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**INRODUCING A FLEXIBLE CLASSROOM INTO A SCHOOL
WORK STUDY PROJECT**

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Abstract

The purpose and function of a flexible class is to arouse interest both among the pupils and in myself, as a teacher, to the point of employing a variety of tools, both technological and analytical, in order to enhance their scope of knowledge pertaining to software engineering. "Flexible class" implies that the teacher manages the class by all means. In other words, the nature of learning depends upon each lesson in itself, while being derived from the group's nature. The advantage of this approach is related to the fact that one may construct any type of lesson. The teacher may conduct either an ordinary, frontal lesson, teleprocessed lesson, or a cooperative lesson, where pupils upload contents onto the server. And yet, the flexible class will be able to deal with that. The difficulty lies within the fact that as a teacher, one must establish boundaries, not allowing constant freedom as for the way in which the lesson is conducted. The goal is to allow the pupil to be a part of the progress, namely, to independently develop information processing modes, to be an actively involved party, who is capable of both contributing and benefitting. Another goal of this study is to develop a digital, modular and cooperative learning model. This method allows the integration of a diversity of varying teaching modes, which are adapted to the various needs. This study will explore the effect of flexible class in various aspects.

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Keywords: Flexible classroom, technology, structuring knowledge, digital learning, 21st century skills.



1. Introduction

“After 150 years the time has come to invest in the school for tomorrow...Why? Because tomorrow’s school will be based on the principle of creating learning conditions. A school will enable its pupils to learn – to take an interest, explore, create” (Harpaz, 2012, p. 29)

The Ministry of Education’s plan to adapt the educational system in Israel to the 21st century was presented in the literary review. As part of the program, diverse skills were defined as part of a learner’s functioning in the 21st century.

Realizing the program and achieving its objectives led to the development of innovative pedagogy in schools through the assimilation of information technology. This pedagogy emphasized the transition from traditional teaching to structuring knowledge and changing pupils’ and teachers’ power foci, learning activities and the role of technology (Ministry of Education, 2012). The innovative pedagogic foundation, characterized by digital learning, enabling the combination of pedagogical means and information technology and communication, turns learners into active people developing various skills (Rotem, 2013). Making pupils involved and integral to the process will lead to meaningful learning (Harpaz, 2012).

The flexible classroom method is one of the modular and collaborative digital learning methods. This method allows combining a variety of changing teaching courses, adapted to diverse needs. In this research, I will examine different aspect of the influence of a flexible classroom.

2. Problem Statement

In this qualitative research I will try to identify innovative processes to which pupils have been exposed as a result of the introduction of ‘a flexible classroom’ in software education lessons

3. Research Questions

How innovative processes to which pupils have been exposed as a result of the introduction of ‘a flexible classroom’ in software education lessons:

- 1) Contribute to demonstrating and illustrating learned 21st century skills
- 2) Enable improvement to traditional teaching
- 3) Improve the learning experience
- 4) Affect teachers’ functioning in their classroom

4. Purpose of the Study

To examine how innovative processes to which pupils have been exposed as a result of the introduction of ‘a flexible classroom’ in software education lessons affect the overall classroom learning

5. Research Methods

For this project I chose to employ a qualitative research method. The aim of this approach is to observe human behaviour and attempt to understand it. The research was intended to describe a situation without researcher involvement and is suitable for use mainly with phenomena that cannot be quantified.

It is a subjective study, based on interviews and observations – tools by which researchers observe and analyse data as they see fit. Qualitative research allows us to identify and understand processes while they are occurring, in their natural place, and to try and find meanings and insights in these processes.

Qualitative research in education looks at questions emphasizing how social, learning and personal experience is built and acquires meaning. For example, how does a teaching style in a particular classroom help learning, why do certain pupils succeed in a particular lesson and fail in another, what causes disruptions in particular lessons etc. (Karniel-Lauer, Szor, Livne, Melamed, Spiro, & Elizur, 2000). I chose a qualitative research method so as to identify and examine such processes. One school was chosen, and group of people throughout the process was documented a. Documentation enabled in-depth learning of processes and drawing conclusions.

