FOSTERING COLLABORATIVE AND CONSTRUCTIVIST LEARNING THROUGH THE FLIPPED CLASSROOM DURING COVID-19

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ABSTRACT

This chapter describes a course teaching unit, carried out in a teacher education college in central Israel, that aims to develop techno-pedagogical skills in different disciplines, fostering independent and collaborative learning. The unit constituted modelling for the flipped classroom strategy using constructivist teaching. The unit was applied with 35 student-teachers from different disciplines online due to the Covid-19 pandemic.

The teaching method of the unit is described through the humanist theoretical lens, while highlighting the teaching and learning processes, the content knowledge, the techno-pedagogical environments and the learners' reflective insights. This process consolidates pedagogic models of teaching and learning methods according to a humanist, constructivist approach in an online learning environment.

Keywords: *distance learning, flipped classroom, independent learner, collaborative learning, humanist learning, constructivist learning*

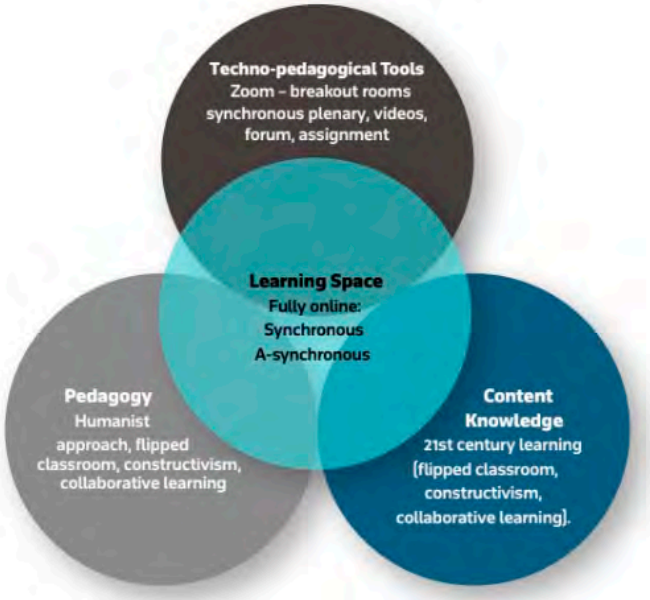
The online learning space encourages flexibility and self-directed processes in learning (Moore, 2000) since it provides opportunities for the learner to exercise wise judgment and independently choose the learning times, location, and content and even navigate between them (Harasim, 2012). The transition of the entire education system to online learning and teaching as a result of the COVID-19 pandemic has altered human lifestyles and affected teaching and learning methods in teacher training institutions, necessitating the use of digital pedagogy and online tools to create an effective learning experience (Bonk & Graham, 2012). Lecturers were required to teach entirely in a digital environment, learn to use new approaches and adopt new digital literacy skills, and their attitudes, beliefs, and professional practices began to change (Klieme & Vieluf, 2009; Li, 2016). The new digital literacy skills helped to engage learners and teachers in self-directed processes, skills that are now essential for lifelong leaning (Darling-Hammond et al., 2017).

This study addresses these challenges and offer a framework which explicitly emphasizes the interaction between the learning space, the pedagogy, and the techno-pedagogical tools applied for transmission of the learning content. The proposed observation is anchored in both the humanistic educational approach (Aloni, 2013; Rogers, 1980), which places the learner at the center of the learning process, and the socio-constructive approach, which emphasizes the importance of knowledge-building through social interactions and encourages collaborative group work to promote shared knowledge (Bielaczyc & Collins, 1999). The framework of this article is presented in Figure 1

THE FLIPPED CLASSROOM METHOD

The "flipped classroom" strategy relates to the alteration of learning time in and outside the classroom, while transferring the responsibility for learning from the teacher to the learner (Xu

Framework of the Combined Humanistic-Educational and Socio-constructive Approach



& Shi, 2018). This learning method may assist the learner to focus more on the teaching and attain deeper understanding of the teaching contents during the lesson time. Learners perform their personal or collaborative learning before the lesson, and during this meeting they can devote the time to knowledge construction. In this sort of learning, the teacher is responsible for supporting the learners' knowledge-building process. This teaching method allows personal instruction and attention to each learner and is based on constructivist learning theory (Felder, 2012). Constructivist learning theory advocates learner-oriented learning led by the teacher and focuses more on the learning process, less on the product (Chuang, 2021; Jones & Brader-Araje, 2002). Thus, the learners are the bricks of knowledge construction, active and involved throughout the learning process.

