not talk about the long history of the law, but nevertheless I would like to point out that before the law was submitted to the Knesset (for second and third readings), for eight years, it has undergone a process of consultation with all stakeholders: The Ministry of Education, all the teachers' and principals' organizations, the State Religious Education Council and even a kind of survey at an education exhibition so that teachers and students would respond to this." (ibid, p.3).

The decision not to set separate goals for every stream in education caused controversy between the Arab and Jewish members of the Knesset committee that drafted the amendment in 1999. For example, former MK Azmi Bishara, speaking at the Knesset Committee, said: "I want to testify that this proposal though it provides progress in comparison to past educational goals [...] Nevertheless, these goals are important in terms of the dominant culture, in terms of cultural hegemony [...] I believe that the goals of state education should be shared by all citizens, we should educate for shared citizenship. However, these goals cannot come instead of unique

educational goals [...] the Religious state education is allowed to adopt a unique approach, but the Arab education system receives no unique approach [...] I still insist that we need different Arab education goals." (ibid., p.4).

As stated, after many lengthy discussions and doubts, the amendment was adopted in section 2, sub-section 11 of the State Education Law, which states that "the unique language, culture, history, heritage and traditions of the Arab population and other population groups in the State of Israel must be acknowledged and recognized as equal rights of all citizens of Israel. The words "Arab history" and "the Arab population" were added to the amendment upon the explicit request of the Arab representatives who participated in the deliberations of the Education Committee. As part of an attempt to overcome the gap between their demands and the wording of the proposed amendment. This is reflected in Bishara's remarks: "I think in paragraph 11 it is time to say the word "Arabs" and "Arab population," they are at least 20% of the population. We have to recognize their national character and not to repeat Muslims, Christians, and Druze every time." The chairman of the committee, Zevulun Orlev, responded to this proposal: "I have no objection to adding the word 'history.' I am open to this. In paragraph 11, we add the word 'history' and the words 'Arab population.' In this, we acknowledge the uniqueness, which was not until today." (ibid., 7-17).

The uniqueness that Orlev mentioned is related to the fact that since the enactment of the State Education Law (1953) until 2000, the Arabs as a group have not explicitly specified the goals of education and have not addressed their unique needs. In addition to the general formulation of respect for different cultures and perspectives, the law contained no mention of the Arabs (Benzamin & Mansour, 1992; Rabin, 2002; Abu Saad, 2006; Jabareen, 2006; Abu Asbah, 2007). Furthermore, the goals of Arab education were a topic of controversy from the establishment of the State of Israel until the amendment of the Bill of Education. The question of whether the schools should educate Arabs to be knowledgeable and Hebrew speakers or Arab citizens who are loyal to the state, what is the nature of loyalty to the state, and whether and how to emphasize the national and cultural uniqueness of the Arabs in Israel without jeopardizing loyalty to the state were at stake (Benziman & Mansour, 1992).

At the center of the public debate that took place in the country in the 1950s, several views were prominent. One argument called for assimilation of the Arab population within the Jewish majority and their complete integration. A second opinion stated that the State of Israel should not aspire to assimilate the Arabs in the Jewish majority and that Arab youth should be an education in a general liberal-humanistic spirit that would be neutral and develop their

personality. Eventually, these two approaches were rejected, and a third approach was adopted, which stated that the Arab minority in Israel should be given a humanistic Israeli-Arab education. Furthermore, students of Arab education must be provided Israeli civic education - loyalty and observance of the laws of the state, as well as knowledge of the history, religion, and literature of the Jews. The assumption was that this would help the Arab minority recognize and understand the Jewish majority. Accordingly, the Israeli government did not define particular goals for the Arab education system, and the goals of state education in Israel, as outlined in section 2 of the State Education Law in 1953, also officially referred to Jews as well as Arabs (Sarsur, 1985). The goals set, Sarsur argues, were not suited to the needs and aspirations of the Arab population, and this position is shared by both Jews and Arabs who study or are related to education policy in Israel by virtue of their role (Eden, 1991; Abu-Asbah, 2001; Rabin, 2002; Shmueli, 2003; Abu-Saad, 2006; Jabareen, 2006).

In the Education Planning Project of the 1980s, Peled Elad, the Director-General of the Ministry of Education and Culture in the years 1970-1976, enumerated several constraints that influenced the definition of the goals of education in the State Education Law of 1953. The first limitation is related to the State of Israel. In the Zionism perception, Israel is the home of the Jews and the solution to the problem of the Jews in the world. Likewise, Zionism stresses the partnership of Jewish fate and the vision of Jewish culture as a historical continuum and with the experience of the Holocaust at the center of its existence. Additional constraints identified by Peled are the State of Israel's aspiration for social justice and equal opportunities, regardless of origin, religion, and so on, as well as Israel's linkage to universal, humane moral values. However, according to Peled, the goals of education formulated in the State Education Law (1953) are no longer suitable for both the Jewish majority and the Arab minority. Some of the wording of the law has different meanings over the years than those intended by its initiators and due to their vagueness and lack of reference to current and future issues (Peled, 1976). As mentioned above, other stakeholders share Peled's concerns.

One of the expressions of criticism of the failure to address educational goals and their incompatibility with Arab aspirations can be found in the words of Emmanuel Kopelevich, who for many years served as the director of the Education and Culture Division for the Arabs: "When the legislator defined the goals of Israeli education as a whole, the Arab population was not brought into consideration. Although most of the goals set out in Article 2 of this law (the achievements of science, training at work, aspiration for a society based on freedom, equality, tolerance, mutual help, and love of people) are also appropriate for the Arab student, the

application of two other goals, loyalty to the Jewish people, values of Israeli culture raise doubts. After all, we cannot and will not want to instill in the hearts of the Arab students' recognition of shared destiny with the Jewish people, and thus the primary goal of Arab education should be to place the imparting of Arab culture " (Kopelevich, 1973, p. 325).

Thus, in 2000, due to the deficiencies in the goals of education and the criticism over their disregard of the changes in Israeli society and its needs, the amendment to the goals of education in the State Education Law (section 2, sub-section 11) was introduced. The creation of this amendment is rooted, as described above, in ideological changes in Israeli society and the field of education, in the rise of the multicultural discourse in Israel, and in the demands of groups to recognize their unique identity within the framework of school curricula. Furthermore, the peace process at the time of the enactment of the law encouraged this move among members of the education system and Knesset members, headed by Education Minister Amnon Rubinstein, which marked a turning point in the Ministry of Education's attitude towards Arab education in Israel (Sarsur, 1999).

The Arab education system in Israel has undergone many changes since the establishment of the state. The discussion of the nature of the amendment, its meaning, and significance to the education system in the Arab sector remains incomplete without a description of the Arab system and the difficulties it has faced over the years, as well as attempts by the State of Israel to improve it through numerous committees and reforms. These commissions and reforms have been severely criticized by the Arab sector, along with claims of discrimination and inequality in the distribution of resources. Furthermore, there is a need to examine the nature and diversity of the curricula over the years, the implications related to the culture and characteristics of the Arab minority in Israel, and to the identity and achievements of Arab students in Israel. These may shed light on the nature of the demands of the Arab minority in Israel in education before and after the amendment.

1.6.6 Reforms and Agreements in Israeli Education in the Last Decade

The Dovrat Report

The Dovrat Report is a report written by a committee appointed by former Education Minister Limor Livnat in September 2003 to examine the state of education in Israel. The committee aimed to formulate a proposal to improve the education system by carrying out a wide-scale reform, both in the pedagogic dimension, in terms of education and budget. Multiple

stakeholders and experts were part of the process, many economists, lawyers, businessmen, and educators (Taskforce for promoting education in Israel, 2005). The primary objective of the program was to improve the results of students in all the subjects and to reduce the gaps between the various social strata. The program recognized the need to create a pedagogical-educational continuum that starts from kindergarten through elementary school through intermediate schools and high schools. Creating this continuum can lead to the realization of students' learning abilities and to the establishment of the aspirations of excellence that underlie this program.

On the practical level, the Dovrat Report recommended that the extended school day program is implemented in the schools until 16:00 from the perspective of the school as the "focus of educational activity," even after the lessons end. Furthermore, a primary curriculum was to be developed, which will constitute the core curriculum of all streams of recognized and state-supported education. Additionally, educational and professional standards were to be defined for each school, as well as goals for student achievements. Thus, the school will be examined mainly according to performance, as well as the efficient utilization of its budget. To this end, every director would be given freedom of choice in all matters relating to the use of the school's budget and would be granted organizational and pedagogical autonomy to achieve the goals set. Moreover, the school principal will be responsible for receiving the teachers, evaluating their work within the school within the framework of the accepted procedures.

The Dovrat Report contained a series of recommendations regarding the change in teacher's terms of employment and upgrading their salaries, as well as stipulations for teachers' compensation according to their achievements and the method of training teachers. Teachers' evaluations will accompany them throughout their careers in the education system. The Dovrat Report also proposes a reorganization of the entire system, setting a target of three levels of management only- the Ministry of Education, which will be responsible for long-term programs, policy setting, budgeting of the education system, setting goals, and more. Regional educational authorities, which will supervise the educational institutions within their vicinity and operated to connect between them and the Ministry of Education and its goals. Finally, the educational institutions themselves, in which, as mentioned above, the principals will be given an autonomous ability to determine the form of internal organization, the division of the budget, and more. Also, the National Authority for Measurement and Evaluation (RAMA) will be established, whose role will be to lead the measurement and evaluation of schools in all matters

relating to targets set by the Ministry of Education. The Authority will publish quarterly reports of all schools.

To implement all of the recommendations, the Dovrat Committee suggested two different actions: The Public Education Law, which will replace, all prior legislation regarding education..." (Taskforce for promoting education in Israel, 2005, p.34); change the teachers' salaries and work conditions by anchoring the terms in collective agreements between the Ministry of Education and the teachers' organizations. The possibility of employing a limited number of teachers on a personal contract basis will remain.

The Dovrat Committee's recommendations were harshly criticized: it required considerable financial investment, though the Ministry of Finance has committed to funding the implementation of the report; the establishment of regional educational centers and the transfer of authority and budgets from the Ministry of Education to the centers and schools will encourage gaps and strengthen the strong schools over the week schools; The application of market rules and the principles taken from the business arena and management will lead, among other things, to an increase in the gaps between weak and strong students, the vanishing of education for values; The report's recommendations dictate the "how"; the reform that is mainly organizational and administrative. Further criticism was expressed that teachers' representatives were not included in the committee's deliberations, indicating that teachers are not perceived as genuine partners in the proposed reform. As a result of this criticism, the committee's recommendations did not materialize. Nonetheless, the issue of education and its problems was put to the top of the public agenda, and the matter of major reform in education in Israel aroused significant public and media interest.

The "Ofek Hadash Reform" (New Horizon)

The reform began with a collective agreement signed between the Government of Israel and the Teachers' Union in August 2008, according to which the implementation of the reform in 2014 is expected to be completed in secondary schools and junior high schools. The negotiations before the signing of the agreement were conducted with the intention of the Israeli government to conduct the reform in the high schools, and as a result, the negotiations were conducted with the Teachers' Union, representing the teachers in elementary and junior high schools.

The “Ofek Hadash” reform is based on a partial implementation of the conclusions of the Dovrat Committee, with the main conclusion being the granting of autonomy to the schools. The school timetable will be based on flexible time units. The school will be free to utilize these units according to its characteristics. The only constraint restricting the autonomy of schools relates to the relative proportion that the school assigns on the basis of disciplines. 75% of the six-year study period is allocated to the underlying curriculum, while the remaining 25% can be used freely by the school.

The “Ofek Hadash” reform focuses on the reorganization of the teachers’ working environment: providing a comfortable working environment and private spaces for teachers. Restructuring of working hours, which determines that new teachers will spend an average of 26 hours of frontal learning, 5 hours of individual study, and 5 hours of school attendance to participate in various tasks. Professional development is also key to the satisfaction and work of the school staff.

In return, the teachers will receive a salary increase according to different levels, depending on their seniority, degree, and the tasks they perform. The reform also details the conditions the teacher must meet to receive a salary increment and how long it takes to earn these salary increases, reflecting global reforms that focus on school autonomy such as the Massachusetts Reform (1993), which focused on changing and expanding curricula Autonomously and in a controlled manner.

The ”Oz La Tmura” Reform (The Courage to Change)

The “Oz La Tmura” reform is the most extensive reform ever undertaken in upper-secondary education. It aims to bring about a fundamental change in the pedagogical aspect, in the administrative field, and in terms of employing the teachers. The reform was implemented gradually from the school year (2011-2012) according to a collective agreement signed in August 2011 between the Union of Local Authorities and the Organization of Teachers in Secondary Schools. The negotiations were carried out with the assistance and guidance of the Ministry of Education and the Ministry of Finance and stem from the government’s desire to invest in education and to implement reforms in the education system. Like “Ofek Hadash,” the reform includes changes in the structure of the teachers’ working week (beyond a 40-hour workweek), teachers’ salary structure (average salary increases of 42%), and the structure of their hours. Also, teachers’ evaluation processes and their advancement were arranged, and an

outline was determined for the establishment of appropriate working space for individual instruction and work during teaching support hours ("Oz La Tmura" agreement, 2011).

To summarize: To this day, education in Israel has been in the course of the "Ofek Hadash" and "Oz La Tmura" reforms, which aimed at addressing the acute problems facing the system: Inflexibility of a centralized system, the inability to meet local needs, and the wearing in the status and authority of the teacher and the principal. Much of this reform is related to international standardization, which forces the Israeli education system to align with it. Israel devotes a relatively high proportion of its budget to education, students' achievements in comparative tests such as the TIMMS and PISA tests continue to deteriorate. The challenges are many, and it is imperative to continue the reforms that will be initiated in education because education is one of the most important investments a country can make to improve its future. Investment in education is a long-term investment, and its positive and negative benefits are evident only after a long time.

1.7 Arab Society and Arab Education in Israel

1.7.1 Arab society in Israel

The Palestinian citizens of the State of Israel are a unique national minority that at the end of 2016 numbered 1.67 million and constituted 20.6% of the country's population (CBS, 2016). This is a former majority that became a minority overnight on its land (Morris, 1991). In contrary to other minorities around the world, this is not a group that immigrated but a group of natives who have become a minority. As a citizen of a country officially defined as a Jewish state and not a state of all its citizens, Arab citizens of Israel face a constant conflict of identity (Rouhana, 1997). In practice, the collective identity of the Arab Palestinian community in Israel includes several components: citizenship (Israeli), nationality (Palestinian), ethnicity (Arabic), and religion (Muslim, Christian, or Druze). Israeli Arabs perceive their identity as consisting of a combination of the four ingredients, a delicate balance between them, or one identity that replaces another identity (Smooha, 1998). This ongoing conflict of identity that changes according to the changing circumstances (Diab & Mi'ari, 2007) provokes a multifaceted discussion on issues such as "ethnic democracy" (Smooha, 2002, p. 478), "Multiculturalism" (Yona and Shenhav, 2005, p. 28), "Palestinian natives" and Israel as "ethnocracy" (Yiftachel & Ghanem, 2004, p.648). Many Arabs in Israel believe that the development of Palestinian

society in Israel is not a natural development but an actual product of a crisis (Ghanem & Rouhana, 2001; Abu-Lughod, 2010).

Though they are the most significant minority in the country (CBS, 2016), the Arab population suffers from discrimination in government policy, which results in deprivation in almost all areas (Suleiman, 2002). In the political aspect, Palestinian citizens of Israel have not succeeded in turning their demographic share into political power. 53% of the Arab population is below the poverty line (National Insurance Institute, 2018). In terms of employment, Palestinian citizens of Israel find it difficult to enter the labor market (Sikkuy, 2004), and most jobs related to security are closed to them (Khamaisi, 2009). However, although most Arabs live in separate communities, they are in constant contact with the Jewish population through work, commerce, and education.

The socio-economic structure of Arab society in Israel has undergone an accelerated change in recent decades. Different scholars perceive in various ways Arab society in Israel - either as a traditional society or as a society in the transition from conventional norms and values to modernity. Although the identity of Arabs in Israel is usually described in terms of a tension between traditional and modern values, this description ignores the dimension of the structural occupation that the Arab minority suffers among the citizens of the State of Israel (Abu-Baker, 2002; Arar, 2010).

1.7.2 Arab education in Israel

Jewish and Arab educational systems in Israel exist as two separate systems and are not equal in the funds they receive from the three sources of education income: the state, the local authority, and the parents. The state distributes resources while continuing to discriminate against Arab education. The local authority is also discriminated against in comparison with the authorities in Jewish localities, which affects the number of resources it allocates to education. Finally, most parents in the Arab sector belong to a low socio-economic cluster. Thus, their limited participation in educational expenses does not improve inequality and even widens the gap (Arar, 2010; Abu-Asbah, 2013).

The participation levels of Arab students in higher education are relatively low compared with the participation rates of Jewish students. This is the result of the deficiencies in the Arab education system but also of inherent barriers that constitute an integral part of the demands of higher education and lead to the inferiority of the Arab students (Arar & Mustafa, 2011). The

Arab educational system is entirely separate from the Jewish education system, located in different geographic regions, a different language, and a different culture. Both education systems are separate but not equal (Golan-Agnon, 2006). The data over the years indicate inequality, deprivation of budgets and curricula that respect Arab culture and identity, as well as inequality in the representation of Arabs in planning, supervision, and management positions (Addi-Raccah, 2006; Golan-Agnon, 2006).

1.7.3 Curriculum, identity, and culture

State laws and regulations relating to state education apply to the Arab education system, which is structured and managed according to the Jewish education system. The Ministry of Education and Culture oversees Arab schools and textbooks, while local Arab authorities are responsible for the provision and maintenance of services to schools. There are also private schools in the Arab sector, mostly belonging to the church and receiving small government support (Gaziel, 1993). These schools are also adequately supervised by the Ministry of Education, operate according to the official curricula, and their graduates take regular matriculation exams (Abu-Asbah, 2007).

The Compulsory Education Law (1949) officially promised education for all children in Israel, but due to the lack of buildings and facilities, it was not implemented in Arab schools for a long time. In 1952 an Arab Education Council was established with Jewish and Arab educators, in addition to the Department of Arab Education of the Ministry of Education. The Department of Arab Education was responsible for the curricula, teachers, and administrative aspects of Arab education. The absence of defined goals and the lack of a structure for this department caused it to ignore many important issues that influenced Arab education. This situation prevailed until 1958, when the Ministry of Education defined the status of the Department of Education for Arabs and its goals and changed its name to the Education Division for Arabs. Under the new goals, the Arab Education Division operated as a semi-autonomous body directly responsible for Arab schools and headed by Jews. Moreover, until the end of the 1950s, the division of authority between the Ministry of Education and the military administration was vague, and in various places, the military governors intervened in the life of the Arab schools (Al-Haj, 1996).

Unique curricula for Arab education in the fields of Arabic history, literature, and literature were written in the 1950s and were designed several times in the two decades that followed.

However, among Arab academics and educators, there has been considerable criticism of these programs on the grounds that they are intended to prevent the development of Arab cultural and national contexts. There were no literary works and significant contents in Arab culture. The goals of the programs were vague, and there were no suitable textbooks. Following this criticism, the Yadlin Commission (1971) formulated the objectives of the education system in the Arab sector (Mar'i & Amara, 2002).

The importance of the Yadlin document was that for the first-time public attention in Israel was given to the uniqueness of Arab education. However, much disapproval has been expressed by Arab leaders and educators for the committee's recommendations. The committee's recommendations were criticized that they are trying to impose on Arab students the values accepted by Israeli Jewish society, creating a unique "Israeli Arab" detached from his nationality and cultural roots. Furthermore, they fail to provide a solution to the conflict between the Arab desire to live in peace within the framework of the state and the identification with the Arab people (Al-Haj, 1994a; Mar'i & Amara, 2002; Levy, 2005). Thus, even before the Arab education system was prepared to implement the Yadlin document, the Arab Education Planning Committee began to discuss the formulation of new goals for the Arab sector in the 1980s. Due to the criticism of the Yadlin report, the Peled Committee was established in 1975 under the direction of Dr. Mati Peled, which included Arab and Jewish educators, who were instructed to outline the goals of Arab education.

The Peled Commission Report stresses the importance of Arab culture in Arab education and the need for new goals in the curriculum. Therefore, based on the committee's recommendations, new objectives were formulated for all subjects taught in Arab schools, and new curricula were prepared (Al-Haj, 1994a). Nevertheless, this committee was also criticized for failing to distinguish between education for Arabism and education for Palestinianism. Unable to resolve the fundamental contradiction between the identity of the Arabs as citizens of Israel and Palestinian people, who were forced to separate from the Palestinian people and ignored their Palestinian nationalism (Levy, 2005).

Some of the contents and objectives of the curricula formulated by the Peled Committee showed an improvement, and in the instruction in the Arabic language for the first time was an apparent reference to the importance of language in shaping the student's personality and imparting knowledge about his national heritage. However, of the twelve new goals for teaching Arabic in Arab schools, only one objective explicitly addressed the student's pride in the Arabic language and as a central component of his personality. The other goals are general

and aimed at improving the students' Arabic skills, the ability to read and understand literature, the ability to express themselves, and impart human values through Arabic literature and world literature.

In other words, in the new curriculum that was formulated, there are still flaws, especially on the Palestinian issue. Though the new curriculum includes significant Palestinian writers and poets, others are missing, and the selection of works is biased. Songs and Romans approved by the curriculum committee were omitted. Also, teaching hours for Palestinian literature are insufficient to cover the required material (Al-Haj, 1994a). Despite the improvement in teaching Arabic, there are still pedagogical deficiencies and a lack of hours in this profession. These have significant effects on students' achievements and the formation of their national identity. One of the difficulties that arise in this context is the status of the Arabic language and the way it is taught in Arab schools. According to Prof. Mevarech Zamira, who relies on the PISA test in 2002, the Arab sector is lagging behind in reading comprehension, so that 60 percent of Arab students in Israel have difficulty reading comprehension, compared to 30 percent of Jewish students. Dr. Elinor Hadad, who is responsible for the Arab sector in the report on the test, claims that one of the reasons for the low result is the gap between spoken Arabic and the literary language. "…Today, there is no exposure of the Arab pupils to the literary language, at school, they are learning spoken Arabic and don't see a value in learning the literary language" (Mei Ami, 2003, p. 4).

The results of the national and matriculation exams also indicate that there is a lack of mastery of Arabic. This lack of proficiency can be attributed to internal factors and external factors. The internal factors are related to the socio-economic situation in Israel of the Arab residents, the widespread use of words and phrases from the Hebrew language among the Arabic speakers, and the dialogical situation of the Arabic language. One of the main characteristics of the diglossic state is the absolute functional division between the literary language and the local dialect. In other words, the literary language is intended for specific functions and is spoken to other services. Literary Arabic is used mainly in Arabic language classes, so the use of literary language is limited only to the formal realm and is one of the factors that lead to the students' low achievements in Arabic (Amara & Mar'i, 1999).

The external factors in the lack of proficiency in Arabic are the inadequate training of teachers, a shortage of hours of study, and outdated study programs (Ministry of Education, 2008). Other external factors are related to the policy of control and supervision exercised by the Ministry of Education on the Arab education system in general and language education in particular, as

well as the dominance of the Hebrew language (Amara and Mar'i, 1999). In this context, Shohami (1996, p.250) argues that the unique characteristic of Israel is that linguistic policy is derived and driven by ideology. The place of the state was rooted in the perception that the Hebrew language played a central role in the nation's creation in the country. Thus, other languages were marginalized, and Hebrew became the language used in all areas of life. This linguistic policy also affected education. However, Al-Haj contends that since self-expression is also a national expression, the Ministry of Education has made every effort to ensure that Arabic instruction will not serve as a channel for the transfer of symbols. Moreover, over time, there is a clear trend in Arab schools of strengthening the status of teaching Hebrew at the expense of the mother tongue (ibid.).

As for history studies, Arab academics maintain that the Jewish student is educated on national Jewish content and the contribution of his people to human culture, while the Arab student is prevented from learning such aspects of Arab identity. In general, both sectors devote equal time for history lessons. However, the time devoted to history lessons in the Arab sector is not identical to the time devoted to the study of Jewish history in the Jewish sector (Al-Haj, 1996; Abu-Asbah, 2001). A comparison between the goals of teaching history in Hebrew and Arab schools until the 1970s indicates that while in Hebrew schools the emphasis is on national content, Arab schools ignore this aspect. The values of Arab-Jewish coexistence, with the superiority of the Jews, are rooted in the Arab student, who is expected to know the importance of the State of Israel to the Jewish people, not to the Jews and the Arabs. Since the early 1970s, the Education Ministry has begun to revise the curriculum. The main change in the history curriculum, compared to the old one, is the identification of the Arab nation as a central goal. At the same time, the new version, carefully phrased, is far from being parallel to the goals of teaching history in Hebrew schools, and the Arab nation is mentioned in general, without reference to the Palestinian people. Moreover, contemporary Palestinian history and the history of the Arab national movement are not obligatory but rather a choice. Students who do not study an extended program in history have no chance of learning anything related to the Israeli-Arab conflict and Israeli-Palestinian relations (Al-Haj, 1994a). Similar arguments regarding the inadequacy of curricula for the needs of the Arab population in Israel are also expressed in religious studies.

In the first programs in this field, Arab students learned more about the Jewish religion than about their own. The Qur'an was not taught as a holy book but as a literary work, while the Mishnah and Talmud were studied as national religious texts (Al-Haj, 1996). Since the 1970s,

there have been several attempts to develop a curriculum for the teaching of Islamic religion, but only in 1987, a select committee was set up to form a study program, whose members were Arab educators and Sharia judges. The new curriculum for the teaching of Islam has a significant change compared with previous plans, yet national-religious education is still vague and is not appropriately reflected in the textbooks. Additionally, the fact that the new program began in high school deepens the gap between the new curriculum and the old curriculum used in primary school (Al-Haj, 1994a). In the previous program, the goals were vague on some critical issues that affect relations between Jews and Arabs, and it failed to address the differences between Jews and Arabs and the fact that the Arabs are deprived citizens in Israel (Al-Haj, 1994a). The goals of the new program, which began in the late 1990s, relate, for the first time, to political issues, to the connection between Arabs in Israel and the Arab world, to an understanding of the problems of the Arab population and its ability to influence and demand rights.

This curriculum stems from the increasing awareness of the Ministry of Education of the tensions inherent in the definition of the State of Israel as a Jewish and democratic state, the conflicts between different groups within Israeli society, and the question of its interpretation and educational challenge. However, the Committee for the Examination of the Curriculum in civics decided to create a uniform curriculum for all sectors of state education on the assumption that Israeli citizenship is a common denominator for all sectors of Israeli society (Pinson, 2005). Despite the good intentions expressed by Ministry of Education officials, reading of how the textbook defines who is included under the Israeli-Palestinian collective exposes the ambivalence and diversity of discourses when it comes to discussing the concept of Israeli citizenship and the boundaries of the Israeli collective.

The present book seemingly adopts a pluralistic approach and presents a complex picture of the existing approaches in Israeli society regarding the nature of the state. However, the way the discussion is structured indicates that the book takes a clear stand on the question of the desired definition of the State of Israel (Pinson, 2005). For example, the book presents the various approaches that exist regarding the interpretation of the State of Israel as a Jewish state over a continuum. However, at the center of the continuum are the desired Zionist approaches. At the edges of the continuum is the "all its citizens" approach, which rejects the definition of the State of Israel as a Jewish state, and the "State of the Torah" approach, which rejects Israel as a democratic state. This is reflected in the textbook: "The various approaches to the definition of the State of Israel can be presented on a continuum ... At the opposite extreme is the approach

according to which the State of Israel must be the state of all its citizens, in which national identity is political and common to all citizens" (Ministry of Education, 2000, pp. 29-30).

Moreover, the book recognizes the fact that the Arab minority is a national minority and emphasizes the tensions arising from the existence of a Palestinian national minority in a Jewish nation-state. At the same time, the presentation of the difficulties that arise in this context is not structured in the textbook as a challenge to Israeli democracy or as a basis for the conception of Israeli citizenship (Pinson, 2005). One example of this is the discussion of the Law of Return. The Law of Return is described in the textbook as the central tenets of Zionism and the Zionist state. In this law, state founders sought to implement the "natural right" of every Jew to live in this country (Ministry of Education, 2000). However, the book does not expand the discussion about the problematic nature of the Law of Return, nor does it challenge the students to discuss the right of return claimed by the Arab Palestinians in Israel.

