

THE MANAGEMENT AND IMPLEMENTATION OF AI IN THE SCHOOL CURRICULUM IN ISRAEL

Loureen HADDAD¹, Rawia ASHQAR²

^{1,2}Ph.D. Students, Doctoral School of Economics and Business Administration, Timisoara
West University, Timisoara, Romania

loureen_haddad@hotmail.com

raviashqar@gmail.com

Abstract: *This article reviews how Artificial Intelligence (AI) tools are implemented and reshaping the education system in Israel. In many ways Education and AI are intertwined. Education is used as a means to develop minds capable of expanding and leveraging the pool of knowledge, while AI provides tools to develop a more accurate and detailed picture of how the human brain works. By leveraging the best features of machines and teachers, the vision for AI in education is one where AI and teachers work together to achieve the best outcome for students. Since today's students will have to work in a future where AI is a reality, it is important that our educational institutions expose students to the technology and train them how to use it. The idea behind managing and implementing AI is to strengthen student-centred and self-regulated learning and promote the development of students' information management and problem-solving skills. The study investigates how teachers, school ICT coordinators, principals, and parents deal with the implantation of AI in education, how they use innovative technological tools, and how do they cope with the challenges facing students. In order to be able to integrate AI elements, teachers from the school receive a training course in a coordinated manner. In addition, implementing AI requires schools to assign instructors, who as teachers, hold weekly meetings on digital skills, and each school has a school ICT coordinator and leading teachers on the subject. The role of the principal in this project is to coordinate between the schools and Ministry of Education that supervises how schools implement the project.*

Keywords: AI technology; Israeli schools; AI, ICT coordinators; Qualified teachers; Transformative principals.

JEL Classification: O32; O33; O35.

1. Introduction

The information technology revolution affects the way people communicate, their daily language, the assimilation of knowledge, modes of thinking, the culture of

leisure, the world of work and more. Some of the traditional tools that made it possible to function in the world of knowledge are degenerating and disappearing, and other tools are being created that redefine the way we read, conduct research, express ourselves, organize our knowledge and share it with others (Center_for_Educational_Technology, 2010). Among the tools we can mention include social networks, video images, digital cameras, mobile phones and computer games (Bigdeli & Kaufman, 2017). The variety of tools that information technology makes available to us encompasses all areas of life. The tools allow, among other things, to extract information from the vast amounts of information available to every person, to play games that activate several senses (modern GPS), get from place to place with the help of a navigator, to have social communication anywhere and at any time (Wargan, 2010), and to send messages through our cell-phone (Voogt, Erstad, Dede, & Mishra, 2013) and on the Internet, including sound files, images and music. However, technological development also entails risks and threats, including excess information, violation of privacy, anonymity and impersonation, viruses, legal and financial liability, fraud, theft, deviation, terrorist threats and addiction. This article deals with the challenges of implementing AI technology in Israel schools in recent years.

2. Implementing AI Technology

2.1. Changes in the world of work

The analysis of the skills required to perform the roles of workers today indicates an increase in the demand for complex thinking and teamwork (Keane, Keane, & Blicblau, 2016), and a decrease in routine skills and manual work. Likewise, emphasis is currently placed on the need for creativity, problem solving (Waks, 2015). Further, interpersonal communication, flexibility and adaptability that are required are a consequence of changes that took place in the world of work between the 20th and 21st centuries.

The technology that was based on routine manual work has become interactive, creative and less routine. The job requirements have expanded from mastering one field to simultaneously mastering a variety of fields. There is also an increase in the requirements for complex communication and team thinking.

AI that can read student's facial expression: These days there is the development of intelligent teaching and the development of digital platforms that use AI to provide learning, tests and feedback to students from elementary school to high school levels. AI exposes students new challenges, where AI identifies gaps in knowledge and

redirects them to new topics if necessary. As technology becomes more sophisticated, the AI may be able to read a student's facial expression indicating whether s/he is struggling to grasp a topic and reexplain the topic to help the student understand the topic.

