BABEŞ-BOLYAI UNIVERSITY
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Personalized Learning enhances the Education system in the digital era compared to Traditional Online Learning

Doctoral student: Moshe FACLER

Supervisor: Prof. Dr. Liliana CIASCAI

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ABSTRACT

As part of the OECD, Israel uses 16 fundamental indicators to diagnose gaps in personal study for high school and higher education institutions. These indicators are used by the Ministry of Education in Israel educational system, including schools and universities. A psychologist or psychiatrist makes the diagnosis with the approval of the school and the national committee. The traditional learning framework, where a teacher instructs a class at a set time, has been used for over 150 years in Israel. This system is called "One Teacher-One Class," "One-size-fits-all," or even "Sit and get". However, the digital age allows for a more personalized learning experience. By getting to know the learner's personality, hobbies, interests, strengths, and weaknesses, a personalized learning path can be created to prepare them for the challenges of the 21st century.

This thesis analyses the REVODUCATE system, which uses the Personal Learning Profile to create a personalized learning path for students. This profile provides a holistic picture of the learner and helps them achieve their learning goals. It is a powerful tool in the personalized approach to learning, which deviates from the traditional diagnosis of external factors. The personalized system regulates basic learning parameters, such as extra time, reading, level of handwriting, and learning aids for those with difficulties. It also prioritizes students' wishes for a suitable learning environment tailored to Generation Z. Parents play an essential role in building the student's learning profile, as they know the student best. Using the personalized learning system as a central and critical component for student success also changes the role of the teacher. It defines a new type of responsibility for the learners and teachers simultaneously. Personalized learning is becoming increasingly important in the digital age, especially after the COVID-19 pandemic, being crucial for the future and the lifelong learning of students.

Keywords: personalized learning, blended learning, REVODUCATE system, personalized learning path, personalized learning path engine, digital competence, learner profile, learning style, traditional learning

CHAPTER 1. PERSONALIZED LEARNING

1.1 Theorizing, Defining, and Delimiting the concept of Personalized Learning (PL)

Personalized learning (PL) is a vital goal for educational systems and promotes quality education (UNESCO, 2017). Frontal teaching that is based on an inflexible curriculum, having the same learning format, does not challenge students and leaves them passive from the beginning to the end of the class, and often bored. The increased interest in the concept of personalized learning can be attributed to the fact that policymakers and educators have come to realize that a "one-size-fits-all" approach to education is inadequate and will not meet either individual or societal needs (O'donoghue, 2010, p. 212- 217). What has changed is technology, and it continues to evolve at a breakneck pace. Today, we find ourselves immediately following the accelerated use of digital tools around the world due to quarantines during the corona crisis. This manifested itself in all education systems at the local level of online and remote teaching attempting to meet the need that arose during the Corona pandemic. It was a unique situation and provided a tremendous opportunity for learners to continue learning and improve their learning in a different way than the traditional "one size fits all" or one teacher-one class method.

One of the most promising ways to implement this change and prepare today's students for tomorrow's reality (deep in the 21st century in the digital age) is the personalization of learning. Personalized learning is an educational approach according to which the student must be at the center of learning and teaching. This approach is tailored precisely to each student's current situation to challenge them in a way that suits them, to allow them to develop optimally, achieve the highest expertise in their field of study, and achieve their personal goals. In the personalized learning approach the student's profile, learning objectives, learning pace and strategies, learning methods, time and place of learning, and assessment methods are adapted to the student. Adapting the learning to the student is based on a continuous process of diagnosis, evaluation, and feedback, and on a personal learning plan built specifically for each student. Education is to bring out the potential a person has so that he/she can improve as a human being (UNESCO, 2017).

The key characteristics of learners, in the context of personalized education, are their differences - it would be ironic to treat students as if they were identical, interchangeable units (Garrick et al., 2017, p. 27-33). Deepening the definition of personalized learning involves distinguishing between personalization and similar concepts. Cognitive science and neuroscience remind us that personalized learning involves different types of learners and different strategies for storing and understanding information (UNESCO, 2017).

Personalized learning allows us to change the method, instruments, research, and teaching practice according to the differences between the students. The goal is to preserve any excellent ability of a students and improve what is challenging to strengthen it for the professional challenges that await with the skills of the 21st century. Personalized learning defined in this way includes learning that is said to recognize different styles and approaches in the design and delivery of learner interfaces, devices, and content (Garrick et al., 2017 p. 27-32).

Personalized teaching aims to promote the learner's abilities and skills in several areas, such as cognitive, social, and personal. SEL (Social Emotional Learning) is an educational-developmental process to promote social and emotional attitudes, knowledge, and skills as part of the complete package for every learner and according to his profile. SEL influences a learner's achievements and situation in personalized learning as part of the learning path. SEL helps students and teachers to develop resilience, meaning, and belonging, leading to success. It helps the individual understand and manage his feelings, set goals and achieve them, make responsible and caring decisions, cultivate sensitivity to others, and create positive social relationships. While we only deal with the pedagogical aspects of students and reference their ability profile, it is also essential to complete the process with the SEL aspects. SEL leads to stronger relationships, a sense of belonging, and a more supportive learning environment, setting the stage for academic learning (NEA, 2021). Personalized learning must address the student's profile to strengthen his learning and achievements.

One of the most common and false myths regarding personalization is that the teacher's role becomes less significant following the transition to personalized learning and technology will replace the teacher (given that in the future robots will be replacing some jobs). The actual situation is entirely different. The concept of personalized learning is to empower the teacher and allow him to reach his full potential as a professional, who knows his students in-depth

and accompanies, advises and guides them along the way to reaching their best achievements (Office of EdTech, 2017).

The teacher is their leader and serves as a mentor for learning and evaluation, being the one who directs learning in an individual manner, together with the student. He designs together with the student the learning environment and the personal learning program and adapts the methods of understanding and evaluation suitable for him, transfers responsibility to him in time and in the background, manages and reviews all the work processes of the students, produces feedback with great diligence according to the pace of progress of the students and in the background has an integration of all the adults involved (such as experts, students, student centers, study centers). The Baeva project, for example, focuses on students who work in groups or pairs with parents, teachers, external companies, the community. The teacher provides the student with professional guidance, support, and helps them grow and encourages them to take ownership of their learning (Pane et al., 2015).

CHAPTER 2. BLENDED LEARNING

2.1 Blended Learning. Theorizing, Defining, and Delimiting the concept

Governments around the globe are facing changes in society unprecedented in modern human history (Brynjolfsson, McAfee, & Spence, 2014; Christensen, Horn & Johnson, 2011; Fullan & Hargreaves, 2012; OECD, 2013; Lynch, 2012; Sahlberg, 2008). These changes have been marked by the mixed learning that occurred during the COVID period, when educational systems were forced to teach entirely online. After the pandemic ended, technology remained increasingly integrated into traditional educational systems, leading to improvements in blended learning education.

There are several definitions of blended learning. The Oxford Dictionary defines blended learning as an education in which students learn through electronic and online media as well as traditional face-to-face teaching. Blended learning is an educational approach that combines traditional face-to-face learning and online learning activities. It integrates in-person and digital learning methods to create a hybrid learning experience. In a blended learning environment, students typically have some control over their learning time, place, and pace. Blended learning often involves a mix of classroom-based teaching and technology-

mediated instruction. It can include various activities, such as in-person instruction, one-line learning platforms, virtual discussions and collaborations, self-pace learning, assessments and feedback. Online quizzes, tests, and assignments are often used to assess students.