The flipped classroom method has produced a worldwide revolution in teaching. The classroom, equipped with various technologies such as video and automatic online reaction systems, has engendered massive changes in the following aspects: the manner in which classroom time is used, the exploitation of extra-classroom time, the different use of the classroom, kinds of interaction and evaluation methods (Abeysekera & Dawson, 2015; Bishop & Verleger, 2013; Hew et al., 2021; Kim et al., 2014). The flipped classroom model reverses the conventional learning arrangements of teaching and learning in the traditional classroom, where the learning of new materials takes place in the classroom and learners are required to exercise the transmitted material by themselves (Bergmann & Sams, 2012; Hew et al., 2021; Sohrabi & Iraj, 2016). In the flipped classroom model, the learning process is founded on active learning theories, peer learning, and collaborative learning, with the focus on the learners at the center. The learners learn and exercise new content through online, digital applications that stimulate learners' thinking (Bishop & Verleger, 2013), while the lesson time is devoted to active learning such as exercises, discussion, problem solving, presenting questions and collaborative work (Akçayır & Akçayır, 2018; Cavinato et al., 2021; Francl, 2014; Houston & Lin, 2012; Lai & Hwang, 2016). The learners perform their learning before the lesson and need to have a basic understanding of the main points of information, to perform required assignments, and to think about points which they did not understand or that caused confusion. They can then resolve difficulties with their teachers and peers in the classroom.

The lecturer, or teacher, guides the learners throughout the process, answering the learners' questions, instructing them, and offering alternative methods of evaluation. They create a foundation for communication between the learners, answer questions that are posed, and provide immediate support and feedback. In this way, the learners advance their learning at their own personal pace in line with the teaching demands, while receiving personal instruction as needed (He et al., 2018; Johnson, 2013).

A review of the research on flipped classrooms paints a mostly positive picture of this strategy. Learners tend to prefer face-to-face meetings to recorded lessons, but prefer interactive face-to-face meetings rather than frontal lectures (Bishop & Verleger, 2013; Strelan et al., 2020). According to these studies, the advantages of the flipped classroom relate to more flexible learning, while enabling an opportunity for structured, active learning that encourages problem-solving. The studies also testify to an improvement in learning in lessons taught according to the flipped classroom strategy in comparison with traditional learning.

The flipped classroom, which allows learning to be performed both before and within the lesson, emphasizes interaction between the teachers and

learners and focuses on independent learning, in a process of knowledge acquisition and collaborative investigation, based on various learning resources and not on the teachers' teaching. The advantage of the flipped classroom is that it encourages independent learning and fosters learning initiatives by the learners, guiding them to knowledge construction (Xu & Shi, 2018).

CONSTRUCTING KNOWLEDGE IN AN ONLINE ENVIRONMENT

In recent years, education has undergone a transformation from teacher-focused teaching and learning programs to learner-focused learning and research (Birgili et al., 2021; Chu et al., 2008; Hmelo-Silver et al., 2007). Active involvement and learning, in which the learners take responsibility for their learning, constitute the main components in this constructivist approach to learning (Brown, 2012; Hailikari et al., 2021; Vygotsky, 1978).

The learners are routinely required to perform collaborative work, using an instructional method that necessitates significant communication with their peers. One such instructional method is Jigsaw Instruction. In Jigsaw Instruction, learners are expected to engage in two different phases of an activity. One is the expert group activity, where they collaboratively work on the same materials. Their collaboration in the expert group facilitates constructive interaction among learners, who meet their individual goals to become experts regarding their assigned material (Miyake, 1986). Learners collaboratively develop their conceptual understanding and prepare for their jigsaw group activity. Collaborative tools produce deep changes in the education settings since they support a social-constructivist learning paradigm by encouraging learners' creative and collaborative involvement in the subject contents using digital tools (Mâţă, 2013). These collaborative tools can improve learning and support the collective construction of knowledge (Dede, 2008; Greenhow, 2011; Siemens, 2005). Collaborative sharing has deep theoretical roots in theories such as the socio-cultural theory of Vygotsky (1978), which advocates assistance adapted by an expert or colleague for the individual's personal learning needs. This necessitates the active involvement of both the individual learner and the expert in order to enable personal development through the interaction between them. Participation in shared and collaborative learning resources with others ensures and enables more effective learning (Lee & Bonk, 2016; Seifert, 2016).

PRESENTING THE CONTEXT FOR THE IMPLEMENTATION OF THE ACTIVITIES

Different learners in the constructivist learning environment have different ways of understanding the construction of knowledge and can build knowledge according to their different levels of cognitive knowledge (Xu & Shi, 2018). From the teacher's viewpoint, they pilot and direct the learners to build their personal knowledge, encouraging their initiative, autonomy, self-revelation, analysis, and problem-solving during the process. Throughout the entire learning process, the teachers fulfil the role of organizer, mentor, assistant, and guide while the learners are situated at the center. Based on constructivist learning theory, this chapter begins by reviewing theories of knowledge construction, the flipped classroom method, and collaborative learning. These theories and approaches provided a foundation for the objectives of the learning unit. The learning unit aims to promote independent learners, who have the ability to examine their learner needs, to create technology-assisted lessons that support the needs of the content area and its pedagogy, and lead learning of this sort in their schools. Furthermore, the research on the learning unit aimed to understand how student-teachers view the contribution of modelling performed through teaching that is applied in a collaborative constructivist manner by the learners, using the flipped classroom strategy online. The effectiveness of the method applied is tested in the research with a focus on a unit implemented while using the Jigsaw model in the flipped classroom strategy. This unit was applied before the COVID-19 period in a face-to-face environment. Due to the constrictions of the pandemic period, an adapted version of this unit was employed in online teaching. It was therefore important to learn:

1. How did the student-teachers perceive the experience of online teaching in the course?
2. How did the collaborative online learning of the student-teachers influence the shaping of their own teaching methods as teachers?