AI that points out where courses and lessons can be improved: Teachers are not always aware of gaps in their lessons and educational materials that can leave students confused about certain concepts. Artificial intelligence offers a way to solve the problem. An example of this is the website coursera.org, a huge provider of online courses, already applying AI technology to answer this problem. When it is found that a large number of students submit an incorrect answer to a homework assignment, the system sends an alert to the teacher and sends prospective students a customized message offering clues to the correct answer. This system helps fill in the gaps in explanations that can appear in courses, and helps ensure that all students build the same conceptual foundation. Instead of waiting to hear from the teacher or being embarrassed to ask, students get immediate feedback that helps them understand the concept and how to do it correctly next time.

Additional support from artificial guides: already today there are programs based on artificial intelligence that can help students with basic math, writing and other subjects. These programs can teach the basics, but so far they are not ideal for students to learn thinking and creativity, something that teachers in the real world are still required to do. However, this should not rule out the possibility that artificial teachers could do these things in the future. Also, AI systems can give the teacher tools to check tasks in a faster and more efficient way, so that he can devote more time to each student and help him where he has difficulty.

2.2. The consequences of the changes on the education system

In the past, most of the learning took place at school, while today it is known that learning takes place everywhere and in all areas of life. In the past, access to information was limited, and often required a fee, whereas today the information is mostly available, accessible and free. In the past there was a demand for uniformity and compliance with conventions, while today people strive for inventiveness and personalization of the learning experience. In the past, cultural diversity was seen as a problem to be faced, whereas today it is seen as an asset and not an obstacle. In the past, a significant part of learning was based on reproducing what was learned, whereas today there is a decrease in the need to reproduce what was learned and there is a need for non-routine analysis skills, filtering and combining knowledge, complex thinking, and the ability to generalize and transfer information.

ICT programs of the Ministry of Education (2010) list the skills required of school graduates and the school as a training agency. The Education Ministry has redefined the skills that student should acquire from their school (Ministry of Education, 2015): Articulating information literacy-skills such as organizing information from different sources, evaluating and analysing it, raising questions based on information needs, identifying the sources of information, using critical thinking for solving problems; drawing conclusions and creating new knowledge, high thinking, and problem solving, choosing the appropriate aggregation of information in different situations and its application; developing critical, analytical and evaluative thinking; stimulating creativity, entrepreneurship and ingenuity, communication and sharing skills, cooperation, building relationships with others for a solving problems in a collaborative and intercultural way, working in a team and integrating into the community online; seeking cooperative learning for the purpose of creating a joint product, acquiring skills on how to use ICT tools, developing self-learning and cooperative learning skills, quickly adapting to changes and innovations, adapting to dealing with a lot of information, goals and communities, developing agility, flexibility, self-esteem, self-management, self-discipline, curiosity.

Moreover, mastery of the language is also necessary in today's age, not only to understand and be able to express oneself, but also to communicate, participate in discussions, formulate queries, read texts and write effectively. Students are also required to develop academic work skills, presentation skills, documentation skills, ethics and online safety, ethical conduct, knowledge of copyright laws, maintaining privacy and the like and awareness of online dangers, acquiring skills for life and career.

Further, DeMonte describes some abilities that we already wish for in high school graduates today including the transformation of the learned knowledge into realization. For example, translating knowledge, presenting relevant questions, the application of solutions derived from it in new problems, ability to deal intelligently with new and complex life problems, which are presented vaguely, while dividing them into specific sub-questions, in a way that allows addressing a broad problem, ability to generalize and assimilate knowledge from different sources and merge it into an integrative whole; ability to deal with a new and complex life problem within the framework of cooperative learning at work.

Andersen Koenig, from the National Institute of Sciences in the United States, refers to the evaluation of the skills required in the 21st century from high school students, that were classified into three categories (Koenig, 2011): 1).

Formally in preparation for acquiring a high school certificate, the model has been changed to put the learner in the centre and provide him with tools for learning.

Milestones for achieving the change that will last a lifetime that are required for this in educational systems include (Shapiro, 2019):

- 1) There is a need to bring teachers, students and parents to the understanding that the demands of the labour market are changing very quickly and that the school is having difficulty to quickly integrating the required changes in the curriculum.
- 2) Students must understand the connection between what they learn in school and their professional future. Teachers must receive opportunities and incentives to study the changes in the labour market, and they should change their teaching methods accordingly.
- 3) Professional development for teachers in this regard must be thorough and continuous and be planned together with teachers at the field level.
- 4) Measuring student achievement must change. One should engage less in measuring memory and facts and more in mastering required current skills such as problem solving, expressive ability, and teamwork.