5.1. Research population

18 pupils of Computer Science in 10th grade, in the excellence class in a school in Rehovot.

These pupils are in their second year of participating in this project. The school has 19 classes, lessons are conducted in a study room, in which there are varied learning stations, laptop computers, round tables, seating areas, a projector and creative materials allowing flexibility in teaching and learning means.

Teaching staff have undergone telecommunication training.

5.2. Research tools

The research tools employed in this work were: observations and interviews.

Observations – observations serve as a tool to collect data from the environment, with the help of methodical notetaking and recording (Shkedi, 2003). I carried out directed observations, in which observers have advance instructions what examined components of behavior they must observe and how these components must be reported.

Interviews – interviews are a means of collecting data using qualitative research. They serve as a tool to collect information by restructuring experiences, placing them in appropriate contexts and reflecting on their meaning (ibid). I used two semi-structured interviews with the teacher leading the flexible classroom project, at the beginning and end of the research. The interview is structured on prepared questions, but these can be changed according to how the conversation develops.

5.3. Research design

5.3.1. Advanced interview with teacher leading the flexible classroom method. The interview was held at the school on 17 November 2016. At the interview, the teacher presented his objectives, described the general idea of the approach and expected difficulties. In addition, the teacher referred to what is required of teachers who are interested in operating the project and to the overall school view about the project.

5.3.2. Four observations of lessons in which the flexible classroom method was operated:

Lesson 1 – 24 November 2016

Lesson 2 – 5 January 2017

Lesson 3 – 2 March 2017

Lesson 4 – 27 April 2017

5.3.3. A summarizing interview was conducted on the telephone with the teacher leading the flexible classroom method on 18 May.

5.4. Findings and discussion

In this qualitative research, I tried to identify innovative processes that occurred in a classroom as a result of introducing a flexible classroom in software engineering lessons. I observed a mix of teaching strategies and varied learning means: frontal, collaborative, autonomous, use of smartphones, various applications, electronic mail, watching short films as well as using tablets.

In the first lesson I observed a combination of frontal and facilitated teaching. In the first part of the lesson, the teacher explained the studied subject using digital means (short film). The body of the lesson was devoted to collegial learning – discussion in pairs, writing up personal logs and assessing colleague's writing. Then back to the full class to discuss, summarize and reflect on the process.

In the second lesson, computer presentations were used for pupils to present both their knowledge and assignments they were asked to carry out. Assignments were carried out in pairs and they were asked to provide high level writing, reach conclusions and inductive thinking. And again – full class for summation with pupils answering questions.

The third lesson provided pupils with the option of using a digital tool (TimedBrower) and required significant cooperation between pupils.

The fourth lesson emphasized the element of choice. Although pupils were asked to carry out a defined task – “Produce some java code (using android programming) that will send SMS to the pupils at defined hour (as a reminder).” - but specific contents and work methods were open, and pupils could choose. Outcomes presented after a number of lessons expressed pupils' internal richness and proved that choice led to positive motivation to learn.

During the four observations, I identified use of various learning strategies – frontal learning based on listening and understanding, communal learning and autonomous learning. In addition, different technological means were employed such as laptops, digital tools and short films.

6. Findings

I will refer to a number of themes expressed in observations and both interviews conducted:

6.1. The flexible classroom method is empowering in that it allows demonstration and illustration of 21st century capabilities. According to Rotem (2013), digital learning is the contemporary pedagogic foundation for the 21st century, which includes teaching-learning methods integrating information

technology, communication in an online learning environment and applying appropriate means of conduct in online space for educational needs. This type of learning is rooted in accessing and using digital teaching-learning units and materials alongside online information sources, available to teachers and learners to structure knowledge based on research, sharing, expanding and deepening. Digital learning is a collection of pedagogic means applied through information technology and communication so as to strengthen learning.