METHOD

The research paradigm employed in the current research was a qualitative approach using student-teachers' journal and analyzing them. This approach enables significant revelation, characterizing processes and variables and providing interpretations for the studied reality as perceived by the student-teachers (Kassan & Kromer-Nevo, 2010). This approach also helps to suggest an explanation for the studied phenomenon (Shkedi, 2010, 2011).

Journal entries underwent interpretative content analysis. At the first stage, each transcript underwent a longitudinal narrative analysis, helped by different narrative analysis practices, noticing content and form of the text (Lieblich et al., 2010). The second stage involved a broad analysis of the transcripts, inductively eliciting main themes from the transcripts. Then connections were identified between interpretative insights and different empirical findings, organised in accord with "grounded theory" (Glaser and Strauss 1967). The inductive extraction of the main themes from the transcripts enabled the identification of connections between the different interpretative insights. The identification of statements, coding, categorization, and thematization were done by two researchers in collaboration. A third researcher finally approved the categorization and thematization independently. The categorization was only accepted if agreement among the three researchers was reached. The initial themes that emerged from this analysis are presented in the Findings section below. The inductive extraction of the main themes from the journals enabled the identification of connections between the different interpretative insights. The research was approved by the institutions' ethics committee. Informed consent was collected from participants before their data was used, and research respondents were promised confidentiality and anonymity in any publication of the research.

The student-teachers all participated in a course entitled "Teaching and Learning in Innovative Environments." This course involved 30 hours study over an academic semester within a Moodle management environment. The class took place during the first year of a two-year M.Teach program and delivered practical techno-pedagogical knowledge. The sample was a convenience sampling, such that respondents were selected according to their participation in the course and convenient accessibility for researchers (Etikan et al., 2016). The learning unit was performed in a teacher education college in central Israel, sampling 35 student-teachers from different disciplines taking the course in the master's degree program over three weeks. The sample included 69% females and 31% males. Most of them (74%) were aged 25-34 years, 20% were aged 35-44 years and 6% were aged 45-54 years. The unit served as a model that exposed the student-teachers to new topics: 21st century learning, lifelong learning, the flipped classroom, collaborative learning, and constructivism. The teaching methods used to deliver these topics served to model the concepts being taught, providing theoretical and practical understanding of those concepts and showing the student-teachers how to implement them synchronously and asynchronously. Due to the COVID-19 pandemic, the student-teachers' participation in the course was solely online. The group included 20 females (58%) and 15 males (42%). Their average age was 29 (SD = 6.5) and they were all Hebrew speakers.

The course was accompanied by regular student-teachers' reflective writing on a journal. Students wrote their reflections about the course contents and their experience of the teaching-learning process. As a result of the specified learning unit, 32 journal entries were written by 23 (72%) among the student-teachers that participated in the course. Citations from these journals are presented here under fictive names keeping a separate list of fictive code-to-name match-ups. Each student posted between one to two blogs.

As part of the course, the student-teachers were exposed to a teaching unit in the knowledge domain of computer-assisted teaching and profound experience of the flipped classroom strategy (in their knowledge domain), and both synchronous and asynchronous online learning according to the Jigsaw model. This was part of the varied teaching methods that constituted modelling for the student-teachers in methods that they could apply as teachers in their schools (pedagogy). Communication during the performance of the jigsaw unit were maintained through meetings on Zoom and division into breakout-rooms, publishing messages on a forum in the Moodle environment, writing a blog, synchronous communications

through a chat, and transmitting assignments.