3. Implementation of ICT tools in the education system

For the purposes of teaching, learning and assessment, the new tools that information technology makes available to us are partially suitable for the education system. Factors of human engineering and the way of learning are involved in examining the contribution of technology and the feasibility of its implementation in schools. Some of the current tools for online learning and teaching are general tools and some are unique to education (Levin, 2016). Among them are 1) blogs, chat, e-mail and social networks, which enable the transfer of information between people and also the exchange of information between professionals and organizations. 2) forums for exchanging information around areas of common interest. 3) search engines, which allow immediate access to vast amounts of information. 4) Wikipedia and similar online sites, whose purpose is to provide information to everyone and to expand the possibilities and opportunities to acquire free knowledge even for populations with little means and far from academic centres. 5) Use of "learning" that allows each student to learn at his own pace and at the level that suits him and to receive immediate feedback for the purpose of correcting and improving his achievements. 6) Integration Computerized learning with remote instruction from a teacher who is an expert in his field, a teacher who can receive data in real time from every student and use them to improve his progress in the study material (Harasim, 2017).

The students spend a significant part of the day in the Internet environment, and therefore expect that technology will also be part of the learning environment in the

school in Israel (Pape, 2009). Yet, the assimilation of the new technologies in the education system does not catch up with the pace of developments. From the Ministry of Education document it appears that the digital gap between Israel and the developed countries in the computer-student ratio is growing. The current gap between the possibilities offered by information technology and its actual use is large, and the state of the infrastructure and students' access to computers and the Internet are still very limited (Wargan, 2010). In 2000 Israel was ranked high on the scale of the proportion of students who have a computer at home, and in 2009 the percentage of such students remained high in comparison to other OECD countries. On the other hand, when computers were tested in schools, it became clear that in 2000 and 2009 Israel was more or less in the same place on the ranking scale (Hall, Lundin, & Sibbmark, 2019).

According to a Ministry of Education document (Israeli-Ministry-of-Education, 2021), the school today is far removed from the student's world. Outside of school, the student is exposed to advanced technologies, while most schools in Israel use traditional pedagogy, without using the same technological means to which the student is accustomed (Israeli-Ministry-of-Education, 2021). A survey conducted by the Centre for Educational Technology among a representative sample of Students in grades 11-12 revealed that students use the computer at home mainly for games and communication with friends, but the use for educational needs is mainly limited to searching and writing papers. About half of the respondents in the survey think that the school does not prepare them for the acquisition of ICT literacy and does not provide them with the skills of the 21st century (Center_for_Educational_Technology, 2010). The parents' attitudes are not very different from the students' perceptions: a survey among parents of school-aged students shows that about half of the parents believe that the school does not prepare the students for the job market in the 21st century, and that students do not study enough hours using a computer at school (Center_for_Educational_Technology, 2010).

Furthermore, the teacher in a computerized environment should change the teaching methods, focus on changing the way a student understands concepts and processes, diversify his work methods (and allow students to perform challenging assignments and experience working as a teamwork (DeMonte, 2013). Such an environment makes the system data available to the teacher in real time for providing feedback to students and improvement of his achievements. In a computerized environment, the teacher must be able to help the student evaluate himself and guide him to learn lessons to improve his abilities (Nir & Hameiri, 2014).

According to the Ministry of Education (Center_for_Educational_Technology, 2010), technology is a necessary but not sufficient condition for utilizing the rich computerized learning environments that have been developed and exist today. Many teachers still do not use it for teaching and learning purposes. Teachers also do not make sufficient use of sophisticated management systems to administer students attendance, grades, disciplinary matters and lesson preparation (Center_for_Educational_Technology, 2010). Following the above, one should expect at least a change in instructions and guidance from the principal to teachers as subordinates and a transition to sharing work, and interaction between the principal and teacher as an individual and with the team of teachers and the entire staff (Nir & Hameiri, 2014). The principal will work to integrate the school into the society in which it operates, while involving parents and various local factors. In addition to this, the principal will be guided in his work to bring administrative transparency and make available to the public information about how the school operates (Hall et al., 2019).