The blended learning model aims to leverage the benefits of both traditional and digital learning methods. It offers increased flexibility, personalized learning experiences, access to a wider range of resources, and opportunities for interactive and collaborative learning. By combining the strengths of face-to-face instruction and online learning, blended learning seeks to enhance engagement, promote active learning, and accommodate different learning styles and preferences. How much face-to-face interaction and online learning is integrated in blended learning depends on the specific program or institution. The contributions of each type of learning can change according to classroom conditions, additional technological innovations, or initiatives on the part of the management, teacher and even students

The most common type of blended learning is the "Flipped classroom". We have already seen this approach enhance the delivery of a presentation in front of an audience. The students must work independently in this model, turning the home into an additional learning environment. This format is essential, especially considering the socioeconomic status of the student's family. Today, mobile personal devices have become a portable and convenient learning environment besides desktops together with mobile computers. In this scenario, the teacher's involvement in ensuring the students' readiness and learning process is crucial. This learning approach saves time by avoiding frontal teaching and allows teachers to engage in differential learning, considering each student's varying progress and levels. This way, teachers can focus more on each student's characteristics, background, and environment, providing additional and challenging learning opportunities for advanced students. The mobile personal device is already becoming a portable and convenient learning environment in addition to the desktop computers and notebooks. In this situation, the teacher's involvement in ensuring the students' readiness and learning process is critical.

Pedagogical knowledge interacts in several ways with technological and pedagogical content knowledge, all of which are integrated within the TPACK framework. This framework, known as the Technological Pedagogical Content Knowledge model, is a theoretical model used in education for understanding and describing the complex interactions between technology, pedagogy, and content knowledge. The Model helps teachers understand the

complex interplay between technology, pedagogy, and content. It encourages them to find the best ways to integrate technology meaningfully into their teaching practices to enhance student learning experiences. It recognizes that technology is not a separate entity but a tool that can enhance and transform teaching and learning when used with effective pedagogy and subject matter expertise. TPACK complements blended learning to enhance teaching and learning experiences for students. The TPACK framework and specific technological tools (hardware, software, applications, associated information literacy practices, etc.) are best used to instruct and guide students toward a better, more robust understanding of the subject matter (tpack.com, 2014).

Technological Knowledge (TK) in the TPACK model refers to teachers' understanding and expertise in using various digital technologies effectively. It is one of the three primary knowledge domains in the TPACK framework, along with Pedagogical Knowledge (PK) and Content Knowledge (CK). The other dimensions of TPACK involve understanding how the subject matter can be fused through different technological offerings and considering which technological tools would best suit subjects or classrooms (Technology Content Knowledge - TCK). They also describe teachers' understanding of how specific technologies can change both teaching and learning experiences (Technology Pedagogical Knowledge - TPK). Also, for teachers' knowledge of how certain technologies can transform teaching and learning experiences, students' technological skills must also be considered.

CHAPTER 3. APPLICATIONS AND REVODUCATE PERSONALIZED LEARNING EDUCATIONAL SYSTEM

3.1 Platform presentation

Today, with the help of technology, the variety of content and the early discovery of the personal profile of a student, it is possible to adopt a flexible, personalized, enjoyable and encouraging learning process for each student. Such an individualized learning process can be ensured through the REVODUCATE system. This system uses the Personal Learning Profile to ensure a personalized learning process for each student. The REVODUCATE has existed for four years in several schools in Israel in technological disciplines from the STEM domain (Science, Technology, Engineering, Mathematics). The system currently operates only in Hebrew, but aims to be marketed outside of Israel, in accordance with the needs and

agreements of foreign educational authorities. The system was officially approved in the Gefen system, an initiative adopted by the Ministry of Education for elementary, upper elementary, and high school levels, and empowers school principals to select educational services that address the needs of their schools. The system can be used by educational institutions because it operates in accordance with the terms of privacy standards, including student data (especially when it comes to personalized learning), diagnostics, pedagogical sources of information, cyber issues and security of technological information.

LMS and PLS approaches are combined in the REVODUCATE system, which integrates the strengths of both personalized learning systems and learning management systems, together shaping the new role of students and teachers for the digital age. Students work with the REVODUCATE system in the classroom (after being registered in the system) via an iPad, laptop, mobile phone, or desktop. This year will be the trial year for taking national tests at the end of the school year, based on portable equipment.

The system can be accessed online through Google or another browser by clicking on REVODUCATE. The system will be at the top of the list in the browser. The login into the system is accompanied by the mandatory filling of a personal questionnaire for the student's profile to get to know him. The questionnaire includes 15 parameters and examines the student's personality and abilities. Students fill in the questionnaire with their parents. The questionnaire is designed to be carried out with the parents, who also have a preparatory conversation to understand the meaning of filling out the data and its effect on the student's route, to provide a complete and not fragmented or missing answer about the student's past.

The second part of the questionnaire includes a section to identify the learning style that suits the student. The learning style in the questionnaire framework determines the learning tendency of the student, which will also be tested while moving along his learning path, despite his declaration at registration. In the research literature, we can find several studies concerning the diagnosis and the character of the learning styles in students (Kolb, 1984; Kolb, 1985; Dunn, 1990; Felder, 1996). The accepted assumption among educators is that the teaching style that matches the student's learning style improves learning efficiency. Studies from recent years do not support the popular opinion that adjusting the student's learning style does lead to higher achievements (Pashler et al., 2009; Rogowsky, 2015).

The learner registers upon entering the system to fill out their entire profile. They will receive their personalized learning journey to learn the subject they need to, which suits them best. In a Personalized Learning Environment, the learner becomes a self-directed, expert learner who monitors his/her progress and reflects on learning based on the mastery of the content. The system was approved a year ago to work within the GEFEN formal system of the Ministry of Education in Israel. According to Government Resolution 226 of August 1, 2021, on the "Program for Administrative Flexibility in the Education System," school principals' and local authorities' administrative and pedagogical flexibility was significantly expanded. Direct management can transfer significant resources. The GEFEN system allows for the formulation of a schoolwork plan, management, budget planning, user-friendly acquisition of adapted educational tools and implementation reporting.

3.2 The model adopted for the system

When all the learning data enter in the REVODUCATE system, the engine will create a flexible and personalized learning path according to the student's priorities and competences. The uniqueness is represented by the engine that generates a personal learning journey.

3.2.1 **Student profile**:

The student profile includes fifteen parameters that determine the personality and abilities of the student upon entering the system. With an annual update and periodic updates throughout the year, the student's whole data updates according to his performance, achievements, hobbies, personal limitations, accessibility or any other diagnosis, and his condition. All this will affect the creation of the student's learning path or group of students in the system. The fifteen parameters are:

1. Personalized diagnosis and recognized disabilities: The adjustments are intended to allow students with special needs to have an equal opportunity to achieve their abilities, given the specific adjustments to the baccalaureate exams. Diagnoses are performed by qualified psychiatrists or psychologists and involve reading the answers from the tape, ignoring spelling mistakes, taking oral exams, administering the exam by a neutral teacher, extending the exam time (25%), reading a questionnaire, adapted language, using an English dictionary, expanding the questionnaire, accompanying the questionnaire or extending the sheet to people accompanying the questionnaire or dictating to neutral people with mathematical formulas.

2. Student basic general information: Family status, working and supporting his family and himself after school and any additional constraints that will make learning difficult.
3. Professions the learner would like to know more about: new areas, even complex ones that student did not deal with but always interested him, that he learned about on the net, and that involve innovation.
4. Performance results from previous years (learner own SWOT): from the same school or previous schools, the learner's strengths, weaknesses, opportunities, threats inner or outer cycles.
5. Activity with responsibility at home: Learning topics for which the student is responsible for his performance and family responsibilities, such as cooking, cleaning, planning family trips, and scheduling movies and concerts.
6. Fields of Interests: The fields the student is interested in overtime and along the years. It does not matter if he engages in them physically, for example, in a specific sports field, scientific field, interest with parents like specific music, or a field he deals with his friends or on the net.
7. Accessible limitations: Physical and online or digital limitations include lack of text in front of images, inadequate contrast in written text or visual content, keyboard accessibility, viewing and hearing, and reading content.
8. Preferred learning style: identifying student's learning style allows to get the right resources for his preferences. This style can change due to the students' achievements and results in the learner's learning path (visual, auditory, kinesthetic). The questionnaire results are used to diagnose the student's learning style and offer him the resources needed (Rogowsky, 2015; Pashleret et al., 2008).
9. Hobbies: The identification of the hobbies the student engages in, either in person or online only, for the latest information and updates. Such information will lead to motivation and learning experience in the self-study course process.
10. Enrichment classes: Classes, individually or in groups, in which he will continue to invest his free time.
11. Contribution to the community: Activities in which the student engages for the benefit of the community by volunteering or paying for its improvement, such as an older adults' home, an ambulance team, elderly in need, a youth movement, and helping families in need.