6.2. The flexible classroom method makes a variety of digital means possible. As we saw in the lessons – the flexible classroom method allows pupils broad exposure both to a variety of tools according to a teacher’s guidance and to possibilities to use them, by exploiting them for pedagogic needs required in English lessons. The teacher leading the flexible classroom also emphasized in his objectives, that she expected “Children will reach a situation of using a wide range of tools, both technological and analytical tools to increase their levels of knowledge on the topic and to allow them this experience of experiencing certain things in a variety of formats to in fact improve abilities that are not necessarily specific to the learned subject” . One can look at the flexible classroom method by reference to a large part of 21st century capabilities as defined in the Adaptation of the Educational System to the 21st century Plan (Ministry of Education, 2010):

6.3. Critical thinking and problem solving

Developing high level thinking means and strategies is one of the four areas defined by the Ministry of Education as 21st century capabilities (Ma’atof, 2014). According to contemporary pedagogy, pupils in the 21st century must have the ability to: (1) Think critically; (2) Identify and solve problems; (3) Make decisions; (4) Think meta-cognitively.

The process of instilling “how to learn” and “how to think” learning is a learning process, which will allow pupils to function effectively in the future in the 21st century learning and work environment (Ministry of Education, 2012). “The purpose of education is not a child who knows... a good pupil is one who knows how to relate to knowledge (critically and creatively)” (Harpaz, 2012, p. 32). According to Harpaz (2012) in order to achieve this objective, an educational environment is needed that turns children into being involved and understanding. The flexible classroom method enables teacher to use information sources and technological means that will allow exploring learning, encourage and develop curiosity. As in the example of the second lesson, in which pupils were asked to add new information to a literary creation through personal interpretation and independent thinking about the original and added texts.

6.4. Creativity and innovation

Another aspect of high level capabilities is expressed in creative and innovative thinking. This capability includes a number of aspects, in which pupils:

1. Employ a wide range of idea production techniques (for example brainstorming).
2. Produce comprehensive and worthwhile ideas.
3. Improve, refine, analyse and assess their ideas so as to improve and utilize fully the creative effort.

4. Work creatively with others.
5. Develop, apply and pass on new ideas to others effectively.
6. Behave openly and responsibly toward new and different points of view and amalgamate inputs and feed them back into their work.
7. Demonstrate originality and ingenuity in their work and understand the boundaries of the real world in adopting new ideas.
8. Refer to failure as an opportunity to learn; understand that creativity and ingenuity are concepts that are tested in the long-term and circular processes of small successes, failures and mistakes.

In the lesson I observed, these capabilities were expressed in a number of ways: blog writing – self-reflection regarding choice processes, creating cartoons expressing various themes emerging from a literary work, writing chain stories, dramatizing and creating artistic posters. According to Ma'atof (2014), using such means encourages pupils to learn actively and independently, produce meaningful learning that expresses every pupil's knowledge and abilities. Experiential learning requiring pupils' involvement, produces profound understanding that allows acquired knowledge to be applied in different circumstances. Teachers' varied demands will lead to assorted intelligences being expressed by pupils.

6.5. Communication, cooperation and team work

The constructivist (structural) approach in education believes that collaborating with colleagues strengthens the learning process and structuring knowledge. Today, teams are referred to as entities, capable of learning and developing over and above the development of the individuals who make them up. Everyone brings their own personal knowledge load into groups and are molded and developed by team processes. The team aspect is an essential component of learning (Azmon, 2011).

In all lessons, a large part of the learning process occurs through teamwork: in pairs or groups. Colleague's feedback constitutes a significant part of lessons. Pupils create, write, think together and also criticize one another. As an example, the first lesson in which pupils were asked to write about their choice process and their colleagues reviewed their table companions' writing and provided feedback. The teacher stated that in his eyes, "What is more important for me is that they are exposed to tools they reveal to one another...they expose their group to the things they know, or to things they are interested in, from my point of you, this allows the best structure". In the teacher's opinion: "Getting positive feedback from classmates, and not just the teacher, led to wanting to continue to strive and bring new things to the class".