In this context, a few isolated lines are written at the end of the chapter: "There is a small Jewish minority in Israel, and a large majority of Arabs believe that the State of Israel is first and foremost a democratic state belonging to all its citizens, without distinction between different religions and nationalities. Supporters of this approach view the Law of Return as a discriminatory law which should be abolished, and in its stead a law that will determine the conditions of immigration and naturalization that are suitable for the State of Israel should be enacted." (Ministry of Education, 2000, p.268). In contrast to the various arguments presented by the state to favor Jews over non-Jews in the Law of Return, only one argument is presented in the study material, which deals with the violation of the right of equality of non-Jews. The issue of the right of return of the Palestinian Arabs in Israel is not raised at all. There is no mention that they claim it as part of their being a national minority, born in Israel, and there is no literary review that will present the students with the source of this right of return.

In this way, the learning material cuts off the student from the reality in Israel and constructs a partial worldview, even though the book ostensibly presents two opposing positions under the guise of pluralism. The purpose of the teaching is also not intended or expanded so that the teachers of citizenship can receive reliable and up-to-date information. The instructions given to the teacher in this context are: "The students will understand why the Law of Return and the Citizenship Law are part of the constitutional foundations of the State of Israel." The students will understand the arguments that support the debate on whether the Law of Return is discriminatory or discriminatory. (Ministry of Education- Guide for teaching citizenship, 2000, p. 65). It should be noted that these goals are common to both Jewish and Arab schools.

Interviews conducted by Pinson (2005) with educators indicate that the new curriculum in Civics has an understanding of the difficulties faced by Palestinian citizens of Israel, but there is also an expectation that they will accept their marginal status in the structured citizenship structure. One of the manifestations of this is presented in the book through the discussion of Israeli society on the issue of resolving the conflict and the borders of the state. The book is shaped as an argument within Jewish society only, the Palestinian minority is excluded from this political-ideological debate, and the book confirms the position of the Palestinian minority on the margins of the civil hierarchy. However, the new textbook states for the first time that the Arabs in Israel are an inseparable part of the Palestinian people, and issues that have been defined as "sensitive" (land, civil rights) are discussed more openly.

Another criticism that arises in connection with the curricula in the various subjects taught in the Arab school is related to the hidden messages transmitted through these programs. According to Abu-Asbah (2007), curricula usually present a world that does not reflect the reality of the Arab student. The student is unable to decipher the world presented and cannot identify with it. The result is helplessness and indifference towards the learning material and lack of motivation to learn. Beyond the deficiencies associated with the messages conveyed to the student within the framework of the school, the Arab school does not cope with issues that are on the public agenda at the level of the state at large and the level of the Arab population. Arab teachers in Israel exhibit indifference, lack of care, and fear of discussing current issues, even when anchored in the directives of the Director-General of the Ministry of Education. Abu-Asbah holds several explanations for this phenomenon. The first reason is the sense of the threat of external supervision, felt by Arab teachers as part of a minority population who is struggling with the State of Israel. These are accompanied by concern regarding the society's response to the teacher when the discussion concerns issues that are not agreed upon, the perception of the role of the teacher as a professional teacher rather than an educator, lack of pressure on the part of students and their parents to discuss the above issues, and the lack of knowledge, tools, and skills required to convey such problems (Al-Haj, 1996; Abu-Asbah, 2001).

1.7.4 Inequality in the allocation of material resources

In addition to the ideological aspect of Arab education, harsh criticism has been voiced over the years regarding the total deprivation and inequality in the allocation of material resources in Arab versus Jewish education. Researchers in the education system point to the existence of

a direct connection between the funds invested in the education system and the output, with the quantity and quality of resources primarily derived from the central government's policy (Abu-Asbah, 2007).

The picture emerging from studies of government policy toward the Arab education system shows a very low level of investment in the Arab sector compared to the Jewish population in many areas of education, such as the small number of hours of study per student, lack of supervision hours and training days, lack of equipment or outdated equipment, a vast shortage of libraries and books, low allocation of resources for special education, and more. The distribution of funds to the Arab student reaches only 30-40% of resources to the Jewish schools. Also, the Government of Israel provides a range of benefits and incentives to localities that have been recognized as a national priority area A. In practice, they are granted mainly to settlements and development towns, while the Arab communities receive a particularly small segment since most of them receive the status of a national priority area level B.

Arab education has less economic resources and management services than those provided to the Jewish system. There is no Arab education administration, although Arab students constitute 28.2% of the students in the State of Israel, and the state invests less per student. An Arab school receives a budget of 1.16 teaching hours per student, compared with 1.56 teaching hours per student in Jewish education. The investment in the education of the local authority in Arab localities is usually $ 40 per child, compared with an investment of $ 1,000 in the local authorities of several well-established communities (Arar & Abu-Asbah, 2013). All of these have an adverse and definite effect on the low achievements of Arab students and the high level of drop-out from schools relative to Jewish students in Israel (Al-Haj 1994b; Jabareen, 2006; Abu-Asbah, 2007).

Due to the low achievements of students in Arab education, many of them experience barriers to future academic studies, mobility, and social equality. In the 2008-2009 academic year, 50.5% of students in Jewish education were entitled to a matriculation certificate, compared to 32.4% in Arab education. The achievements of Arab students in international standard tests were close to half of the accomplishments of Jewish students (ibid.). Many of the difficulties in the Arab education system in Israel are like those of other under-developed education systems in developing countries (Arar & Mustafa, 2011). The gap between the achievements of Jewish and Arab students is even more severe in the field of technical education because of the enormous lack of science and computer labs in Arab schools, which are poorly equipped and often outdated (Human Rights Watch, 2001).

Since the 1980s, Arab society has raised the issue of education to a high place in its priorities and has begun an intensive struggle to improve the education system (Sarsur, 1999). The primary demand was to bridge the gap between Arab and Jewish schools in terms of educational conditions and educational services (Al-Haj, 1994b). In May 1980, the National Committee of Arab Local Councils convened a conference in Nazareth in which Arab education was discussed. The Education and Culture Ministry boycotted the convention and objected to Arab supervisors attending the conference. In 1984, the National Committee of Arab Local Authorities established the Follow-up Committee for Education, whose task was to examine the Arab education system and to act to promote it. The Follow-Up Committee on Arab Education served as a lobby that increased the pressure on the Education Ministry, who responded by adopting a strategy to establish committees to examine the state of the Arab education system and improve it (Sarsur, 1999). In addition, a select committee was set up to inspect the education of Arabs in the framework of the Committee of Directors General, which consisted of Jewish and Arab officials from the Ministry of Labor and Social Affairs and the Ministry of Education.

The central conclusion of the report of the Committee of general directors was that to achieve equality between Jewish and Arab citizens in education should be obtained and that the disparity between schools Arabs and Jews is estimated at twenty to twenty-five years (Al-Haj, 1994b). It was further stated that "the Arab education is not always and at the same time a partner to changes and innovations introduced in the Jewish education, such as curricula, textbooks and teaching methods, including software. The programs were established many years ago, and not all of them have been adapted to the changing conditions in the field of teaching and way of life of Arab society "(Ministry of education directors' report and the Summit General Directors, 1985, P. 32). The report of the Committee of Directors-General was welcomed by the leaders of the Arab community as it provided official recognition of the struggle of the Arab population for equality. However, several meetings between Arab representatives and official officials in the Ministry of Education did not produce any concrete action to translate the recommendations into practice. The operational unit recommended was not established, no unique program was developed to promote Arab education, and the Ministry of Education continued to allocate a relatively small amount of money to Arab schools (Al-Haj, 1994a).

In the 1980s, the Ministry of Education appointed several additional committees to examine the situation of the Arab education system and its improvement (Gaziel, 1993). However, the

criticism leveled by Arab educators and academics against the various committees stated that there was a lack of systematic evidence of the problems of the Arab education system and a lack of adequate reference to pedagogic issues unique to the Arab education system. Recommendations reflect the lack of systematic view of the problems facing Arab education, lack of attention to the unique pedagogic requirement, and the inability of the Arab population to be involved in the education of their children (Abu-Saad, 2007). All attempts of reform failed to bring about any change, as none of the many recommendations of the committees appointed by the government were never binding (Abu-Saad, 2007).

Moreover, in 1987 the Division for Arab Education, which was renamed the Education and Culture Division for the Arabs, was dismantled and became a unit subordinate to the Pedagogical Secretariat of the Ministry of Education. With the dismantling of this division, it was expected that the six districts of the Ministry of Education, the Jewish ones, would also work with the administrative matters of the Arab schools. The only function left by the Department for Arab Education was the supervision of the educational work of school principals. The dissolution of the division created a structure that was very ambiguous, and the division of labor and the authority of the departments were not clear. Only some of the schools were integrated, and, in many cases, Arab teachers and local authorities had no point of contact to turn to with their issues. This situation created a sense of helplessness and confusion, which exacerbated the problem, which already existed in Arab education (Al-Haj, 1996).

The 1990s are considered a milestone in the lives of the Arab population of Israel and the life of the State of Israel in general. Following the signing of the peace agreements between Israel, Egypt, Jordan, and the Palestinian Authority, and attempts to expand the peace process with the other Arab countries, the cycle of hostilities between Israel and the Arab world has been broken. This is manifested, inter alia, in the lifting of the Arab boycott of the State of Israel and the process of normalization and attempts at a compromise between Israel and the Arab world. This situation had implications for the Arabs in Israel. As a result of the peace process, the Arabs in Israel felt accepted by both worlds: for the State of Israel that had been suspicious of them and the Arab world which until now had been alienated from them. Furthermore, in the 1990s, there was a change in the attitude of the Ministry of Education towards education in the Arab sector. Relations and ways of cooperation between the Ministry of Education and the heads of local Arab authorities have improved. At the conference convened by the leaders of the Arab communities in 1995, Amnon Rubinstein, who was one of the initiators of the amendment to the State Education Law in 2000, also took part (Sarsur, 1999).

1.7.5 Failure to implement the amendment to the law in the curricula of the Arab sector

The amendment to the goals of the State Education Law Section 11 (2) of Article 2 relates directly to the Arab population and does not recognize the Palestinian minority as a national minority. Nonetheless, it has a more substantial recognition of its cultural needs (Abu-Asbah, 2007). In the words of Amnon Rubinstein, "For the first time, the Arab public is defined as a group, not as individuals, and for the first time, it is incumbent upon the schools to teach Arab history and the identity and culture of the Arab public. Though only partial recognition, the declaration in the law is of tremendous importance" (Rubinstein, 2005, p. 15). Beyond the importance of the amendment to the law, one can also learn from Rubinstein's remarks about the connection between the amendment to the law and the obligation to teach the unique characteristics of the Arab minority in Arab schools. Thus, ostensibly, the amendment to the Education Law, for the first time in Israel, guarantees unique curricula suited to Arab culture and identity. However, despite the change in legislation to date, no significant and deliberate effort has been made to change curricula in Arab schools to reflect the culture, history, and status of the Arabic language (Abu-Asbah, 2007).

In the Golan-Agnon (2004, p.80) reference on the existence of curricula that express the unique characteristics of the Arab minority, she notes: "Until now, no significant and deliberate effort has been made to enable the study of content that reflects Arab culture, history, and literature in Arab schools. Without respect for Palestinian national identity, the sense of alienation between the two peoples and the sense of deprivation of the Arab minority in Israel is strengthened." The Arab education system in Israel institutionalizes fear: fear of connecting to the past, fear of sharpening the sense of cultural and national identity, and fear of the teachers talking about current events.

The lack of implementation of the amendment to the law can also be found in a Ministry of Education document from 2004, summarizing the three years of the Ministry's educational vision between 2001 and 2004. This document details all the objectives of the State Education Law, which are written in Section 2, as stated in the Law after the amendment, as well as the goals against the implementation of the educational vision. The document states: "The amendment (to the law) was the result of the private initiative of several Knesset members, but our ministry expressed willingness and desire to promote legislation and greatly assisted in this (Tirosh, 2004, p. 66). However, in the chapter on the promotion of values and heritage, this document states that the milestones of the activities in 2004 and 2001 were the reinforcement of heritage studies, Zionism, and democracy. Accordingly, the achievements and outputs

recorded include: adding an hour of study to all junior high schools on the subject of Jewish heritage and culture, assimilation of a program in the homeland of society and citizenship, and the production of "Booklet 100 Fundamental Concepts of Judaism, Zionism, and Democracy." All this without any mention of the development of curricula or additional hours for the Arab sector to implement the amendment, even though at this stage, four years have passed since the amendment of the section of the law.

The aim of the "One Hundred Concepts Program" mentioned in the Ministry of Education's summary document was to provide students in Israel with a solid conceptual basis for their identity and the democratic regime in which they are conducted, and to instill in them shared values. However, this program emphasizes the significant differences in the ability of Jewish students to learn about their national heritage and culture extensively, in contrast to the limited capacity of Arab students with regard to these issues in relation to their Arab-Palestinian identity. The program consists of three parts: the "democracy" part - which is shared by all the schools, the "Zionism" part - is also shared by all the schools but with slight differences between Jewish and Arab schools. Finally, the "heritage" section - where the differences between Jewish and Arab schools are significant.

The list of terms in the "heritage" section for Jewish schools comprehensively covers the cultural, religious, and historical heritage of the Jewish people. Part of "Zionism" also refers to the Jewish heritage. In contrast, the concepts of "heritage" for Arab schools relate only to the religious heritage of Muslim and Christian students. In addition, the names of three personalities from Arab history, all from the Middle Ages (Peled, 2006), are listed.

The impression that Arab students should receive from the list of terms, Peled (2006) argues, is that there has been no historical or cultural heritage shared by the Arabs since the Middle Ages, as far as the Arab Palestinian people are concerned. Therefore, he argues that the "100 Concepts" education program, as reflected in the program, seeks to deprive Arab students of Israel of the possibility of recognizing their national cultural heritage as Palestinian Arabs, as opposed to Jewish students who learn extensively about their cultural heritage. Peled's claims are shared by various elements in the Arab society, and attempts have been made to write alternative terms to answer some of the criticism that was leveled at the old list. These attempts were met with strong opposition from the Ministry of Education (Khromchenko, 2005; Ghanem, 2006).

Chapter 2 - RESEARCH DESIGN AND STUDY METHODOLOGY

2.1 Methodology Framework

Classroom-based educational research employs qualitative and quantitative designs or a combination of both. According to Lincoln and Guba (1985), research design depends on the research question being investigated. Quantitative data and methods are suitable when research seeks to predict or prove a hypothesis; however, qualitative data can be utilized to allow us to learn about human behavior using data collected from the natural environment where the action takes place (Bogdan & Biklen, 2007).

Heath (1997) adds that while studying human behavior, qualitative researchers project the voice of the informants and should refrain from including their personal biases in the study. A naturalistic or qualitative study is appropriate in this case since the current study is focused on teachers' beliefs and practices (a study of human behavior) while practicing and implementing meaningful learning in Science and mathematics classrooms (natural environment).

Qualitative research methods allow the researcher to access complex layers of meaning and interpret human behavior and experience beyond surface appearance (Cousin, 2009). Furthermore, qualitative methods support the idea that there is no 'one' truth and that reality is in the construct of the human mind. Interviews (and I would argue other qualitative methods) can bring understanding, interpretation, and meaning to the description of social interactions (Lichtman, 2006).

Qualitative research in education can be approached in various ways and conducted in various settings. An in-depth understanding of the environment in relation to its participants is the goal of qualitative research (Merriam, 2002). In the current study, the environment was the implementation reform stage taking place in the mathematics and science classroom.

Qualitative research is not conducted to prove or disprove a hypothesis; the goal is to study human behavior using data collected from the natural environment where the action takes place (Bogdan & Biklen, 2007). Heath (1997) adds that while studying human behavior, qualitative researchers project the voice of the informants and should refrain from including their personal biases in the study. A naturalistic or qualitative study is appropriate in this case since the current study is focused on teachers' beliefs and practices (a study of human behavior) while

implementing a new instructional reform in mathematics and science classrooms (natural environment).

Interpretive qualitative research is aimed at identifying the experiences, interactions, and interpretations of an individual with the social world (Merriam, 2002). Interpretive research is built upon the belief that knowledge is socially constructed based on a researcher's interaction with his or her environment (Rowlings, 2005).

Cousin (2009) defined interpretivism as a research paradigm that focuses on gaining an understanding of how people feel inside, seeking to interpret individual everyday experiences, their deeper meanings and feelings, and the reasons for their actions.

I chose interpretivism as my theoretical framework because I concur with Cousin (2009) that objectivity is impossible in human sciences and that as a researcher, I am part of the setting and not outside it. I wanted to explore the depths of teachers' understanding of what Meaningful learning is, and I was excited to go deeply into the worlds of my participants, although for a very limited time, and therefore I tried to understand and subsequently interpret what they said and what they did.

Interpretivist research is recognized for its value in providing conceptual depth; however, it is often criticized in terms of its validity, reliability, and generalisability (Kelliher, 2011). In response to this type of critique, it is arguable that interpretative research using qualitative methods does not require the same levels of validity; instead, researchers should be concerned with understanding (Wolcott, 1994) and trustworthiness (Jones et al., 2006).

Furthermore, the detail and effort involved in interpretive inquiry allow researchers to gain insight into particular events as well as a range of perspectives that may not have come to light without that scrutiny (Long et al., 2000).

Having affirmed an interpretive stance, I now explicate the ontological and epistemological assumptions that guided the study.

Generally, I subscribe to the view that reality exists in the form of multiple subjective mental constructions based on an individual's social, historical, and cultural contexts (Lincoln and Guba, 2013; Hatch, 2002). Therefore, to understand the reality of science and mathematics teachers' beliefs about meaningful learning, teaching, and learning, it was important to focus on the teachers' ways of thinking. Further, given that individual teachers have unique experiences in teaching, there exist multiple realities of their beliefs (Hatch, 2002). These

multiple realities are locally and socially constructed in the context in which teachers teach science and mathematics (Lincoln & Guba, 2013).

From an epistemological perspective, adopting an interpretive approach means I assume that the researcher and the participants subjectively co-construct knowledge through interaction (Hatch, 2002; Creswell, 2007). In other words, how I, as a researcher, interact with participants plays a crucial part in how I come to understand and 'see' their world through their own eyes.

In keeping with this perspective, I explored science and mathematics teachers' beliefs about meaningful learning through conversations and interaction with the teachers. This involved deep discussions and explorations with the teachers to arrive at a mutual understanding of their beliefs.

Informed by interpretivism, the methodology that has been chosen to use for this research is a case study. A case study approach was selected not because of the focus of the study but due to the component being analyzed. A case study allows in-depth analysis to provide a deeper understanding of a phenomenon chosen due to its distinctive, exclusive characteristics. The case study method is common in education research and is often used to aid the understanding of a unique phenomenon (Merriam, 1988, 2002). I have examined the implementation of meaningful learning reform and explored this by analyzing teachers' beliefs and practices.

Although some scholars argue that case study research is not a methodology but a choice of what is to be studied (Stake, 2005), others present it as a methodology (Merriam, 1998; Yin, 2003; Denzin & Lincoln, 2005). By examining the literature on case study methodology, I found that it can be both contradictory and confusing. Merriam (1998) suggests that there is little consensus about what constitutes a case study or how exactly this type of research is done. In the field of qualitative research methodology, many authors discuss case study as a methodology along with phenomenology, ethnography, and grounded theory (Guba & Lincoln, 1994; Creswell, 1998; Denzin & Lincoln, 2005).

The case study methodology is differentiated from other research strategies because the focus of the research is a bounded system or case.

Yin (1984: p. 23) defines the case study research methodology as 'an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used.'

Further, Yin (2013) argues that a case study is an inquiry in a real-life context in the form of ethnography, focusing on a program or activity involving individuals. The case is described as a bounded system. In this study, the case is bounded in terms of place by relating to a country, namely Israel, and selected teachers (Arab teachers), and by focussing on the methods used to teach students in middle school, mathematics, and science.

Merriam (1998: p.27) maintains that the single most defining characteristic of case study research lies in delimiting the object of study: the case, and that 'the case is a unit, entity, or phenomenon with defined boundaries that the researcher can demarcate or 'fence in,' and therefore, can also determine what will not be studied.'

Merriam (1998) also argues that the case study does not claim any specific data collection methods but focuses on holistic description and explanation. There are different kinds of case studies; Merriam's (1998) explanation of 'heuristic' case studies, where the focus is on the understanding and gaining new insights and meaning about phenomena (for this research, the phenomenon would be Meaningful learning), seems relevant to this research.

The present investigation is a case study because it was conducted in Arab middle schools and involved science and mathematics teachers working in that schools, i.e., in the "real-life context" (Yin, 2003, p.13), over a five-month period of data collection.

The data were contextualized through interviews, classroom observations, and document analysis. No previous hypothesis guided the data collection, and findings were subjected to grounded analysis informed by the broad themes identified in the literature review. Therefore, it fits the characteristics and the purpose of a qualitative case study as described above. Specifically, the reasons for choosing a case study method for the present study are both methodological and pragmatic. Methodologically, I have followed Borg"s (2006) advice that: The study of cognitions and practices in isolation of the contexts in which they occur will inevitably, (therefore), provide partial, if not flawed, characterizations of teachers and teaching. (p.275)

Similarly, Pajares (1992) reminds researchers of the methodological dimensions in researching beliefs: It is also clear that, if reasonable inferences about beliefs require assessments of what individuals say, intend, and do, then teachers" verbal expressions, predispositions to action, and teaching behaviors must all be included in assessments of beliefs. Not to do so calls into question the validity of the findings and the value of the study. Traditional belief inventories provide limited information with which to make inferences, and it is at this step in the

measurement process that understanding the context-specific nature of beliefs becomes critical (p.327).

Critics of the case study methodology believe that the study of a small number of cases can offer no grounds for establishing reliability or generality of findings, although it can offer lessons that may be adaptable in other settings and contexts. In principle, I do not wish to generalize my research because I believe that human experience is not generalizable, and as was said by Stake (2005: p.8), case studies are about 'particularisation not a generalization.' However, I do believe case study research can bring about a better understanding of the complex issue, which is Meaningful learning, and add strength to what is already known through previous research.

Merriam (2002) classifies case study design as descriptive, interpretive, and evaluative. Interpretive case studies use thick description and inductive analyses to hypothesize and build theory to describe the phenomenon being studied.

Rich, detailed descriptions are required, and study methodology must be purposefully planned, well-thought-out and highly organized in order to offer "credible answers" or "convincing evidence" about the problems under investigation (Thomas & Brubaker, 2008). Matching appropriate methods to research questions is vital to uncovering understanding. The current study is exploring the opinions of science and mathematics teachers about beliefs, practices, and implementation of meaningful learning. Three critical questions frame the investigation, as presented in Table 2.1.

In the current study, I have explored a bounded system in search of answers to a focused question in efforts to conceptualize and produce in-depth descriptions of understanding these beliefs and practices. The purpose of this study was best met using an interpretive case study design, as described by Merriam (1988).

Table 2.1 Research Design

Detailed research question nr.1:	Research method:	Research tool:
What beliefs do Arab middle school science and mathematics teachers hold regarding meaningful learning?	*semi structured interviews*	*interview questionnaire (dispositions for interviews 1-7)*
Detailed research question nr.2:	Research method:	Research tool:
What are Arab middle school science and mathematics teachers' classroom practices?	*Observations(visible)* *Document analysis*	*Notes, artifacts (documents)*
Detailed research question nr.3:	Research method:	Research tool:
What kind of situations do teachers perceive as the implementation of meaningful learning?	*Semi-structured interviews*	*interview questionnaire (dispositions for interviews 8-14)*

2.2 The Researcher Role

At the heart of the qualitative inquiry is the "gendered, multiculturally situated researcher" (Denzin & Lincoln, 1998, p. 23) whose "gaze is always filtered through the lenses of language, gender, social class, race and ethnicity" (p. 25). Qualitative research depends on the interpretations offered by the researcher and on the intimate relationships that develop between the researcher and the data. Such investigations demand that the researcher explicate why the research focus was chosen, what the researcher's views are regarding the focus of the study, and what relationships exist between the participants of the study and the researcher (Schram, 2003).

To acknowledge my place in relation to the subject, participants, context, and process (Etherington, 2004), I now describe my familiarity with mathematics teachers and the school contexts in the Arab schools in Israel, reflecting on my background experiences and how these might have influenced the process and outcome of this study.

Generally, during the actual research process, a researcher slide on a slippery insider-outsider continuum rather than occupying a fixed location (Merriam et al., 2001). This is because the complexities inherent in the research site blur the boundaries between insider and outsider positions (Merriam et al., 2001).

I was an outsider because the site schools were not my work institutions; therefore, I was less familiar with the 'specifics' of the school setting. However, I was a student and later on a mathematics teacher in the same school system; thus, I was familiar with general aspects such

as school routines and curriculum, which are common to the school system in Arab society. During my schooling and teaching mathematics, I might have constructed certain images of mathematics teachers, teaching, and learning. I share grievances common to all mathematics teachers in Arab society about their professional role, status, and remuneration.

Due to these, I might have had some preconceptions of teachers' practices even before the actual encounters. However, I strived to remain open-minded to participants' responses to minimize prejudices on my interpretations. This, however, does not fully eliminate the fact that the researcher's values and beliefs inevitably influence the research process and outcomes (Etherington, 2004).

Being an insider, however, provided chances for enhanced rapport and the ability to gauge honesty, authenticity, and accuracy of responses (Merriam et al., 2001). I felt that my insider status allowed me to develop natural conversations and interactions that enhanced the quality of the data I generated and made interpretation a shared responsibility between me as an 'insider-researcher' and my participants as 'insider practitioners.'

It is hoped that describing the researcher's perspective in this way will help to achieve auditability (Lincoln & Guba, 1985) and highlight any possible biases the researcher may have during the investigation and in reaching the conclusions of the study.

My own perspectives on mathematics learning and my beliefs about effective approaches to its instruction were instrumental in selecting the focus of this study. However, any qualitative study is subject to researcher bias to some extent, and I have ensured that the results and interpretations are as trustworthy as possible.

My role in the study was that of a non-participant observer (when observing teachers during teaching). As I was a mathematics teacher myself, and as I played a facilitative rather than an authoritative role, I hoped that I was viewed by the participating teachers as a colleague rather than an "expert." The fact that I conducted the study for the purposes of my research as a doctoral student and not as a figure of authority in the Israeli educational system did help, on the one hand, to maintain such a collegial relationship with the teachers. On the other hand, my lack of authority and novice teacher educator role in the project is likely to have negatively impacted the uptake process

The background, interest, and possible bias of a study's researcher are important influences on an investigation's observations, interpretations, and conclusions. My background includes

experience as a teacher of mathematics and as a principal of a middle school that is implying the new reform.

Essential to this study, also, are my skills and experience in classroom observation and teacher training. My experience as a school administrator has further enhanced these skills, and, as a result, I am well versed in classroom indicators of good practice. I know what to look for, how to collect the data, and how to link what I have observed with established patterns of practice.

2.3 Context of The Study

Rokeach (1968) cautioned that what people say at the 'surface level' may or may not portray their true beliefs because most are not conscious of their beliefs. For this reason, an in-depth conversation is inevitable to get deeper into what teachers believe, intend, and do.

Since I set out to understand what teachers truly believe and the way in which they reflect these in their actual teaching, it was necessary to select a few schools for in-depth investigation. Further, to gain in-depth insights into the 'real-time' impact of teachers' beliefs on their pedagogical choices and decisions, I aimed to document teachers' espoused beliefs, justifications for their beliefs and actions and link these during or shortly after the teaching activity. This required selecting schools that I could access for the whole day and stay with teachers for prolonged periods without disruptions due to travel between districts. In short, understanding the belief-practice relationship demanded interviews to be based on teaching tasks. To achieve this, selecting schools I could access and stay in for a prolonged time was imperative.

After securing research permits from the relevant local authorities, I approached five different schools. I described the purpose of my research to the principals of the respective schools and requested permission to invite science and mathematics teachers to participate in the study. Of the five schools approached, I gained permission from three principles, and I received a refusal from the other two. The principals who did not allow me to conduct the research within the school under their management did not provide apparent reason except they said teachers had other commitments and could not have time to participate in the study.