In short, there is thus a gap between what is expected of the school today, in the age of information technology, in terms of training the student and preparing him for the future labour market on the one hand, and the performances of schools on the other hand. This gap means that the functioning of the school is perceived as unsatisfactory, the curricula are perceived as inappropriate and not up-to-date, and the professional authority of the teacher as the transmitter of knowledge is perceived as weaker than before.

3.1. The Professional Quality of Teachers

The professional quality of the teachers relates to each of the five problems reviewed above. Prominent among these professional quality is its impact on students' achievements. A review of research material shows that the teachers' contribution to the students' achievements is large and clear. One study found that the differences between teachers explain about 30% of the variation in a student's achievement (Kim, Raza, & Seidman, 2019). DeMonte reviewed studies examining differences in the achievements of student groups as a function of teaching and teacher characteristics, and found that the identity of a the teacher has great, and undisputed, importance in explaining the variation in student's achievement (DeMonte, 2013).

The teachers' characteristics relate to 1) their personal qualities 2) their professional background and training 3) their knowledge and skills 4) and their teaching practices. The empirical attempts to establish clear relationships of cause and effect between the achievements of students and between the personal characteristics of the teacher,

his training, his knowledge and his skills. These characteristics came up well in only a few of studies.

Personal characteristics, professional background, knowledge and skills: a review of several studies show that no relationship was found between many administrative characteristics of the teachers and the students' achievements, that the relationships found were not consistent between the various studies, or that the relationships were not significant (Drovnikov et al., 2016; Kim et al., 2019). The characteristics of the teachers tested were seniority, education, certification, identity of the entity that awarded the degree and academic status, scores in licensing tests (Drovnikov et al., 2016). In recent reviews, however, some relationships have been found to be significant, where the most prominent of which is a positive relationship between the teacher's gender and the students' achievements: female teachers are more successful than male teachers in improving the measured achievements of their students (Kim et al., 2019).

In mathematics, unlike in other subjects, connections were found between the student's achievements and the teacher's degree, his academic certification, his grades from his college and the training he received in teaching general mathematics (Kim et al., 2019). The influence of these factors was greater in post-primary schools, the researchers even pointed out a relationship between math teachers' well-versed knowledge of the material and the achievements of their students. Even if it is not found that education and cognitive ability tests are beneficial in predicting the effectiveness of teachers, setting a high bar may improve the image of the teaching profession and thus attract new teachers to the world of teaching with high general abilities and even allow screening of candidates while observing their work (Drovnikov et al., 2016). Here it is worth noting that in recent years the Ministry of Education has been promoting a variety of projects for "alternative training," such as the program for training engineers to teach mathematics. These programs are supposed to promote the changes presented above and their degree of success in achieving the goals of the school.

The teaching practices: the characteristics of the teaching practices are the ones that influence the learning patterns (Harasim, 2017), which indicate the student's personality more than any other factor.

The teacher's perception of the student's role in acquiring tools for self-study: from research findings, it turns out that the most significant effect on the student's learning is evident when the teacher checks if his actions as a teacher are effective and the teacher updates them accordingly. In addition, the teacher should allow the student to expand his "classical" status, the status of a student who is content with receiving knowledge from the teacher, and to adopt for himself teaching roles such as self-

monitoring, self-evaluation and self-study. In this way, the teacher would allow the student to acquire learning tools on his own.

Teaching for Understanding: Success in teaching-for-understanding is largely a function of learning the material in a way that is perceived by the student as clear. The two-way feedback, from the teacher to the student and vice versa, makes it possible to verify the understanding of the material and the achievement of the educational goals.

Monitoring the success of learning and producing lessons: A teacher must know how to identify correct or incorrect learning, know how to evaluate the success of learning and decide if and when to switch to an alternative strategy. Personal skills and abilities, impressive presence of the teacher, control of the classroom climate, ability to challenge the students, ability to discuss issues in depth, ability to improvise, and ability to develop new skills on integrating information in his daily studies, and the ability to abstract.