12. Ambitions and aspirations: Identifying the student's short- and long-term ambitions is needed.
13. Countries or places that they would like to visit and why: Countries the student would like to visit, physically or virtually. They are adding why they are interested in that country or place (for example, a country with many earthquakes).
14. Inspirational figure and why: From the fields of science, media, movies, sport, and more. In addition, the figure's greatest accomplishment and why the student chose this particular figure.
15. Family activities the learner does together with his family: the activities the learner does as a group with his family, like tours, sports, museums, theater, trips.
The presented parameters are critical for designing the student's learning path in the classroom at the start. The parameter data is constantly updated according to a recurring annual or biannual questionnaire. In the 10th grade, this is done together with the learner's parents, and in the 11th-12th grades completely independently after learning the characteristics of the tool engine for creating the learning path, its purpose, and its effect.

3.2.2 **System resources**:

In the technological era, digital resources have been integrated into the education system, transforming how information is accessed, shared, and learned. Digital resources encompass a wide range of electronic materials that can be used for educational purposes. The types of digital resources that can be used for educational purposes are e-books and digital textbooks, online courses and learning platforms, educational apps, multimedia resources, open educational resources (OER), virtual and augmented reality (VR/AR) and games.
The sources in the REVODUCATE system include academic ones as part of the curriculum, a spectacular and updated database of combined materials for a unit of study. These include areas of interest based on the student's profile and aim to create the personal learning path of a student or group of students, through the PLPE engine.

3.3 The Personalized Learning Path Engine (PLPE)

The student's personalized learning path is created by the PLPE (Personalized Learning Path Engine), which uses the database of digital information sources listed above and the student's profile data, updated from time to time. The goal is to improve the students' path to meet their

learning goals set at the beginning of the year, along with improvements and updates to the milestones. The data from the student profile engine is saved and used as a source for the learning path in the following year, which changes each year considering changes in subjects and curriculum. A number marks each content resource of information according to the database (profession number, type of database, number of the database among the types, utilities, auxiliary or leading database, enrichment database, worn-out database).

After students complete the personal profile according to all parameters, a refinement takes place regarding the students' personal profile, to include all their intentions and knowledge gaps. The teacher, the class educator, and the educational consultant perform this.

According to the engine's recommendation for the personalized learning path, the educational team approves the personal path with final adjustments in each study unit. Suppose the subject includes placement by pairs or groups. In that case, the students are placed into groups with a recommendation for different routes, different from what exists in the classroom.

CHAPTER 4.1 ISRAELI PRE-UNIVERSITY TEACHERS' DIGITAL COMPETENCE AND WELLBEING

4.1 Introduction

The COVID-19 pandemic has greatly intensified interest in teachers' digital competencies, which were already gaining attention due to the growing digitization of modern society (González et al., 2023). Moreover, this interest is highlighted by the fact that digital learning offers numerous advantages that enhance educational experience for various subjects and educational levels. One of the most highlighted advantages mentioned by specialty literature is personalized and self-paced learning, as digital learning allows students to learn according to their learning styles and needs. Interestingly, the teachers from Israel who participated in the study employed traditional and personalized learning methods while using a uniform questionnaire to provide a complete picture of Israel and the frameworks examined. The widespread use of computers, smartphones, and the internet for communication, information access, and entertainment was already becoming common before the COVID-19 pandemic. Basic digital literacy skills included email, browsing the web, and navigating social media platforms. Digital competence has become critical for participating in higher education and the modern workforce. Proficiency in using word processing software, spreadsheets, and presentation tools is now considered crucial for students and employees alike.

Many individuals rely on social media platforms for personal and professional networking, sharing updates, and staying connected with friends and family. People also engage in digital creativity, creating and sharing videos, photos, and blog content. From a well-being point of view, maintaining a balance between online and offline activities is crucial. People recognize the need to disconnect from screens to engage in physical activities and face-to-face interactions. With the rise of online transactions and data sharing, individuals have become more aware of protecting their personal information and guarding against cyber threats. Digital platforms allow individuals to connect with like-minded individuals globally, forming communities based on shared interests.

4.3 Research Questions

The present research study aims to answer the following questions:

1. What is the Israeli pre-university teachers' level of digital competence?

2. What is the overall mental wellbeing level of Israeli teachers?
3. Is there a significant relationship between digital competence and mental wellbeing?
4. Which specific attributes of mental wellbeing are most strongly associated with digital competence?

4.5 Research Methods

4.5.1 Participants and sampling method

The study sample was composed of 152 pre-university teachers from Israel, comprising 52 (34.2%) males and 100 (65.8%) females. The teachers who are part of the Amal High School Network and Ort High School Network in Israel specialize in technological education, business entrepreneurship, and professions based on the high school curriculum of the Ministry of Education.

The sampling is a convenience one, with participants recruited from public Israeli schools. After receiving prior consent, teachers were asked to volunteer to answer an online survey in the last month of the current school year.

4.5.2 Instruments

The measurement tools that were selected have robust psychometric characteristics. In what concerns wellbeing assessment, "The Warwick-Edinburgh Mental Wellbeing Scale" (WEMWBS) was chosen as this instrument has been elaborated to measure mental wellbeing in the general population and evaluate programs aimed at improving it. The WEMWBS comprises 14 items with 5 response options, which are summed to produce a score that captures various aspects of mental wellbeing. The scale's positive framing and inclusion of emotional and functional dimensions facilitate understanding of this construct (Tennant et al., 2007). This scale has been employed globally to monitor and assess programs and analyze mental wellbeing indicators. It has been validated for use across a wide range of geographical regions, cultural contexts, various settings, and educational institutions (Stewart-Brown et al., 2011).

The survey tool selected to measure digital competence is the DigCompEdu questionnaire, which was developed based on the European Commission's framework for the Digital Competence of Educators. This instrument comprises 22 statements that assess various aspects of teachers' digital technology practice, categorized into 6 distinct areas: professional

engagement, digital resources, teaching and learning, assessment, and empowering learners (Punie & Redecker, 2017).

4.6 Findings

4.6.1 Demographic characteristics of teachers

The analysis of the demographic data reveals the sample of the study consists of predominantly female teachers (65.8%), which aligns with global trends in K-12 education, where teaching remains a female-dominated profession. Most of the participants work in urban schools (83.6%), suggesting greater representation from more technologically connected environments. In what concerns the age ranges of the participants, the distribution is balanced, though it skews slightly towards educators that are at the middle point of their careers as 28.3% are aged 30-39 and 44.7% are aged 40-49. Another characteristic of the sample is the fact that 94.7% of participants hold temporary positions.

Israeli teachers' digital competence and wellbeing

Most teachers report being comfortable with using technology in their instructional practice: 65.8% feel fairly comfortable, and 21.1% feel very comfortable. Only a small minority (13.1%) express discomfort. This suggests a high level of confidence among Israeli educators in terms of integrating digital tools into their pedagogy.

More than half the participants (58.6%) report using technology in the classroom for at least 10 years, with the largest group (38.2%) belonging to the 10-14 years range. This long-lasting technology usage suggests that digital integration is not a recent development but rather an established teaching practice.

The overall mental wellbeing level of the sample, measured using the WEMWBS, has a mean score of 52.56 (SD = 6.87). Given that the WEMWBS score range is 14–70, this result indicates a moderate to high level of subjective wellbeing of the participants. Table 4.1.1 presents the correlations between teachers' digital competence and various attributes of mental wellbeing.