6.6. Information, media and teleprocessing literacy

The era of blackboards and chalk is over, and using digital means allows pupils to be exposed to an abundance of information on the internet, and thus expands possibilities to look for information, broadens horizons and enables autonomous and cooperative learning using communal tools, but at the same time, information has to be treated intelligently. Pupils have to learn to distinguish between what is important and know how to crosscheck and combine information (Ministry of Education, 2012). Employing the Timed Brower tool, for example, contributes to independent work instead of teaching. As a tool that allows navigation between various channels, links to the website, pictures and different paces

of work together with the teacher's request to look for texts that 'communicate' with the creation, making the task much more meaningful in the face of the variety of search options and wide range of knowledge available on the internet.

6.7. Develops independent and autonomous learners lifelong learning

In autonomous learning, learners themselves choose from diverse stimuli the learning environment that suits each one, in the field of knowledge they chose. To achieve this process, teachers must allow learners, after presenting objectives, tools and method, choose their own learning space in which they want to learn, allow them to acquire broad expertise in relevant content and at the end present their insights as principles that can be applied in similar spaces. Autonomous learning ignites intrinsic motivation. In the fourth lesson, pupils were given the opportunity to choose, both contents and methods. The lesson allowed each group of pupils to express themselves in a manner that suited them. Some chose arts, others dramatization, giving a lesson, clay and more.

Improve traditional teaching that is principally frontal teaching, as a result of introducing the flexible classroom in software engineering lessons. Traditional teaching is characterized by uniformity, a planned teaching process, expected and clear outcomes, single place and time, teacher centered, memorization, practice, learner obedience and passivity, does not provide the capabilities required by 21st century man. The educational system must train people to be active learners and develop complex thinking skills. The flexible classroom is a learning environment that allows reference to the difference between learners and allows teachers to have work encounters with groups of pupils adapted to different needs such as instilling, guiding, supporting and the like. Learning activities and tasks place learners in open learning situations and present them with complex problems and projects with different means of solution, learning outcomes that are not predetermined and how they are solved and in what form are chosen and controlled by pupils. Ongoing occupation with such tasks enables profound learning, in which all capabilities and abilities characteristic of effective learning are expressed. In the flexible classroom model, meaningful learning is according to the indirect instruction approach, which defines the role of teachers as navigating pupils' learning processes – pupil-centered and teachers as facilitators (Fisher, 2015). In the lessons we observed, there was a noticeable combination of traditional and innovative teaching. Every lesson started as a frontal lesson in which the teacher stood in front of the pupils and passed on specific knowledge. Thereafter, the lesson became varied and facilitated, giving learners more open learning situations with the exception of the last lesson, in which pupils were given the choice of activities that enabled learning outcomes that were not predetermined. All other lessons were directed to a defined outcome – blog, story, cartoon and the like. The learning environment also moved between teacher, table, chair and pupil to being in unique spaces with tables connected according to need, beanbags, whiteboards, laptops and a variety of seating spaces. A varied learning space allows pupils to maximize their potential, assimilate learned material through choice of what type of learning space is best for them, working cooperatively, improving interpersonal communications between pupils and operating critical thinking (Flexible Classrooms, 2015). One of the objectives of a flexible classroom, as presented by the leading teacher, is making pupils interested. From the experience of other schools, it emerged that pupils showed a sense of interest, curiosity, responsibility, enjoyment and satisfaction.

In the final interview with the teacher, she noted that during her concluding conversation with pupils, they repeatedly expressed their desire for more flexible lessons. They specifically emphasized the positive elements of working in irregular groups or pairs that allowed them to get to know their classmates and develop abilities they thought they would not develop. According to Harpaz (2012), “Pupils learn best when they are involved in the learning process through their intelligence, imaginations, emotions and bodies ... involvement in the learning process provides a positive experience of learning” (p. 45).