THE PEDAGOGICAL ENVIRONMENT

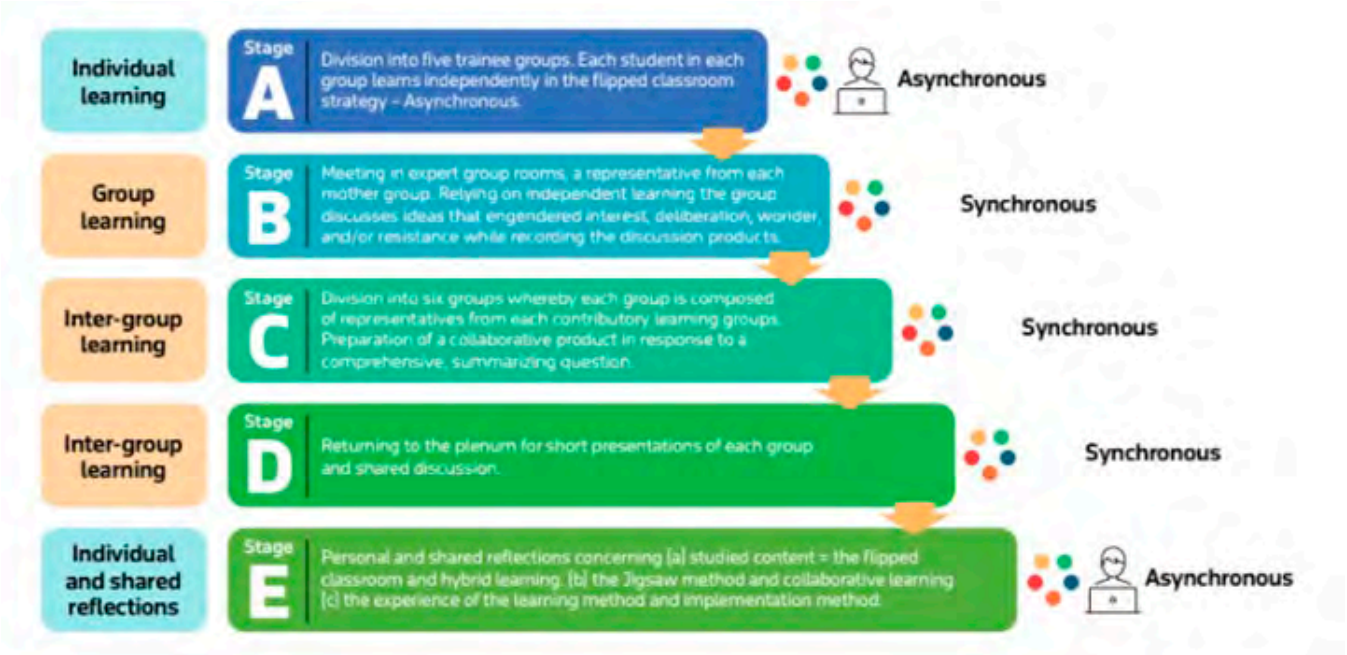
These components were applied in a learning space, which, due to the constrictions of the pandemic, appeared online and combined synchronous with asynchronous teaching according to the teaching-learning contents and objectives. Figure 2 presents the entire model framework.

The teaching unit that was studied included different stages, both in terms of the learning space and in terms of the studied contents, the pedagogy that was applied in line with the teaching objectives and the contents, and tools that assisted in mediating the unit. Figure 3 presents the model that applied Jigsaw activity in a flipped classroom adapted to online teaching.

As can be seen in Figure 2, the learning unit includes five stages, which were conducted as both synchronous and asynchronous activities. In the first stage, the class was divided into six groups of students for individual, asynchronous, independent learning. The students in each group were asked to watch a video conveying innovative ways of learning, the flipped classroom, the concept of lifelong learning, and personalized learning with MOOCs. In this stage, the learning was flipped as the activities traditionally conducted in the classroom were conducted at home, and activities normally constituting homework become classroom activities. In the flipped classroom, the teacher helps the students instead of merely delivering information, while the students become responsible for their own learning process and must govern their own learning pace (Lai & Hwang, 2016). Since classroom time is not used to transmit knowledge to students by means of lectures, the teacher is able to engage with students by means of other learning activities such as discussion, solving problems proposed by the students, hands-on activities, and guidance. Today, the concept of the flipped classroom has been implemented in many different disciplines (math, social sciences, humanities, etc.), and in schools and universities around the world (Hao, 2016).

The assignment was to respond to several questions relating to the video they watched and submit the assignment prior to the next lesson. In the second stage, each group met in a breakout room in order to conduct individual study of the material and deepen their understanding collaboratively. In the third stage, six groups were formed, such that in each group there was a representative from each of the contributing groups who was able to contribute their group's different contents to the representatives of the other groups. At this stage, the group reacted to a general question relying on the knowledge that was presented by them

Figure 2 Model of Aapplying the Jigsaw Instruction Method in a Flipped Classroom



all. At the fourth stage, presentations were delivered in the general plenum, including the principal elements of the contents that were raised in the different groups. Finally, in the fifth stage, personal reflections were written, leading to discussion and a collaborative process in the plenum. During the discussion, the students reflected on the content knowledge, the methods applied, the learning space applied at each stage, and the learning theory they modeled through the learning unit. From the viewpoint of the lecturer who instructs the course, the journal that accompanied the course throughout the process allowed a glimpse behind the scenes to understand the learning methods, the teacher's role, and the contribution of the process to the student-teachers' functioning as teachers.

RESULTS

The Student-teachers' Perspective Concerning the Learning Methods

This theme deals with the asynchronous learning methods, the synchronous methods in the plenum and in the breakout rooms, while considering collaborative teaching, the Jigsaw method, and the flipped classroom strategy as well as the student-teachers' learning experience. The student-teachers wrote in their journals and related to various aspects of the learning methods.

Learning Through Zoom

Despite their initial anxiety, it was obvious that there were student-teachers who understood the added value of this type of learning. One student-teacher noted:

> Learning through Zoom brings a lot of advantages: it saves you travelling time and parking costs, saving the time needed to get organized in the morning (with two small children it's a real challenge), its comfortable, everything is around you, it allows you more time to sleep (you don't need to get up early) and you can doze between lessons (Hani).