Three schools willing to participate in the study were contacted. These schools are located in three different places near the city of Nazareth (Schools A, B, and C). The names of schools and teachers (Table 2.2) are pseudonyms. The actual names of places and teachers are concealed to protect participants' identities from colleagues, neighbors, and authorities.

All three schools are small public middle schools in the northern district; each contains about 500 students. On average, there are approximately 30-35 students in each classroom, which is typical for an Arab class. All schools use the same curriculum, and students sit for the same national examination. The schools had similar patterns of students' achievement in the national examination results for the past five years.

Despite these similarities, schools were different from each other in terms of geographical location (i.e., one school from each city) and the students' socio-economic backgrounds. The decision to include schools that were different from each other in this way was applied to make the data more varied, and therefore the results more generalizable, ensuring transferability of the results to other contexts or settings.

2.4 Participants

I recruited teachers based on their teaching experience, professional qualification, and teaching subjects. Although variation in teacher characteristics was not a pre-requisite, I selected teachers with different experiences and varying demographics to get in-depth insights and enrich findings.

Therefore, I requested a list of science and mathematics teachers showing their background details from the principals' offices. Next, I identified teachers from the list and contacted the prospective participants to explain the study goals as well as to clarify the researcher's role when appearing in the classroom. I invited twenty-two teachers in total; two teachers had personal commitments that prevented them from participating. This early contact helped the researcher to build up relationships and develop a rapport with the participants (Lincoln & Guba, 1985). During this process, twenty teachers were recruited. I summarise details about teachers in table 2.2, 2.3.

Table 2.2 Demographic data

		n	*%*
Gender	male	5	25%
	female	15	75%
Age	21-30	3	15%
	31-40	10	50%
	41-50	7	35%
Teaching subject	Math	10	50%
	science	10	50%
Teaching experience	4-7	3	15%
	8-19	10	50%
	19+	7	35%
Education	B.Ed	4	20%
	B. A	4	20%
	M.Ed	8	40%
	M.A	4	20%

Table 2.3 Information about the Participants

Teacher (Pseudonym)	School's Name (Pseudonym)	Gender	Teaching Experience	Academic Background	Age	Teaching subject
T1	*School (A)*	male	*4*	M.Ed	*27*	Math
T2		female	*8*	M.Ed	*31*	science
T3		female	*25*	B. A	*50*	Math
T4		female	*14*	M.A	*38*	science
T5		female	*24*	M.A	*49*	Math
T6		male	*13*	B.Ed	*37*	science
T7	*School(B)*	female	*15*	M.Ed	*39*	science
T8		female	*14*	B.Ed	*38*	Math
T9		female	*22*	M.A	*46*	science
T10		female	*5*	B. A	*28*	Math
T11		male	*23*	M.Ed	*48*	Math
T12		female	*11*	B.Ed	*35*	Math
T13		female	*10*	M.Ed	*37*	science
T14	School (C)	female	*22*	B. A	*45*	Math
T15		female	*15*	B.Ed	*39*	science
T16		male	*20*	M.A	*44*	science
T17		female	*12*	M.Ed	*38*	science
T18		female	*6*	B. A	*29*	science
T19		female	*10*	M.Ed	*35*	Math
T20		male	*20*	M.Ed	*44*	Math

2.5 Data Collection

As stated by Pajares (1992), "Beliefs cannot be directly observed or measured but must be inferred from what people say, intend, and do – fundamental prerequisites that educational researchers have seldom followed" (p. 207).

Researchers need to infer meaning from what people say, and their actions can be an appropriate way to access their beliefs and practices. Thus, in order to gain a deep understanding of teachers' views of learning, examining what they say, what they think, and what they actually do is necessary.

Qualitative research is concerned with collecting data in a natural setting or in a site where the participants take part in the study (Stake, 1995; Creswell, 2007). Therefore, most of the data in this study were collected from the school settings, particularly in the classroom context in which each teacher performed their teaching. Observing the participants in their natural setting allowed the researcher a direct opportunity to record how they really talked and acted within their school context (Creswell, 2007). Thus, the researcher expected to observe and participate in authentic events.

I entered the research site with a desire to elicit deeper stories of teachers. When narrating their stories, teachers' beliefs, meaning, and experiences unfolded. Further, I observed science and mathematics lessons taught by these teachers not only to get deeper insights into the meanings of subject knowledge, teaching, and learning that teachers expressed but also the way such meanings manifested in practice. Therefore, I used interviews and lesson observations to collect data because these methods allow direct access to teachers' meanings, experiences, and practices (Savin-Baden & Major, 2013).

The actual process involved in conducting interviews and observations concurrently often begins with one or two interviews, followed by classroom observation and post-observation interviews.

Lesson schedules on the school timetable and participants' choices determined interview and observation time. In this way, interviews informed observations of critical incidences during the lessons, which I then explored during the post-observation interviews. Therefore, I interpreted practices I observed considering the beliefs about teaching and learning that teachers articulated during interviews.

I collected data between November 2018 and March 2019. Without the student vacation that was in December, the study lasted for a period of 16 weeks in the researched school contexts for the data collection in Israel.

I spent approximately one and a half months at each school. During this time, I interviewed teachers and observed lessons they taught, starting at school (A), followed by school (B), and finally at school (C).

Rather than relying on a single data source, the use of multiple sources of evidence, such as teachers' interviews (see Appendix A for the semi-structured interview questions), classroom observations(see Appendix C for observation schedule), and document data, helped the researcher construct the study's validity (Creswell, 2007; Yin, 2009). More details about data collection follow next.

2.5.1 Semi-structured interview

Interviewing is one of the most powerful tools used in attempting to understand people's points of view, beliefs, and attitudes. The essence of the interview approach is to help the researcher uncover the participants' experience, seek out the information that is in the participants' minds, and gain information about how they make sense of their world (Patton, 2002; Yin, 2009). In addition, the interview technique helps to reveal information that the researcher cannot obtain directly from observation (Hatch, 2002).

Approaches used in this study were the 'semi-structured interview' (Patton, 2002). The semi-structured interview is, as its name suggests, somewhat flexible in nature, so the researcher is free to explore information in more detail than was originally stated in the interview protocol. How far this goes depends on the situation and on the participant's responses (Patton, 2002; Hatch, 2002). This interview technique is often used to examine teacher beliefs in the way they describe their thoughts and practices (Kagan, 1990). One interview was conducted with each teacher – the interview was conducted after the first classroom observation. The discussion lasted about one hour.

The questions focused on teaching and learning, the roles of teachers and learners, and instructional strategies. The questions were based on the literature review. In addition, teachers were asked to provide any information they felt was relevant at the end of the interview.

To achieve comparable data, the same interview format and questions were used for all participants. The interview was tape-recorded and then transcribed (Patton, 2002; Yin, 2009). Alongside the observation, the interview provided points of comparison in order to determine the relationship between teacher-stated beliefs and their beliefs in action.

Initial teacher interviews were conducted by me during the second week. The interviews took place in a small room in the school. At the beginning of each interview, teachers' consent was obtained (verbally) to audio record the interview. Teachers were also reminded that they could discontinue the recording at any point if they wished. Occasionally a teacher would request to discontinue the recording or would add to the discussion after the formal aspects of the interview were completed and the tape recorder was switched off. In such cases, I requested the teacher's permission to note down their responses. The interviews took between 30 – 60 minutes. All interviews were conducted in Arabic, audiotaped, and transcribed.

The interview responses were analyzed and categorized pursuant to the following researcher-developed rankings, in part based on the literature: traditional (or didactic), transitional, and modern(constructivist).

2.5.2 Classroom observation

Observing the teachers in action allowed a means of assessing the extent to which the teachers' practices and expressed beliefs corresponded to what actually happened in the classroom.

The way teachers organized classrooms, carry out teaching, learning, and assessment activities can be considered a manifestation of the mental models of good teaching they hold (Thomas et al., 2001).

Specifically, lesson observation focused on the selected elements of science and mathematics lessons, including the physical set-up of the classroom, interaction patterns, nature of teaching and learning, and the overall classroom culture. I designed an observation protocol (appendix C) in which I divided these broader aspects into more specific elements of the lesson.

For example, when observing classroom interaction, I focused on the role of the teacher and students. Often, before the first lesson observation, I explained the purpose of the observation and assured teachers regarding confidentiality.

I observed three lessons taught by each of the twenty teachers. Although limited by three classroom observations, combining the data across the three examples provides a snapshot that informs the study's questions.

The school timetable, which reflected curriculum prescription, predetermined the duration of the lesson. In Israel, all school subjects are organized into a single period lesson, which lasts 45 minutes, or a double period lesson, which lasts 90 minutes.

As we entered the classroom, particularly during the first observation, teachers introduced me as a university student. They did this possibly because I introduced myself as a doctoral student from the university. During the observation, I sat at the back of the classroom and took field notes. My notes included observations of every event that occurred during the lesson, as well as specific quotes from the teacher when I felt that this was important. The handwritten notes taken at the time of each observation also included background information that had been shared with the researcher. This information contained school enrolment, class size, grade level, the physical arrangement of the classroom, wall displays, and classroom personnel.

I also included notes relating to my feelings/comments about the events that occurred. I also copied down material from the blackboard when I felt it was necessary and would be useful for later analysis. I did not interfere with the lesson or speak unless the teacher or a student directed a question at me.

With the teachers' permission, I audio-recorded the lesson sessions. I transcribed the audio recorded lessons to supplement my observation notes.

This study used a non-participant observer, which involved observing classroom interaction and taking notes but not contributing to the interaction itself (Van Lier, 1997). I strived to minimize any interruptions that could result from my presence in the classroom by not interacting with the students and the teacher when the lesson was in progress.

At times when the students were involved in their own work, and the teacher was moving around the class or seating at the front of the class, I would walk around and observe the students' work, although I did not comment at any stage. If any handouts were given, I was usually provided with a copy too. Occasionally at the end of the lesson, I randomly collected students' notebooks and studied them, making photocopies when necessary. In studying students' work, I was particularly interested in the kind of activities they did and in the teacher's feedback (e.g., underlining, corrections, and comments).

I conducted the observations at a time that was convenient for the participants and asked them to choose a class that they thought was appropriate for me to observe for my research. I produced an observation schedule, which I completed at the time of the observation and further annotated afterward. I was aware that during the observation, my presence might have altered what would normally happen in that class. Stake (1995: p.12) suggests that in carrying out observations, 'we try not to disturb the ordinary activity of the case' but inevitably 'the interpretations of the researcher are likely to be emphasized more than the interpretations of those people studied, but the qualitative case researcher tries to preserve the multiple realities, the different and even contradictory views of what is happening.'

In the current research and through the classroom observation, the researcher relied on the literature to identify the instructional strategies teachers employed.

Relying on the literature, instructional practices can be grouped into four strategies: classroom management; clarity of instruction; cognitive activation; and enhanced activities (OECD, 2019).

Classroom management is often described as the actions teachers take to ensure an orderly environment and effective use of time during lessons (van Tartwijk and Hammerness, 2011).

Clarity of instruction: practices pertaining to the clarity of instruction, including the explanation of new terms, drills, and rehearsals.

Cognitive activation consists of instructional activities that require students to evaluate, integrate, and apply knowledge within the context of problem-solving (Lipowsky et al., 2009). These activities are commonly associated with group work on complicated problems.

Enhanced activities include practices that give students the chance to work independently, using some specific tools, such as information and communication technology (ICT), or over a longer period of time (Vieluf et al., 2012).

Approval to undertake the research was obtained from the Legal Adviser of the Ministry of Education in Israel. Information about the research was given to the teachers, and their consent was obtained, assuring them about their anonymity. Financial rewards were not offered to any persons involved in this research project. Copies of participant information sheets and consent forms are contained in Appendix B.

Post-observation interviews

To understand why the teachers decided to act in certain ways during the lesson, I interviewed each teacher following each lesson. Initially, before the lesson began, I scheduled a post-observation interview session with each teacher. During the lesson observations, I noted incidences and actions that required further exploration to clarify the reasons and assumptions that underlie them. After each lesson, I invited teachers for the post-observation interviews, which often began on our way back to the office. I did this immediately when the teacher's memory of the lesson was still fresh. I used the exact incidences and actions I noted during observation to prompt conversations. Each post-observation interview lasted between 15-20 minutes, and the conversation was audio recorded. In what follows, I discuss my data analysis approach.

2.5.3 Document analysis

Document analysis is a form of qualitative research that uses a systematic procedure to analyze documentary evidence and answer specific research questions. Merriam (1988) pointed out, 'Documents of all types can help the researcher uncover meaning, develop understanding, and discover insights relevant to the research problem' (p.118).

Document analysis is often used in combination with other qualitative research methods as a means of triangulation— 'the combination of methodologies in the study of the same phenomenon' (Denzin, 1970, p.291). The qualitative researcher is expected to draw upon multiple (at least two) sources of evidence; that is, to seek convergence and corroboration using different data sources and methods. Apart from documents, such sources include interviews, participant or non-participant observation, and physical artifacts (Yin, 1994).

By triangulating data, the researcher attempts to provide 'a confluence of evidence that breeds credibility' (Eisner, 1991, p. 110). By examining information collected through different methods, the researcher can corroborate findings across data sets and thus reduce the impact of potential biases that can exist in a single study. According to Patton (2002), triangulation helps the researcher guard against the accusation that a study's findings are simply an artifact of a single method, a single source, or a single investigator's bias.

As a research method, document analysis is particularly applicable to qualitative case studies— intensive studies producing rich descriptions of a single phenomenon, event, organization, or program (Yin, 1994; Stake, 1995).

Similar to other methods of analysis in qualitative research, document analysis requires repeated review, examination, and interpretation of the data in order to gain meaning and empirical knowledge of the construct being studied (Corbin & Strauss, 2008; see also Rapley, 2007). Content analysis is the process of organizing information into categories related to the central questions of the research. The reviewer takes a closer look at the selected data and performs coding and category construction, based on the data's characteristics, to uncover themes pertinent to a phenomenon. The codes used in interview transcripts, for example, may be applied to the content of documents. Codes and the themes they generate serve to integrate data gathered by different methods.

In the current research, document analysis was conducted in combination with classroom observation to provide data to inform the second research question regarding the practices that teachers employed. The documents included a copy of all the lesson plans taught during the data collection period, along with a set of sample learning activities given to the students, researcher's field notes diary, worksheets, and tests, as well as photocopies of some of the students' work that had been marked by the teachers.

The main purpose of collecting such documents was to understand and explain the instructional practices the teachers used in the classroom and to study their alignment with the principles of the new curriculum. The main document was the teachers' lesson plan. Plan can provide a broad range of information about the instruction that occurs and potential information about the teacher. Since they are prepared by individual teachers, they vary greatly from one teacher to another.

The second main document was Researcher's Field Notes. The researcher maintained a diary of field notes to strengthen the data collected. According to Yin (2012), note-taking of some sort is common to virtually every case study. Yin also argued that field notes could be taken from different sources of evidence, including open-ended interviews, document review, or observations that have been made in a field setting (Yin, 2012). Creswell (2005) stated that field notes are "the data recorded during an observation" (p.213) and suggested two types of field notes, both of which were used for the current study: "descriptive field notes and reflective field notes" (p.214). Descriptive field notes were taken to provide a description of the events, activities, and people involved in the conduct of lessons.

The field notes were intended to record the activity and reflect the researcher's own explanations of how teachers used questioning, how they managed the learning environment,

and how they interacted with students. These records were based on what the researcher observed directly, and they were used as evidence to record the researcher's perception and reflection of all activities related to the teachers' actions.

2.6 Data Analysis

In qualitative research, it is difficult to separate data collection from data analysis. Both exercises are woven together to provide an understanding of the questions under study (Bogdan & Biklen, 2007).

Bogdan and Biklen (2007) define data analysis as:

> *...the process of systematically searching and arranging the interview transcripts, field notes, and other materials that you accumulate to increase your own understanding of them and to enable you to come up with findings. Data interpretation refers to developing ideas about your findings and relating them to the literature and to broader concerns and concepts. The analysis involves working with data, organizing them, breaking them into manageable units, synthesizing them, searching for patterns. Interpretation involves explaining and framing your ideas in relation to theory, other scholarship, and action, as well as showing why your findings are important and making them understandable. (p. 159)*

Although data collection and analysis are ongoing in case study research, Merriam (1988) warns researchers to end data collection and commence with intensive analysis by studying the situation's practicality. Merriam (1988) agrees with Lincoln and Guba (1985), who listed several guidelines to end data collection: exhaustion of sources, a saturation of categories, the emergence of regularities, and overextension.

Creswell (2007: p.151) argues that often data analysis is not something which can be bought 'off the shelf' but rather that it is something which a researcher must 'custom build' in order to have a good fit. Creswell also argues that it remains difficult to find the perfect predetermined data analysis tool because the researcher has a vast array of choices.

After all relevant data was available for analysis, the researcher started with transcribing all audio-taped interviews and then reviewed each interview transcript for accuracy. The interviews and field notes were mainly used as sources to access teachers' views of learning, while the classroom observations and documented data (lesson plan, tests, activities, field

notes) were primarily utilized to understand teachers' instructional practices. Table 3-4 was created to summarize the data collection techniques, and the focusing point is reflected.

Table 2.4 Data Sources and the Focus of the Study

The Focus of the Study	***Data Source***
Teachers beliefs	Teacher's Interviews Researcher's Field Notes
Teaching practices	Classroom observations Document data (lesson plan, test, worksheet) Researcher's Field Notes
Teachers reform implementation	Teacher's Interviews Researcher's Field Notes

Based on the data, beliefs, and instructional practices of the teachers were analyzed. The findings and evidence from all the data sources were used to determine and explain teachers' beliefs, actions, and implementation of the meaningful learning reform.

The findings were written in the form of a discussion between the teachers and the researcher, as stated by Creswell (2012): "the primary form for representing and reporting findings in qualitative research is a narrative discussion" (p.274). No particular format was used in writing texts, as there was no set form for these narrative discussions (Coffey & Atkinson, 1996). Direct quotations from the written communications connected to noteworthy events that indicate the evidence of current practice are included in the discussion chapter.

2.6.1 Data coding

Creswell (2012) argued that there is a large amount of literature on qualitative data analysis, with many different viewpoints about the process. According to Gibbs (2002), coding depends on how the investigator defines the data. It is likely that although there exist different terms to refer to the processes of data analysis, they are similar in the techniques of analysis. For this research, the processes of coding and categorizing used mainly paper Creswell and Clark (2012). The researcher concluded the procedures manually with the help of color-coding. Gibbs

(2002) argued for two ways of coding, concept-driven and data-driven methods. Concept-driven coding is considered a method that builds up a list of thematic ideas based on keywords from the literature review, previous studies, or topics in the interviews, and then data are coded using the list. In this study, both beliefs and practices were coded by using concept-driven coding, as will be detailed in this chapter.

Procedure for coding observed lessons and Document data

The researcher analyzed data from both the classroom observations and associated documents (lesson plans, Examination and quiz papers, worksheets) to identify the teachers' actual practices.

The procedure for coding the 60 observed lessons and the documents data was Done according to the four instructional strategies groups (classroom management; clarity of instruction; cognitive activation; and enhanced activities) (OECD, 2019). This analysis used color-coding. Against each of the lesson plans, associated documents, and observation reports of the twenty teachers, the suggested instructional strategies were color-coded to reveal the actual practices teachers employed. The whole process for each lesson plan and lesson observation was transcribed manually with the help of color coding to map the information.

The same frequency analysis coding procedure was used for the interview transcripts as it will be presented.

2.6.2 Analysis of interviews

The semi-structured interview method was used in order to answer the first and the third research questions as detailed in table 3.1

RQ1: What beliefs do Arab middle school science and mathematics teachers hold regarding meaningful learning?

RQ3: What kind of situations teachers perceive as an implementation of meaningful learning?

After carefully examining teachers' interview transcripts, a summary was developed. After that, the summaries were searched for patterns and categories. Responses regarding teacher's beliefs about teaching and learning were analyzed into coded categories as either 'traditional' or 'modern' beliefs – this analysis used color-coding. The categories were then checked against confirmatory or otherwise contradictory evidence in the data and modified accordingly. Thus,

I conducted several rounds of category generation, confirmation, and modification to satisfactorily reduce and organize the data.

A response was considered as modern belief if it was consistent with the modern thought of the teaching aspects as described in the literature review chapter in this dissertation and was coded as "M." Using the same process, a traditional belief category was determined and coded as "T." For example, if a participant responded that "the best way of teaching is to give student clear information," this response was categorized as traditional belief and coded "T" regarding teaching strategies. On the other hand, if a participant responded that "the best way of teaching is to help students to make their own understanding," this response was categorized as a modern belief of teaching and coded as "M."

2.7 Trustworthiness

Data collection was conducted in Israel with mathematics and science teachers at three chosen schools selected for their appropriateness to the research design. Further, approval to conduct this research was obtained from the concerned authorities in Israel.

To ensure credibility and avoid bias, maintenance of anonymity was done, and pseudonym names were used to protect the identity of the twenty participating teachers.

Besides the maintenance of anonymity, the researcher attempted to maintain the trust of the participating teachers. In order to develop their confidence and to derive factual data, the researcher intentionally made the research purpose clear during her pre-visit to the schools. The researcher also reminded the participating teachers not to consider her as someone who is trying to evaluate their practice. Rather, they should feel free to express anything related to teaching and learning of mathematics and science.

A qualitative study is considered trustworthy only if conducted ethically. Trustworthiness depends on internal and external validity and reliability.

Merriam (2002) lists triangulation, member checking, peer review, reflexivity, and engagement in data collection until data saturation occurs as ways to ensure internal validity in qualitative research. Triangulation is the process of gathering information from at least three data sources to ensure the accuracy of the data collected (Bogdan & Biklen, 2007). In the current study, triangulation was achieved using multiple data sources from different participants and multiple data collection methods (e.g., observation, interview, documented data, and field notes).

In the current study, data were collected from various sources and perspectives. Participants have confirmed the text from their transcribed interviews and the field notes, and I have discussed the discrepancies between what was said and what was observed, which is considered member checking.

Validity and reliability depend on the researcher's ethical conduct, and a researcher must be prepared to resolve any ethical dilemmas that arise by making assumptions prior to conducting a study (Merriam, 2002).

Bogdan and Biklen (2007) suggest a few strategies for overcoming ethical dilemmas in qualitative research in education: (1) Avoid research sites where you hold an administrative or supervisory role over study participants. (2) Do not choose participants who are not comfortable sharing information with you. (3) When conducting observations or interviews, choose a time and place that is convenient for study participants. (4) Preserve participants' anonymity in both oral and written communications. (5) Respect study participants and respect your contract with them. (6) Have the courage to report your findings as they are. These affairs were prioritized in the current study.

As a qualitative researcher, the researcher was privileged to have a lot of personal information about study participants and have faced ethical dilemmas. The researcher understood her responsibility to protect informants from harm.

The purpose of the study, data collection methods, and time commitment, along with artifacts required from participants, have all been explained to participants, and participants had given informed consent and had the right to withdraw from the study at any time. Participants were not placed at any more risk than what they would have faced in their everyday lives. In addition, the researcher acknowledged potential bias that might have occurred during data analysis and monitored this closely, as suggested by Merriam (2002).

Chapter 3 - RESULTS AND FINDINGS

The present study was designed to explore the opinions of science and mathematics teacher's about beliefs, practices, and implementation of meaningful learning in Israel. The chapter presents results gathered from qualitative data collection methods. Data was collected from semi Interview schedule, Classroom Observation, Researcher's Field notes, and document analysis.

3.1 Results Regarding Teachers' Beliefs.

The interview revealed that most of the teachers participating in this study held positive attitudes towards meaningful learning and believed that it is important for students to be active learners and to have control over their learning.

The results were analyzed and organized according to the meaningful learning principles (Teaching style**,** learning environment, Teachers' role**,** students' role, learning content) with direct quotations selected from interview responses of the participants regarding each principle.

3.1.1 Teaching style or pedagogies

The participant teachers' beliefs regarding pedagogy supported and corroborated meaningful learning. Thirteen teachers (65%) of those interviewed acknowledged learners as the heart of their instruction, generally called student-centered learning. They expressed their ideas of teaching by using terms such as guiding, encouraging, helping students to discuss, make an interpretation, express their ideas, and make meaning.

However, seven (35%) of the interviewed teachers were aligned to direct transmission belief of teaching (Table 3.1). According to these participants, the best way of teaching is giving the students clear information; presenting scientific facts from credible sources by the teachers, generally referred to as teacher-centered teaching.

Table 3.1 Teacher's beliefs about teaching strategy

Teacher (T)	Summary of the interview excerpt	Category
T1	Guiding students to make understanding	M
T2	Presenting the scientific facts from credible sources	T
T3	Let students control their learning	M
T4	Giving students clear information	T
T5	Allowing the student to suggest new ways of solutions	M
T6	Encouraging discussion to make clear conception	M
T7	Allowing learners to explore by themselves	M
T8	Helping students to make understanding	M
T9	Giving an accurate explanation	T
T10	Allowing students to discuss the subject matter	M
T11	To summarize and practice the contest	T
T12	Giving students clear ideas about scientific knowledge	T
T13	Giving students chances to discover by their selves	M
T14	Giving students to construct the information	M
T15	Use a lot of practice and drill	T
T16	Helping students to make understanding	M
T17	To give a lot of drills in the class	T
T18	To guide students	M
T19	Give opportunities for students to discover or construct concepts	M
T20	Helping students to make a relationship between new concepts	M

M= Modern Belief; T= Traditional Belief

3.1.2 The teachers' role

The participant teachers' beliefs regarding teachers' role support the role determined by the meaningful learning reform, that teacher's role is to monitor student understanding and guide the discussion so that all students have an opportunity to express their understandings in language and engage in activities such as clarifying, elaborating, justifying, and evaluating alternative points of view.

In responding to the teacher's role during the interview, thirteen (65%) of the teacher participants accredited the teachers' mediating role (Table 3.2). In stating their views regarding teachers' role, the participants applied the terms to allow students to interact with peers and to learn by themselves; paying attention to students' prior knowledge; let the students discuss and come up with a solution; creating a learning environment so that the learners can work by themselves.

In contrast, the beliefs of seven of the participants (35%) regarding teachers' role paralleled those of the traditional dimension, where teachers' role is to dispense accurate knowledge; correct the way to solve a problem; set learning goal, and check students' knowledge by searching for a predetermined response (Table 3.2). Teachers in this category believed in students' mastery learning. According to the participants, the best way of learning is finding the right answer, drilling, repeating until mastery, hard work in practicing classwork.

Table 3.2 Teacher's beliefs about Teachers' role

Teacher (T)	Summary of the interview excerpt	Category
T1	Interacting with students	M
T2	Transferring true knowledge	T
T3	Engage students in exploration learning	M
T4	Gives a lot of drill and practice	T
T5	Paying attention to students' prior knowledge	M
T6	Allow students to lead their own learning process	M
T7	Creating a learning environment so that learners can explore	M
T8	Let students discuss and come up with a solution	M
T9	Solves the problems the student finds difficult to solve	T
T10	Invite learners to construct the knowledge	M
T11	Demonstrates how to access the problem	T
T12	Teaching by modeling	T
T13	Engage students in exploration learning	M
T14	Engage students in learning through projects	M
T15	Exposing the content and simplifies it because he is the main source	T
T16	Use an alternative assessment that relies on high learning skills	M
T17	Watching over the class and simplifies the content	T
T18	Engage students in knowledge search and exploration	M
T19	Challenging students with an unfamiliar learning activity	M
T20	Stimulates thinking and creativity among students	M

M= Modern Belief; T= Traditional Belief

3.1.3 The students' role

The participant teachers gave credibility to students as discoverers of knowledge rather than passive recipients of information as is determined by the meaningful learning reform.

Eleven participants (55%) recognized students as independent learners, creators of knowledge, and autonomous explorers. Conversely, nine of the participants (45%) believed that student responsibilities are to cope with what the teachers do, be passive listeners, memorizing scientific facts, and listening carefully to teachers' talk (Table 3.3).