Table 4.1.1

The relationship between digital competence and the wellbeing attributes

	DC	O	U	R	IP	LE	DWP	CT	GOS	CO	CF	MOM	PL	IT	C
DC	1														

O	.365	1													
U	.512	.514	1												
R	.449	.382	.477	1											
IP	.288	.279	.415	.298	1										
LE	.284	.270	.364	.313	.368	1									
DWP	.414	.308	.360	.251	.285	.341	1								
CT	.356	.406	.362	.365	.338	.264	.596	1							
GOS	.322	.371	.346	.290	.211	.262	.387	.447	1						
CO	.397	.328	.439	.354	.399	.340	.399	.355	.460	1					
CF	.450	.406	.497	.308	.285	.308	.493	.444	.466	.599	1				
MOM	.423	.406	.461	.370	.256	.298	.399	.426	.478	.396	.557	1			
PL	.347	.390	.460	.427	.369	.496	.458	.493	.401	.438	.464	.524	1		
IT	.425	.306	.414	.344	.297	.393	.515	.388	.332	.374	.340	.364	.576	1	
C	.282	.346	.340	.302	.346	.440	.393	.464	.389	.482	.459	.266	.551	.493	1

**Correlation is significant at the 0.01 level (2-tailed).

Among the strongest relationships observed are the Usefulness (U) (r = .512) and Relaxation (R) (r = .449), suggesting that teachers who feel more competent also tend to feel more useful and at ease in their daily lives. The Clarity of Thinking (CT) (r = .356) and Dealing Well with Problems (DWP) (r = .414) attributes also show robust correlations. These findings imply that digital competence is associated with stronger problem-solving and cognitive processing abilities.

In what concerns attributes that reflect personal agency and openness to experience, Confidence in the Future (CF) (r = .450), Making One's Own Mind (MOM) (r = .423), and Interest in New Things (r = .425), results also show high levels of association. Moreover, the correlation with the Closeness to Others (CO) (r = .397) and Feeling Loved (PL) (r = .347) attributes reflect the interpersonal benefits of digital proficiency as teachers who navigate digital tools more comfortably may feel better connected to colleagues, students, and communities, especially in hybrid or online settings.

The study's findings also show moderate significant correlations, which are observed with Optimism (O) (r = .365), Level of Energy (LE) (r = .284), Feeling Good About Oneself (GOS) (r = .322), and Cheerfulness (C) (r = .282). These attributes compose the portrait of a teacher who by being more digitally capable, is more positive, energized, and emotionally self-regulated.

7. Conclusion

The present study highlights the positive relationship between digital competence and mental wellbeing among Israeli pre-university educators. The findings indicate that teachers who feel more capable and confident in the use of digital tools tend to report higher levels of

psychological wellbeing in multiple dimensions, including clarity of thinking, optimism, relaxation, dealing well with problems, and interpersonal connectedness, feeling more close to others and more useful. These results reinforce the view that digital competence is not just a technical skill set but a multidimensional resource that supports educators' cognitive clarity and emotional resilience in a challenging and rapidly evolving educational context.

The findings of this study have important practical implications, particularly in the context of teacher training and life-long professional development. By demonstrating a significant positive correlation between digital competence and various aspects of teachers' mental wellbeing, the study underlines the need to view digital skills not only as technology specific proficiency, but also as contributors to psychological resilience and professional satisfaction. These insights suggest that enhancing educators' digital competence can serve as a strategic pathway for promoting wellbeing in the education sector. Consequently, the study may serve as a starting point for the development of training programs that integrate both digital skills development and wellbeing support, empowering teachers to face the technological job demands while maintaining their mental and emotional health in increasingly digital learning environments.

CHAPTER 4.2 PERSONALIZED LEARNING, DIGITAL TOOLS-BASED LEARNING, AND THE TRADITIONAL METHOD IN THE CHALLENGING DIGITAL ERA

4.2.1 Introduction

Attempts have been made to improve the education system, especially with the advent of the digital age since the 1990s. Digital learning and digital skills, especially in the education system, have been continuously updated over the years, considering the digital competence existing in the civilian sector, directly or indirectly. The competencies that school leaders must achieve and demonstrate are also continually updated (Barbara & McClaskey, 2016). Moreover, technology is advancing the idea of "personalization" everywhere (Timothy et al., 2018, p. 37). In Israel, which is surrounded by a hostile environment, the perception has been adopted that students must be prepared for an emergency, in which rockets can attack Israel. They will be forced to study from home continuously, without coming to school. This

process is carried out several times a year, usually with only self-study for a short period as a feasibility study. Every school is choosing digital tools to complete assignments without regularly studying remotely for several days or more. The COVID learning process in Israel and around the world has also accelerated this process, with increased use of digital tools and learning management systems (LMS) as a platform for digital content, learning, and assignments, both remotely and in the classroom, as studies have become integrated, both remotely and physically in the classroom.

Today we can still see three concepts of learning: individuation, differentiation, and personalization. Personalization encompasses differentiation and individualization (UNESCO, 2016, pp. 43-48). Technology was already available, but the education system had to catch up. This led to an acceleration of the integration of technology in schools and improvements in infrastructure and end products. In the past, personalized learning referred to different classroom arrangements, personal attitudes, and diverse approaches for students diagnosed at multiple levels and in small classes.

4.2.2. Research questions

The present study aimed to answer the following questions:

1. What is the level of teachers' proficiency and experience with educational technology in Israel?
2. Does personalized learning improve student learning outcomes compared to traditional learning in the digital era of Israeli high school education?
3. What are the differences, according to Israeli students, between traditional and personalized learning, especially in terms of individualization and differentiation?

4.3.2 Methodology

Participants

A group of 152 teachers from Israel responded to the survey in this stage to evaluate the effectiveness of the REVODUCATE system for personalized learning compared to traditional learning approaches. The efficacy of the personalized learning has been tested using two groups of students. One group consisted of 71 students who worked with the REVODUCATE system in a personalized model, and another group of 78 students who used the online digital system of Google Classroom.

Research instruments

The research design followed both a quantitative and a qualitative approach, and it was structured in two stages that were developed online. In the first stage, teachers were evaluated regarding demographic data. Also, the DigCompEdu questionnaire was applied. This instrument was created according to the European Commission's Framework for digital competence of the educator, and it has 22 items assessing the teachers' use of digital technology in educational and school activities (Facler & Ciascai, 2022; Dixon, 2019; Punie & Redecker, 2017).

The effectiveness of the REVODUCATE system was assessed through a questionnaire divided into five sections: Part A - Student profile, which had 11 subsections; part B - Questions related to the learning management system; part C - Learning format in the system; part D - Activity with the teacher and feedback, part E - Open-ended questions, which asked for feedback on the system's effectiveness, suggestions for improvement, and overall enjoyment level.

During the study, an online interview was also conducted to collect qualitative data. The interview guide proved to be a valuable tool in conducting interviews with the teachers. It was structured around several thematic units, including digital learning facilities, learning outcomes through digital learning, and the effectiveness of digital learning compared to traditional learning.

4.2.4 Results

The analysis of the results was performed using SPSS software for statistical analysis for the quantitative data and thematic analysis of the qualitative data collected in the interviews.

The Israeli teachers' sample consists of 52 (34.2%) males and 100 (65.8%) females. Most of the participants' ages ranged from 40 to 49. Namely, over 90% of participants of the Israeli teachers have a permanent job position status.

Regarding teachers' digital competence, in this section, the focus will be on Israeli teachers and the use of technology, following two aspects:

a. Israeli teachers were asked to rate their comfort level when using technology in educational activities. Teachers were given a four-point Likert scale, ranging from "very uncomfortable" to "very comfortable." The results showed that most Israeli teachers had a positive attitude toward using technology. A whopping 65.8% of teachers said they felt

relatively comfortable using technology in their classrooms, while 21.1% said they were "very comfortable" with using technology.

b. Israeli teachers have been incorporating technology into their classrooms for several years. According to a recent study, 38.2% of Israeli teachers use educational digital technology for 10 to 14-year-olds, followed by 15.1% who use technology for 15 to 19-year-olds.

Digital Learning Tools – Teachers Point of View

Data from the interviews with the teachers was collected using an analytical framework based on several themes of discussion, which are summarized in table 4.2.1. Data analysis resulted in the identification of 6 codes, grouped into 3 themes relevant to the present research:

Table 4.2.1

Thematic analysis summary

Theme	Codes	Excerpt samples
Digital learning facilities	1. Students' involvement 2. Diversified content	"Children are more active and connected to learning" "The digital tools resulted in a diversity of the lesson"
Learning outcomes	3. Better understanding 4. Increased cognitive abilities	"Made students better understand the material" "All abilities are improved and intensified with learning technologies…out-of-the-box thinking, imagination, logical thinking, planning pleasure, and enthusiasm of students from the digital learning tools"
Virtual learning vs traditional learning	5. Personalized learning 6. Students'satisfaction	"Learning at an individual pace" "A student sends me a digital product and immediately asks to know my opinion. In the old method, this did not happen at all, while the student was waiting for the result of the work" Pleasure and enthusiasm of students from the digital learning tools".