An improved learning experience was noticeable in many parts of the lessons we observed. Pupils were highly and positively involved in lessons. They cooperated and expressed their satisfaction at how lessons progressed during lessons. Comments we heard from pupils express the interest, curiosity and enjoyment they felt in lessons: “It wasn’t boring because she didn’t lecture to us all the time”; “I’m a creative person and she allows me to be so”; “Teacher, I really enjoyed preparing the cartoon” (during summary of second lesson when class was assembled); “Thank you David, I didn’t notice at all that some was in the first person and some in the second person” (a pupil’s reaction to feedback from a classmate about her writing).

The research findings revealed that innovative processes occurring as a result of the introduction of a flexible classroom, influenced teachers’ functioning in class. The transition to the flexible classroom model of teaching and learning, demanded a change in teachers’ role in class. Teachers, who were at the center and whose primary role was to impart information, turn into facilitators, mediators and leaders (Flexible Learning Environments, 2018).

In lessons we observed a teacher who started lessons by imparting information and became a facilitator and mediator. “Facilitating open and enabling discussing with direction to the required subject”; “Presents the clip, facilitates discussion, assesses pupils understanding”. “Asks leading questions”; “Examines pupils’ progress”. “The teacher moves among pupils and helps make their work more precise”.

To prevent or ease teachers’ sense of losing control over a class, teachers must rigorously follow a number of guidelines to ensure investigative learning and not a free period. They must create a structured opening to lessons; ensure they give pupils clear instructions and tasks. All pupils must undoubtedly understand what is required of them, both generally and in current lessons. Clear structure, preplanning and determining objectives are the key rules for the success of facilitated lessons. One can also send pupils instructions by email, project them onto the classroom blackboard, screen and discuss them together. Teachers must talk to pupils, discuss with them their strengths of weaknesses identified in previous lessons and together think about work problems and possible means of solving them. One assignment can be done together as an example. At the end of the lesson, there must be a lesson summary and tasks to continue, even if pupils are embedded in their work and ask not to be disturbed. One must stop the lesson a few minutes before it ends, ask each group to briefly present its progress and present problems they encountered in groups to the class. To conclude, teachers must explain to pupils what they have to prepare for the next lesson and what their assignment will be in that lesson. It is important to maintain clear boundaries, respectful dialogue between pupils themselves and with teachers, setting assignments and intermediate tasks with exact times and the like. Thus, pupils understand that pedagogic

freedom give to them is anchored in a serious and obligating educational framework (Cohen & Zamir, 2013).

The lessons I observed were characterized by a clear structure, defined timetable and framework enabling freedom. Pupils are aware in advance of the assignments they need to hand in, and the freedom indeed obligates a serious educational framework. It is possible that this is the reason why the teacher chose to introduce the flexible classroom in outstanding classes, classes in which from the start contain pupils with high learning abilities, work ethic, responsibility and natural curiosity.

With the exception of the providing initial information and conclusion, I hardly saw the teacher as the focus of attention. From a teacher whose role was to interest pupils, she became a teacher interested in the pupils.

In addition, collaborative learning requires teachers to think flexibly-

- a. To recognize and accept pupils' differences;
- b. To relinquish their traditional role of imbuing knowledge and make themselves available to pupils as instructors, facilitators, advisors, directors, helpers, encouragers, supporters and active partners;
- c. To encourage pupils to do things themselves and take responsibility;
- d. To delegate authority and divide it among pupils;
- e. To divide the class into small group according to different criteria, and give pupils the opportunity to determine the makeup of groups;
- f. To design a learning assignment that allows learning through dialogue and reciprocal relationships between pupils;
- g. To develop cooperative behavioral norms in class, such as mutual assistance, consideration, sharing materials and sources, exchanging information and ideas, shared planning and the like;
- h. To develop learning and discussion skills such as compiling and arranging information from different sources, shared planning, attention, reference to what others say, equal distribution of permission to speak and lead discussions;
- i. To nurture among pupils' interpersonal capabilities of mutual support, empathy, maintaining a friendly and respectful atmosphere and the like;
- j. To implement various types of assessment: formative assessment, outcome assessment, personal assessment, group assessment and class assessment (Avinun, 2013).