Table 3.3 Teacher's beliefs about students' role

Teacher (T)	Summary of the interview excerpt	Category
T1	Seeker of knowledge as an autonomous explorer	M
T2	Passive listening	T
T3	Discoverer of knowledge	M
T4	Good listener, coping what teachers do	T
T5	Following teacher	T
T6	Independent learning	M
T7	Following teacher	T
T8	Active role, seeker of knowledge	M
T9	Recipient of information	T
T10	Active learner	M
T11	Taking notes and listen to the teacher	T
T12	Imitate his teacher	T
T13	Independent learner	M
T14	Independent learner	M
T15	Memorizing scientific facts	T
T16	Independent learner	M
T17	Listening to teachers carefully	T
T18	Active learner	M
T19	Active learner	M
T20	Active role, seeker of knowledge	M

M= Modern Belief; T= Traditional Belief

3.1.4 The learning environment

In responding to the ideal setting of teaching, the answers of eleven (55%) of the participants regarding classroom organization were analogous to meaningful learning, where teachers offer a variety of avenues for exploring and various routes of approaches, and where unexpected classroom happening is anticipated by the teachers.

On the other hand, nine (45%) of the participants did not support the contemporary classroom scenario, but rather than a quiet and calm classroom state was more appealing to perform whole class instruction and routine activities (Table 3.4).

Table 3.4 Teacher's beliefs about the learning environment

Teacher (T)	Summary of the interview excerpt	Category
T1	No specific setting, various ways of teaching	M
T2	Calm and quiet classroom conveying the knowledge	T
T3	Various ways of teaching group/ peer work	M
T4	Noiseless atmosphere for instruction	T
T5	Calm and quiet classroom for lecture	T
T6	Different ways of teaching; peer or group discussion	M
T7	Conducive environment instructing whole class	T
T8	Risk-free environment for expressing ideas	M
T9	Well managed classroom whole class instruction	T
T10	Different ways of teaching; peer or group discussion	M
T11	Calm and quiet classroom for lecture	T
T12	Calm and quiet classroom for lecture	T
T13	An environment which encourages exploration and discovery	M
T14	An environment that allows cooperative learning, which places the student in the center	M
T15	Noiseless atmosphere for instruction	T
T16	A rich space to serve student center instructions	M
T17	Favorable environment to hear the lecture	T
T18	Learning through rich educational discourse that students initiate and	M
T19	An environment featuring challenges to the students to construct the information	M
T20	Unfamiliar space to engage students in learning by a variety of methods and tools	M

M= Modern Belief; T= Traditional Belief

3.1.5 The learning content

The beliefs of eleven (55%) of the interviewed participants aligned with the meaningful learning view (Table 3.5) of the curriculum, which is interactive and dynamic, focusing on reasoning, thinking, and understanding by problem-solving or inquiry. In contrast, nine (45%) out of twenty teachers believed that the curriculum should be static, planned, and well-sequenced and that a finite body of predetermined knowledge should be listed in the book to be covered.

Table 3.5 Teacher's beliefs about learning content

Teacher (T)	Summary of the interview excerpt	Category
T1	Generating new ideas	M
T2	Promoting next grade	T
T3	Focusing on thinking and reasoning	M
T4	Passing the exam	T
T5	Completing syllabus, having a good score	T
T6	Focus on problem solving, understanding, and creativity	M
T7	Completing the syllabus exam	T
T8	Focusing on thinking and reasoning	M
T9	Completing the syllabus exam	T
T10	Focusing on thinking and reasoning	M
T11	Passing and promoting to next grade	T
T12	Covering syllabus	T
T13	Focusing on thinking and reasoning	M
T14	Learning thinking skills and not covering the syllabus	M
T15	Completing syllabus, having a good score	T
T16	Focusing on thinking and reasoning	M
T17	Completing the syllabus exam	T
T18	What is important Learning thinking skills	M
T19	What important is problem-solving and thinking	M
T20	Acquire higher thinking skills	M

M= Modern Belief; T= Traditional Belief

Table 3.6 shows the summary of the interview findings. 65% of the interview respondents held modern beliefs regarding teaching strategies. 55% of the respondents held modern beliefs regarding the learning environment. 65% of the participants held modern beliefs regarding Teachers' role, and 55% of teachers supported modern beliefs regarding student' role, while 55% of the participants held modern beliefs regarding aspects of learning content.

Table 3.6 Summary of the interview findings

		Meaningful learning principles			
Teacher (T)	Teaching strategy	Learning environment	Teachers' role	Students' role	Learning content
T1	M	M	M	M	M
T2	T	T	T	T	T
T3	M	M	M	M	M
T4	T	T	T	T	T
T5	M	T	M	T	T
T6	M	M	M	M	M
T7	M	T	M	T	T
T8	M	M	M	M	M
T9	T	T	T	T	T
T10	M	M	M	M	M
T11	T	T	T	T	T
T12	T	T	T	T	T
T13	M	M	M	M	M
T14	M	M	M	M	M
T15	T	T	T	T	T
T16	M	M	M	M	M
T17	T	T	T	T	T
T18	M	M	M	M	M
T19	M	M	M	M	M
T20	M	M	M	M	M
	65% (13)	55% (11)	65% (13)	55% (11)	55% (11)

Table 3.7 Summary of teacher's beliefs

Belief categories	Modern Belief (M)	Traditional Belief (T)
Teaching strategy	65%	35%
Learning environment	55%	45%
Teachers' role	65%	35%
Students' role	55%	45%
Learning content curriculum	55%	45%

According to the summary of the teacher's beliefs (Table 3.7), the participating teachers were grouped according to the following groupings: Traditional, Transitional, and Modern.

Traditional beliefs regarding teaching-learning

Teachers in this group believe in the transmission of knowledge to the students by the teacher or other credible sources. They do not consider students as active constructors of knowledge and think that they are the only recipients of knowledge and followers of teachers as passive learners. They do not believe in a dynamic view of the classroom environment, rather believing in a calm and quiet situation to deliver a lecture and doing routine works. They focus on covering the syllabus or passing exams, or promoting to the next level rather than thinking and reasoning.

Transitional belief about teaching-learning

Teachers in this group showed inconsistencies in expressing their beliefs on teaching and learning. For example, a teacher may state the role of the teacher as a facilitator, but he does not believe in the student's active role in knowledge construction. The same teacher also believes in covering the syllabus without considering learners' thinking and reasoning toward conceptual development. Some of them believe in interaction through discussion.

Modern beliefs about teaching-learning:

Teachers in this group have a strong understanding of modern principles of teaching and learning. They believe in the importance of learner's self-responsibility in the process of learning, where they are actively involved in constructing their knowledge through a variety of teaching activities. They state the role of the teacher as a guide or helper that supports the student's learning. They believe in the necessity of a dynamic or relaxed classroom environment, where students express or share their ideas without any fear. Equally, they are aware of group work and interaction among students during the construction of knowledge.

Table 3-8 shows the distribution of science and mathematics teachers' beliefs based on the criteria described above.

Table 3.8 The division of teachers according to the categories of beliefs

	Traditional belief about teaching-learning	**Transitional belief** about teaching-learning	**Modern belief** about teaching-learning
School(A)	*T2, T4*	*T5*	*T1, T3, T6*
School(B)	*T9, T11, T12*	*T7*	*T8, T10, T13*
School(C)	*T15, T17*	-	*T14, T16, T18, T19, T20*
Total	*7*	*2*	*11*

In sum, eleven out of twenty participating teachers had a positive disposition towards meaningful learning. They saw their role in the classroom as that of a facilitator whose job is to provide opportunities and resources for students to discover or construct concepts for themselves. They disagreed that their job is to teach content using facts and textbooks.

There were two teachers who held a transitional belief about meaningful learning; these beliefs are a mix of student-centered and teacher-centered pedagogical beliefs.

Seven participating teachers believed that their students learn the content best when the teacher goes over the material in a structured way and agree it is their job to explain how to do the work and assign specific practice.

Teachers throughout the interviews expressed positive attitudes towards meaningful learning. Their beliefs were aligned with the principles of meaningful learning. However, from the

observed lesson, it was evidenced that they did not strongly adopt these principles within classroom practices as presented in the following section.

3.2 Results Regarding Classroom Practices

In this section, I present an analysis of teachers' classroom practices. When analyzing teaching, I focused on specific elements such as lesson plans, lesson structure, learning activities, and teacher-student interactions. My intention was to understand how teachers' beliefs were manifest in these crucial elements. At first, I will describe the structure of the classroom and how it is organized. In the following, I turn to specific elements of the actual lessons.

3.2.1 The structure of the classroom

The structure of the classroom tells only part of the story about the teaching activity taking place inside it. In all researched schools, the classrooms were arranged in a traditional setup with rows of chairs and tables facing the chalkboard and the teacher.

The teacher normally stood at the front. Teachers often spoke from the front of the class and occasionally moved between the rows to check students' seatwork. In most post-observation interviews, teachers disclosed their beliefs behind this classroom setup that they consider as a traditional seating arrangement that is convenient for controlling and managing students. The teachers used verbal and physical means for controlling students' behaviors, including raising hands in the classroom, keeping eye contact with students, and verbally reprimanding students to pay attention.

Teachers largely interacted with the whole class and rarely with individual students. The only exception was when teachers called students to the front to share a solution with the rest of the class. When they asked questions, students raised their hands to get permission to speak, stood up, and answered the questions, often addressing the teacher rather than the entire class. When called to the chalkboard, students either talked in a low voice or did not talk at all. It was difficult to follow their thinking.

There were no classroom displays, which is indicative of a teaching style that mainly involves talking and listening rather than interacting with visual materials. The chalkboard was the main teaching resource used for writing lesson notes and demonstrating answers for students to copy. The teachers used textbooks to prepare the lesson notes and assign students to questions at the end of the chapter. Students mainly relied on the lesson notes they copied during the lesson, which seems to be sufficient for the primary purpose of passing the exams. Teachers organized

and delivered notes in a way that students could easily memorize and recall during the exam; this clearly illustrates the widespread culture of learning just to pass the exams.

3.2.2 The lesson planning

All the lessons I observed followed regular periods (45-minute). Moreover, the lesson activities took place within the precisely allotted time.

When planning lessons, teachers had to organize everything to fit within the specified lesson duration because there was no time to pursue anything beyond the allotted time.

One of the methods I used to gather information in this study is document analysis; the main documents were lesson plans. It was noted that most of the sample lesson plans appeared to have followed a similar structure composed of four main components: objectives, information input, activity, and closure. The lesson plan format adopted by the majority of the participating teachers still followed the age-old template introduced to them when they were student-teachers in teacher-training colleges. The majority of the participating teachers appear to hold behaviorist views of teaching and learning in mathematics and science. The teachers' plans tended to exhibit authoritative discourses and styles of teaching on which it was assumed that knowledge is transferrable. Support for this interpretation of the plans draws on the following three observations.

First, the lesson formats stipulated lesson objectives needed to be achieved at the end of the lesson and are measured by the lesson closure. Second, the flow of the lesson appeared to be direct and linear. For instance, information input appeared to depend on lesson objectives, and the learning activity is provided to evaluate the information input delivered. Likewise, lesson closure was intended to summarise and evaluate whether students had achieved the lesson objectives. Third, this approach to planning contrasts the lesson components suggested by the new reform, which supports a constructivist view.

According to the meaningful learning view, a lesson is intended to begin with what students already know on the targeted topic, rather than a top-down or transmission approach of must-know based on the framed lesson objectives.

Most of the participating teachers appeared to have adopted a traditional approach to planning and conducting mathematics and science lessons. Most of the sampled learning activities illustrated instructional approaches based on teachers' explanations rather than engaging the

students in exploring and constructing their own knowledge. For instance, most of the learning activities were like the lesson plans rather than tasks for students to explore on their own.

The least frequently evident standard was problem-solving, a few samples, including challenging, non-routine tasks that would provide opportunities for multiple solution methods. Likewise, only a few participating teachers attempted to design tasks that might encourage students to explain their reasoning and articulate their thinking in solving the problem.

Although lesson plans give some insight into the intended practices, the actual implementation may not be fully captured by the plans. Thus, it was necessary to explore the actual conduct of the lesson to understand whether a lesson was implemented consistently with the lesson plan and whether the actual practices were aligned with the meaningful learning reform.

3.2.3 The lesson structure

All the lessons I observed had specific goals. They had a clearly structured and predictable introduction, presentation, and culmination phases. A typical introduction phase, which lasted for about 10 minutes, comprised several events, including greetings, dividing the chalkboard into equal portions, and writing the topics that will be covered during the lesson. Students also pulled out their notebooks and wrote the topic.

Further, the presentation phase was dominated by a teacher-led delivery of content knowledge, interspersed with factual questions, that was intended to prompt students to recite the content. Of all the different practices adopted by the participating teachers in the presentation phase, the most observed one was explanation through closed questioning. This practice was observed in almost every lesson taught by these twenty participating teachers. A closed questioning session may not engage students in terms of learning taking place, other than recalling previous knowledge: little thinking was encouraged in students to construct their own knowledge. In this way, it was difficult to evaluate a deep understanding of the concept by most students in the class, as the teacher tended not to ask any further questions following the responses given by the students. Instead, they moved on to the next question. Moreover, the response to the question asked was mostly given by a few enthusiastic students. Hence, this type of practice is misaligned with the intentions of meaningful learning reform.

The next common observed practice was teacher-led discussions that intended to convey the meaning of the concept. However, the conversation frequently appeared to be shallow and failed to provide opportunities for students to explain their reasoning.

Another commonly observed practice was that most of the participating teachers practiced formative assessment by inviting students to the front to present to the class without much classroom engagement.

In this way, the participation of students in formative assessment was limited. The benefits were only for those presenting the work; the rest of the students were left inactive. In such activities, the students could be described as passive listeners to teacher explanations.

This is concerning in light of the purpose of the formative assessment to assess what has been learned. Based on the performance of those few chosen students, teachers either moved on to the next activity or repeated the explanation to the whole class.

The lesson conclusion phases varied. Some teachers highlighted concepts and ideas that students needed to explore further before the next lesson, while others invited student questions. Others, however, simply summarised the lesson to signify its culmination. The teachers concluded most lessons by asking questions that reviewed the content covered during the presentation phase.

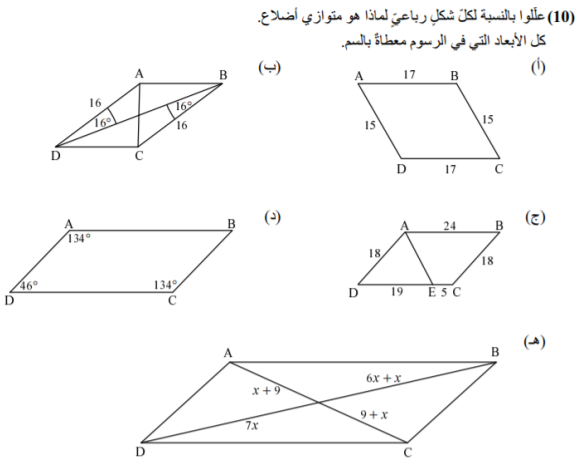
3.2.4 The learning activities

As observed, most of the learning activities and worksheets were transmissive with little thinking required from students; it seems that the main goal of these documents was to practice the content that the teacher conveyed. Moreover, during the exposition phase of the lesson, there was evidence of the teacher adopting explanation strategies rather than letting students explore, discuss, and construct their knowledge through making connections between new concepts and already known concepts.

Looking at the type of knowledge the learning tasks promote, teachers predominantly promoted the acquisition of factual knowledge. Over 70% of learning tasks sought to promote factual knowledge, compared with 20% of tasks that promoted conceptual knowledge and 10% of tasks that promoted procedural knowledge. Teachers often restricted their teaching to delivering factual knowledge even when the task potentially required a certain level of conceptual understanding. Evidence of that, I found while observing teachers teaching the chapter of quadrilaterals (parallelogram, rectangle, rhombus, square). Teachers summarized the definition and features of each quadrilateral and asked students to remember the list of characteristics instead of leading them to explore and discover the features for themselves.

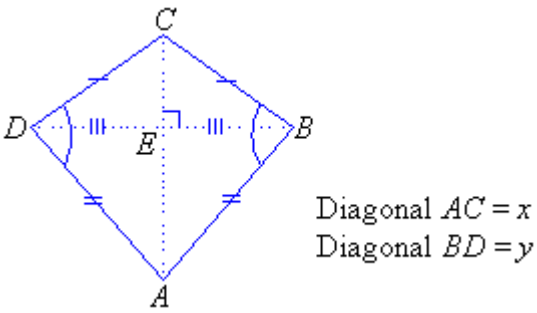
Most of the tasks were routine calculations requiring little thinking and few opportunities for students to develop problem-solving skills. There were very few tasks requiring high order thinking levels, like apply knowledge and analyzing thinking. Here are two examples that require high thinking order apply, analysis, and evaluation of knowledge, both from the quadrilaterals chapter.

Application of knowledge (a task for grade nine) -: determine the type of quadrilateral given according to the registered data only.



In this task student has to complete the missing data in the given shape and then try to identify if there is any characteristic that catheterizes it, then he has to associate this characteristic to the suitable type of quadrilateral, supporting his answer with appropriate arguments.

An Analytic task for grade nine: *Consider the area of the following kite.*



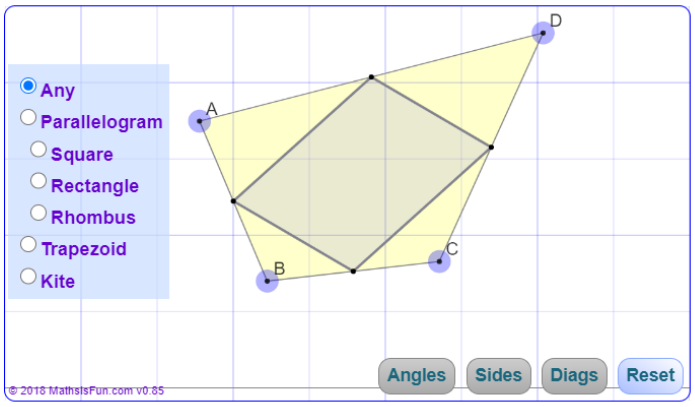
In this task, the student was required first to identify two overlapping right angeled triangles and that because one diagonal is the perpendicular bisector of the other diagonal.

Then he was required to calculate the area of each triangle in the following way: the long diagonal multiplied by the half of the second diagonal divided by two. In the end, he was required to simplify the formula and accept that it is a product of the two diagonals divided by two. He was required to explain each step, and in the end, he has to evaluate the result and to check if this result can be generalized to more quadrilaterals and why.

Thought-provoking tasks were very rare. The following is an example of one thought-provoking task in geometry. The task was given to students to work collaboratively in small groups. Each group explored one quadrilateral and shared the information they construct with the rest of the class. To achieve collaborative work, the teacher divided the students into groups, and every group worked on one part

A Task for ninth-grade students:

Consider the outcome of taking any quadrilateral and connecting the consecutive midpoints of the sides. What kind of figure is formed? What is the ratio of the outer quadrilateral area to the inner quadrilateral area? What would happen if you did the same routine with specific types of quadrilaterals? What figure is formed by joining the midpoints of a rectangle, a kite, an isosceles trapezoid, a square, or a rhombus?



Consistent with their conception of teaching as conveying knowledge, the teachers advocated asking questions that required students to recall content knowledge they have acquired to demonstrate learning. They consider students' recall of factual knowledge taught in class as a standard and as evidence of successful teaching and learning. This was also reflected in tests performed to evaluate students' performance.

The test sheets that I got to see and to gather throughout the period in which the study lasted were in keeping with the method by which the various worksheets and learning activities were transferred, many questions that require mere recall of factual knowledge and early drill and repetition. There were very few thought-provoking questions requiring students to apply their knowledge through deep thinking. In this sense, most of the knowledge required in answering the questions was of the procedural-type, and very little conceptual-type knowledge was demanded of the students.

Nature of teachers′ questions

The most prevalent type of questions asked during class sessions were questions, which checked students' content knowledge, seconded by management strategy question, followed by low-order questions that represented something by a word or phrase and rhetorical question. High-order questions which are assessing student's ability to analyze, evaluate, and synthesize knowledge were very few. Conceptual-change questions that elicit pre-conceptions and challenge students to resolve and review inconsistent ideas, to construct new ideas from their existing knowledge were very rare. The following are examples of questions that were asked while watching some of the lessons.

Table 3.9 Types of teacher questions

Question Categories	Descriptions	Examples from this study
Managerial	Questions focused on keeping the classroom going	Only one knows the answer! Don't you have your notes with you there?
Lower- order	A question which checks students' content knowledge (factual knowledge)	What are the three steps do we have to follow when writing a chemical formula?
Higher-order	The questions assessing student's ability to analyze, evaluate, and synthesis	distinguish metals from non-metals based on their physical and chemical properties
conceptual-change questions	Thought-provoking, challenging, and extending questions.	Separation of mixed materials according to their features.

Results Regarding Teacher-Student Interaction

The results show that teachers mostly interacted with the whole class rather than with groups or individuals. Few teachers were involved in teacher–group and teacher–individual interactions. There was more teacher–individual interactions than teacher–group interactions. This suggests that most learning activities were solitary; thus, collaborative small group learning activities were rare. Students rarely interacted among themselves. When students interacted among themselves, they did so with the whole class rather than with individuals or groups.

It is found that most of the talk is covered by teachers' initiation, which includes teachers' lectures, teachers' questions, teachers' directions, and justifying authority. Student talk-initiation-a crucial part of student-centered teaching, which allow the student to express their ideas and make them empowered to be the part of knowledge construction- is almost absent.

The findings reveal that most of the teachers' feedback was evaluative type through which the teacher comprise simple affirmation to signify acceptance or rejection of answers. The facilitative type of feedback, through which teachers are giving directions to help learners improve their learning experiences by themselves, was uncommon. It was rare to find teachers prompting students to explain or justify their responses. This accords with the fact that teachers rarely asked thought-provoking questions that required students to express their views and perspectives.

It was found that the Classrooms talk was Conducted according to the type of feedback teachers employ to students. Where the feedback was evaluative, teachers asked closed questions, only a single student participated in the talk, and the teacher hold the authority to judge. In this case, the classroom talk was monologue or authoritative talk. On the other hand, where feedback was facilitative, the teacher asked open questions, more than one student participated in the discussion, and the teachers shift the authority to the students to judge. The talk in the classroom was a dialogue. Below are two quotes of discourse conducted in the classroom according to the type of feedback the teacher provided.

Table 3.10 Excerpts from a real lesson based on feedback

Type1 (Facilitative feedback)	Type2 (Evaluated feedback)
Teacher: given the following statement" quadrilateral where a pair of parallel opposite sides and another pair of equal opposite sides is a parallelogram." Is that correct or no? *Student* 1: correct *Teacher*: can you explain why? Can you prove it? *Student 1*: No Teacher: anyone else? Are you agree with him? Is it yes or no? *Student2*: yes, because if its equal then it is parallel *Teacher*: are all two sides equal are also parallel? *Student2: not in general but in this example, it has to be.* *Teacher? Are you agree with him? who thinks differently?* Student3: no, the trapezoid has two parallel but not equal bases *Teacher*: excellent, so what you think? Is it right? *Student3*: I think this statement is wrong. Teacher: if no, can you give me a counterexample *Student4*: I think an isosceles trapezoid is a good example Teacher: can you explain your answer? *Student 4*: isosceles trapezoid has two equal sides and two parallel sides, and it's not a parallelogram *Teacher*: very good	*Teacher*: how you define a kite *Student*: a quadrilateral with two pairs of equal adjacent sides. *Teacher:* wrong answer, you have to say distinct pairs. *Teacher*: what are the properties of a kite? *Student:* any two opposite angles are equal *Teacher:* no, just Angles between unequal sides are equal; what else? *Student:* the diagonals intersect at right angles. *Teacher*: write an answer. and the main diagonal bisects a pair of opposite angles. *Teacher:* there still another features. What else? *Student:* main diagonal and cross diagonal *Teacher*: what is about them? *Student:* no response *Teacher*: the *main diagonal* is the perpendicular bisector of the cross diagonal

As Leatham (2006) pointed out, "beliefs cannot be perceived or measured but must be inferred from what people say, intend, and do." When considering this quotation and according to the data that emerged from the classroom observation, teachers who were identified as modern teachers did not support their beliefs about meaningful learning. Hence according to classroom practices, only five teachers out of twenty (T1, T6, T8, T10, T20) are classified as modern teachers who held favorable beliefs toward meaningful learning. However, there was no change in classifying teachers into transitional and traditional groups.

Table 3.11 summarizes the results of the teaching styles by teacher's category. Results indicate that modern teachers used practices aligned with student-centered instruction. They allowed students to work in a group and asked them to help in the lesson activity.

Transition teachers basically used teacher-centered instruction. However, they were not too strict about following all aspects. Although some of them were concerned about group discussion, it was absent in their actions. Thus, they showed inconsistency in their beliefs and practices.

Traditional teachers, on the other hand, strictly followed practices aligned with teacher-centered instruction that correspond with teacher-centered teaching. They again supported their beliefs about the mechanical view of teaching, i.e., the teacher will perform some routine work, including lecturing and checking student learning by asking questions.

Table 3.11 Teachers' actual practices

	Teacher	*SLG*	*RSH*	*PS*	*CSEB*	*L & C*	*WG*	*HPCAT*	*EROW*	*WP*	*SMP*
School (A)	*T1*	*x*	*X*	*x*	-	-	*x*	*x*	*x*	*x*	-
	T2	*x*	*X*	*x*	*x*	*x*	-	-	-	-	-
	T3	-	*X*	-	*x*	*x*	-	-	-	-	-
	T4	-	*X*	-	*x*	*x*	-	-	-	-	-
	T5	*x*	*X*	*x*	*x*	*x*	*x*	*x*	-	*x*	-
	T6	*x*	*X*	*x*	-	-	*x*	*x*	*x*	*x*	-
School (B)	*T7*	*x*	*X*	*x*	*x*	*x*	*x*	*x*	-	*x*	-
	T8	*x*	-	-	*x*	-	*x*	*x*	*x*	*x*	*x*
	T9	*x*	*X*	*x*	*x*	*x*	-	-	-	-	-
	T10	*x*	-	-	*x*	-	*x*	*x*	*x*	*x*	*x*
	T11	*x*	*X*	*x*	*x*	*x*	-	-	-	-	-
	T12	*x*	*X*	*x*	*x*	*x*	-	-	-	-	-
	T13	*x*	*X*	*x*	*x*	*x*	-	-	-	-	-
School (C)	*T14*	*x*	*X*	*x*	*x*	*x*	-	-	-	-	-
	T15	*x*	*X*	*x*	*x*	*x*	-	-	-	-	-
	T16	*x*	*X*	*x*	*x*	*x*	-	-	-	-	-
	T17	*x*	*X*	*x*	*x*	*x*	-	-	-	-	-
	T18	*x*	*X*	*x*	*x*	*x*	-	-	-	-	-
	T19	*x*	*X*	*x*	*x*	*x*	-	-	-	-	-
	T20	*x*	-	-	*x*	-	*x*	*x*	*x*	*x*	*x*

"×" = indicates observed; "- "= indicates not observed

Legends: SLG=State learning goals; RSH= Review students' homework they have prepared; PS= present a short summary of the previous lesson; CSEB= Check students' exercise books; L & C= Lecture and check by asking questions; WG= working in a group; HPCAT=student help in lesson and activity; EROW=students Evaluate and reflect their work; WP= students work on a project; SMP= Students make a product;

Compared to the traditional and transitional groups of teachers, modern teachers did not dominate their classroom through lecturing only. Besides, they praise students and use students' ideas, and ask more questions. Giving direction and justifying authority was found as the least prevalent compared to other teacher groups. They had a very rich collection of questions. They allowed students to talk and express their ideas.

Teachers of the modern group tried to engage the students in the lesson in multiple ways. It is said that to enable students a wide range of thought processes, effective teachers use a variety of questions (Ewing & Whittington, 2007).

In the case of modern teachers, varieties of students' responses were found. This includes long responses express thinking and knowledge. It is the reflection of their richness of asking varieties of questions comprise higher-order, lower-order, and conceptual changes.

Transition teachers used mixed of teacher-centered and student-centered instruction. They moderately use lecturing in their classroom talk. Besides, they allow students to talk and expressed their ideas.

Teachers in the transitional group had a poor collection of questions. Beside lower-order questions, they asked analyzing and evaluative type questions. However, no challenging questions were found.

Traditional teachers dominated their classroom talk through lecturing and asking a very poor repertoire of questions to assess student content knowledge. Through predominant lecturing, they attempt to transfer knowledge. Since there is no student activity, they are recognized as passive recipients of true knowledge.