Prominent characteristics of effective practice found in empirical research include: 1) the teacher's perception of the importance and centrality of the student's acquisition of tools for self-study. 2) the teacher's willingness to continuously check whether his actions as a teacher are effective and correct them accordingly. 3) teaching-for-understanding: the teacher should help students to perceive learning as two-way feedback between the teacher and the student, a pattern of action that makes it possible to verify the understanding of the material and the achievement of the educational goals. 4) The teacher should monitor the success of learning process.

3.2 Lessons Learned

Recruiting qualified personnel: Improving the status of teachers is key to recruiting talented, qualified personnel, and it can be achieved with the help of attractive financing measures and licensing tests that will help filter unsuitable candidates and convey a message to the public that engaging in the teaching profession requires special and not obvious skills. To these should be added the improvement of the working conditions of the teachers, the improvement of their promotion possibilities, the financing of their studies during the training period and the provision of subsistence scholarships, which will also contribute to the realization of the goal of recruiting high-quality personnel.

Another contribution to the recruitment of high quality personnel can come from retaining these quality personnel in the system, where prominent factors that may contribute in this goal are salary, professional promotion scales, professional development, support in reducing disciplinary problems, professional accompaniment and feedback, teaching in small classes, providing work time in the

framework of work planning. Empirical studies have revealed that effective professional development is characterized by 1) joint training of the entire teaching team at the school at the same time (in general pedagogical issues that are not specific to a certain profession or a certain age group). 2) Intensity: The training must be intensive, that is, one that requires an investment from the participants, persistency over time in getting UpToDate training. 3) Relevance: The training must be relevant to the teacher's day-to-day practice and should focus on teaching and learning specific academic contents. 4) Long-term commitment of the teachers to the application of what is learned. 5) Integrating the results of the training into the teacher's day-to-day work by using tools such as joint planning of lessons by all the teachers, making joint decisions about the operation of the school and the curricula, and supporting the mutual learning of each other's teachers. Strategies with potential in this context are, for example, joint discussions, peer observation and mutual feedback, use of video tape, viewing and analysis after the lesson. 6) Compatibility between the development programs and other programs of the school: it is desirable that the training be part of a comprehensive system of change in the school and not an isolated component that is not Integrates into the broader picture of the planned changes. 7) Providing constant and continuous feedback to the teacher with the aim of allowing him to constantly improve the quality of his professional work.

3.3. The Principal's Contribution as a Transformative Leader

The influence of the principal on the school climate: The findings reviewed the issue of the school principal deal but little with the classical administrative functions that include: supervision, coordination, planning, control, etc. and emphasize the influence of the principal as a leader of the staff, the students and the characteristics of the school climate (Keane et al., 2016). Nir and Hameiri found that one of the main factors influencing the variance in student achievement is the school climate (Nir & Hameiri, 2014). The principal of the school has a great influence on the formation of such a climate, through effective leadership that has various components and in particular:

- Forming a common vision for all team members
- Setting clear goals
- Engaging in resource mobilization
- Consolidating a sense of teamwork among teachers
- Analysis of the school activity and learning lessons
- Participation of teachers in school discussions and aspiration to achieving unanimity among the team of teachers on the question of how to realize the school's goals (Tubbs & Garner, 2008).

Another study notes that the atmosphere of trust between the administration, teachers, students and parents contributed to the students' sense of personal security and their feeling at the same time these factors contributed to the teachers' feeling that the administration is attentive and helpful (Benbenishty, Astor, Roziner, & Wrabel, 2016).

4. Conclusion

This article deals with notable transformations that took place since the late 20th century, their implications for certain goals of the education system and the need to place them in a high order of priority, to update and implement them according to the current knowledge structure, based on recent empirical findings. A significant part of the disagreements regarding the goals of education stems from different opinions and perspectives regarding the definition of knowledge and its value. According to some, the purpose of education is to enable students, as members of society, to realize their full potential, while providing appropriate knowledge and tools that will allow them to integrate into the labour market, society and community.