Throughout the lesson observations, it appeared that the teacher was very attentive to processes occurring in class. She directed pupils to shared creation, facilitated meaningful discussion and combined various types of assessment, such as collegial assessment, self-assessment, outcome assessment and the like.

According to the teacher, teachers in flexible classrooms require three key things: flexibility, boundaries and technological abilities. She herself almost never needed, in the lessons we observed, to significantly change how the lesson was going, but she maintained she is always ready for the possibility that she may have to change lesson arrangement or tasks given to pupils considering their level of understanding of a subject, their attention and moods.

7. Conclusion

The flexible classroom method includes many possibilities and allows realization of a variety of innovative learning skills fitting for the 21st century, which matches reform in the educational system, referring to encouraging and strengthening meaningful learning and requires from its teachers to provide their pupils with suitable learning functions, by giving them a place for investigative learning, innovative learning, collegial learning and thinking outside the box.

The change has started, I have turned to meaningful learning, traditional teaching no longer meets the needs of the generation, schools have turned to different contemporary methods, but it still appears that the flexible classroom method, which allows a combination of all methods, does not play a significant part in the Israeli educational system. According to the teacher, the Ministry of Education encourages the introduction of flexible classrooms in elementary schools, but the method has yet to be accepted in high schools. 10th grades, is a level that allows more flexibility, because it does not have the pressure of matriculation. In her opinion, the method can continue to work in at least some lessons, even at higher levels. The research reveals that the flexible classroom method created interest, curiosity and positive learning experiences for pupils. Possibilities to choose, the range of means and tasks, employing digital tools and cooperative learning led to much greater pupil involvement and as such to enjoying learning. This method caused pupils to be a significant part of the learning process. It appears that the knowledge they acquired became part of the wider world and did not remain extrinsic knowledge.

It also emerged that the change in the role of teachers, from imparters of knowledge to facilitators requires a clear framework definition: chaos must not ensue in classrooms, structures, order and great teacher responsibility are required and therefore their training is extremely important. Operating such a project demands teachers' self-efficacy to carry out change, technological knowledge and flexible thought. As the teacher defined it: "A flexible classroom also requires excellent conversance with new teleprocessing means and developing teachers' knowledge ... not every teacher allows this or knows how to encourage it.

In addition to personal capabilities, one must create appropriate teacher training in the field. The Tpack model presents the right combination in the teaching process – between learning content, technology and pedagogy. Teachers must be capable of correctly choosing suitable digital representations, both of content and pupils' abilities. Employing technological tools, without filtration, is likely to missing educational and learning objectives, therefore training is so important.

In the research, we met outstanding pupils operating in the flexible classroom method, and in our opinion, one must consider how to exploit the benefits of this method, which encourages personal motivation and interest specifically in classes with weak populations, despite the teachers argument that in classrooms without self-discipline, flexible classrooms are not effective, some classes require more discipline and less flexibility.

And finally, we met a teacher who strives to relate to the differential characteristics of pupils – level of achievement, thinking skills, learning capabilities and language achievements, learning and thought styles, types of intelligences, types of motivation and interest, cultural background, learners' self-image and uniqueness of every individual, who chose to try and integrate a flexible class into school out of a belief that this program will meet respond to interpersonal differences.

Combining these two points of view in the research process, the pedagogical-educational view and the teleprocessing view and common thinking how to create a meaningful learning experience and lead pupils to enjoy learning and good achievements, made us understand that the flexible classroom project is very important. Since the findings in this work refer solely to a limited number of subjects in one school, it is recommended to continue exploring the topic and expand it to a greater number of participants and/or different populations. The qualitative research we undertook does not constitute a representative sample but is a call to expand research in the field.

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