In the case of traditional teachers, a poor variety of student responses has evolved. Most of the responses were limited to one word or phrase. A few long responses that expressed knowledge were found, but long responses that express thinking was totally absent. It confirms that they asked a small variety of questions that were of low-order, which resulted in a single word or phrase type of response.

Summary of the findings regarding teachers' practices

I found that all studied schools have oblong-shaped classroom designs, with students' chairs and tables traditionally organized in rows, all facing the chalkboard and the teacher. The students sit in rows, one behind the other, interacting with the teacher as a whole class but rarely with each other. This classroom organization symbolizes teaching in which the knowledge flows from the teacher to the students.

I found that lessons have precise and predictable framing in terms of time and content. Most lessons have three distinct phases: introduction, presentation, and culmination. In the introduction phase, question-and-answer episodes prevailed and are intended to ascertain the amount of subject content that the students can recall. Further, teacher-led delivery of content knowledge interspersed with factual questions intended to prompt students to recite content dominates the presentation phase.

It was found that teachers were for most of the time positioned in front of their class, consistent with the teacher-centered approach, and employ didactic teaching practices. They used predominant lecturing, took on the almost full responsibility of the talk in a non-interactive discourse manner where students' participation is negligible. In this regard, students are not able to share their ideas in the class. They are only the recipients of knowledge conveyed by the teachers.

The pattern of interaction in the observed classroom is non-interactive and authoritative. Teachers lecture is predominant along with teachers' directions and criticizing or justifying authority. Meaningful learning (Entwistle, 1990) requires pupils to engage in an active reconstruction of information, to make new links and test old ones, to resolve contradictions, and to identify underlying principles (McCormick & Leask, 2005). It happens best where social interaction, particularly between a learner and more knowledgeable (usually the teacher) others, is encouraged. Teaching styles, therefore, need to take account of the need for discussion, both between pupils and between pupils and teacher (ibid. 200,5 p.279).

The participating teachers basically use low-order questions to check students' content knowledge. In this way, teaching practices were not able to involve learners in the learning process, while active involvement of the learners in the learning process is the core of the meaningful learning reform. Rhetorical question and the question that ask for classroom management were also found predominant. Negatively, higher-order and thought-provoking questions were rarely asked. In this sense, teachers of science and mathematics should ask high-

order questions. Teachers should ask students to explain and justify their responses to engage them in the lesson in multiple ways.

Learning tasks required students to receive, memorize, and reproduce as faithfully as possible the content knowledge delivered by the teacher. Students were provided with minimal opportunity to be active and to create their own knowledge. All that was required of the students is to sit passively and listen to the teacher and copy down whatever was written on the blackboard. Activities such as groups and plenary discussions were rare. In most of the lessons, instead of contextualized activities provided for students to solve on their own, participating teachers generally used context-related examples while trying to explain the targeted concept.

The results of teachers' feedback in various lessons studied did not support meaningful or effective learning. The pattern of interaction was found as authoritative and not empowering. Teachers who view learning as a process of constructing knowledge rather than memorizing a transmitted content are understandably more likely to draw out students' existing knowledge and to encourage students to participate actively and interact with a variety of materials in order to arrive at new concepts. In many of the observed classrooms, students listen quietly to the teachers talking, with only one right answer accepted, and the textbook and workbook used exclusively as the only source of learning**.**

It was found that only five teachers out of twenty were strictly employing the meaningful learning principles, while in the expressed beliefs in the interview section, eleven out of twenty teachers declared that they hold positive beliefs toward the meaningful learning reform. This implies a gap between beliefs and practices, which I will discuss in the discussion chapter.

3.3 Teachers' Experiences During the Implementation of Meaningful Learning Reform

The third research question explores the experiences of middle school teachers implementing the meaningful learning reform, which required educators to exercise judgment regarding the way in which to meet the reform's goals.

Exploring twenty participating perceptions regarding the implementation of the Meaningful Learning Reform in Israel revealed that they experienced two main challenges:

1. the need for clear guidelines
2. coping with ambiguity – meaning that they were required to operate under conditions of uncertainty.

As mentioned in the review of the literature chapter, The Meaningful Learning Reform was not a single reform; it was part of a succession of reforms launched in the Israeli school system. However, most of these reforms were based on a top-down authoritarian relationship, with schools being required to follow detailed instructions.

There was no room for tailored implementation or creative interpretation. The Meaningful Learning Reform was unusual in this regard, as it allowed teachers to exercise considerable discretion about how to meet the broad policy goals.

The interview data regarding these challenges are presented below, supported by excerpts from participants' interviews.

3.3.1 The need for clear guidelines

According to the findings based on a qualitative analysis of the data, the first challenge that teachers felt was that of difficulty to act without clear guidelines.

For many teachers in this study, dealing with the reform implementation was a difficult and unpleasant experience. Importantly, teachers compared the new situation to the former one, noting that nobody could guide them in a professional manner "as in the past." They wished there was more professional help like in past reforms.

This perceived challenge was mentioned by 13 study participants. For example, Participant Two (T2) claimed that teachers need actual tools to implement the reform:

> "*...teachers must be given tools for implementing the reform... We need a practical help to implement."*

Contrary to the belief that teachers can implement a generally-outline reform without detailed guidelines, participant four (T4), a science teacher with 14 years of experience, believed that teachers needed help in implementing the new Meaningful Learning approach. She did not utilize her prior knowledge and experience to interpret the reform concepts; instead, she claimed that the Ministry of Education is not providing practical tools for teachers to do so reflects its detachment from actual school reality:

the Ministry sets impressive goals, but there is a big gap between the current state and these goals. Teachers get a limited help as a result; the reform did not really change teachers' practices.

For T4, implementing meaningful learning at school meant a long process rather than a quick fix; thus, she did not recognize any real change in her school.

T9, a science teacher with 22 years of experience, compared the new situation to the former one, noting that nobody could guide her in a professional manner "as in the past." She did not rely on her prior professional experiences as a guide but rather wished there would be more professional help:

"...there is nobody that can guide you optimally as in the past. What is it exactly that I am to do to create meaningful learning?

In addition to professional preparation, teachers like (T11), a mathematics teacher with 23 years of experience, advocated the gradual implementation of the reform:

"This is very difficult and demands a process of study and change. I think it should have been implemented gradually and after extensive preparation courses for the teachers..."

The utterances of T2, T4, T9 emphasize the need for external guidance. Instead of relying on their own knowledge and experience, they sought external guidance. Moreover, their utterances reflect both teachers' difficulty to act without clear guidelines, which is the subject of the current section, and their hardship in acting within an atmosphere of ambiguity, which is the subject of the next section.

Many teachers believed that the authorities should have trained the teachers if a successful implementation of the Meaningful Learning Reform was desired.

For example, T15, a science teacher with 11 years' experience, explained that teachers' training was necessary since they had been working according to another method for many years. She thinks, Dramatic change all at once is almost impossible; only professional training would make it happen. According to T15, professional training would improve the quality of teaching and facilitate truly meaningful learning:

"A teacher working according to a certain method for 11 years can't just switch instantly to a new way of teaching. Teachers have to be trained to make a successful instructional change. I'm sure that if everyone is trained to work according to the new

system, the quality of instruction will rise, and the result will indeed be meaningful learning."

In sum, the autonomy granted to schools required teachers to be creative, work independently, and exercise discretion. The teachers interviewed for this study considered this autonomy to be a problematic factor. Seeking professional development and guidance, they considered external support to be vital for teachers' ability to change their teaching habits gradually.

3.3.2 Coping with ambiguity

The second challenge that teachers perceived as involved in implementing the meaningful learning reform was ambiguity. The reform was characterized by the uncertainty of meaning, with several interpretations seeming plausible. For the teachers, this ambiguity proved to be complex and confusing.

This perceived challenge was mentioned by 15 participants in the study.

A good proof for the ambiguity that teachers perceived was when they were asked to describe student-centered instruction; they tended to describe the roles or activities of teachers and learners. For instance, participants listed "Group work," "When the teacher helps the student," "Teachers guide learning," and "Teachers facilitate learning." The most thorough description, out of all participant definitions, was:

*"Student-centered instruction means students take ownership of their learning. Students determine the objective or outcome […] Students use their creativity in assignments or project de*sign."

When the teachers were asked to describe effective lessons that they taught, 15 0ut of twenty teachers suggested lessons, save for one, which was substantially based on traditional epistemology.

Some teachers identified the confusion as a "characteristic of this reform," for instance, (T17) a science teacher with 12 years' experience, believed that no one fully understood the reform's ideas:

"*We have thrown into a new situation, and no one truly understands the messages that are supposed to reach the ground, as they are very confusing."*

T11, a math teacher with 23 years of experience, said in this regard:

> "*... Since nobody understands what this meaningful learning is actually about, it doesn't really happen*."

Study participants made it clear that the ambiguity involved in the meaningful learning reform was challenging. Within this ambiguity, they were required to act at their own discretion—an expectation that they perceived as an additional difficulty, as presented in the previous section. Teachers mentioned several results of this ambiguity. Seeing the reform as a mess to be dealt with, experienced teachers in this study (with more than ten years of teaching experience) claimed that since the reform designers did not go into details, the implementation was slow and inconsistent. Thinking out all the details would take a very long time. The reform lacked the infrastructure that would enable smooth and quick implementation. One of these teachers is T5, a mathematics teacher with 24 years of experience; she said:

> *"…since teachers did not understand what to do, there was an increased sense of pressure in the school."*

One more result of the reform program's ambiguity was mentioned by T7, a science teacher with 15 years' experience. She opined that since expectations from teachers were unclear, everyone did what they saw fit. The uncertain that characterized this reform had resulted in everyone working according to their personal understanding and individual preferences:

> *"Since there is no learning process designed for teachers, so everyone does what he or she likes. There are general instructions, and each teacher suits his teaching to them according to his abilities and comprehension."*

T15 from C school, a science teacher with 15 years of teaching experience, asserted that due to the reform program's ambiguity, no change has occurred in his school. Teachers continue to use the traditional methods, albeit with some insubstantial decorations. The reform's looseness enabled teachers to choose the easier option of continuing to work without any real change:

> *"Since nobody understands what this meaningful learning is actually about, a teacher can say that meaningful learning is about anything he wants, the teacher can do what he used to do and then present it as meaningful learning. As a result, meaningful learning doesn't really happen."*

Teachers used the methods they knew well not only because that was the easiest way but also due to their need to make sense of the unfamiliar situation of the new reform. In the ambiguous situation that had come about, teachers clung to the familiar and known – i.e., what they had already done before.

In short, teachers perceived the meaningful learning reform as involving uncertainty of meaning and intention, which made its implementation difficult. The ambiguity that characterized the reform did not lead teachers towards creativity and renewal; instead, it made them confused and even angry, while the reform remained unfulfilled, at least in part.

In addition to the need for clear guidelines and Coping with Ambiguity As the main challenges that teachers perceived as involved in implementing meaningful learning, many teachers have experienced the implementation of the reform as a process full of obstacles that made the implementation process difficult and sometimes imperfect. These situational and institutional barriers are discussed in further detail below.

3.3.3 Factors influencing teachers' implementation of meaningful learning reform

Overcrowded classrooms and Physical structure:

Meaningful learning is often associated with moving about and physically being active; therefore, one of the perceived barriers is the layout of the teaching space. The environment in which the learning takes place can no doubt have a huge influence on how learning and teaching are implemented.

Most teachers emphasized that the size of the student groups was too big. In addition, teachers did not have enough appropriate space to support students' work in meaningful learning environments. Teachers made the following statements:

> *'It is almost impossible to use active learning methods in our class because it has 32 students,' 'Working with very large groups is very hard for both students and teachers,' 'It's hard to manage discussions in crowded classrooms,' 'The physical conditions of the class are inadequate for putting students into groups because of the inflexibility problems.'*

Lack of time and time pressure in the studies:

The participating teachers were worried about the stress of time. They emphasized that the syllabus was overloaded, that they were working under time pressure, that the use of Meaningful learning methods increased the required amount of time, and sometimes lecturing was the easier and more efficient means of transmitting the information. Participating teachers used the next statements to express this difficulty:

> *'Overloaded curriculum'; 'too heavy a workload'; 'the lack of time.*
>
> *"...meaningful learning methods need time, and on the other hand, one has to complete the syllabus. It is difficult to find time to conduct investigations."*

Examination system:

Another barrier mentioned by the participating teachers was that the Israeli educational system was based on examinations. Israel has standardized examinations for evaluating students at all levels. For this reason, teachers mentioned that they could not use these innovative methods in their class because of the examination system and students' and parents' expectations. Hence, this barrier limited the implementation of meaningful learning reform. Teachers feel that they are accountable for the performance of learners and fear that they may be held responsible if learners perform poorly due to the curriculum not being covered. This is evidenced in the following interview excerpts.

> *"...The need to cover a certain amount of work within a particular time and the performance of learners in tests. That is important because if learners do not perform because you did not finish the work, then you are in trouble."*

Lack of necessary materials, equipment, or resources:

Most teachers complained about the lack of materials or equipment. This could be a barrier to the implementation of some activities that involve Meaningful learning (for example, demonstration and laboratory exercises, or computer and visual-based instructional activities). Also, teachers criticized current textbooks that did not provide ideas on how to use Meaningful Learning methods, nor did the textbooks offer practical examples or worksheets for implementation. This, therefore, resulted in an even heavier workload for teachers. This is shown in the following interview excerpts:

"... I think the people who drafted this policy do not understand what is happening on the ground. We have no labs, no equipment, in the textbooks there are no practical activities... How can we conduct experiments all the time?"

"...There are no sufficient resources, the school is poorly resourced, and we are striving."

"We have a lack of good learning materials."

"We have not a good access to the internet to support inquiry learning."

Low expectations in students' ability and performance

Another factor influencing the implementation of meaningful learning are teachers' low expectations of students' ability and performance. Participants considered their students' lack of several pre-requisite skills a major challenge in implementing meaningful learning instructional approach in their classrooms. This was reflected as 'low expectations' for all of their students. The study participants' first reaction to the meaningful learning principles was that it was a great instructional approach but not particularly good for their students. The participants believed that their students lacked the skills and maturity to learn through any other instructional approach other than direct instructions.

"... meaningful "learning is a great instructional approach but not particularly good for our students."

"...for students, what is important is the grades, so it does not matter the way we teach..."

Teachers' willingness

The teachers' willingness to engage with the new experience as well as to get through the problems within their school setting was another crucial factor influencing their successful implementation.

Generally, all the teachers in this study had concerns, and these concerns were similar, involving issues such as curriculum, testing, or the lack of academic resources. However, even though every teacher had the same set of anxieties, the teachers who employed modern methods

in the instructions and the non-shifting group(the teachers whose practices were aligned with traditional methods) presented different methods and ideas to deal with their concerns.

The teachers who had a positive attitude toward the reformed learning approach and their beliefs were aligned with their practices (five teachers only) transformed these perspectives into a willingness to be engaged and challenge their practices. Hence, they tended to have the power to implement the new learning approach (Allinder, 1994; Haney, Czerniak, & Lumpe, 1996; Bray-Clark & Bates, 2003). Furthermore, they were better able to endure the barriers or stressful situations (Bandura, 1997).

Teachers who expressed an optimistic attitude in this study and made the shift toward the new instructional learning approach were able to see ways to work through the reform and some of the classroom management barriers. Hence, they were not overly bothered by those matters. In other words, the teachers actually recognized the concerns and were able to see how to deal with them. On the other hand, the non-shifting teachers who had favorable beliefs towards meaningful learning but their practices were not aligned to their beliefs saw these concerns as barriers and did not want to engage in the implementation process.

The teachers in the non-shifting group were more sensitive to the barriers they faced and, therefore, ultimately did not translate their positive or neutral attitudes into moving their practice toward reformed learning.

> *"... there are a lot of problems ... we cannot solve... like the class size, curriculum, testing, and the scarcity of resources*…"

Disciplinary issues

Most of the teachers raised the issue of student discipline – or the lack of it – stating that this was their main hindrance to teaching. Maintaining discipline was their main concern in the classroom, with teaching science reduced to a lesser priority.

"...it is not possible to teach. It is very difficult ...I spend all my time shouting at the students and very little time teaching. It is very difficult to employ meaningful learning methods."

Most of the observed lessons involved detailed lectures on with little student involvement because it was "the only way of keeping the class quiet for some time" one teacher admitted that this was not the most favored of teaching strategies, but he did it because: if you ask them to do many things there will be so much noise. So, this way, they are quiet, and they will maybe be able to learn something. I can make them involved, but then maybe only four or five students

will take part, and then I will be a failure in front of the students, and I will not be able to control the class. So, it is better this way.

Teachers believed that this was because “nobody is interested in learning.” Nobody thinks it is very important to learn. So, students just do what they like.”

Chapter 4 - DISCUSSION

This study focuses on the Meaningful Learning Reform, which was launched in the Israeli school system toward the 2014-2015 academic year and is currently being implemented. It set out to explore the opinions of science and mathematics teachers in Arab middle schools about beliefs, practices, and implementation of meaningful learning in Israel.

The objectives of the study were expressed as three Research Questions**.** These questions allowed the study to explore the beliefs or perceptions and the actual instructional practices of science and mathematics teachers' through the implementation stage of the meaningful learning reform. The research questions also afforded opportunities to discover any situations that impacted the implementation of meaningful learning.

A literature review was completed to inform the study. Multiple data collection methods were utilized in this qualitative research study, which included semi-structured interviews, classroom observations, and document analysis. The findings in chapter four demonstrated clear results about teacher beliefs and the extent of meaningful instruction in science and mathematics classrooms and delineated situations that impacted or hindered the implementation of meaningful learning.

The teachers in this study exhibited a positive attitude toward meaningful learning. However, the actual practices observed were not aligned with meaningful learning principles. Teachers in this study employed traditional instructions that emphasized teacher-centered. The findings explored situations, usually barriers, impacting the implementation of meaningful learning.

This chapter will describe and interpret the findings from chapter four of the study in relation to the literature review from chapter one.

4.1 Teachers' Beliefs About Teaching and Learning

Beliefs shape what teachers think should be taught, how it should be taught, how students learn, and what the appropriate teacher and student roles are in the classroom (Errington, 2004; Harwood, Hansen, & Lotter, 2006; Snider & Roehl, 2007). Understanding the foundation of teacher beliefs may yield insight into their attitudes and their rationale or how they approach teaching and learning.

Twenty teachers were interviewed in order to gather data for the first question. Based on the questions posed in the interview protocol, participants' beliefs were explored in five categories, namely:

- Teaching strategies
- Teachers' role
- Students' role
- Curriculum/ learning content
- Classroom environment

Overall, teachers' responses suggested beliefs about meaningful learning that were consistent with modern learning theories, as discussed in chapter 3. findings that emerged from the teacher interview (Table 3.7) led to the first Assertion in this study.

Finding 1: Teachers held favorable **beliefs regarding meaningful learning.**

The results of the study revealed that the participating teachers favored meaningful learning. Researchers and practitioners agree that meaningful learning occurs when students are active participants, not passive recipients (Dawkins, 2004).

Meaningful learning rejects previous ideas that pictured learners as vessels into which teachers could pour new ideas and information-straight from the teachers' brain to the students'- brain, completely intact. Instead, it views learners as having complex networks of understanding that they have developed from their experiences. As they encounter new experiences through their senses, they attempt to fit these into their existing networks. However, good teachers can provide environments that support learners in the process of establishing these connections and make sense of what they experienced (Dawkins, 2004).

Most of the participating teachers had a positive disposition toward meaningful learning. Overall, the teachers' responses suggested beliefs about meaningful learning that were consistent with constructivist learning theories.

The results of the study revealed that participants have a favorable position regarding all the principles of the meaningful learning reform, which is parallel to the constructivism theory, as detailed below. Of all principles that are essential for meaningful learning, there were two

principles that got a low percentage of support compared to the other principles; these principles are Curriculum and Students' role. (Table 4.1)

Table 4.1 Key Findings from teachers' responses

Belief Categories	Key Findings	Type of Belief
Teaching strategy	The majority of respondents (65%) believe that not teaching but helping or guiding the learners as the heart of their instruction generally called student-centered learning.	Modern (M)
Learning environment	The majority of respondents (60%) beliefs regarding classroom organization are analogous to a modern setting where teachers offer a variety of avenues for exploring various routes of approaches.	M
Teachers' role	The majority of respondents (65%) believe that students have to learn by themselves, let students discuss to come up with a solution; creating a learning environment so that learners can work by themselves.	M
Students' role	The majority of respondents (55%) believe that students have to be discoverers of knowledge rather than passive recipients of information.	M
Learning content Curriculum	The majority of respondents (55%) believe that the focus is on thinking and reasoning and not on covering the syllabus.	M

The most encouraging result of the present study is that the participants are aware of contemporary teaching strategies (Table 4.1). They believed that pupils are at the heart of the instruction, generally called learner-centered teaching and learning. This result coincides with the research conducted by Levitt (2002) and the OECD (2009). They conclude that teaching strategy should focus mainly on student learning, generally referred to as student-centered learning. The OECD (2009) reveals that in all the countries, except Italy, the average endorsement of modern beliefs is stronger than that of direct transmission beliefs. The same result emerged from the data of this study.

Concerning teachers' roles, the participants' beliefs were aligned with modern notions about teachers' responsibilities (Table 3.2). Beliefs regarding the role of the teacher saw the teacher as a facilitator, guide, provocateur, friend, and so on (Tobin et al., 1994). This result is similar to the results of Levitt (2002), Tsai (2002), and the OECD (2009). In most countries, teachers believe that their task is not simply to present facts and to give opportunities to practice but rather to create learning opportunities and guide discussion (OECD, 2009).

Concerning student' roles, only 55% of the participants in this study held modern beliefs regarding students' roles. They thought of students as active and independent knowledge discoverers (Table 3.3). This result is similar to the research conducted by the OECD (2009). Teachers, in most OECD researched countries, believe that students are the active constructors of their own knowledge. The percent (45%) of teachers that possessed traditional beliefs regarding students' role is large, and it can be speculated that the teachers in this study from the researched middle schools did not have a complete understanding of each aspect of teaching-leaning. This partial or incomplete idea about teaching-learning is called naïve constructivism (Prawat, 1992). Dewey already cautioned about this problematic form of constructivism. He argued that student engagement in the so-called teacher's guided discussion is not the best measure of educational value.

An important finding of this research is that teachers were incoherent in expressing their beliefs to a particular aspect of teaching and learning to its associated aspects. For example, most of the teachers in this study believed in teachers' mediating role to monitor students' understanding and guide the discussion so that all students have opportunities not only to express their understanding in language but also engage in activities such as clarifying, elaborating, justifying, and evaluating alternative points of view.

However, the participating teachers did not believe in students' autonomous behavior as independent knowledge discoverers and rather thought of them as passive recipients of information, listening to the explanation from teachers and taking notes (Prawat, 1992; Fosnot, 1996).

It is also evident that when teachers provide students with opportunities to feel supported, challenged, and autonomous in the classroom, students' motivation increased. Conversely, when teachers' predominant role in the classroom is to transmit knowledge as an authority, students' intrinsic motivation decreases (Wetzel, 2004). In this regard, it can be speculated that

low thinking ability and low interest of Arab science students in science are attributed to being passive recipients of information.

Regarding the learning environment, 60% of the participants possessed modern beliefs. They believed in an interactive and dynamic classroom environment (Table 3.4). Their beliefs regarding classroom organization were analogous to a modern setting, where teachers offer a variety of avenues for exploring various routes of approaches and where unexpected classroom happening is anticipated by the teachers.

Although 40% of the participants possessed traditional beliefs regarding the learning environment, they believed that a calm and quiet classroom is necessary to perform a whole class instruction through lecturing and carry out routine activities (Table 3.4).

Classroom management is often described as the action's teachers take to ensure an orderly environment and effective use of time during lessons (van Tartwijk & Hammerness, 2011).

Numerous studies have identified classroom management as an important contributor to student learning and a strong predictor of student achievement – see, for instance, Baumert et al., (2010), Klusmann et al., (2008), van Tartwijk and Hammerness, (2011).

Large-scale international assessments of student achievement have found a positive relationship in several countries between an orderly environment (as reported by teachers) and student achievement (Martin et al., 2013; Le Donné, Fraser & Bousquet, 2016; Wang & Degol, 2016).

TALIS (Teachers and School Leaders as Lifelong Learners) (OECD, 2019) provides insights INTO the things teachers do to maintain an order that may already exist in the classroom or to re-establish order.

In 2018, on average across OECD countries and economies that participate in TALIS, more than 60% of teachers reported that they frequently or always engage in practices that aim to maintain an orderly classroom, such as telling students to follow classroom rules (71%) and listening to what they say (70%). Slightly fewer teachers report that they frequently or always take measures to react to disruptions from students in the classroom, such as calming students who are disruptive (65%), as well as asking students to quieten down quickly (61%) (Fig. 4.1).

If quite a few teachers rarely engage in these classroom management practices, it may be because they do not need to, either because their students take care to create a pleasant learning

atmosphere or because the teachers have succeeded in establishing a classroom environment where it is not necessary to keep repeating classroom rules to students.

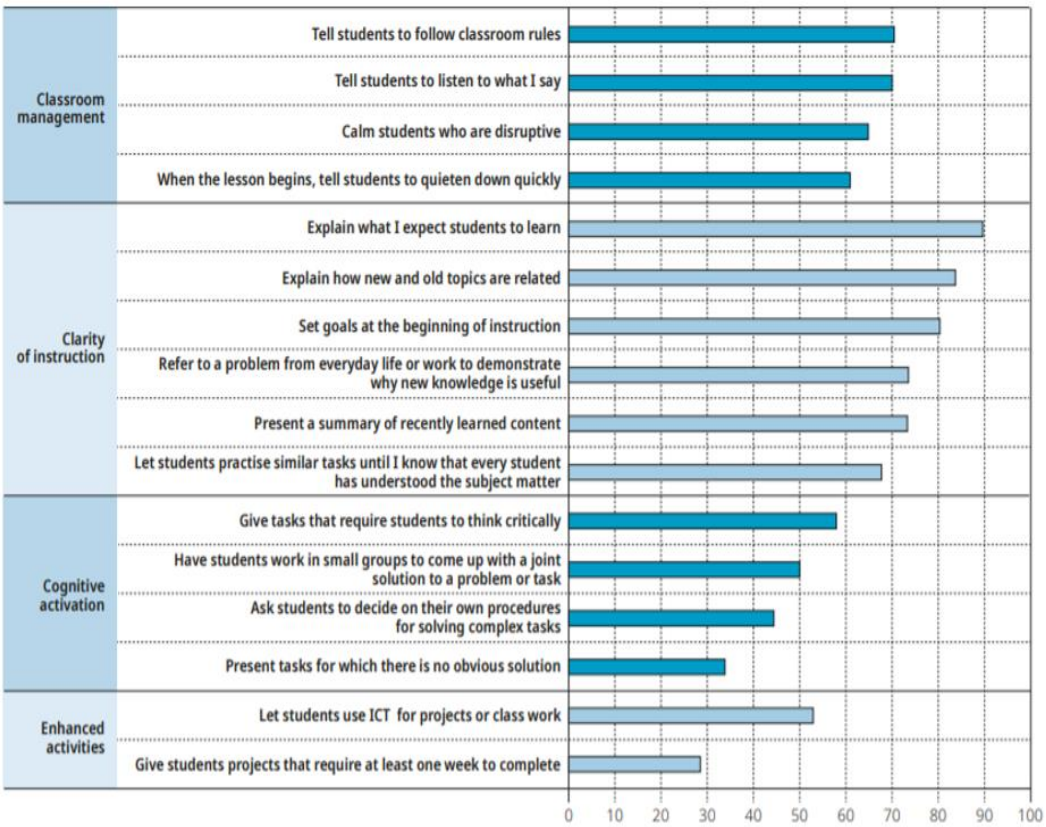


Figure 4.1 Teaching practices. Percentage of teachers who "frequently" or "always" use the following practices in their class (OECD 2020)

It may be speculated that Arab teachers are highly influenced by the classroom culture that is dominant in the traditional Arab society. Usually, teachers teach in the way they were taught as students. Moreover, they may not have any idea about interactive and dynamic classroom environment. It is said that teachers who are insecure in their knowledge of science can find the uncomplicated transmission of knowledge attractive (Osborne, Simon & Collins, 2003). The transmission view of teaching avoids discussions (since learners lack knowledge worth for consideration) and interactions, which might reveal teachers' uncertain knowledge and so alter the power of relationships in their classroom (Carr et al., 1994).