Zoom Breakout Rooms

The division into breakout rooms on Zoom allowed the student-teachers to overcome barriers and develop a sense of belonging to the group and skills for the application of the methods with their students. One student-teacher noted:

> When we were first divided into groups, I had a sense of discomfort, I lacked confidence to speak, when to speak etc. But when we gathered together, I saw that everyone was rather confused, uncertain what to do, we all succeeded together in breaking the ice and after a few minutes the conversation flowed enjoyably (Mira).

The Flipped Classroom

The student-teachers also related to this teaching method and reflected on the process that they underwent. One student-teacher remarked: "My sense of responsibility in asynchronous learning, such as I felt in my experience of another course, is enlarged and this creates self-directed learning" (Yaara).

The student-teachers tried to examine the learning process from their own perspective as students, but as teachers they also understood the power of the method. One student-teacher remarked:

> As noted, this is actually the "flipped classroom" method, in which we learn at home and exercise in the classroom. We learnt about the main points of the lecture at home (independently) and we practiced it in the "classroom" together. The discussion in the room was exciting, each student expressed their opinion and their view of the approach and the critique that was heard in the lecture. The common ground of the students (their knowing one another and previous watching of the lecture) created a businesslike discussion, which was productive and fascinating between the group members. There was a very high level of involvement in the room. The group demonstrated responsibility, attentiveness, ability to transmit information clearly, and much respect towards each other. The meeting in the room was interesting since we were exposed to discussion and concise summaries of other lectures on education and teaching, close to our hearts. The students were attentive, interested and friendly. In conclusion, the meetings in the small groups were pleasant, we got to know our fellow students better. The meeting was interesting and fascinating and we learnt a lot. Previous watching of the lectures and our learning at home before

> the lesson formed a common background and important subject for group discussion and practice [flipped classroom strategy]. The collaborative work created a fascinating productive work dynamic and each student participated. It was challenging, very interesting and no less important …fun! (Daniel).

Collaborative Learning

The student-teachers understood the advantages of collaborative learning as a way of enriching the learner's knowledge, enabling various viewpoints to be expressed, and strengthening motivation and involvement in the learning. A student-teacher explained:

> The encounter with the group in the room in which we all listened to the same lecture was enriching and gave me an additional angle to my own interpretation of the lecture. The use of a collective presentation was wonderful and sometimes cancelled the need for one leader who was chosen by the group (or chose themself) in order to summarize things (Yaara).

The same student-teacher added her views on the approach underpinning the lesson activities:

> The additional division into rooms in which I needed to summarize concisely the main points of the lecture in a few minutes, led to an interesting discussion about different approaches of education methods and refining certain approaches such as the humanist approach, which puts the learner at the center, which is what we found to be the common motive in the lectures that the students had watched (Yaara).

In addition to writing about the teaching method, this student spoke about her motivation in such activities for active participation and undertaking responsibility for the collaborative learning process:

> The assignments and the activities in this course arouse my desire to participate in the lesson, a sense of being part of the group for authentic learning, I want to show my ability to the class to study in small groups. Despite the "late" hour (Yaara).

Another student defined this as "a sense of togetherness in the group which shifted to serve the common goal and can help weaker students and empower the stronger students" (Uri).

The Jigsaw Method

The students also wrote about the Jigsaw method. For example, one student noted:

> It's a wonderful method for peer learning and enriching one another. The early preparation for the lesson obliged us to become an active part of the lesson and to arrive with knowledge and not just consumers of the lesson where the teacher is the only source of knowledge. Instead, the teacher guides us and gives a place to their learners to express something no less important, if not more in some cases. I think this is an excellent tool for online learning, I really enjoyed it and learned from different colleagues who saw the same lecture and see different points and of course in a group you are involved in hearing about other lectures that the other students saw (Guy).

Another student added words about the effectiveness of the method:

> In my opinion, although this was the first time that I participated in this sort of learning–it's an excellent method to absorb content. However, it raises the question to what extent the content that we received from our colleagues in the rooms will really remain in our heads, since each one shared relatively short insights (Tom).

Beyond the aspect of their studies, one student also related to the social aspect of the learning method:

> I see the Jigsaw method as a very interesting and effective format for learning. It's a method that develops additional values beyond learning the materials such as our social orientation and effectiveness of the learning (Elon).

Despite the advantages offered by this method there were some students who felt that the method needed to be seriously weighed up:

> …however, it's necessary to weigh up when it's worthwhile to use the method, because when there is complex material and it's

> difficult to explain it, it may be preferable for the teacher to explain the subject to all the learners and not to allow the learners to learn by themselves and explain to their classmates (Eli).

Some participants felt that the method effectively inspired them to alter their teaching methods:

> Frustration led me to search for change in the way I teach, to throw out my old presentation and prepare a new one with other materials, to search for what would interest me to speak about so that the learners would experience my enthusiasm and become interested themselves. This experience was very formative for me and I continually try to refresh the subject matter that I teach, to alter the teaching method and to remain connected to the joy of teaching and learning [Tomer].