Respondents highlighted several key elements that shape the environment and dynamics of relationships during the teaching-learning process using digital tools. They found that learning with digital tools is conducive to a student-centred approach, as it provides opportunities to provide individual feedback to each student on demand. Students' attitudes towards learning activities are defined by engagement and enthusiasm. The interviews also revealed several facilities that allow students to develop their cognitive skills and better understand the subject

matter. Unlike traditional learning, digital learning tools offer diversified classroom activities that lead to better learning outcomes and help students develop through engagement.

Personalized Learning – Demographic Data for the Group Samples

Two groups have been created to study the personalization process in learning. The first was the treatment group, which consisted of 71 students. The second was the control group, which numbered 78 students. The total number of students who participated in the study was 149. The treatment group (T) consists of 71 students. Most (50 - 70.4%) are males, and 21 students (28.4%) are females. The control group (C) consists of 78 high school students. Most (54 - 69.23%) are males, and 24 students (30.77%) are females. All the students are from High school (K-10 - K-12). The survey was conducted in 8 classes: 4 classes in the learning group using personalized learning (71 students) and four classes in the control group (78 students). Gender differences for our variables of interest were tested using the T-test and the results are illustrated in table 4.2.2.

Table 4.2.2

Israeli students' differences according to gender

	Gender	N	Mean	Std. Deviation	Std. Error Mean	t	Sig.
Material variability	Female	45	3.244	1.048	.156	-1.569	.119
	Male	104	3.538	1.053	.103		
Additional material variability	Female	45	3.156	.825	.122	.064	.949
	Male	104	3.144	1.061	.104		
Studies motivation supported	Female	45	3.156	1.025	.152	.282	.778
	Male	104	3.106	.976	.095		
Teamwork supported	Female	45	3.200	1.054	.157	-.413	.680
	Male	104	3.279	1.074	.105		
Skills improved	Female	45	3.378	.983	.146	.126	.900
	Male	104	3.356	.974	.095		
Enjoy learning	Female	45	3.422	.988	.147	.047	.963
	Male	104	3.413	1.066	.104		
Frequent teacher help needed	Female	45	3.333	1.261	.188	.332	.741
	Male	104	3.260	1.238	.121		
Learning promoted	Female	45	3.244	.802	.119	-1.350	.179
	Male	104	3.433	.772	.075		
Structured feedback	Female	45	3.089	1.018	.151	-.283	.778
	Male	104	3.144	1.127	.110		
Achievements improve compared to other methods	Female	45	3.244	1.069	.159	-.634	.527
	Male	104	3.356	.944	.092		
Motivation level	Female	45	3.222	.901	.134	-.399	.690

	Male	104	3.288	.941	.092		
Future direction involvement	Female	45	2.778	1.020	.152	-.147	.883
	Male	104	2.808	1.183	.116		
Studies path clear	Female	45	3.422	.988	.147	.150	.881
	Male	104	3.394	1.065	.104		
Status clear	Female	45	3.467	1.159	.172	-.164	.870
	Male	104	3.500	1.132	.111		
Teacher reaches all students	Female	45	3.244	1.0259	.1529	-2.015	.046
	Male	104	3.625	1.0720	.1051		
Feedback from teacher received	Female	45	3.422	1.0551	.1573	1.598	.112
	Male	104	3.144	.9391	.0921		
Feedback helpful	Female	45	3.333	.9045	.1348	1.150	.252
	Male	104	3.144	.9287	.0911		
Parents usefully involved	Female	45	1.867	.9909	.1477	.233	.816
	Male	104	1.827	.9393	.0921		

Our variables seem to be equally distributed between males and females, with no significant differences identified, except for the variable "teacher reaches all the pupils, for which small significant differences seem to exist between males and females (t = -2.015, p = 0,046).

We further tested differences for our variables of interest according to the type of group that students worked in: REVODUCATE and other system group. The other five variables are presented in the following tables for treatment and control groups, female and male respondents. In all of them, the personalization platform seems to be significantly better according to the learning criteria included in the study. T-tests confirm these outcomes for all the variables but structured feedback. The results are presented in table 4.2.3.

Table 4.2.3

Systems effectiveness according to the learning criteria included in the study

	Personalized system (71 students)		**Other system (78 students)**			
	Mean	**Std. Deviation**	**Mean**	**Std. Deviation**	**t**	**Sig.**
Learning promoted	**3.662**	0.7736	3.115	0.7021	-4.501	**p <0.05***
Structured feedback	3.127	1.3194	3.154	0.8690	.146	p>0.05
Better results	**3.563**	1.0919	3.103	0.8153	-2.896	**P<0.05***
Motivation level	**3.563**	0.9962	3.000	0.7729	-3.830	**P<0.05***
Future direction involvement	**3.141**	1.0596	2.500	1.0596	-3.570	**P<0.05***

Significant differences have been identified between the REVODUCATE system and traditional system for the following variables: learning promoted (t = -4.501, p < 0.05);

achievements improve compared to other methods ($t = -2.896$, $p < 0.05$); motivation level ($t = -3.830$, $p < 0.05$) and future direction involvement ($t = -3.570$, $p < 0.05$)

Insignificant differences were found regarding the structured feedback variable, which seems to be the same between our two groups.

We conducted the independent t-test analysis for the variables included in the D section of the questionnaire, which assesses "activity with the teacher and the feedback received". The results are presented in Table 4.2.4 below.

Table 4.2.4

Systems effectiveness according to the activity with teachers and teachers' feedback

Subject	Personalized system (71 students)		Other system (78 students)		t	Sig.
	Mean	Std. Deviation	Mean	Std. Deviation		
Studies path clear	**3.986**	0.8017	2.897	0.9479	7.540	.000
Status clear	**4.028**	1.0687	3.026	0.9932	5.829	.000
Teacher reaches all the pupils	**4.014**	0.9334	3.051	0.9790	6.202	.000
Feedback from teacher received	3.254	1.0918	3.205	0.8733	.316	.752
Feedback helpful	**3.394**	1.0886	3.026	0.7020	2.444	.016
Parents usefully involved	**2.113**	0.9935	1.603	0.8427	3.376	.001

The parents' involvement is low for all the students but still higher for the students working in the REVODUCATE system. T-tests for independent samples demonstrate significant differences for all the variables, except for the variable that assesses the feedback received from teachers, which does not seem to differ between the REVODUCATE group and the other system group.

4.2.5 Conclusions and discussions

It is essential to understand that everyone's brain is unique. While some of these differences occur naturally, most skills can be improved through practice (as opposed to the quality of intelligence). Shockingly, UNESCO estimates that by 2030, we will need 69 million teachers to keep up with the demand for education. In today's digital age, one-size-fits-all approaches are no longer practical. According to the findings of this study, personalized learning is a significant advantage of using an information system in the digital age. A concept that began

long ago, even before the digital age, is being reinforced in the form of tools that can be managed together with students so they can begin to take responsibility for their learning based on their profile (Bray & McClaskey, 2016). We are all uniquely individual, in the same way that our fingerprints are unique (Diamandis & Kotler, 2020).

The results show that students who used the REVODUCATE system, which considers the personal profile of the learner, showed a significant advantage and improvement in the learning process. The system offers a range of digital products, including presentations, podcasts, videos, simulators and games, which are personalized according to the needs and preferences of the learner. This is particularly important in the digital age and especially during periods in which teaching and learning cannot occur in a physical environment. However, some areas for improvement were identified. First, teachers should provide feedback to students through a variety of digital tools in addition to face-to-face interaction. Second, parents also play a vital role in the learning process and should be involved in their child's individual educational journey. It is recommended to involve parents from the beginning of the process and recognize their contributions. Parents can provide encouragement to their child, which can motivate them to progress in their learning. In conclusion, the learning process between adults and children is required to be reciprocal. Children must be given opportunities to lead and succeed (Svitak, 2010).