Concerning curriculum/learning content, the participants' beliefs were analogous to those of modern beliefs (Table 3.5). During the interviews, 55% of the teachers' beliefs were found to be analogous to modern beliefs of the curriculum, which is interactive and dynamic and focusing on thinking and reasoning.

However, 45% of the participants were comfortable with a fixed and rigid curriculum, which is seen as a list of things to be taught. Arab teachers may not be aware of the skills that students are likely to need in order to face the complex problem-solving circumstances of today's society. In addition, social expectation added values on individual 'product' and 'achievement' through year-end tests based on the content in the textbook.

The teachers stated that the reason for teaching facts was because students have to get good scores to promote to the next grade or pass the exam. The pressures of standardized testing appeared to put the teachers into pressure for covering the syllabus rather than using content for the development of students' thinking and reasoning to contribute to problem-solving.

As Leatham (2006) pointed out, beliefs cannot be perceived or measured but must be inferred from what people say, intend, and do. Results from the interview appeared to indicate that, generally, teachers held beliefs support and favor meaningful learning. Given these findings, it would be reasonable to expect that teachers would plan and implement practices aligned with meaningful learning principles. Although most of the teachers expressed a positive disposition, in practice, they used traditional instructions, as discussed further in the following section.

4.2 Analysing Teaching Practices

In this section, the practices of twenty middle school teachers are discussed. The analysis of classroom practice was carried out based on observation. A total of sixty observed lessons were analyzed through the underlying principles suggested by the meaningful learning reform (teachers' role, student role, teaching strategy, Learning environment, and the content).

Three important issues emerged from analyzing the data regarding actual practices that teachers employed in this study. The three issues were: teachers employ traditional instructions, inconsistency between teachers' beliefs and their actual practices, and mismatch between teachers' actual practices and the meaningful learning principles and intentions. Below is a breakdown of each issue.

4.2.1 Teachers' practices in the actual classroom

Teachers of this study take on almost full responsibility to talk in a non-interactive discourse manner where students' participation is negligible or completely absent. They had actions, i.e., predominant lecturing restricting students' participation, a big gap between teachers' initiation and students' initiation, as well as between teachers' initiation and students' response. The power of the relationship between teachers and students was found to be very weak where the responsibilities and decisions about learning were not shared. The teacher takes all the decisions regarding teaching and learning in a controlled environment. Teachers play a predominant part in influencing the students directly. They talk more, listen less, and lead the class in an authoritative manner. These findings seem to consistent with the study by Cladue (2014) and Chafi et al. (2014). They found that teachers hold the authority and restrict students' participation through much more lecturing and providing scarce opportunities for pupils' learning.

Controlling the environment has been found to have a negative effect on perceived competence and participation, which results in decreased intrinsic and self-motivation. On the other hand, pupils are motivated by teachers who know, support, challenge, and encourage them to act independently from each other and even from the teachers (Gervis & Capel, 2013).

An autonomy-support environment is one in which the teacher gives increasing responsibility to the pupils, e.g., for choice/options about what they want to do; encourage pupils' decision-making by spending less time talking, more time listening, making fewer directive comments, asking more questions, and not giving pupils solutions; allows pupils to work in their own ways; and offers more praise and verbal approval in class (ibid, 2013, p.152).

Such an environment supports pupils' academic and social growth by increasing their intrinsic and self-motivation to succeed at school, self-confidence, perceived competence, and self-esteem. In a similar fashion, Rogers (1983 as cited in Gregory, 2006) stated that "creativity in learning is best facilitated when self-criticism and self-evaluation are primary, and evaluation by others is of secondary importance."

In order to increase the interaction, science and mathematics' teachers need to present themselves as co-learners in the class. They should create a learning environment where teaching and learning are in a symbiotic association such that the teacher teaches and learns from the student, and the student learns from and teaches the teacher (Beccles, 2012).

Classroom authority needs to be shared equally both between teachers and the students (Weimer, 2002; Beccles, 2012). Teachers need to change the pattern of questioning from the traditional way of checking students' knowledge. In order to increase interaction, science teachers need to set hands-on activities, group or peer work, subsequent student presentations, and discussions. Thus, students need to be encouraged to participate in such activities liberally and willingly express their thoughts. Teachers should avoid language that criticizes and justify authority. Language like this has a subtext that relates to power and control (Weimer, 2002). Power and authority are one of the main characteristics of didactic teaching, which limits interaction and active participation.

Teachers enacted their beliefs through the type of questions they asked, answers they sought, and feedback they gave following students' responses.

Teachers' preference for interacting with a whole class rather than with individuals reinforces their belief that the best way to deliver knowledge is through a standard form for all students, irrespective of their previous knowledge, to receive it unquestionably. Teacher–class interaction becomes logical an efficient strategy to achieve standard knowledge delivery, while more individualized interactions become less efficient, consistent with teachers' understanding of how knowledge is acquired.

The study revealed that the questions teachers asked are mainly of the lower-order type that is basically used for checking students' content knowledge. Moreover, they asked a large number of management strategy questions. High-order (Analyze, Evaluate, and Synthesis) and conceptual-change questions were rarely asked.

Studies of the classroom discussion show that teachers are generally not good at asking high-quality questions. Most teachers' questions are short-answer questions that require the students to recall factual knowledge, while only a small percentage of teachers' questions demand higher cognitive skills. Beccles (2012) and Swift et al. (1988), for example, reported similar results. Swift et al. (1988) reported that 85.9% percent of teachers' questions in middle school science were at the recall level. In Ghana, 42% of the questions were asked for assessing students' content knowledge (factual knowledge). The percentages of questions assessing students' ability to apply, analyze, evaluate, and create were 5%, 1%, 2%, and 0%, respectively (Beccles, 2012).

Learning begins with questioning, and it is the first stage in the learning process (Jarvis, 2006). It is evident that teachers who are using various questions during classroom discussions are

enabling students to practice a wide range of thought processes. On the other hand, if teachers frequently use one particular type of question, students' thinking may not be challenged at higher cognitive levels (Blosser, 2004). Thus, the use of multiple types of questions is recommended during class sessions for greater interaction with the learning content.

The analysis of feedback in various lessons described that teachers in the researched schools were comfortable with giving precise information through direct instruction along with explicit correction in case of students' incorrect or no responses.

It was found that the majority of teachers' feedback was evaluative and corrective type while the use in facilitative type was very rare. The findings of the study somehow corroborate with the findings of Chin (2006). She stated that teachers used, for most of the time, the evaluative type of feedback, neglecting the facilitative type.

However, there were some teachers who did provide facilitative feedback to students. Through this type of feedback, teachers retained a long discussion, tried to draw out students' ideas with a variety of questions. The purposes of these questions was a calling for reasoning, asking for explanations, and encouraging a wider response.

Facilitative feedback is the most crucial part of teaching. It constructs cognitive scaffolding (Chin, 2006) as well as a dialogical pattern of discourse in the classroom. Cognitive scaffolding engages students in more cognitively active roles such as formulate a hypothesis, predict outcomes, brainstorm ideas, generate explanations, make inferences and conclusions, as well as to self-evaluate and reflect on their own thinking (Chin, 2006). Research findings made an assertion that active discussion, for example, dialogical one, both between pupils and between pupils and teacher, need to take account for meaningful learning (McCormick & Leask, 2005).

The facilitative feedback may improve students' ability to monitor their own thinking, and under the appropriate conditions, could be more beneficial than simply providing them with the correct form (Chin, 2006). So, teachers should learn how to make facilitative feedback in a learning situation for creating better interaction with the students and getting a productive response from them.

Instructional quality is understood differently across the field of education, but there is a consensus that the concept is multidimensional (Kunter & Voss, 2013; Wagner et al., 2013; Fauth et al., 2014).

The results (Table 3.11) indicate that the participating teachers are comfortable with structure-oriented teaching practices that correspond to didactic teaching. The practice includes learning

goals, reviewing student homework, presenting a short summary of the previous lesson, checking students' exercise book, giving a lecture, and checking by asking questions whether the lesson content is understood or not.

In the structure-oriented practice, reviewing student homework (RSH) and lecturing and checking by asking questions (L & C) whether the lesson content is understood or not were found predominant. This finding agrees with TALIS (EOCD, 2019) results (Figure 4.1).

In the TALIS questionnaire, these instructional practices are grouped into the "clarity of instructions" category.

In 2018, on average across OECD countries and economies, almost all teachers frequently used practices pertaining to the clarity of instruction; 90% of teachers report that they frequently or always explain to students what they expect them to learn; 84% explain how new and old topics are related; 81% set goals at the beginning of instruction; 74% refer to a problem from everyday life or work to demonstrate why new knowledge is useful or present a summary of recently learned content; and 68% let students practice similar tasks until they know that every student has understood the subject matter (Figure 4.1).

In this research, "cognitive activation practices" such as working in a group, student help in lesson and activity, students evaluate and reflect their work, was very rare while enhanced activities were almost absent. This finding agrees with TALIS (OECD, 2019) results (Figure 4.1).

Cognitive activation consists of instructional activities that require students to evaluate, integrate, and apply knowledge within the context of problem-solving (Lipowsky et al., 2009). These activities are commonly associated with group work on complicated problems.

In 2018, on average across OECD countries and economies: 58% of teachers report that they frequently or always give tasks that require students to think critically; 50% have students work in small groups to come up with a joint solution to a problem or task; 45% ask students to decide on their own procedures for solving complex tasks; and only 34% present tasks for which there is no obvious solution (Figure 4.1).

Cognitive activation practices are perhaps the most demanding and complex of the teaching strategies, possibly because they are more closely connected to the subject domain than the other three strategies (Hiebert and Grouws, 2007; Klieme, Pauli and Reusser, 2009; Baumert et al., 2010).

TALIS also asked teachers about the frequency with which they use what can be referred to as "enhanced activities," which encompass practices that give students the chance to work independently, using some specific tools, such as information and communication technology (ICT), or over a longer period of time (Vieluf et al., 2012).

In the current study, only seven out of twenty teachers engage students in projects. This finding aligns with the results of TALIS (OECD, 2019). On average, across the OECD, only 29% give students projects that require at least one week to complete (Figure 4.1).

Enhanced activities are not as widespread as other teaching strategies, potentially because they require additional resources and command of them (access and skills to use ICT) and more sophisticated planning. They also require that students be ready for such activity, as it demands higher responsibility and planning skills from them.

PISA data show that teacher-directed instruction that aims at providing a well-structured, clear, and informative lesson on a topic is more frequently used than other types of instructional practices by both mathematics and science teachers. These strategies are typically less time-consuming (i.e., more efficient) and easier to implement (more convenient) than other teaching strategies (OECD, 2016, p. 65). It is possible that teachers now use them more often because they face increasing demands to cover a long curriculum or to teach (more) diverse classrooms (OECD, 2018).

4.2.2 Inconsistency between teachers beliefs and actual practices

The findings indicated that there is a gap between teachers' beliefs and actual practices. Teachers in this study failed to conduct lessons that aligned with their favorable beliefs regarding meaningful learning. Although most respondents were able to demonstrate a strong reform-oriented viewpoint in their beliefs, they showed limited evidence of implementing a pedagogy that matched those beliefs.

This inconsistency, relating to Nespor's (1987) recognition that teachers' beliefs include conceptualizations of ideal situations that differ from reality, may be explained in terms of what teachers would like to ideally be able to achieve even though they knew that it was an unrealistic goal.

Consequently, when the sixty lessons were observed and coded based on the underlying principles suggested by the new reform, the majority of the lessons were dominated by

exposition strategies (information input), and other components such as exploration were far less evident.

A similar study that explored mathematics teachers' beliefs and curriculum reform was conducted by Handal and Herrington (2003). These authors' focus was mainly on the role of mathematics teachers' beliefs and their impact on curriculum reform. Their study strongly supported the argument that "teachers' beliefs about the teaching and learning mathematics are critical in determining the pace of curriculum reform" (Handal & Herrington. 2003, p.59). They concluded that teachers with behaviorist beliefs constrained the successful achievement of constructivist-oriented curriculum reform.

Likewise, a study conducted in the USA by Cooney (2001) argued that interest in teachers' beliefs had been grounded on the conjecture that what teachers do in their classrooms is a product of their beliefs. This seemingly contradicts the findings of the present study in regard to beliefs expressed through the semi-structured interview and teachers' sample learning activities. Hence, it appears that there is a gap between teachers' expressed beliefs regarding the intentions of the meaningful learning reform and their implementation of it. This finding is like that of Perrin (2008), who claimed that there was no significant correlation found between teachers' beliefs scores and their reported level of the use of NCTM-aligned practices.

Although most of the participating teachers appeared to believe in a constructivist approach to teaching and learning science and mathematics, they did little to engage students in thought-provoking activities. Most of the time, as is seen from the data gathered through the classroom observation, teachers were busy explaining, demonstrating, and solving problems for students. This finding is quite like the one observed in the study, the role of teachers' beliefs and knowledge in the adoption of a reform-based curriculum in the USA by Roehrig and Kruse (2005). These researchers found that, although the curriculum was designed for the class to spend equal amounts of time on the whole class, small group, and individual work, teachers spent 70% of their time giving directions and lecturing.

A similar study that explored mathematics teachers' beliefs and curriculum reform was conducted by Handal and Herrington (2003). These authors' focus was mainly on the role of mathematics teachers' beliefs and their impact on curriculum reform. Their study strongly supported the argument that "teachers' beliefs about the teaching and learning mathematics are critical in determining the pace of curriculum reform" (Handal & Herrington. 2003, p.59). They

concluded that teachers with behaviorist beliefs constrained the successful achievement of constructivist-oriented curriculum reform.

Roehrig and Kruse (2005) conducted a study on the role of teachers' beliefs and knowledge in the adoption of a reformed-based curriculum in a school in California. The main purpose of their study was to understand the impact of a reformed-based chemistry curriculum; they found that teachers' beliefs shape classroom practices. Their findings were consistent with those of earlier researchers such as Guskey (1986), Richardson (1996), and Tobin and McRobbie (1996), who claimed that teachers' beliefs have a significant impact on their classroom practices and that teachers are able to implement practices consistent with their beliefs about teaching and learning approaches.

However, in this study, the overall findings are not consistent with those of past researchers in terms of beliefs and practices. In this study, a gap was found between teachers' beliefs and actual practices. The methods and practices adopted by the teachers when conducting lessons were not aligned to beliefs as expressed through the semi-structured interview.

Using the theoretical literature, I attempt to explain this belief–practice inconsistency and why some teachers enacted one set of held beliefs over another.

As described in the literature review, beliefs are web-like mental representations of reality that form part of the human cognitive structure. Teachers hold beliefs along the core-periphery dimensions (Rokeach, 1968; Hutner & Markman, 2016). Core beliefs are strongly related to other beliefs and have been frequently used in past cognitive processes, and are thus resistant to change. For a belief to manifest in practice, it must be active during the cognitive process that produces the practice (Hutner & Markman, 2016). In the context of this study, for example, for teachers to teach using learner-centered strategies such as inquiry learning, they must activate or prioritize beliefs supporting a learner-centered pedagogy.

However, in theory, not all beliefs held in a person's memory are activated during a particular cognitive process because there exists only a limited 'energy' for activation (Hutner & Markman, 2016). Based on this line of thought, it is possible for teachers to hold two sets of beliefs, such as realist and relativist beliefs about knowledge, and yet prioritize only one set of beliefs that support a particular practice and hold the rest in abeyance. In this context, it is possible that teachers often activate beliefs that support teacher-centered practices but not beliefs that are aligned with learner-centered teaching.

Why and how is this possible? In theory, core beliefs are more readily activated than the rest of the beliefs that the teachers hold. According to Pajares (1992), the earlier the belief is incorporated into the belief structure, the longer that belief is used and, therefore, the more robust and important it becomes to the individual holding it. Such beliefs are core to the individual holding them. In the present study's context, traditional beliefs about 'how people learn' or 'how people teach others' or even 'who possess the knowledge to be learned' are incorporated into the teachers' beliefs structure early, during childhood and early schooling, as explained in chapter one.

In contrast, the teachers acquire beliefs that are supportive of a learner-centered pedagogy later, during initial or in-service teacher training. Therefore, traditional beliefs are core and inherently important to the teachers because they have grown up with and frequently used them in past cognitive processes (Hutner & Markman, 2016).

Most teachers in this study had more than five years of teaching experience and had been schooled in an education system where teacher-centered teaching was the norm. Thus, they are likely to be committed to beliefs that are aligned with teacher-centered teaching that they experienced through 'apprentice of observation' during their own schooling (Lortie, 2002).

Educational structures and contextual constraints also validate traditional beliefs that are supportive of a teacher-centered pedagogy, thereby contributing to their tenacity and vigor. For example, even when the teachers espouse 'constructivist beliefs' and are committed to implementing inquiry learning and giving students the opportunity to reflect and query knowledge, school structures such as the curriculum, exams, and timetables may be unsupportive of this. This makes traditional beliefs more likely to be activated than otherwise because they are closely related to or more applicable in the existing school structures (Hutner & Markman, 2016).

Before the government announced the new reform, school structures, including classroom designs, curricula, exams, and accountability systems, were all appropriated to the traditional teacher-centered pedagogy. A new reform has entered without changing the environment so that it fits in and supports the objectives of the new reform. Even after the reform, the curricula, for example, remain content-overloaded, while exams are largely high stakes and misaligned with the envisioned learner-centered pedagogy.

A significant insight from this study is that, although teachers may be introduced to innovative ideas about teaching and learning, their ability to translate them into practice is not only

dependent on whether they espouse such ideas but also on how educational structures including curricula, exams, and textbooks support the reform proposals.

Teachers may hold different beliefs about subject knowledge, teaching, and learning, but their predominant adherence to a teacher-centered pedagogy is a reflection that their 'core' beliefs, which are ingrained in their own schooling and first-hand experiences of learning and teaching, reinforced by the educational structures. Initiatives to change teachers' pedagogical practices must, therefore, focus on teachers' beliefs and the current system-wide structures that strongly support a teacher-centered pedagogy.

4.2.3 Mismatch between practices and intentions

Having analyzed the results regarding teachers' practices in this study, there appeared to be a mismatch in terms of teachers' implementation and the intentions of the new reform. Teachers in the current study showed a lack of understanding of the actual practice of teaching and learning in ways aligned with the philosophical intentions of the new reform. They demonstrated a few lessons that created a collective learning environment for students to construct ideas and modify them through interactions. Their practices appeared to be consistent with Tarmizi et al. (2010), who argued that the teachers' task is to create a kind of collective environment for learning.

According to the findings, most respondents had beliefs aligned with the intentions of the new reform. They believe that students have to be active and independent learners, and the role of the teacher is to be a facilitator of learning, helping students to construct their own ideas. However, when observed in-depth, a gap was evident between the intention and implementation of the new reform. This was evident in the analysis of the sample learning activities and lesson plans, followed by lesson observations. There was an indication of a limited understanding of the reform intentions reflected in all these artifacts.

Sixty conducted lessons were analyzed according to the intentions of the meaningful learning reform. It was found that the majority of the lessons were dominated by exposition strategies (information input), and other components such as exploration were far less evident. Hence, there were few lessons where all the reform intentions were strongly integrated. In this way, the intentions of the new reform were not being achieved.

These findings confirm the misalignment between reform intentions and the way it is being implemented. This finding is consistent with those from other studies, which reveal a mismatch between an intended and an implemented reform (Cuban, 1993; Handal, 2001).

As discussed before, the type of practice observed by the majority of the participating teachers tends to align with traditional beliefs, where teachers play the main role in explaining the concept, thereby contradicting the intentions of the new reform. Such teachers tend to hold authoritative views about their knowledge and see themselves as experts. They see their role as mainly transmitting their knowledge to their students.

Part of the reason for this preference for teacher-dominant techniques relates to the teachers' need to maintain discipline and minimize the noise in the classroom. This statement was expressed by many teachers in the interview when they were asked to describe the ideal environment for teaching—lack of opportunities for students to speak meant, of course, less noise. As Carless (2004) notes, teachers in traditional contexts often handle teacher-fronted instruction better than they handle communicative or task-based approaches to teaching.

The teachers appeared to be concerned more about classroom management issues than teaching approaches or the learning process. Their hesitancy in adopting more learner-centered techniques such as encouraging group discussions among students stemmed from their fear of disruption and losing control of the class. Teachers regarded classroom management as a necessary and sufficient condition for learning to occur *(Table 4-4)*. As Joram and Gabriele (1998) point out, such a view of teaching is consistent with a transmission model of learning and does not reflect current theories of education.

One possible reason why these teachers focused so much on a calm learning environment may be the fact that the school culture equated quiet classrooms with effective teachers and productive teaching. In fact, teachers reported that on the rare occasions that they were observed during teaching by a senior member of the school management team, the observer would provide feedback mainly on the teacher's classroom management skills and not on other – arguably more important – aspects of teaching. When supervisors or principals talked of teachers, they seemed to evaluate a teacher's effectiveness based on their ability to maintain discipline among the students.

Similar to the teachers at the researched Schools, Carless's teachers in Hong Kong secondary schools were seen to be concerned over issues of noise and discipline, which inhibited the successful implementation of Task Based Language Teaching. As Carless, following Tsui

(2003) notes, teachers in such situations should learn to tolerate constructive noise, differentiating between off-task noise – which should not be permitted – and on-task noise – which should be allowed. The reason for this distinction is to ensure that instructional objectives are achieved rather than a need for the teacher to reinforce his authority. Carless (2004) argues: "Good teaching is characterized not by establishing routines, … but by possessing the judgment that informs executing the routines with some flexibility" (p.656).

Research has shown that changing a teaching style is difficult because a decision to change one's practices demands a process of unlearning and learning again (Mousley, 1990). Moreover, teachers find teaching mathematics through traditional approaches easier than attempting reformed methods, which are normally considered burdensome, despite evidence of their advantages (Handal & Herrington, 2003). According to Beswick (2006a), it is not enough to provide teachers with resources, curriculum materials, and ideas without attending to their beliefs.

4.3 Perceptions of the Adoption of Meaningful Learning

It is widely agreed that the success and sustainability of educational reform implementation rely on the ability of teachers to change their beliefs and teaching practices to align with the reform (Wyss et al., 2017). However, transforming teaching practices is a complex process that is influenced by various factors (Fullan, 2001; Thurlings et al., 2015).

However, numerous studies show that the sustainable implementation of reform depends on how well the reform ideas are implemented in classrooms by teachers rather than how well they are written in documents (Fullan, 2001). As Fullan (ibid) suggests, "implementation is a variable, and if the change is a potentially good one, success (such as improved student learning or increased skills on the part of teachers) will depend on the degree and quality of change in actual practice" (p.70). Nevertheless, research reports that it is challenging to get teachers to implement new ideas, and reforms are not always implemented as expected (Maass et al., 2019).

The reviewed literature as described in chapter one shows that the main factors related to teachers' implementation of curriculum reforms can be grouped into individual factors, including teacher beliefs, attitudes and self-efficacy, and contextual factors, such as school culture, training support, and resources. Some researchers claim that individual factors have a more direct influence on teachers' behavior than contextual factors (Fullan, 2001; Cloud, 2014;

Thurlings et al., 2015). In the current research, teachers pointed out both kinds of factors as influencing the reform implementation.

In this study, although teachers had a favorable attitude toward the meaningful learning reform, they fail to make the request changes. Relevant studies have also found that although teachers may have positive attitudes, they can fail to implement necessary changes due to contextual factors such as time, resources, materials, and a lack of professional development (Milner et al., 2012).

The third research question was addressed in order to explore the experiences of middle school teachers implementing the meaningful learning reform.

The Meaningful Learning Reform was not a single reform; it was part of a succession of reforms launched in the Israeli school system. However, most of these reforms were based on a top-down authoritarian relationship, with schools being required to follow detailed instructions. There was no room for tailored implementation or creative interpretation. The Meaningful Learning Reform was unusual in this regard, as it allowed teachers to exercise considerable discretion about how to meet the broad policy goals.

The Israeli Ministry of Education expects schools to implement the Meaningful Learning Reform. However, it did not instruct them as to specific ways in which this is to be done. Instead, it presented the pedagogical framework in order to stimulate professional discussion among various stakeholders and to serve as a basis for various staff levels' work programs, providing some examples of meaningful learning as well as a few tools.

Exploring twenty participating perceptions regarding the implementation of the Meaningful Learning Reform in Israel revealed that they experienced two main challenges:

1. The need for clear guidelines- teachers had to follow their own judgment and discretion
2. Coping with ambiguity – teachers were required to operate under conditions of uncertainty.

As mentioned before, meaningful learning reform is a generally outlined education reform that requires educators to exercise judgment regarding the way in which to meet the reform's goals. The lack of external guidelines created a situation of uncertainty. Hence, these challenges are somehow related.

From the teachers' perspective, these challenges not only made the teachers' work more difficult and required additional effort but also adversely affected the implementation of the reform. The uncertainty as to the meaning of this generally outlined education reform did not lead teachers toward creativity and renewal; instead, it made them confused and even angry, while the reform remained unfulfilled, at least in part. Teachers' sense of pressure increased, and the application of the reform was slow and incomplete.

These findings emphasize the complexity of generally outlined education reforms. Generally outlined education reforms are bottom-up reforms (Elmore, 2004; Birkland, 2010; Louis & Robinson, 2012). These kinds of reforms are intended to deal with the problem of policy incoherence, where the reform policy differs from school priorities, or where several reform initiatives are being carried out simultaneously (Russell & Bray, 2013).

However, the findings of this study illustrate how challenging such generally outlined education reforms may be. While they may mitigate the problem of policy incoherence, they require the teaching staff to be independent and creative and to operate under conditions of obscurity. Teachers that were interviewed for this study saw these characteristics of generally outlined education reforms as complicating educational work while at the same time reducing its effectiveness.

From the teachers' perspective, in order to perform well during an education reform, teachers need detailed instructions. This need may be seen as inconsistent with the characteristics of the desired 21st-century teacher. In the present fast-changing world, where students use rapidly evolving and changing technologies and participate actively in an increasingly diverse, globalized, and media-saturated society, teachers cannot merely provide "more of the same" education (Key, 2010). Instead, they must provide students with the adaptability required for occupational success in the communities and workplaces of the coming decades (Lemley, Schumacher, & Vesey, 2014).

A prerequisite for this is that teachers themselves are able to work within a changing environment and adapt to a dynamic teaching experience, being lifelong learners who acquire new professional knowledge on an ongoing basis (Pellegrino & Hilton, 2012; Stevens, 2012). Teachers who find it difficult to function without clear instructions may also find it difficult to address 21st-century students' academic and social needs.

Teachers in general, rightly and importantly hold a central position in the ways schools operate (York-Barr & Duke, 2004; Stoelinga, 2008), supporting the professional development of peers,

influencing decision making, and ultimately targeting student learning (Mangin & Stoelinga, 2008; Scribner & Bradley-Levine, 2010; Wenner & Campbell, 2017).

Playing these important roles, one might think that teachers would prefer greater autonomy in implementing the educational reform. Infringing on their freedom would undermine their professional status and expertise. Since they are in the best position to make informed decisions about the reform implementation, one would imagine that they should be granted as much autonomy as possible (Parker, 2015). This study, however, shows that teachers are not always interested in such autonomy. In their view, clear instructions, training, and even supervision would make their educational work simpler and more effective.

Teachers' need for clear instructions may be understood through the conceptual lens of sense-making.

Sense-making is a process that applies to both individuals and groups who are faced with new information that is inconsistent with their prior beliefs. More specifically, it is an active process of constructing meaning emerging from present stimuli, mediated by prior knowledge and embedded in the social context, which allows individuals to navigate through profound disruption (Weick, 2009; Gawlik, 2013).

Since a generally outlined education reform inherently involves comprehensive changes, uncertainty, a lack of information, alteration of previous working habits and new arrangements, sense-making can provide insights into how individuals attribute varying meanings to an event characterized by ambiguity, confusion, and misunderstandings (Matsummura & Wang, 2014; Allen & Penuel, 2015).

Sense-making is most often needed when our understanding of the world becomes blurred in some way. Such a situation creates uncertainty as to the right mode of action. People feel "that something is not quite right, but they cannot put their fingers on it" (Weick & Sutcliffe, 2007, p.31). This could occur when our environment changes rapidly, presenting us with surprises for which we are unprepared, or confronting us with adaptive rather than technical problems to solve (Heifetz, Grashow, & Linsky, 2009).