The Teacher's Role

In consideration of the teacher's role, it was clear that the student-teachers understood that just as they had undergone a change in their teacher's role during their learning experience, a significant and necessary change was essential for them to implement it with their own students.

Change in the Teacher's Role

The students related to the necessary change, associating it with the accessibility of information, as one student explained:

> It seems that there has been a welcome and unusual change in available teaching methods. So that I believe the world of teaching has to undergo, among other things, a substantive revolution throughout the system in defining the goal of education. In an era in which information is accessible and exposed to everyone, the teacher is not the only exclusive source to attain knowledge (Daniel).

That opinion was supported by another student who said: "And the question arises, what is the educator/teacher or perhaps the guide, what is their role in the present era?" (Efrat). From their learning experience it was clear to the students that:

> The teacher's role alters and they become a sort of mentor for the learners, so that their role is to arouse the learner's inspiration and to guide them and less to act as the source of information. The Industrial Revolution was the source of the development of printing and the Information Revolution taking place today is the result of the invention of the personal computer and use of the Internet. The education system needs to change: the accessibility of information, its wealth and distribution, the difficulty involved in verifying its truth and other matters will mean that the future teacher will need new tools and characteristics (Gal).

The Learning Experience

The students testified that the learning methods were excellent, clever, and needed to be used more than regular methods. The students noted:

> For someone who wanted to enter the education system, the lesson contributed to me in various ways, it "broke down" the social boundary. I ended the meeting encouraged and with a sense of optimism (Tali).

> Because when a student arrives home, they don't always have the desire and the means to do their homework. Not every student has the necessary means such as Internet to enter a database that could contribute to their homework, or in general to get help from their parents to supplement the lessons. The rationale of homework is important and I understand it, but in my opinion, it is preferable that the student will just read the materials at home and when they arrive at the classroom, they can perform the lessons aided by the teacher's professional help and in this way, they can learn and acquire learning skills. Learning according to this method will develop the student's ability to learn and help them in the future if they want to study in a higher education institution (Yair).

The student-teachers related to the flexibility of the learning, taking responsibility, and learning with their peers. One student-teacher explained: "The freedom to learn in our spare time, really helped me and allowed me to study on non-routine days and hours and so I took responsibility for my learning" (Efrat). Another student-teacher added:

> We are practicing Zoom and learning new things as we go. Also, we are not just

> "marking a v" on the lecturer's assignments, rather we are sharing our insights while doing collaborative work. The course is not delivered to us only in the set hour once a week rather it sends us to learn from outside lectures and to absorb interesting knowledge and even to transmit it between us (Tom).

The student-teachers used the journal to share their learning experiences. One student-teacher noted:

> Using Zoom was a special experience, innovative, comfortable and accessible, but also alienating, cold and lacking a sense of belonging, connection and intimacy. The use of the Jigsaw technique, when we were divided into breakout rooms with small groups of students, created a sense of intimacy, closeness and cohesion between the group members. This was a refreshing and welcome change in the circumstances (Daniel).

Another student-teacher added:

> It was fun to work on the subject of education in this enjoyable and productive manner. The division into small rooms was the most successful in each lesson. It gave us an opportunity to speak with the others and to ask a few questions about their personal lives. It is difficult on Zoom to sense the atmosphere of a classroom and group cohesion and using the rooms I can speak with more people and feel connected (Tali).

While another student-teacher commented on the learning experience that constituted experiential modelling:

> The cooperation was immediate, it was very interesting that each participant really knew the information from the film they had seen and we noticed that although we had seen different films, they all had a common denominator. The flipped class approach was present in one way or another in each film at least conceptually, whether it was highlighted or declared or not. We discussed these revelations openly, even exchanged friendly words and got to know each other better. The use of the Jigsaw method is very good, effective, enjoyable and even produces intimacy in a small group and I would be happy to use it again (Ohad).

LOOKING FORWARD

The Future of the Education System

The student-teachers understood that the existing technology allowed for more flexibility and creativity, which if used well could help construct a new, modern education system that puts the learner at the center and serves as a platform for the learner's development and self-realization. In this context, the student-teachers noted:

> Our first taste of the possibilities offered by these practices was provided in the last lesson. Apart from the matter of their effectiveness, they allow unique expression to be given to each student (Gal).

> Technological aids help to improve the dynamics and the structured learning materials …[also] the need to learn independently is important and it is good to develop it at a young age, I don't think that it's a question of pleasure, sometimes its demanding to the same extent as its pleasant, if not more, but that is what is needed in the present achievement-oriented world today (Haim).

Some student-teachers clearly understood what they needed to do, as one student-teacher explained:

> The education system needs to rethink the goals of teaching and determining evaluation methods, and to focus especially on providing tools and skills for children to cope with a world rich in frequent rapid changes, some of them totally unexpected. I am very hopeful that the education system will be wise enough to incorporate the innovative digital potential with new goals that the system needs to aspire to, so that they can create an advanced learning environment, which is pleasant, dynamic, differential and provides today's children with the ability to cope and prepare for tomorrow (Shani).