We are now very aware of how our profile is being built in every domain: Netflix, Facebook, purchases on Amazon sites, and soon our personalities will also be integrated into virtual reality. Every technology that currently has an impact on entertainment does double duty in education. We will see in the shortest possible time that one-size-fits-all does not fit for generation Z and not for the Alphas who will already enter the virtual environment (Rickabaugh, 2016; Zmuda et al., 2015).

CHAPTER 4.3 THE PERSONAL LEARNER PROFILE AS THE KEY COMPONENT FOR SHAPING A PERSONALIZED LEARNING JOURNEY, IN A LEARNING MANAGEMENT SYSTEM IN THE DIGITAL ERA

4.3.1 INTRODUCTION

Using a learner profile as a part of personalized learning can have a dramatic benefit and influence, such as improving achievement, by focusing on the individual needs and abilities and can help the learner make more progress in his personal journey. Greater engagement and motivation are one of the most important issues. When learners feel that their learning is tailored to their specific needs and interests, they may be more motivated and engaged in their learning. It is not only the results but the way you achieve them. By using a learner profile to create a personalized learning path, educators can more effectively use their time and resources to support the learner and to reach each necessary one.

The student profile makes it possible to get the full picture of the student from every aspect, and not only his specific learning abilities but with defined direction to continue in the areas of interest that will inspire and motivate learning if combined. If we assume that a student will learn a subject as part of his learning path, and we integrate his interests according to a pre-planned schedule or activity in which she/he likes to engage for a long time, this combination can result in increased motivation and higher achievement rate, compared to a daily schedule consisting of studying at school and after school engaging in other activities.

In this study the researcher addressed students two open-ended questions about their profile and learning, using the REVODUCATE system compared to traditional learning with a digital learning tool such as the Google-classroom platform:

1. Do the learners think they have succeeded in their learning path?
2. Do the learners think that they would like to continue working with the system using the learning method?

The research question addressed in this study is: does the personalized learning improve students' results compared to traditional learning? Both groups (the treatment and the control) use a digital LMS.

4.3.2 METHODOLOGY

The research design followed both a quantitative and qualitative approach that was developed for online response. The survey was carried out after an online conversation with the parents

to fill out the survey together with the learners (their children), not only the students but with the cooperation of the parents, to receive a broader and more in-depth answer due to the parent's guidance in dealing with the variety of questions.

The questionnaire was distributed to 4 sample classes: treatment group (working with the REVODUCATE system in the personalized model, a total of 48 students), compared to 4 classes that include 36 students, as the control group, working on the online digital system of Google classroom.

4.3.3 RESULTS

The analysis of the results was performed using SPSS software for the quantitative data and thematic analysis for the qualitative data collected in the survey.

4.3.3.1 Learners' Demographic Characteristics

84 students from 3 high schools participated in the survey. Most of them (56.63%) study at Carmel-Zevulun high school, 20.48% at Ort high school, and 22.89% at Amal high school network). The locations are in Israel's cities: Givataim, Kfar-saba, and the Zevulun regional council (next to Haifa in the north of Israel). Most of them (46, 54.7%) are males, and 38 students (45.3%) are females. Approximately half are males (54.22%). 60% of males and 52.63% of females participate in the REVODUCATE program, which represents the personalized learning approach. The rest of the students (40% males and 47.23% females) were included in the traditional approach group.

Interests: A primary component of the system that affects the track's content beyond the pedagogical content. Many female respondents are interested in health and food (18.4%), and the most common interest of males is computer games (11.1%). Besides, there is a wide variety of interests with a low percentage: animals, aviation, art, music, riding, robotics, technologies, photography, and more.

Gaming (on a digital tool): Most of the students (49; 58.3%) agreed to consider the incorporation of gaming during learning and only 7% did not like the idea of gaming during learning in any of the two approaches. More female students liked to use gaming (65.8%) than males (53.3%).

Learning method**:** The most common learning method is using video or digital tools (31.69%) of the respondents), reading (14.46%), private lesson (11.5%), and learning with a friend (9.64%).

Hobbies: Sports are the most common hobby of most of the respondents to the study (32%), both males and females. Arts are in second place (11.93%) and computers in third place (13.45%), more common for females.

Learner's skills: Most learners answer about sport as the primary skill (16 females, 28.95%; 6 males, 13.33%) and computer skills (3 females, 7.89%; 3 males, 6.67%). The rest with low percentages were: music, volunteer activities, cooking, trip planning, programming, animals, dancing, and more.

Home activities and responsibilities: cleaning (12 females, 31.6%; 22 males, 48.89%), dog walking (8 females, 21.05%; 5 males, 11.11%), and the rest: gardening and dishwashing.

The range of students' hobbies and interests is very wide. The data are presented in Table 4.3.1.

Table 4.3.1

Learners' response about gaming, attention disorder, and access limitations during learning.

Variable	Gender	N	Mean	Std. Deviation	Std. Error Mean	t	Sig
Access limitation	M	45	.133	.343	.051	.387	.700
	F	39	.105	.311	.050		
Attention disorder	M	45	.400	.495	.073	-.431	.668
	F	39	.447	.503	.081		
Like-gaming	M	45	2.222	.901	.134	-1.176	.243
	F	39	2.447	.828	.134		

In the REVODUCATE system, three learning styles were used: Auditory (MSA), Visual (MSV), and Kinesthetics (MSTM). There are no significant differences between the genders in the means calculated for learning styles (t-test for independent samples), as shown in table 4.3.2.

Table 4.3.2

Learners' learning style differences between genders t-test

Learning style	Gender	N	Mean	Std. Deviation	Std. Error Mean	t	Sig.
MSV (visual)	M	46	.640	.207	.030	-1.527	.134
	F	38	.713	.230	.037		
MSTM (Kinesthetic)	M	45	.749	.186	.027	.685	.491
	F	38	.719	.207	.033		
MSA (Auditory)	M	45	.670	.209	.0312	-.256	.798
	F	38	.682	.2115	.034		

There are no significant differences between the genders, according to independent samples' means

Personalized Learning – Student Recommendation on the System

The two questions from the learners' point of view are presented in the following tables for treatment and control groups, female and male respondents. In all of them, the personalization using the learning styles and the learner profile with the REVODUCATE LMS is significantly better. T-tests confirm these outcomes for all the variables except for structured feedback. The results are presented in tables 4.3.3 and 4.3.4.

Table 4.3.3

Learners' recommendation for the personalized learning path and the traditional

Question	REVODUCATE participation		statistic	Bootstrapa (a)			
				Bias	Std. Error	95% Confidence Interval	
Learner point of view	R - Revoducate, T - Traditional					Lower	Upper
Learning path success	R	N	47				
		Mean	4.45	0	0.1	4.26	4.64
		Std. Deviation	0.686	-0.01	0.06	0.547	0.783
		Std. Error Mean	0.1				
	T	N	36				
		Mean	2.97	0	0.12	2.72	3.22
		Std. Deviation	0.774	-0.017	0.104	0.554	0.964
		Std. Error Mean	0.129				
Learner recomandation for next year and friends	R	N	47				
		Mean	4.8085	0	0.0574	4.6809	4.9149
		Std. Deviation	0.39773	-0.00713	0.04777	0.28206	0.47119
		Std. Error Mean	0.05801				
	T	N	36				
		Mean	3.0556	-0.0019	0.0811	2.8889	3.2215
		Std. Deviation	0.47476	-0.01304	0.07102	0.3191	0.58554
		Std. Error Mean	0.07913				

a. Unless otherwise noted, bootstrap results are based on 1000 stratified bootstrap samples.

Table 4.3.4

Learners' recommendation on the system

		Levene's test for equality of variance		t-test for equality of means		
		F	Sig.	t	df	Sig. (2-tailed)
Learning path success (MSV, MSA, MSTM)	Equal variances assumed	1.522	0.221	9.182	81	0.000
	Equal variances Not assumed	1.522	0.221	9.034	70.361	0.000
Learner recomandation for next year and friends	Equal variances assumed	1.522	0.221	18.291	81	0.000
	Equal variances Not assumed	1.522	0.221	17.866	67.83	0.000

The previous results are added to the previous research in which high school groups and classes used personalized learning compared to digital platform learning (Facler & Ciascai, 2022).