School teachers, who had to deal with a generally outlined education reform that involved a need for self-reliance and coping with ambiguity, were required to make sense of what they are doing, why, to what ends and in whose interests, and how (Thomson & Hall, 2011).

As Weick and Sutcliffe (2007) noted, if the resources for sense-making are maintained or even strengthened during the processes of change, people will be able to cope with what they face.

By contrast, if the resources for sense-making are undermined or weakened during the change, people will lose sight of what they are trying to do and why.

Teachers who were thrown into an unclear reform program without the support required for their sensemaking process could not reduce the ambiguity in their work without precise and unequivocal instructions.

Moreover, some schoolteachers encountered difficulties in implementing the reform, as their sense-making was anchored in prior reform initiatives. This generally outlined pedagogical reform was launched after a succession of top-down authoritarian reforms in the Israeli school system, which required the following of detailed instructions without much creative interpretation (Berkovich, 2011). The current reform was unusual in this regard, as it allowed schoolteachers to exercise considerable discretion as to the ways in which they might fulfill the broad policy goals (Israeli Ministry of Education, 2014a).

Therefore, teachers made sense based on their prior experiences, looking for clearer and more explicit demands from top authorities concerning the reform implementation.

Encountering a lack of clarity and help from top authorities, some teachers relied on their own past professional experiences and educational beliefs as a guide for daily implementation of this generally outlined reform (Cornelissen, 2012; Maitlis & Christianson, 2014). In other words, to understand the current reform, teachers relied on their previously constructed cognitive frames, which were largely grounded in past experiences with reforms (Spillane et al., 2002).

Apparently, broader support for teachers' sense-making could lead them to ponder whether and how they need to collaboratively create an "organizational self" (Kraatz, 2009) that would increase coherence in teachers' practices in light of the broad and generally outlined reform initiative.

From the participants' perspective, the lack of external guidelines and the ambiguity not only made the teachers' work more difficult that required additional effort but also adversely affected the implementation of the reform.

Cheung and Wong (2012) argued that "teachers' inadequate understanding of and support for the reform is considered as the top hindering factor to the reform process" (p.52). In their study on factors affecting the implementation of curriculum reform in Hong Kong conducted by Cheung and Wong (2012) found that teachers had a limited understanding of the new reform.

The same findings were clearly seen in this study through three different data sources, such as teachers' interviews, document analysis, and classroom observation.

Teachers' understanding of the reform ideas is supported by a new study (Zhao, Mok, & Cao, 2020) in China, which examined the implementation of new instructional reform, with a focus on the teacher factors behind its success. This study was a longitudinal project investigating the degree of implementation of a new instructional reform in China and the factors that influence teachers' levels of implementation.

This study found that teachers' understanding of the reform an important dimension that also influences teachers' implementation of the reform.

Teachers' understanding of reform ideas is supported by Underwood (2012). His study examined teachers' beliefs and intentions regarding instruction under national curriculum reform, arguing that Japanese teachers' negative attitudes towards reform-oriented teaching were due to their misperception of the proposed reform ideas and exam requirements.

Remillard (2005) also pointed out that curriculum reform was never a straightforward process of executing prescriptions; rather, teachers' practices in carrying out reform were products of a sense-making process between the teachers and the ideas.

Understanding reform ideas is an important but often overlooked factor. Many policymakers blame teachers for their unwillingness to change their way of teaching, overlooking the possibility that teachers do not fully understand or even misunderstand the reform proposals.

Currently, one of the main problems in terms of implementing the ideas and intentions of the new reform is the lack of timely professionalism. There is a strong requirement for timely and, if possible, on-going professional development that would ensure that teachers understand what is required of them.

Roehrig and Kruse (2005), in their findings, indicated that "only through intensive one-on-one professional development, over an extended time-period, did some teachers confront their beliefs and embrace the reform-based curriculum" (p.413).

Powell and Anderson (2002) argued that the implementation of a reformed curriculum often entails a transformation in teachers' ideas about the subject matter and the teaching and learning of mathematics. Further, Guskey (2002) claimed that experienced teachers seldom become committed to innovation or reformed ideas until they have seen them work in their classrooms with their students.

In addition, As argued by Tarmizi et al. (2010), educating students mathematically is more difficult, challenging, and complex than teaching them mathematics. It is not only important for teachers' beliefs to be consistent and to change their beliefs to be in tune with the reforms but equally important for policymakers to support the reformed ideas so that the ideas are enacted in the actual classrooms as intended. For this, timely support must be given to teachers to understand and then implement the intended ideas of reformed materials. In this study, the majority of participating teachers seemed not to have received a proper orientation to the new reform.

For instance, when the researcher asked the interviewers to describe a meaningful lesson, some of the participating teachers described a traditional lesson that emphasized teacher-centered. Hence, according to Bantwini (2010), a lack of understanding of reform could hinder positive change and implementation.

Although data about the teachers' content knowledge were not collected directly by the researcher, the interview and observations exposed that content knowledge was also a factor influencing the implementation of the new reform (Roehrig & Kruse, 2005). Moreover, Hill, Rowan, and Ball (2005) have argued that teachers' deep and flexible understanding of mathematical concepts helped them deliver richer learning prospects for students, such as using better concrete simulations and more meaningful examples.

Many teachers were deprived of chances to attend an orientation program and had to teach based on their own principles and knowledge. This type of situation could encourage teachers to fall back to an old transmission approach. Hence, there is every likelihood that existing practices still follow what Subba (2006) has described:

> *Teachers taught us through dictation; the only pedagogical approach teachers seemed to possess at that time. You had to solve problems by looking at the examples in the textbook, repeated them several times until you got used to the steps that led to the answer. (p. 26)*

Currently, one of the main problems in terms of implementing the ideas and intentions of the new reform is the lack of timely professional learning. In the absence of a well-planned and ongoing professional development, current teachers adhere to the old practices that encourage students to acquire procedural types of knowledge.

A few studies throughout the world have revealed that despite the strong curriculum endorsement for meaningful learning, implementation has been varied across educational

landscapes. Classroom contexts are complex and diverse in terms of resources, the educational and cultural backgrounds of students and teachers, school culture and class size, and these all factor in the extent and degree to which educational change is manifest (Chin & Chia, 2006; Howitt, 2007; Zion, Cohen & Amir, 2007).

In Israel, as described in the review of literature, these differences are quite pronounced. The Israeli education system is segregated into departments for Arabs, Jews, religious Jews, Bedouin, and Druze.

The funding of these departments was unequal, with the per capita expenditure for a Jews student is five times that for an Arab student. Arab education has less economic resources and management services than those provided to the Jewish system. There is no Arab education administration; most teachers at Arab schools were unqualified to teach (Arar & Abu-Asbah, 2013). These have an adverse and definite effect on the low achievements in the standardized examinations in science and mathematics.

Despite attempts by the government to redress the Arab schools, the Arab schools remain poorly resourced. The parents of learners are generally poorly educated and have low paying jobs.

Given this persistent inequality in the Israeli education system and the reform imperative for meaningful learning, participants perceived more challenges that may be involved in implementing the meaningful learning reform. These challenges are situational and institutional constraints that participants identified as impeding the implementation of the new reform. These barriers are discussed in further detail below.

4.4 Perception of Obstacles on The Way to The Implementation Stage

4.4.1 Teachers' heavy workload, lack of time, and time pressure in the studies

A further reason for the teachers in this study to opt for a teacher-fronted approach may also reflect the simple fact that it is just easier to teach via a lecture method than in any other way. Given the fact that the Israeli School teachers had a heavier workload, teaching between 23 – 36 hours per week, dealing with up to 200 students. Arab School teachers also faced a palpable lack of resources (e.g., no photocopying, printing, or computer facilities; an under-resourced library).

Moreover, most of the time, participating teachers were either engaged in curricular activities or being called out by the school principal to attend important meetings. In this way, teachers seem to face a challenging time to prepare lessons.

To expect teachers to provide quality education is unrealistic when they have to grapple with issues like large classes, heavy teaching loads, numerous activities to carry out daily, as well as normal duties.

A heavy workload also impacts the capacity for teachers to reflect on practice (Boody, 2008). Bantwini (2010) found that the implementation of the reform was affected due to teachers' overload with teaching as well as other responsibilities assigned to them. Besides this, as pointed out by Klein (2001), implementation of a reform can be affected if social issues and contextual factors that surround schools are neglected.

As such, teachers were often found struggling to give individual attention to all students. The findings from Beck et al. (2000), who explored teachers' beliefs regarding the implementation of constructivism in their classroom, argued that it is essential for teachers to be provided with adequate time and knowledge to modify existing curricular materials to suit the reforms. Moreover, a teacher with a heavy workload may have no time to prepare and seek further knowledge as demanded in the educational reform, thus leading towards an inadequate understanding of the reform discussed in this section.

A lot of interviewed teachers were very worried about the curriculum. They explained that courses are overloaded, and they are working under time pressure. They felt that active learning methods take too much time, and they cannot take the risk that students do not learn all the contents of the curriculum. A sense of continuous time-pressure was very strong.

This research looks like other studies where lack of time and pressure to cover content were problematic (Lederman et al., 2002).

While time was mentioned in terms of scheduling models, it was also at the root of a problem of testing to address accountability mandates causing additional instructional time lost. With the inclusion of testing as a loss of time, time in general, was noted as a factor more often than any other constraint.

Seventy percent of the curricula enumerated the types of assessments for students. Tests and quizzes were the dominant methods of assessment in almost all curricula. Approximately half of the documents indicated summative assessments such as unit tests, mid-term exams, final exams, and benchmarks.

Study participant instructional practices were in alignment and prepared students for significant, summative assessments. Teachers expressed their concerns about student understanding of concepts and utilized multiple assessment activities such as frequent checks for understanding, quizzes, and tests. Students were assessed on a broad range of material as teachers were required to adhere to textually dense curricula.

This meant that teachers did not have the latitude to engage in substantial re-teaching of misunderstood concepts, present enrichment lessons, or allow for additional time in instruction to ensure student understanding. Due to the breadth of material to be taught, teachers had to disseminate information instead of allowing students to learn the material through discovery.

4.4.2 Crowded classroom and physical structure

Normally, an Arab school has large class sizes. Such a contextual situation can make it difficult for teachers to handle students' miscellaneous behaviors, conduct inquiry activities in their classrooms, and promote a change from traditional instruction to student-directed learning.

In this study, having a large class has been found as another factor that made it is difficult for teachers to interact individually with students and thereby scaffold them towards the development of conceptual understanding. They considered direct instruction to be more effective in this regard.

This finding on the class size resonates well with another research. For example, a study by Johnson (2005) suggested that "large class size inhibited the teacher from interacting with individual students" (p.24).

The set-up of all classrooms I observed was dominated by a traditional physical arrangement. The physical structure of the classroom can add to the quality of reform implementation. As argued by Wiske and Levinson (1993), the details of school life also affect teachers' abilities to incorporate new practices.

The classroom structure and environment in the researched schools (A, B, C) appeared to be traditional and thus suited to a traditional teaching approach with students sitting in rows. Johnson, Monk, and Hodges (2000) point out that "new practices will only survive if there is a fit with the working environment" (p.181).

Nevertheless, in all observed classes, most of the activities carried out were to be performed individually, eliminating the opportunity to share ideas through interaction and verbal

communication. Apparently, none of the educational leaders and management team seems to have realized the unfavorable layout for learning science and mathematics. Hence, the existence of such a physical structure in the classroom limits the opportunity for both teacher and students to practice as intended in the new reform; they simply were not comfortable environments in which to learn.

The two factors, "crowded classroom" and "teachers' overload," have strong evidence from TALIS (OECD, 2019).

TALIS makes it possible, for the first time, to explore resource issues from the perspective of teachers. It asks them to rate the importance of several priorities if the education budget were increased by 5%. For each priority, they are asked if it is "of low importance," "of moderate importance," or "of high importance." To avoid the dilemma of forcing teachers to choose among competing issues, they had the option of rating all issues as of "high importance."

Nevertheless, it is possible to get a sense of the most prominent resource issues by examining the proportion of teachers in each country that identified each issue as an area "of high importance," as well as the top three issues they most often reported as high priorities.

In 2018, on average across the OECD, the number one spending priority reported by teachers was "reducing class sizes by recruiting more staff" (rated of high importance by 65% of teachers), followed by "improving teacher salaries" (64%), "offering high-quality professional development for teachers" (55%), and "reducing teachers' administration load by recruiting more support staff" (55%). These four issues are rated of high importance by over half of the teaching workforce on average in the OECD.

By contrast, "improving school buildings and facilities," "supporting students with special needs," "investing in ICT," "supporting students from disadvantaged or migrant backgrounds," and "investing in instructional materials" are rated of high importance less often. However, these issues are still considered of high importance by 30% to 50% of teachers across the OECD (*Figure 4.2*).

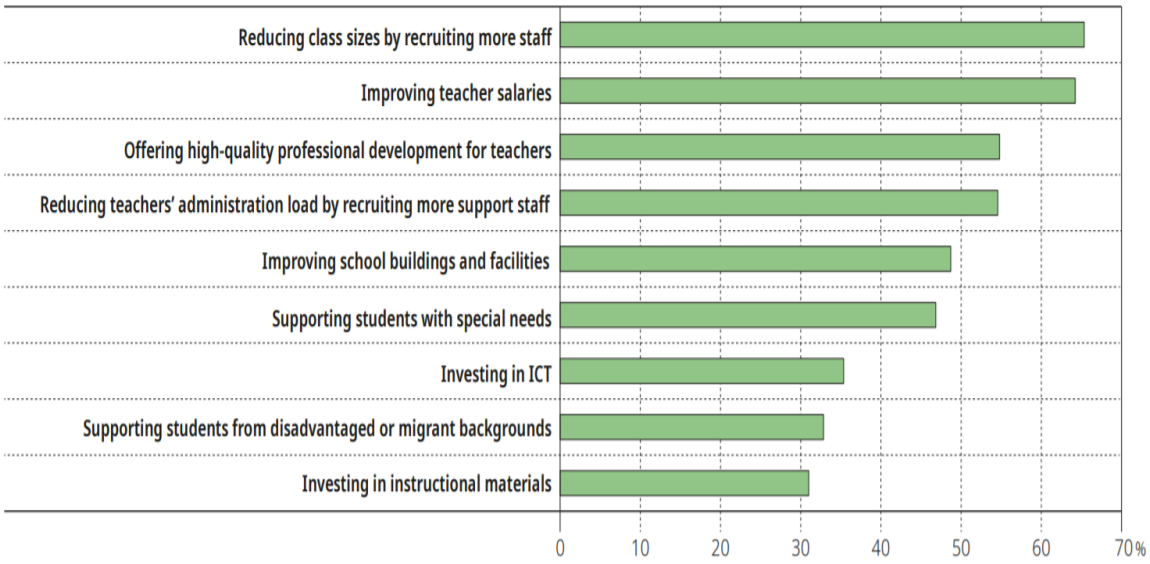


Figure 4.2 Spending priorities for lower secondary education. Percentage of lower secondary teachers who reported the following spending priorities to be of high importance1 (OECD average-31)

Another way to look at broad patterns is to examine, for each issue, the number of countries and economies for which it was among the top three priorities rated by teachers. With this approach, the key priority areas remain the same but the order changes. "Improving teacher salaries" becomes the issue most often rated among the top three priorities (in the education systems of 39 participating countries and economies), followed by "reducing class sizes" (29 education systems), "reducing teachers' administration load" (24 education systems), "offering high-quality professional development for teachers" (23 education systems), "improving school buildings and facilities" (15 education systems) and "supporting students with special needs" (10 education systems).

As the frontline actors of education systems, teachers are particularly well-positioned to report resource issues that directly affect their daily work. It is, therefore, important for policymakers to rely on the professional voice of teachers to inform policy on resource needs within the education sector and to better understand not only what teachers believe should be priority areas for intervention and additional spending but also what factors shape these beliefs.

4.4.3 Examination system

Another barrier mentioned by almost all the participating teachers was that Israel has standardized examinations for evaluating students at all levels.

Teachers were responsible for helping students earn high scores on these tests, as teachers are evaluated based on their students' test scores. Serving as a deterrent to teachers trying new instructional approaches is the indirect pressure from the school districts requiring teachers to aid in students' increased test scores.

Teachers are tempted to believe that high-test scores are associated with students' learning, which may or may not be true. Participants stated that the meaningful learning approach helps students gain a deeper conceptual understanding; however, all of them considered that meaningful learning instructions might not effectively help students earn high scores on the standardized tests.

One teacher explained that meaningful learning instructions would not be of immediate assistance to her students but that it might help them learn over a period. Another teacher belief that meaningful learning instructions should be a supplemental approach and not the only approach to instruction, and she feared that meaningful learning instructions would have her students unprepared for the standardized tests. Several studies in which meaningful learning instructions are compared with traditional instructions in terms of assessment found meaningful learning instructions to be effective during open-ended assessments involving the application of concepts (Walker & Leary, 2009).

A meta-analysis (Gijbels, Dochy, Bossche, & Segers, 2005) conducted to explore meaningful learning instructions effectiveness as compared to traditional instructions revealed that students following meaningful learning instructions outperformed students following traditional instructions in both knowledge-principle effects and the application of knowledge. In addition, Strobel and van Barneveld (2009) found that meaningful learning instructions are effective if the assessment is based on long-term knowledge retention and if the tested knowledge requires a detailed explanation. It has also been found that traditional learning methods (lecture method and direct instructions) were effective when the assessment types included multiple-choice questions, true or false statements (Strobel & van Barneveld, 2009).

Teachers at the researched schools perceive a didactic approach to be effective in preparing learners for tests and examinations. This finding is in agreement with studies conducted in other countries cited by Blanchard et al. (2010) that show it is a common practice for teachers at poorly performing schools often located in poor communities to "teach to the test" (Perreault, 2000; Jones & Johnston, 2002). Perreault (2000), for example, found that teacher-centered instructional approaches that focus on basic skill development are often reinforced at low-

performing schools. Johnston (ibid) suggests that these approaches are common at low-performing schools because they can be an effective way to prepare students for high stakes assessment. Yet, as Hilliard (2000) and Kohn (2000) pointed out, although an emphasis on test preparation may improve test scores in the short term, they do little to improve student learning.

4.4.4 Low expectations in students' ability and performance

Another factor influencing the implementation of meaningful learning in the mathematics classroom is teachers' low expectations of students' ability and performance. The study participants' first reaction to the meaningful learning' principles was that it was a great instructional approach but not particularly good for their students.

The participants believed that their students lacked skills and maturity to learn through any other instructional approach other than direct instructions

Several researchers (Kelly & Carbonaro, 2012; Sorhagen, 2013) have examined the relationship between teacher expectations and student achievement. Peklaj et al. (2012) identified two types of goals: mastery goals and performance goals.

Mastery goals are associated with students mastering certain standards and solving cognitively demanding tasks; performance goals are associated with displaying knowledge and high-test scores. Peklaj et al. (2012) concluded that teachers' mastery goals for their students positively impacted students' self-efficacy and mathematics mastery (solving open-ended tasks). In terms of performance (actual test scores), students also responded positively to teachers' performance goals. According to Sorhagen (2013), teachers' expectations for their students, as early as in 1st grade, have an impact on students' academic achievements in high school. In addition, students tend to believe their elementary teachers' predictions concerning their ability levels in mathematics and language; this was more pronounced in children from low-income families (Sorhagen, 2013).

Expectations for students are subtle and are difficult to change because of the beliefs associated with them. Focused professional development on how to develop high expectations for all students and how to adjust teacher behavior accordingly is necessary for teachers to consistently implement active methods in the classroom.

4.4.5 Availability of resources

Another barrier to teachers implementing meaningful learning reform in their classrooms is the lack of necessary materials, equipment, or resources. Pressures of time, assessment, lack of resources, and physical space in the classroom are often cited as barriers that stop teachers from teaching the way they would like to (Toohey, 1999).

Most teachers complained about the lack of materials or equipment. As was described in the literature review chapter, the Arab school system suffers from a scarcity of resources and budgets, such as school hours, classrooms, scientific labs, and computer labs.

This could be a barrier to the implementation of some activities that involve meaningful learning (for example, demonstration and laboratory exercises, or computer and visual-based instructional activities.

Teachers expressed concern over not being able to provide learning experiences that they deemed were relevant to student learning. Teachers stated that they purchased supplies out of their own funds to provide learning experiences for their classes. This was unfortunate as laboratory investigations were among the most student-centered learning experiences provided.

The use of technology and access to the internet has been highlighted as an important component of the reform and a limiting factor. Lacking access to the internet strongly curtails the power of the computers for providing teachers and students with access to information and reference materials to support inquiry learning and other goals of the reform.

Also, teachers criticized current textbooks that did not provide ideas on using active or collaborative approaches, nor did the textbooks offer practical examples or worksheets for implementation. This resulted, therefore, in an even heavier workload for teachers.

Similar to the barrier of time, the barrier of inadequate availability of resources to support meaningful learning was mentioned as a top concern among Michael's (2007) workshop participants. Space and resources remain a contentious issue in every teaching context.

4.4.6 Classroom management takes precedence

The teachers appeared to be concerned more about classroom management issues than teaching approaches or the learning process. Their hesitancy in adopting more learner-centered techniques such as encouraging group discussions among students stemmed from their fear of

disruption and losing control of the class. Teachers regarded classroom management as a necessary and sufficient condition for learning to occur. As Joram and Gabriele (1998) point out, such a view of teaching is consistent with a transmission model of learning and does not reflect current theories of education.

Numerous studies have identified classroom management as an important contributor to student learning and a strong predictor of student achievement (Klussmann et al., 2008; Baumert et al., 2010; van Tartwijk & Hammerness, 2011). Large-scale international assessments of student achievement have found a positive relationship in several countries between an orderly environment (as reported by teachers) and student achievement (Martin et al., 2013; Le Donné, Fraser & Bousquet, 2016; Wang & Degol, 2016). TALIS provides insights into the things teachers do to maintain an order that may already exist in the classroom or re-establish it.

In 2018, on average across OECD countries and economies that participate in TALIS, more than 60% of teachers reported that they frequently or always engage in practices that aim to maintain an orderly classroom, such as telling students to follow classroom rules (71%) and listening to what they say (70%). Slightly fewer teachers report that they frequently or always take measures to react to disruptions from students in the classroom, such as calming students who are disruptive (65%), as well as asking students to quieten down quickly (61%) (OECD, 2019).

One possible reason why these teachers focused so much on classroom management is that the school culture equated quiet classrooms with effective teachers and productive teaching. In fact, teachers reported that on rare occasions they were observed during teaching by a senior member of the school management team, the observer would provide feedback mainly on the teacher's classroom management skills and not on other – arguably more important – aspects of teaching. When supervisors or principals talked of teachers, they seemed to evaluate a teacher's effectiveness based on their ability to maintain discipline among the students. In the researched School (A), for example, one teacher was seen as a good teacher because she could keep the students quiet; another teacher was viewed as less effective simply because there was usually much noise from students in his classes.

During my time at the researched schools, I was always struck by how school leaders' conceptions of the school's best class were different from my own.

In School B, for example, the school leader felt that class D was the best in its grade level because the students were all very quiet during teaching. They also achieved excellent grades

in their exams. Class F in the same grade achieved equally good results but was not considered the best by either the school manager or teachers because the students in class F tended to be more vocal. These students questioned teachers, were keener to interact, and did not remain silent during the entire lesson. They were less hesitant to speak up when asked a question, and indeed, voluntarily did so; they were confident and outspoken. In class D, however, teachers had to call on a student and wait for a long time before the student would respond, yet this was regarded as the "best" class.

Lack of opportunities for students to speak meant, of course, less noise. As Carless (2004) notes, teachers in traditional contexts often handle teacher-fronted instruction better than they handle communicative or task-based approaches to teaching. As the teachers at the researched Schools, Carless's teachers in Hong Kong secondary schools seem to be concerned with noise and discipline issues, which inhibited the successful implementation of Task Based Language Teaching. As Carless, following Tsui (2002) notes, teachers in such situations should learn to tolerate constructive noise, differentiating between off-task noise – which should not be permitted – and on-task noise – which should be allowed. The reason for this distinction is to ensure that instructional objectives are achieved without the need for the teacher to reinforce his authority. Carless (2004) argues: "Good teaching is characterized not by establishing routines, … but by possessing the judgment that informs executing the routines with some flexibility" (p. 656).

4.4.7 Lack of student interest

Lack of student interest was reported to be one of the difficulties faced by a lot of participants. Students were passive and silent, appearing uninterested much of the time. Rather than attempt to make them more involved and thereby ignite some interest, most teachers – while acknowledging that their students appeared uninterested and were inactive – did not make a concerted effort to change the situation. Students (especially boys) did not pay any attention to the teacher most of the time and were more engaged in talking to each other; the noise of their conversations often drowned the voice of the teacher. Yet, despite this obvious lack of interest on the students' part, teachers were seemingly unwilling to try new strategies for making their teaching more interesting. They dismissed the idea that trying something different might help to get students' attention.

4.4.8 Teachers' willingness

It was found that the majority of the participating teachers had a positive response towards the new reform ideas. Nevertheless, there was a mismatch between teachers' employed practices and those ideas. Therefore, without a willingness to assimilate the change, a positive attitude and accumulated knowledge may not be a solid enough foundation to drive teachers to implement reformed learning.

Thus, this study suggests that teachers' positive attitudes and willingness are connected to the shifting of practice and are necessary for change.

On being asked to describe an ideal teaching situation without the constraints of mandated policy or school culture, 11 of the 20 teachers interviewed stated that they would teach in much the same way as they did now, suggesting that they were content with their current practices. The teachers dismissed most modern methodological trends as impractical, providing evidence supporting Fullan's (2007) conclusion that teachers, in general, reject theories.

For most of the teachers in the study, contemporary approaches such as meaningful learning were reserved only for "other teaching contexts" (as many teachers in the interview declared) and were beyond the scope of their students and school. At best, these approaches were relegated to the "good students." Moreover, such learner-centered teaching approaches seem to be mainly "fun" approaches, something to exploit periodically to increase student motivation. The approaches were not seen as methodological choices that would lead to the same degree of learning as a pedagogy that promoted knowledge transmission; instead, they were simply a "sideshow" (Howatt, 1984, p.279).

As highlighted in the literature, self-efficacy is an important factor in supporting teachers' confidence in their teaching ability, positive attitude, and willingness to implement a new teaching approach (Hoy & Woolfolk, 1990; Ghaith & Yaghi, 1997; Guskey, 1998; Bray-Clark & Bates, 2003).

Although this study did not measure self-efficacy, it appears to the researcher that it may have positively influenced teachers' positive attitudes toward and willingness to implement a new teaching approach.

Self-efficacy may have worked in tandem with a positive attitude toward the meaningful learning approach to increase teachers' willingness to implement meaningful methods in their teaching practice in the classroom. At the same time, those factors diminished teachers'

concerns and pushed them to implement the innovative teaching approach (Czerniak & Chiarelott, 1990; Westerback & Long, 1990; Posnanski, 2002).

Similarly, Lack of confidence was cited as a constraint to implementing active learning. Two teachers who employed transmissive instructions declared that they are wary or even reluctant to make changes in the curriculum; they said they "can't take the risk" to employ student-centered instructions.

Another teacher was unwilling to take that risk because he did not want to lose face in front of his students by not being able to maintain discipline. The extent to which teachers feared change also, therefore, was important. This need for teachers to be confident in their abilities to adapt to change reflects Lamie's (2002) findings.

These comments may reflect the mentioned above teachers' low self-efficacy, as they felt doubtful about their abilities to support student-directed learning and work in this approach. Hence, this might be another factor that influenced teachers' unwillingness to engage with constraints and continue with the implementation process, even if they initially displayed a positive attitude toward the new learning approach.

As opposed to the participants whose beliefs founded not aligned with the practices, the five teachers whose beliefs aligned with their practices expressed their confidence in their understanding of inquiry and their content knowledge. This may reflect a high self-efficacy that made them feel challenged by the new learning approach and the implementation process rather than being threatened or concerned by it like the other teachers.

Therefore, there appeared to be a strong connection between teachers' self-efficacy, positive attitude, and willingness. This point raises critical and interesting questions for the researcher that may become part of future research to explore the connections among these issues. Future research could also investigate these critical factors to explain the difference between these five teachers and others. In this light, the difference between the five teachers' group and the others might occur due to their self-efficacy, as it could be a potential determining factor in the changing process.