Initiatives

Among the student-teachers, there were some who also suggested educational innovations. One student-teacher remarked:

> Since the first two lessons were synchronous

> and really enjoyable, I heard students were a little disappointed that from now on we would continue with asynchronous lessons. I thought that it would be possible to join up in small groups and to implement asynchronous lessons but without the lecturer but in a small group and to form a support system for students for whom it is important to be in a group to keep up-to-date. I would note that I do this with a friend and we enrich each other. Also, students contact me by telephone if they are not involved enough, and it's clear that they are in a bit of a panic because of their uncertainty when the support system that they expected doesn't exist. Personally, I don't have a problem learning independently (Ohad).

Future Implementation

The student-teachers understood the power of the method since it was interactive, collaborative, and activated all the members of the group. One student-teacher noted:

> I am sure that I will use this method in online learning, it's an excellent method to activate the whole class and create a dynamic lively lesson and to involve more students in the lesson (Guy).

A similar opinion was expressed by another student-teacher:

> I believe that if I succeed in partially integrating, at least at the beginning, the asynchronous learning processes in my teaching, many of my students will benefit from it. The stronger students' learning can progress faster and they can even enrich themselves, and students who have difficulties can receive a more significant part of the time (Tomer).

This process was perceived as a process of progress and regression, as explained by a student-teacher:

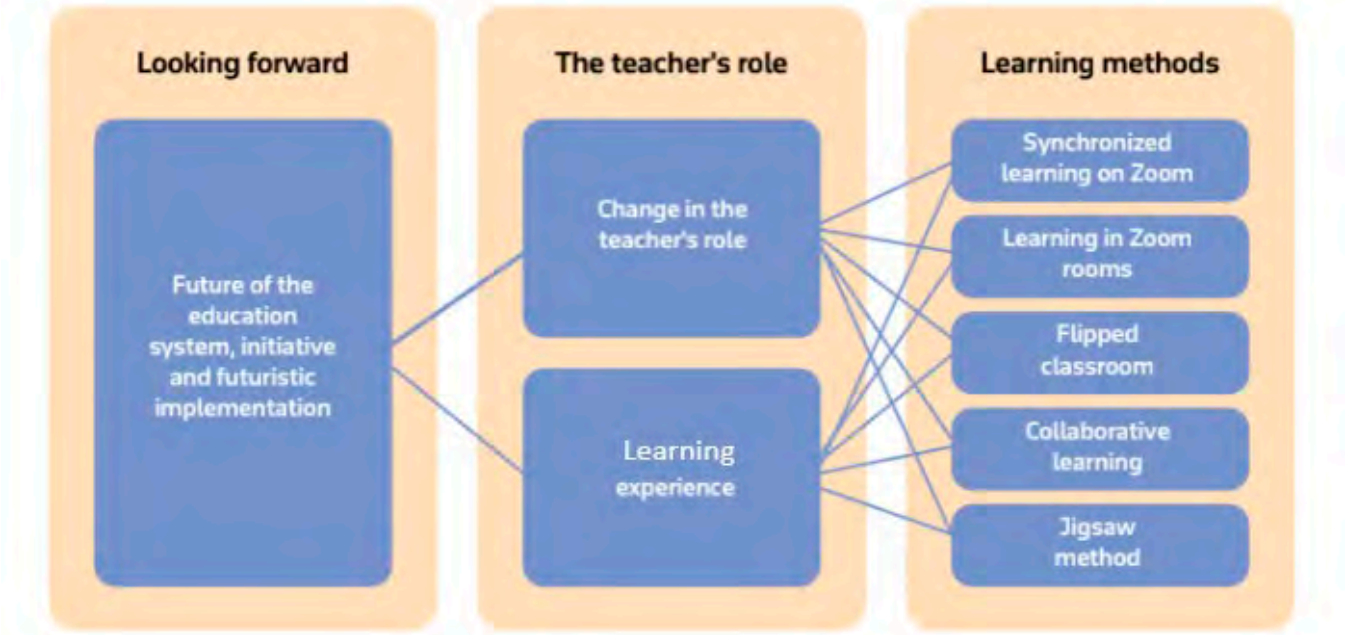
> Reflecting on myself from the outside, I identify progress–recognition, learning and implementation of new technologies, but at the same time–regression. Still despite all the new environment, pressure arises concerning its implementation. So, I think that learning the tools for advanced learning is more relevant today than ever, even if we soon return to frontal learning and put this period behind us (and if not), the progression that has happened with distance learning will remain, and we can exploit it in an optimal manner (Sapir).