4.3.4 CONCLUSIONS

Learning is personal (Barbara & McClaskey, 2015; Rose, 2016). The results, which refer to a personalized path for learners in the REVODUCATE system, indicate from the learners' point of view significant satisfaction and enjoyment of the results from the student's point of view. The learning path combines not only the pedagogical content as required in the curriculum but through an engine that generates the personalize learner path, also the supplements for the learners according to their profile: areas of interest, topics of inspiration, issues needing improvement and accordingly, using gaming as an essential tool for the Z generation and alpha to come (UNESCO, 2016; OECD, 2006), simulators and as essential their learning style. Results and feedback influence the student's profile, and the learning goals formulated with them for their personalized learning path plan. The results also indicate that the learning style as a part of the learner profile is prominent in forming the learning personal path. A learning style is designed together with the learner at the beginning and will usually not change in the future (Allen et al., 2011; Rickabaugh, 2016). We must take gaming more seriously with the Z generation. The learners like gaming, and we can involve ourselves to the learning territory, build a new approach and bring a better atmosphere to the learning field (Prensky, 2003; Bejjanki et al., 2014).

The participation of parents in filling out the student's questionnaire in the system (with registration) is a critical part of the parents' partnership in the process, a path that is improved later, also according to age and topics of interest and challenges. The teacher also changes his role at school and focuses with each student on what is required specifically for them rather than according to the traditional method for everyone together and at the same pace. Online learning presents a different setting for learning where the technologies are taken away from specialists and given to the learner (Allen et al., 2011; Rickabaugh, 2016; Dixon, 2019).
Learning style is a preferred way of thinking, processing, and understanding information. We all learn in different ways. The teaching style is the way the instructors teach. If the learners get the information and their tasks in a different way, they will succeed in achieving the same goals, the learner will upgrade their abilities and skills for the next level. Technology today works for us, allowing us to promote the personalized learning approach with outstanding achievements in the digital era (Punie & Redecker, 2017; Darling-Hammond, 1995; Sampson et al., 2018; Prensky, 2003; Bejjanki et al., 2014; Punie & Redecker, 2017).
The results are from science classes, but the same approach can be made with every subject and content when knowing the learner's profile and how to motivate his work. On the other hand, it is recommended that the teacher supports and transfers responsibility to the learner along with the already established students' learning path. Moreover, monitoring each student with digital tools to control paths' status since she/he does not necessarily produce the materials, which are already available at a high level online. The teacher is required in the digital age to change his role with great responsibility and control over a variety of skills, even in front of the students, and will be required to be certified for this (Zhao, 2018; Kallick & Zmuda, 2017; Zmuda et al., 2015).

Depending on the learner's hobbies and interests, combining games or topics according to his profile in his learning style track constitutes another layer for motivating the student's success. It is essential to check the dosage and time constants in which these resources have flowed into the system to adapt to the student's profile and goals and the challenges he must face. The monitoring of the teacher/mentor in this case, as monitoring of each track and student, is critical to the success of personalized learning, following the means of control and focus on who is required to promote the learner's progress in his track and his pace.

CHAPTER 5. FORMATIVE INTERVENTION THROUGH THE REVODUCATE SYSTEM

5.1 Introduction

The formative research involved testing the effectiveness of the REVODUCATE system regarding the following learning criteria: material variability, teamwork supported, skills improvement, learning enjoyment, the need of the teacher's help, learning promotion, structured feedback, achievements, learning motivation, future direction involvement, studies path is clear, status is clear, teachers' involvement, feedback from teachers, the usefulness of the feedback received, the usefulness of parents' involvement.

To test the effectiveness of personalized learning through the REVODUCATE system, we had an experimental group who were taught using the REVODUCATE system and a control group who were taught using traditional teaching methods. The result of this research shows that students who were taught through the REVODUCATE system improved their learning regarding the above-mentioned criteria, compared to those who were taught through traditional methods.

5.2 Research question

The formative intervention of this study aimed to test the impact of the REVODUCATE system on students' learning. The question of the study is "What is the impact of individualized learning, offered through the REVODUCATE system, on students' learning path?".

5.3 Research hypotheses

Because individualized learning through the REVODUCATE system is currently implemented in the Israeli educational system, we needed evidence-based data about the effectiveness of the program. Based on the existent literature on personalized learning, we formulated and tested the following hypothesis.

H1: Students who participated in the personalized learning system improved their learning, compared to those who participated in a traditional system based on Google Classroom.
H0: Students who participated in the personalized learning system do not improve their learning, compared to those who participated in a traditional system based on Google Classroom.
We operationalized the learning variable using several indicators that proved to be important in learning in general and in personalized learning in special. The learning dimensions included in this study are learning promotion, structured feedback, achievements, learning motivation, future direction involvement, studies path, status, teachers' involvement, feedback from teachers, the usefulness of the feedback received and the usefulness of parents' involvement.

5.4 Methodology

5.4.1 Participants

A group of 74 high school students participated in this formative research, with 35 being included in the experimental group and 39 in the control one. Students from the experimental group studied using the REVODUCATE system, while those from the control one used only the google classroom system. The experimental group had 30% female students and 70% male students.

5.4.2 Instruments

To assess all the dimensions of learning included in our study we designed a questionnaire that allowed us to assess the effectiveness of the REVODUCATE system for personalized learning, compared to traditional learning approaches. Although the questionnaire has five sections, for this study we used the following sections: Part A - Student profile, which had 11 subsections; Part B - Questions related to the learning management system; Part C - Learning format in the system; Part D - Activity with the teacher and feedback.
The questionnaire was given to four classes. One treatment group consisted of 35 students who worked with the REVODUCATE system in a personalized model, and a control group of four classes consisting of 39 students who used the online digital system of Google Classroom.

Students were asked to fill in the questionnaire before starting to learn in different systems. After working in either REVODUCATE or traditional digital system, they were assessed again to identify potential differences between those learning with REVODUCATE and those learning in the google classroom format.

The student profile section of the questionnaire included gender, school, grade, city, hobbies, interests, electronic devices and disciplines they use REVODUCATE or the google classroom system.

5.5 The formative program

The formative intervention programs conducted in this research study in the context of the personalized learning study planned to provide support and assistance to the target group of learners of the study to improve their learning experiences and outcomes. These programs aim to address learning gaps, personal needs and challenges that other learners may encounter while participating in the personalized learning approach in the research.

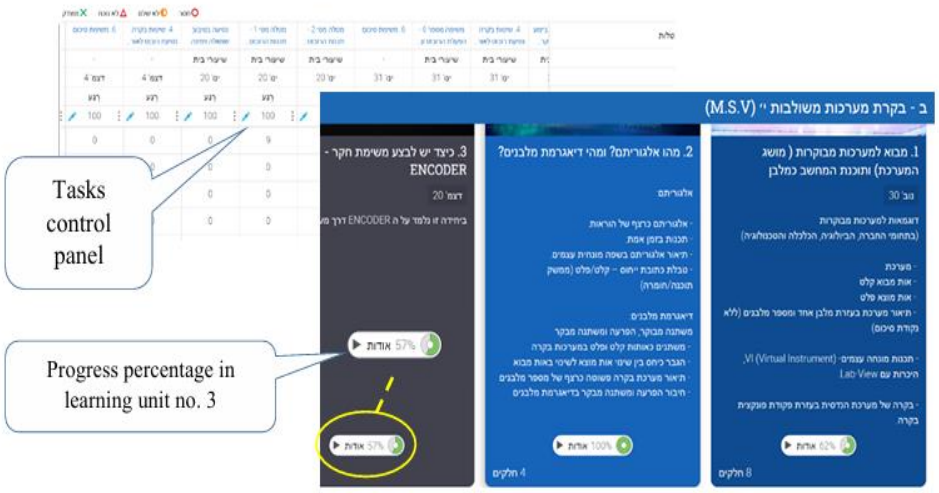
Carried out in the following issues:

1) Needs and assessments: Specific needs and challenges were identified by and for learners in a personalized learning environment through short feedback from the systems. This also involved analyzing data on student performance during and up to the close of each learning unit, identifying learners with difficulties and understanding areas where individualized support is needed.