As Crookes and Arakaki (1999) pointed out, difficult conditions, including heavy workloads or uncooperative students, negatively affected teachers' instructional practices. When burdened with heavy workloads, teachers would undoubtedly spend inadequate time planning lessons. As Richards and Pennington (1998) found in their study of first-year teachers in Hong Kong,

situational constraints (e.g., unresponsive students, examination pressures, a set syllabus, pressure to conform to peers, student resistance to new ways of learning) led teachers to diverge from innovative practices and discouraged them from experimentation. These situational constraints were faced by teachers encouraged them to opt for the safest and easiest instructional strategies. As Richards and Pennington (1998, pp.187-8) note: without any relief from these factors and without any reward for innovating in the face of them, the teachers would naturally be led back toward a conservative teaching approach to align themselves with the characteristics of the existing teaching context.

Chapter 5 - CONCLUSIONS

The research reported in this thesis investigated the opinions of science and mathematics teachers about beliefs, practices, and the implementation of meaningful learning in the 7^{th} -9^{th} grades mathematics and science classrooms in Israel.

The overarching research question guiding this study was what are the opinions of science and mathematics teachers about beliefs, practices, and implementation of meaningful learning in Israel?

Study participants included ten mathematics teachers and ten science teachers from three separate Arab middle schools.

The findings in chapter three demonstrated clear results about teachers' beliefs and the extent of the implementation of the meaningful learning reform in the science and mathematics classrooms and delineated situations that impacted or hindered meaningful instruction from occurring. According to the findings, participating teachers reported meaningful instruction occurrence at a greater level than it was observed from practice. The findings explored situations, usually barriers, impacting the delivery of student-centered instruction.

This concluding chapter will present a summary of the main findings as well as how they relate to the research questions; in other words, a discussion about the implications and recommendations of the study. It will also draw attention to the study's limitations and suggest how future research could rely upon its findings.

5.1 Main Findings

Research Question One: **What kind of beliefs do science teachers hold regarding meaningful learning**?

The results regarding teachers' beliefs have revealed that Arab science and mathematics teachers' opinions when it comes to teaching and studying did not partition within a particular belief dimension.

Nearly one-third of the Junior High school teachers at the researched schools hold traditional beliefs regarding teaching-learning; more than half of the teachers that participated hold modern beliefs, while one-tenth of them hold transitional beliefs.

Science teachers holding transitional beliefs did not have holistic and consistent views about teaching-learning aspects. They had a modern approach towards beliefs about teaching strategies and teachers' role aspects of teaching-learning. On the other hand, they held traditional beliefs regarding the students' role in the school system and learning content. Additionally, they were in favor of the traditional learning environment. Since beliefs about teaching-learning are intertwined, in-service training and other professional training should address all the aspects of modern teaching-learning in a packaged program so that the teachers can have a complete idea about the modern approach of teaching.

Research Question two: What kind of practices do science teachers do in the actual classroom?

Observational data revealed that teachers followed a transmission approach. Science and Mathematics teaching involved a routinized pattern of rule explanation followed by practice exercises. Hence, it can be concluded that didactic teaching practices are still prevalent in the researched Junior High school science and mathematics classrooms in Arab society, while student-centered teaching is rarely practiced. Evidently, teachers practiced traditional transmissive chalk and talk methods. They ignored instructional guidelines, which encouraged them to engage students in dialogue and discourse about their understandings. Although there was some use of appropriate and context-based examples to help explain mathematical and scientific concepts, rich and complex problems were largely absent from their teaching strategies.

Almost all participating teachers were found to be good at explaining the taught concept using limited context-based examples. In this case, seeds of constructivist ideas were sown, with teachers being encouraged to choose appropriate examples related to their students' real-life activities. However, the study revealed little evidence that teachers encourage students to explore problems on their own or to work in collaboration, as they attempt to solve problems and give them enough time to think creatively about the problems. Moreover, formative assessments were rarely conducted.

In terms of practice, the majority of the participating teachers demonstrated traditional beliefs about teaching and learning. These findings highlighted the challenges faced by Arab schools with the introduction of a reform that is aligned with contemporary theories of teaching and learning, particularly in terms of delivery (engaging students constructively). Hence, this

study's findings tend to support the conclusion that reform takes time to be materialized as intended.

This experience indicates that the prevailing situation was not favorable for teachers to implement new ideas in terms of time and space to reflect on their beliefs about the teaching and learning of science and mathematics. For success in implementing the educational reform, teachers' beliefs about the current reforms need to be reflected upon, supported, and challenged.

Support can be rendered in the form of providing sufficient time for teachers to reflect on their beliefs about reform-based instructional practices and providing adequate space for them to practice accordingly. Otherwise, the vast majority of teachers will continue teaching their traditional practices in the privacy of their classrooms, and the implementation process, as a result, would be a waste of energy and resources (Handal & Herrington, 2003).

A significant insight from this study is that, although teachers may be introduced to innovative ideas about teaching and learning, their ability to translate them into practice is not only dependent on whether they espouse such ideas but also on how educational structures including curricula, exams, and textbooks support the reform proposals. Teachers may hold different beliefs about scientific knowledge, teaching, and learning. However, their predominant adherence to a teacher-centered pedagogy reflects their 'core' beliefs, which are ingrained in their own schooling and first-hand experiences of learning and teaching, reinforced by the educational structures. Initiatives to change teachers' pedagogical practices must, therefore, focus on teachers' beliefs and the current system-wide structures that strongly support a teacher-centered pedagogy. This points to teacher education through raising awareness of these issues and working with student teachers to explore opportunities within the education system that can provide a space for new ideas to develop and grow.

Aydin et al. (2009) are among many researchers who have argued that beliefs are considered a major factor affecting teachers' way of teaching and changing their practice of teaching. Therefore, as found in such past studies, a mismatch of the teachers' beliefs and practice is found to be one of the factors hindering the effective implementation of the new reform. Beliefs impact on practice, but one can only implement beliefs if the conditions are suitable, and one has the confidence to do so. For instance, teachers trying their best to cover the syllabus in time for students to prepare for their examinations and score good marks tend to over-rule the implementation of practice consistent with their beliefs, as shared by some interviewed teachers.

The same situation was reported by Barkatsas and Malone (2005), who argued that:

> *Teachers may believe, for instance, that group work is the best environment for exploring mathematical ideas and learning mathematics but that preparing their students for university-entrance examinations and the pressure to achieve the highest scores possible for each student may keep them from implementing their beliefs into practice (p. 86).*

Moreover, as in the situation that prevailed in this study, Barkatsas and Malone indicated the difficulty of introducing and sustaining innovative teaching practices in a system that has solid traditional foundations. They recommended that the broad social and cultural environment of the classroom may influence teachers to embrace beliefs about teaching and learning. Clearly, the culture of schooling in the Arab sector appeared to be one constraining factor.

This study's theoretical contribution tends to confirm that it is not always true that teachers' beliefs shape classroom practice, and one can only implement beliefs if the conditions are suitable.

Several possibilities as to why the teachers were unable to enact their beliefs in their teaching were identified. Even though teachers may have wanted to adopt student-centered approaches, their unfamiliarity with such approaches may have led them to teach differently. A second reason may be the straightforward nature of teacher- fronted lessons, which would be favorable to teachers such as those at Arab School who faced large workloads and difficult working conditions and were seen to have low levels of professional motivation. Additionally, the issue of maintaining discipline was a central theme that was evidenced in the data. A teacher-dominant approach would help to minimize student talk, and therefore make it easier to maintain discipline.

Another explanation for the mismatch between beliefs and practices may be attributed to the difference between teachers' espoused theories and their theories-in-use. This difference may explain why teachers could not articulate the reasoning behind their routinized instructional practices and verbalize the beliefs that underlay their actions.

Furthermore, the conflicts between teachers' beliefs and systemic conventions may also have acted as barriers that prevented teachers from enacting their beliefs.

As already noted, it is also likely that teachers presented themselves in a more favorable light in responding to interview questions, as it is human nature to portray ourselves in the most positive manner.

Research Question Three: What kind of situations are perceived by teachers as the implementation of meaningful learning?

Although the majority of the teachers in this research expressed a positive disposition towards meaningful reform, in practice, they used traditional instructions**.**

Herbel-Eisenmann et al. (2006) argued that although the teacher's comprehensive orientation towards teaching influences their instructional practices profoundly, contextual factors can prompt local changes in teachers' enacted instruction.

Several factors were seen to be responsible for leading to or preventing change. Exploring 20 middle school teachers' perceptions regarding the implementation of the Meaningful Learning Reform in Israel revealed that they experienced two main challenges: the need for clear guidelines, which means that teachers had to follow their own discretion; and coping with ambiguity – meaning that they were required to operate under conditions of uncertainty.

These findings shed light on how significant the notion of early and continuous support is for teachers. This research began five years after the introduction of the new reform in Israel, and many teachers were still struggling and seeking additional information regarding the goals of the reform. This could be attributed to the lack of instructional workshops designed to help teachers adjust to the new reform.

The literature on educational innovation has identified frequent mismatches between reform goals and teachers' beliefs as a barrier to the implementation of a change (Orafi & Borg, 2009).

Unfortunately, even if teachers' beliefs align with the reform goals, it is not always possible to enact those beliefs due to the underlying nature of the educational system (Handal, 2003). In some instances, the perceived school view regarding the importance of the subject can act as an impediment to the successful implementation of the reform (Liddicoat & Scarino, 2009).

In terms of concerns, Fuller (1969) proposed one of the earliest models focusing on teachers' concerns regarding educational reform. This model was hierarchical, made up of three levels: self-concerns, task concerns, and impact concerns. Self-concerns relate to teachers' anxiety about their ability to successfully engage with the reform's new demands. Task concerns relate

to concerns focused on the day-to-day duties associated with teaching, e.g., covering the curriculum, lack of available resources, time constraints, etc. Impact concerns deal with the consequences of the change to student learning.

In the early stages of reform, teachers typically express intense self-concerns that, over time, diminish and are replaced by task concerns. Once the reform becomes established, teachers' concerns tend to evolve again and become more focused on its impact on students, with many teachers eventually suggesting alterations to improve its effectiveness (McKinney et al., 1999; Van Den Berg & Ros, 1999). Tunks and Weller (2009) substantiated the importance of this evolution in teachers' concerns through the three levels but stressed that only when teachers are continuously and substantially supported in implementing the reform will this shift occur.

Continuing Professional Development (CPD) is a key approach that can help teachers alter their beliefs about pedagogical instruction while simultaneously helping teachers' perceptions of the new reform to progress from personal considerations to classroom-based considerations.

The reduction in the frequency of CPD courses being offered to teachers could be a potentially harmful occurrence as educational reform requires significant and lasting support as the pressure to revert to traditional practice is always present, which could erode the reform even after it is put in place.

From the teachers' point of view, there are several perceived constraints, which hinder the practice of meaningful learning, including pressure from the examinations, inadequate resources, and large class sizes.

An increase in the use of technology in education has been highlighted as an important component of the reforms. While many schools have computers, slightly less than half of these can access the internet. Lacking access to the internet strongly curtails the power of the computers for providing teachers and students with access to information and reference materials to support inquiry learning and other goals of education.

Furthermore, various situational and personality factors also appeared to affect the degree of implementation and uptake. Regarding situational factors, time, workload, and support from the school leaders appeared to be important. There was also evidence that a teacher's level of confidence, low expectations in students' ability and performance, willingness to take risks, and readiness to collaborate all affected the extent to which they implement the new reform.

There are some factors which the teachers are not in control of, and therefore, if teachers are unwilling to work around those issues, no changes will not be made. Hence, the main conclusion in this section is that the probability of teachers adopting meaningful learning strategies rests on their ability to overcome the barriers mentioned above.

During their interviews, the participants mentioned that traditional assessment (or Assessment of Learning, AOL) constrained them.

Most assessment in school life focuses on testing what a student knows or is capable of doing, and then this process ends with the teacher giving the student validation in the form of a mark or grade, known as a summative assessment. In response, students may naturally work towards learning, which is required to pass the test, adopting surface or strategic approaches to learning, rather than engaging at a deeper level or applying their critical thinking skills.

Often used alongside summative assessment is formative assessment, which does not result in a grade but can be equally helpful for the student as it often takes place in real-time so that the students and the teacher can react and adapt as the situation requires. Formative assessment involves teachers sharing success criteria with learners, comment-only marking, peer- and self-assessment (Black & William, 2006; 2009). Black and William (2009: p.8) also advocate formative assessment as a way to encourage students to act as 'instructional resources' for one another; and to be 'owners of their own learning.'

However, it is possible to draw a link between meaningful learning and Assessment for Learning (AFL), and our conclusion in this regard is that there should be a move from assessment of learning (AOL) to assessment for learning (AFL).

5.2 Recommendations

Recommendation 1: **Long term ongoing professional development**

The current study results indicate that the teachers lacked adequate professional learning on the implementation of the new curriculum.

Teachers demonstrated a need for this professional development through their accounts of classroom practices, learning activities, along with their explanations of student-centered instruction. Teachers have an obligation to improve instruction.

Several studies have revealed that effective educational reform involves a transformation of the individual teacher, focusing on their beliefs through appropriate and timely ongoing professional learning activities (Harris, 2003; Hopkins, 2007).

Powell and Anderson (2002) argued that to have a successful implementation of reformed curriculum materials, teachers are required to attend timely and adequate professional learning activities and transform ideas in terms of their understanding in related subject matter such as the pedagogy of mathematics and science.

Similar findings were presented by Keys (2007). Hence, policymakers within the Ministry of Education should be in a position to devote considerable resources in ongoing professional learning activities in providing support, conducting monitoring, and promoting teacher alliance within schools and other learning organizations.

Stigler and Hiebert (1999) identified the mismatch which often occurred between intended and implemented reform and argued that this was the result of inadequate knowledge of the range of possible teaching methods rather than of weak teachers. They referred to the teaching methods used to implement the intentions of educational reform more effectively to help students develop a deeper understanding.

To significantly improve students' academic achievements, teachers are expected to have appropriate knowledge and skills in teaching that match the intentions of the curriculum. Thus, there is much to be done at the school level. Long-term ongoing professional learning activities are recommended for practicing teachers to help them change their beliefs to align with the intention of the new reform, which is the same strategy that was undertaken in countries such as Japan and Indonesia.

Considerations in relation to the findings described in this study could contribute to further improvement of educational policy and assist other teachers facing the same problems enacting the intention of a new reform. It may help policymakers to be more aware of the need for more funding or influence strategies on how the new policy could be implemented.

Findings from this study reveal a strong requirement for teachers to move from the traditional model of professional development by just providing knowledge and skills to the inclusion of reflective practice that connects with existing beliefs. Therefore, it is recommended that the Israeli government and teacher-training institutions provide pre-service teachers with a clear

understanding of how they want teachers to understand the concept of meaningful learning and how this should be enacted at the classroom level.

Recommendation 2: Strengthen the focus of assessment for learning

The current study's findings show that there were few chances for students to be actively involved in the learning process. The main priority of the teachers who participated in this study was covering the syllabus in time. In the process, any focus on essential knowledge tended to disappear, and the focus became more one of drilling procedural knowledge and helping students pass the examinations. There were relatively few activities that engaged students in meaningful learning and in providing teachers with opportunities to plan and implement effective formative assessments. According to the new reform, assessment for learning is expected to occur in parallel with teaching so that the teacher can facilitate students' learning. Therefore, all concerned authorities and teachers are expected to place more importance on reducing assessment of learning through pen-and-paper methods and increasing assessment for learning to align with the intentions of the meaningful learning reform and the social-cultural context of education in Arab society. They need to realize that introducing assessment for learning without considering the social-cultural context in which it is implemented is a major challenge.

Recommendation 3: The need to change teachers' beliefs

Learning is unique to the student, and prior knowledge brought to the classroom affects knowledge construction (Tafrova-Grigorova, Boiadjieva, Emilov & Kirova, 2012). All students should be exposed to student-centered instruction as a means of meeting their unique individual studying needs. Teachers have an obligation to respect learners, regardless of the skill set that they present (NSTA, 2013).

The beliefs about teaching and learning that teachers in this study espoused are largely antithetical to the principles of meaningful learning. Changing teachers' well-established beliefs remains complex unless attempts to transform beliefs are connected with the socio-cultural and structural context in which teachers teach (Markic & Eilks, 2013).

As mentioned before, school structures influence the type of beliefs that teachers prioritize and enact in practice. This means that helping teachers acquire beliefs supportive meaningful learning is not sufficient unless such attempts consider the social and structural constraints in schools. In Arab Society, school structures, including classroom designs, curricula, exams, and accountability systems, will continue to influence the type of beliefs teachers to enact, even if they acquire beliefs supportive of meaningful learning. Therefore, attempts to deconstruct and reconstruct teachers' beliefs should take place in relation to the structural forces that inevitably shape teaching. Through school-based mentoring - via cycles of teaching, reflections, and analysis - teachers should be supported to concomitantly promote deeper learning through active pedagogy in the context of high-stake exams and resource-constrained classrooms.

Recommendation 4: deep learning compared to lateral learning

Teachers are obligated to cover their respective curriculum content, which tends to be textually dense with rigid pacing guides. Most curricula required the utilization of traditional methods. Traditional epistemology focuses on the actions of instructors and how they present or transmit information to learners.

Constructivist instruction emphasizes meaningful learning based on prior student experiences to trigger the learning of new material (Hartle, Baviskar, & Smith, 2012; Ültanir, 2012). Student-centered instruction can address the learners' needs. Science and Mathematics teachers are presented with a dilemma - the requirement of providing traditional instruction concurrently while having the professional responsibility of recognizing and meeting learner needs (NSTA, 2013). This situation can be resolved, in part, through altering curricular demands.

The modification of the science curriculum can permit the instruction of codified standards, local school district requirements, and learners' needs. Decreasing the content presented would allow teachers to engage in instruction that promotes a deeper understanding of the concepts. The promotion of student-centered inquiry-based instruction requires more time for implementation than traditional instruction. However, it represents the methods employed by scientists to solve problems. It is recognized that decompressing the curriculum may cause all mandated concepts, pursuant to the codified standards, not to be met. This may be easily remedied. Districts should consider increasing the number of science and mathematics class interactions per week or decreasing educational material from the scheduled curriculum.

5.3 Implications

As revealed in this study, having a policy and curriculum documents alone is not enough to ensure successful implementation without reform-oriented teachers with a sufficient supply of teaching and learning materials. This study's findings confirm much of the research on the difficulty of implementing a change (Fullan, 2007). Many of Fullan's constraints in Western contexts and by others in developing contexts (Bulut, 2005) are confirmed in this study. Policy initiatives such as reforming curricula can set unrealistic expectations, which involve changes in beliefs and knowledge (Schweisfurth, 2011). Challenging and changing teachers' beliefs has been established as essential in the reform process, but the difficulties and strategies are well documented (Timperley & Robinson, 2001).

Inconsistency and lack of clarity in the communication of reform are one constraint evident in the Israeli school system. Limited support for teachers and lack of time in preparing lessons are also well-documented factors in implementing the new reform.

The Meaningful Learning Reform differed from previous reforms in that it was virtually the first time when teachers were not given precise directions but only general guidelines.

It is advisable to combine a broad policy that allows educators to exercise discretion about meeting its goals, with scaffolding, i.e., guiding educators and explaining how to deal with ambiguity and uncertainty.

Integrating autonomy with support may nurture educators' needs in times of broad policy initiatives. In addition, the reform context is also important.

Freedom of action can overwhelm practitioners and raise their suspicion when it does not have its prior practical seeds in schoolwork. Therefore, expanding teachers' freedom of action should be accompanied not only by providing them with the support needed but also by considering that their process of adaptation must be gradual, as they inherently involve obstacles and difficulties.

As aforementioned, while implementing generally outlined reforms, schoolteachers make sense of external policies, which in turn affect the extent to which they alter their practices. Therefore, the district and principals should actively engage teachers in sense-making activities when generally outlined reforms are introduced. They should invest time upfront working with

teachers to help them make sense of the new generally outlined reform policies (Matsumura, Garnier, & Spybrook, 2012).

Moreover, the district principals should facilitate both the top-down and the bottom-up policy response, building and sustaining bridges of communication, support, and knowledge between their respective worlds as they enact education reforms (Daly & Finnigan, 2011; Honig, 2012).

Effectively responding to generally outlined reform policies requires a learning partnership among and between the district, school senior management teams, and teachers. I would argue that to bring about a change, the attitudes towards teaching and teachers need to change first. If teachers are to evolve and learn to teach in new ways, schools must first be viewed as places for teachers as well as students to learn. Teachers must be regarded as learners who need to expand their knowledge and improve their practice continually.

For successful change to occur, schools must create an atmosphere that is both supportive and persuasive. On-going support, as well as pressure, is crucial for continued improvement and systematic implementation. Support provides teachers with the scaffolding and encouragement they need, while pressure can help initiate change among those who are not overly motivated to change. The three schools that this study focused on did not overtly support change and did little to encourage teachers to improve their practice. As a result, many teachers remained lax and unconcerned about the quality of their teaching.

Teachers did not feel the need to be more innovative. Some teachers explicitly referred to the school management's lack of involvement in building professional development programs and indicated that the implementation of the innovation would have been more successful if it had been mandatory. These statements shed light on the fact that we have to implement modern teaching methods as a priority in the school system.

The involvement of school leaders in building professional development programs is also important for another reason. As teachers appear hesitant to apply practices that conflict with institutional norms and expectations, the involvement of school leaders in development sessions can provide the opportunity to negotiate and reconcile any differences between them and encourage working towards a shared vision of learning and teaching.

5.4 Limitations

Compared with previous studies, this study provides new data on schoolteachers' perceived challenges while implementing a generally outlined education reform in their school contexts.

However, this study is subject to several limitations that should be pointed out, suggesting further future research. Additional research is required since the findings were collected in a particular context so that their cross-cultural validity was not proven. Replicating this study elsewhere in various socio-cultural contexts will possibly enable the generalization of the findings to broader populations. In other words, it is important to understand how teachers' instructional practices take place in different school contexts, as it is not a one-size-fits-all doctrine that provides a yes or no answer for a wide range of scenarios (McDonnell & Weatherford, 2013).

Another aspect we have to take into consideration is how this study is related to its target. Although this study's philosophical aim was to help students learn mathematics and sciences more effectively, there is no direct involvement of students as research data sources. Besides collecting artifacts from the students during lesson observations, there were no other direct activities where students were required to participate in this study. The main focus of the study was on teachers, with the intention of helping them to facilitate students' learning in effective ways. One of the main limitations was the exclusion of students in exploring the impact of the new reform. Hence, a study focusing on the reactions, receptions, and performance of the students on the change in teaching mathematics and science should be explored.

The research was also limited in scope in that it explored the implementation of a new reform in a small number of mathematics and science classrooms in middle schools in the Arab society. Its findings should not be generalized to other contexts. Although the schools in which research data were collected may be representative of middle schools in Arab society, it still cannot be claimed that the findings are consistent across all middle schools in Arab society. However, individual teachers, policymakers, and researchers are able to consult this research as evidence to inform strategic or policy directions. The study provides findings that may help explain other similar situations.

We used maximal differentiation sampling (Creswell, 2014) to capture a wide range of perspectives and gain greater insight into the perceived challenges of teachers during the implementation of the meaningful learning reform; however, in this study, we could not differentiate between each teacher considerations and the school context from which they

emanated. Therefore, it is important to explore the interactions between these perceived challenges and factors, such as gender, seniority, school size, and school district. In addition, further study could explore whether and to what extent this education reform's intended outcomes have been affected by teachers' perceived challenges.

Additional longitudinal studies, including repeated interviews with the same schoolteachers to explore how their beliefs and instructional practices have evolved and unfolded throughout reform implementation, will also be useful.

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APPENDICES

Appendix A: Interview Questions

Ph.D. Research: The opinions of science and mathematics teacher's about beliefs, practices, and implementation of meaningful learning in Israel. *A case study of Arab middle school(s).*

Abu Ahmad Laila

Semi-structured interview questions for teachers

Background and teaching philosophy

1. What do you teach, and how long have you been teaching?
2. What do you think makes a good teacher in school Education?
3. What kind of teacher are you? Do you have a teaching philosophy?
4. How important is the relationship between student and teacher?
5. What do you think is the purpose of school education, and what do you think the teacher's role is?

Teaching and learning

1. *What do you think is meant by Meaningful Learning? What does it look like? What is the teacher doing/what is the student doing in a Meaningful Learning environment?*
2. *In which approach or strategy do you think that Science/Mathematics should be taught?*
3. *Could you describe what an ideal teaching environment would look like?*
4. *What do you think teachers should do for effective learning?*
5. *What are the best ways to learn science/ mathematics? Explain your ideas.*
6. *What do you think about the responsibilities of the student when learning science/ mathematics?*
7. *What should teachers focus on teaching "presenting facts (definition, theory, process, concepts, etc.) or students' individual development of thinking and reasoning"? Please explain your idea/s with reasoning.*
8. *How do you normally assess your students? What do you think the role of assessment is?*
9. *Have you ever taught using what you think is a Meaningful Learning method?*
10. *Could you describe a lesson that you believe was successful, and why?*
11. *Do you think Meaningful Learning is appropriate in all learning situations, or are there times when you think alternative instruction methods must be used?*
12. *Do you ever feel constrained in your teaching? If so, when, how?*
13. *What factors impact how you teach science/ mathematics?*
14. *Is there anything else that you would like to share?*

Appendix B: Participant Consent Form

Researcher: Abu Ahmad Laila

Supervisors: Prof. Aleksandra Boron, Dr. Anna Mankowska

Research Title: *The opinions of science and mathematics teachers about beliefs, practices, and implementation of meaningful learning in Israel. A case study of Arab middle schools.*

I am Laila. I am a Ph.D. student at Adam Mickiewicz University, Poland. I am holding ID no. 024732257. For my Ph.D. research, I would like to observe and interview teachers in middle school.

The purpose of the study is to explore the opinions of science and mathematics teacher's about beliefs, practices, and implementation of meaningful learning in Israel.

If you agree to participate in this research, I will observe your teaching, and then you will be interviewed by me about your thoughts, feelings, ideas, and experiences as a teacher. The interview will be audiotaped, and afterward, the content of the interview will be transcribed.

The original recording will be destroyed once I have typed it up, and your name will be not be used in the written transcript of the interview, so you will not be able to be identified from it. I will write part of my thesis based on the content of your interview: this will then be submitted and assessed. Excerpts from your interview will be included, but your name will not appear anywhere in my written thesis. You have the right to withdraw at any time you choose during the research, and I assure you that all your data will be deleted and not be used by anyone once you choose to leave.

1. I confirm that I have read and understood the Plain Language Statement for the above study and have had the opportunity to ask questions.
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason.
3. I consent that my interview is being recorded and that I will be referred to by another name in the written research.
4. I agree/do not agree (delete as applicable) to take part in the above study.

_____	_____	_____
Name of Participant	Date	Signature

Best regards

Laila

Appendix C: Observation Schedule

Ph.D. Research: The opinions of science and mathematics teachers about beliefs, practices, and implementation of meaningful learning in Israel. *A case study of Arab middle school(s).*

Abu Ahmad Laila

Describe the class you are observing? (? School, subject, grade, Physical organization of the classroom)
Exploring students' prior understandings: How does the teacher elicit prior students' understandings? How does the teacher connect new concepts to pre-existing students understanding of concepts? How did students connect new concepts with what they already know?
Nature of Learning Task Does the task focus on the acquisition of knowledge or transformation of knowledge? Is the task tightly framed, specified, or open-ended? E.g., is the teacher seeking single right answers or divergent answers?
Classroom interaction Who does most talk? Teacher or students? What role does the teacher play? Explaining? Facilitating? Guiding activities? What roles do students play? Mostly listening? Planning and conducting investigations? Did students interact with the teacher, e.g., whole-class dialogue? Did students interact among themselves, e.g., small group dialogue/activities?
Classroom management Does the teacher face any discipline problems, e.g., off-task, noisy students?

What strategy was used to solve discipline problems?
What learning and teaching resources are used?
Does the tutor use activities as part of the lesson
Do the students appear to be engaged in their learning? If yes, how is this demonstrated?
Meaningful learning How is the class arranged? Is it suitable for meaningful learning? What teaching methods is the tutor using? Feedback? Classroom talk?