The 21st century is accompanied by a dramatic technological revolution. The society we live in is becoming more diverse, more global and saturated with media, and this process is accelerating all the time. It is difficult to predict what the world will look like in a few years, but the education system has the duty to prepare students, if possible, for life in this changing world. The students encounter new issues that emerge all the time: global warming, lack of natural resources, hunger, health issues, population explosion and other social and environmental issues. These transformations require students to know how to communicate, function and create personal, social, economic and political change at the local, national and global level. All of these changes altered the role of the teacher, students-teacher relationships and requires principals to adopt new methods of administering the school.

References

1. Benbenishty, R., Astor, R. A., Roziner, I., & Wrabel, S. L. (2016). Testing the causal links between school climate, school violence, and school academic performance: A cross-lagged panel autoregressive model. *Educational Researcher*, 45(3), 197-206.

2. Bigdeli, S., & Kaufman, D. (2017). Digital games in health professions education: Advantages, disadvantages, and game engagement factors. *Medical journal of the Islamic Republic of Iran*, 31, 117.
3. Center_for_Educational_Technology. (2010). Education in the 21st century: the growth engine of the State of Israel. Tel Aviv:. Retrieved from
4. DeMonte, J. (2013). High-quality professional development for teachers: Supporting teacher training to improve student learning. Center for American Progress. Retrieved from <https://files.eric.ed.gov/fulltext/ED561095.pdf>
5. Drovnikov, A. S., Nikolaev, E. L., Afanasev, A. S., Ivanov, V. N., Petrova, T. N., Tenyukova, G. G., . . . Povshednaya, F. V. (2016). Teachers professional competence assessment technology in qualification improvement process. *International Review of Management and Marketing*, 6(1), 111-115.
6. Hall, C., Lundin, M., & Sibbmark, K. (2019). A laptop for every child? The impact of ICT on educational outcomes. Retrieved from
7. Harasim, L. (2017). *Learning theory and online technologies*: Taylor & Francis.
8. Israeli-Ministry-of-Education. (2021). Trends and Opportunities in Education following the Corona Crisis. Retrieved from <https://meyda.education.gov.il/files/Planning/megamotcoronamismach.pdf>
9. Keane, T., Keane, W. F., & Blicblau, A. S. (2016). Beyond traditional literacy: Learning and transformative practices using ICT. *Education and Information Technologies*, 21(4), 769-781.
10. Kim, S., Raza, M., & Seidman, E. (2019). Improving 21st-century teaching skills: The key to effective 21st-century learners. *Research in Comparative and International Education*, 14(1), 99-117.
11. Koenig, A. (2011). Assessing 21st century skills: Summary of a workshop. Retrieved from <https://www.ncbi.nlm.nih.gov/books/NBK32690/>
12. Levin, D. (2016). Building a Trusted Environment for Education Technology Products. Foundation for Excellence in Education (ExcelinEd). Retrieved from <https://files.eric.ed.gov/fulltext/ED576767.pdf>
13. Manning, M., Garvis, S., Fleming, C., & Wong, G. T. (2017). The relationship between teacher qualification and the quality of the early childhood education and care environment. *Campbell Systematic Reviews*, 13(1), 1-82.
14. Ministry of Education, I. (2015). Second Assistant Reform in Kindergartens.
16. Nir, A. E., & Hameiri, L. (2014). School principals' leadership style and school outcomes. *Journal of Educational Administration*, 52(2), 210-227.
17. Shapiro, J. (2019). *The New Childhood: Raising kids to thrive in a digitally connected world*: Hachette UK.
18. Tubbs, J. E., & Garner, M. (2008). The impact of school climate on school outcomes. *Journal of College Teaching & Learning (TLC)*, 5(9).
19. Voogt, J., Erstad, O., Dede, C., & Mishra, P. (2013). Challenges to learning and schooling in the digital networked world of the 21st century. *Journal of computer assisted learning*, 29(5), 403-413.

20. Waks, L. J. (2015). Education 2.0: The learningweb revolution and the transformation of the school: Routledge.
21. Wargan, Y. (2010). Computerization of schools - a snapshot, an update document, was submitted to the Education, Culture and Sports Committee of the Knesset. Retrieved from https://fs.knesset.gov.il/globaldocs/MMM/dd5b6b58-e9f7-e411-80c8-00155d010977/2_dd5b6b58-e9f7-e411-80c8-00155d010977_11_9874.pdf