2) Personalized support: Once the learner receives the personalized learning plan, teachers can help the learner adjust their approach and teacher role shifts as needed. These plans clearly outline specific areas for improvement, interventions needed and expected outcomes for each learner.

3) Collaboration with teachers and the education team:

Even though the groups (intervention and control groups) were separate, collaboration was essential to synchronize the process and find gaps for any support.



5.5 Results

The personalized REVODUCATE system seems to be effective and to significantly impact the learning variables included in this study. Table 5.1 illustrates the impact of REVODUCATE for each learning variable.

In the pre-test assessment, there are no significant differences between our learning variables except for the clarity of the study path (t=3.280, p=.002) and the usefulness of parents' involvement (t=2.217, p=0.030). In the post-test assessment, significant differences were identified for all the variables except for structured feedback, which seems to be the same across the two groups between the two assessments (pre-test and post-test).

The effect sizes for the differences identified are medium to high, varying between 0.531 and 2.294.

Table 5.1

The effect of the REVODUCATE system on students' learning

		Pre-test				Post-test				
		M	SD	t	Sig	M	SD	t	Sig	d
Teamwork	EXPERIMENTAL	3.200	1.471	-.271	.787	3.600	1.035	3.634	.001	0.825
	CONTROL	3.282	1.123			2.974	.280			
Learning skills	EXPERIMENTAL	3.686	1.183	1.647	.104	3.743	.780	5.688	.000	1.337
	CONTROL	3.256	1.044			2.846	.540			
Learning enjoyment	EXPERIMENTAL	3.743	1.221	1.616	.111	3.829	1.014	5.297	.000	1.211
	CONTROL	3.308	1.080			2.872	.469			
Teacher's help	EXPERIMENTAL	2.914	1.197	-1.931	.057	2.400	.847	-9.675	.000	2.261
	CONTROL	3.487	1.355			4.179	.721			
Learning promotion	EXPERIMENTAL	3.686	.932	1.875	.065	3.657	.591	6.499	.000	1.489
	CONTROL	3.282	.916			2.949	.320			
Structured feedback	EXPERIMENTAL	2.943	1.434	-1.446	.153	3.257	1.172	1.731	.088	-
	CONTROL	3.385	1.161			2.923	.270			
Achievements	EXPERIMENTAL	3.343	1.235	.428	.670	3.771	.910	4.528	.000	1.042
	CONTROL	3.231	.986			2.974	.584			
Learning motivation	EXPERIMENTAL	3.514	1.147	1.348	.182	3.600	.847	5.010	.000	1.148
	CONTROL	3.179	.970			2.821	.451			
Future direction involvement	EXPERIMENTAL	3.143	1.141	1.777	.080	3.114	.993	3.363	.001	0.784
	CONTROL	2.641	1.287			2.359	.932			
Studies path is clear	EXPERIMENTAL	4.086	.887	3.280	.002	3.886	.718	9.762	.000	2.294
	CONTROL	3.333	1.084			2.462	.505			
Status is clear	EXPERIMENTAL	3.857	1.141	1.555	.124	4.171	.985	8.729	.000	1.997

	CONTROL	3.436	1.188			2.615	.493			
Teachers reach all students	EXPERIMENTAL	3.886	1.022	1.827	.072	4.171	.822	8.609	.000	2.015
	CONTROL	3.436	1.095			2.667	.662			
Feedback from teachers	EXPERIMENTAL	3.171	1.043	-1.508	.136	3.343	1.162	2.331	.023	0.531
	CONTROL	3.538	1.047			2.872	.469			
The usefulness of the feedback received	EXPERIMENTAL	3.400	1.168	1.114	.269	3.400	1.035	2.645	.010	0.603
	CONTROL	3.128	.894			2.923	.422			
The usefulness of parents' involvement	EXPERIMENTAL	2.171	1.1501	2.217	.030	2.057	.838	2.620	.011	0.613
	CONTROL	1.615	.9898			1.590	.677			

The pre-test-poste test analysis allows us to establish several conclusions. A close analysis of the results illustrates that the students who learned using the REVODUCATE system had higher values for all the learning variables included in the study, except for the variable "teachers' help". This is understandable since the REVODUCATE system offers an individualized learning path and students need lower support from teachers, since they learn in their own rhythm and in accordance with their own needs. For students learning through the google classroom platform the teacher's help is higher because students do not have individualized learning support and must ask for the teachers' help to overcome their difficulties in learning.

CHAPTER 6. CONCLUSIONS, DISCUSSION AND FUTURE RESEARCH

Personalized learning with the REVODUCATE system focuses on adapting educational experiences to the individual needs of students and learning styles and to enhance engagement, understanding and pedagogical achievements and the goals faced by learners. The problem approached in this thesis covers three main issues:

1) Today's generation of students has access and is connected to technology and information from a young age, but for some reason, this is not reflected in current teaching and learning systems.

2) Even after the COVID-19 pandemic, the role of teachers in the education system remains the same, although the pandemic has shown teachers that teaching can also be done online through technological tools.

3) The COVID-19 pandemic has accelerated digital skills in distance, online and face-to-face education, but the current approach still requires more success for students.

REVODUCATE has been used for personalized learning in the Israeli education system since 2018. It was first introduced in the Ort high school network in Givatayim, near Tel Aviv. However, there was no research about the effectiveness of the system. This thesis is the first to approach the topic of the REVODUCATE effectiveness. The testing of the impact of the program on students' learning began in 2019 and attracted the interest of the Ministry of Education. In 2021-2022, the Ministry of Education officially recommended the system for high schools in the national system called "Gefen". Meanwhile, we used a control group from another high school network that used the Google Classroom approach to learn the same subjects over the same period. After learning in either REVODUCATE and Google Classroom programs we tested again the students to identify their progress in several learning variables.

The main findings of this thesis show that students who participated in the personalized learning program with the personalized system called REVODUCATE showed significantly higher levels of learning outcomes than the control group. The results suggest that tailoring instructional methods to individual learning styles and needs, motivation, task engagement, adaptive behavior, and academic achievement can improve learning outcomes and the same goal set at the beginning of their journey. Interestingly, the increased

engagement among students in the personalized learning group aligns with motivation and self-directed learning theories.

The individualized nature of the interventions allowed students to take ownership of their learning, which led to increased participation and enthusiasm. Although our study provides valuable insights into the benefits of personalized learning, several limitations should be noted. Factors such as digital skills instruction, variability, and student characteristics may have influenced the results. Future research could explore the long-term effects of personalized learning interventions and explore the optimal balance between structured instruction and student autonomy. Furthermore, investigating the role of educator training in implementing personalized learning strategies could enhance the effectiveness of such interventions.

In conclusion, our study highlights the potential of personalized learning interventions to improve pedagogical performance and engagement among high school students. By individualizing educational approaches, educators can create more meaningful and compelling learning experiences, paving the way for improved educational outcomes.

Today's learners, as Generation Z learners, are already born to be digital citizens, and teachers can be considered digital immigrants who need to develop their digital skills.

The results presented in this paper are from science classes and robotics, but the same approach can be made with different school subjects. On the other hand, it is recommended that the teacher supports and transfers responsibility to the learner in 3 or 4 steps (Bray & McClaskey, 2016). The teacher is required in the digital age to change his role with great responsibility and control over various skills, even in front of students, and will be required to be certified for this.

The issue of personalized learning has been known for a long time around the world, as has the review of specialized literature. The digital age brings with it an opportunity to change the way of learning with digital tools to which they connect. Students will also become teachers tomorrow. Yesterday's students (in the traditional approach for more than a century) will not be tomorrow's students (due to their digital competence).

The student profile, which includes a variety of parameters to determine his/her abilities, hobbies, personality, and learning style, must be tested every year and continue research on

this topic alongside a digital system, as a student changes his/her personality, preferences, family, and personal situation every year until the end of his/her studies.

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