DISCUSSION AND CONCLUSIONS

The different themes explained above are illustrated in Figure 3. In a model of this kind, the digital tools and environments contribute to the advancement of humanist aspects expressed in the "involvement" of all the student-teachers in a collaborative learning process and individual autonomous learning (Brown et al., 1989; Mâţă, 2013), "effectiveness," or exposure to expansive materials which are processed and helped by dialog with peers who point out different important viewpoints, "effective learning" (Xu & Shi, 2018), or a learning experience in a social atmosphere, and "reflection," both personal and collaborative following the use of the Jigsaw method. This model creates a synthesis between technological and collaboration tools with pedagogic aspects that promote an effective learning method using collaborative learning (Akçayır & Akçayır, 2018; Francl, 2014; Houston & Lin, 2012; Lai & Hwang, 2016).

The challenge in implementing the model described in Figure 3 was the need to interweave content aspects with pedagogic aspects that promote independent construction and learning, together with techno-pedagogic aspects that use the Zoom breakout rooms and technological environment available to the student-teachers. These enabled the student-teachers to advance their learning as students while also developing their ability to use such a model with their own students. Student-teachers reported that the collaborative elements of the presented assignments and activities were considered valuable, and this enhanced their engagement and involvement in the course. They also were able to construct their own knowledge as future educators and build some bricks of their role as teachers. The fact that the students themselves did their teaching practicum online accelerated their perception of the importance and applicability of the learning methods and processes applied. The feeling was that the course had allowed them to gain a collaborative online learning toolkit which

Figure 3 Themes Emerging from Analysis of Student-teachers' Reflective Journals



could influence the shaping of their own teaching methods and assist them throughout their journey as teachers.

Some students offered a respectful critique of flipped learning. In the group phase activity, students were expected to engage in productive interaction within multiple zones of proximal development, depending on multiple knowledge sources (e.g., Brown & Campione, 1996). With respect to all group participants, each student acquired expertise in one component of the learning activity. While each student was able to gain multiple perspectives regarding the topic being learned, the content was processed by others and there might be content knowledge that was missed or conveyed in a way that some students would miss that knowledge. As for the instructor, even though he could approach each of the groups in the breakout rooms, he still missed most of the discussions, the connectedness to the whole class at the same time and to the whole process but could mostly follow the online collaborative submissions of the different groups in the forum and get the final outcomes of each group.

As for the online activity, in a face-to-face setting, the group learning phase took place in the classroom. Each member of the group presented their part and became involved in the discussion while there were various discussions in the same space. The lecturer was able to sit next to each group in turns, listen and give their input or intervene when needed. In a synchronous meeting, each group had a private space. The lecturer could be called by a certain group or enter each room, one after the other. The lecturer could ask the groups to return to the plenary session when finished or end the breakout room sessions at a certain time. Another point is that due to the COVID-19 pandemic, most of the students experienced quarantine and felt that they were missing the experience of learning in a campus, getting to know their peers. In most of the courses, they felt that the opportunity of getting to know other students was restricted or rare. In this course, where they felt engaged during lessons and got to know other students and discuss with them, it gave them some kind of sense of "normality." As for the technical aspect, in a jigsaw activity, all the students were involved. It was quite easy to share each student's work in one screen, share text they prepared at home in the chat area, share the screen of the presentation they were creating, and have this additional space clearly viewed by all students.

The learning is practiced in an online learning space adapted for synchronous and asynchronous learning, while deepening the understanding of the studied contents. The main characteristic of

the constructivist learning theory is that it emphasizes the learner-oriented learning style (Felder, 2012; Jones & Brader-Araje, 2002), while the lecturer plays the role of the organizer, assistant, and instructor who undertakes the responsibility to promote the students' independent learning, help them to perform self-oriented learning, and foster their learning autonomy. The transition to fully online teaching and the demand to conduct only two online synchronous meetings set challenges for the careful planning of different lessons and necessitated the provision of value added to synchronized meetings which the student-teachers attended. The course described above took place at the end of the day. The students were usually rather tired. It was a challenge to listen to the student-teachers' reports on their learning experiences in preparation for the lessons, during the lessons in the rooms, and in groups with their peers. It was also challenging because the student-teachers mentioned that some of them saw the planning of the lessons as modelling for the lessons that they intended to plan and apply in practice with their own students. For the author, as a teacher-educator, these lessons and the student-teachers' reflective writings indicated that a lesson in which the student-teachers were active, innovative, and challenged was very valuable for the student-teachers and provided a good experience of online learning and teaching in the course. It enabled them to overcome their tiredness even on days full of learning, in lessons that took place at the end of the day, and provided rewards for their physical synchronous presence during the lesson.

As seen in this study, constructivist learning theory is quite important in a flipped classroom. It plays a vital role in promoting collaborative learning and self-directed learning. It also has profound influence in the future development and promotion of flipped classrooms by student-teachers both as learners and as future teachers. A follow-up study is recommended with a larger sample, with greater gender representation, and expansion of the study to additional teacher education colleges. The proposed observation can hopefully contribute to the learning design in the unique context of an online learning environment. An environment that fosters a humanistic educational and social-constructive view through cognitive, social, emotional and technological aspects that promote learning. Such an environment enhances the students' sense of belonging to the group, to the studied content and demonstrates methods that they can use to work with their own students, improving both their self-esteem and their self-efficacy.

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