Challenges of teaching - personalized students learning by using video tools to improve thinking skills

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Abstract

Research in the field of education highlights the fact that teachers, in a significant proportion, continue to favor traditional rather than modern teaching strategies and are still dependent on methodological clichés that negatively influence curriculum implementation. Education and training systems need to be modernized to strengthen their efficiency and quality and to give people the skills and competencies they need to succeed in the labor market. Contemporary education systems are under increasing pressure from so-called "global challenges". More than ever, the immense opportunities for personal and social knowledge and affirmation of the individual and the spectacular advancement of science and technology contrast with economic polarization, mistrust, and violence, with the higher problems of natural resources and climate change.The paper is based on quantitative research data, collected in March-June 2020. The results are related to the new video skills of teachers, in a pandemic period and to the role of these tools to personalized student's experience in online teaching.

Keywords: video tools, personalized learning, HOTS, thinking skills, STEM.

1 Introduction

The speedy way of the dynamical nature of the rising technologies in our 21st-century society activities modification the maximum amount discussion, analysis, and unsupported assumptions because it will give claims concerning the “potentials” and “possibilities” that rising digitals tools provide. In this respect, that use of technology can“transform” education, “revolutionize” our curricula and “engage” students that have antecedently been unprecedented.

Australian Government Department of Industry, Innovation, and Science (2019) conducted research in which 64% of young Australians say that learning about science and technology is exciting. Alex Snow (2020) , Head of research at Foundation for Young Australians says that “Technology will transform the world of work. That presents a significant challenge as well as an opportunity to provide the right learning for young people. Tech can support that process through new learning platforms, and new types of learning content.”In Canada, over 1 in 3 children use digital technology for schoolwork (MediaSmarts, 2018). The Human Resources Professionals Association (2017) obtained data from research that suggesting than more than 70% of Ontario HR professionals believe that curricula modifications by using video-games in classes could help students acquire missing soft skills.

More and more teachers are asked children to use the information that they have stored in their brains, to use it in everyday life, to manage the own process of thinking, and to help students achieve their highest potential. The concept of HOTS is different from low-order thinking (which included most of the memorization skills) that are promoted students to remember facts and include synthesizing, analyzing reasoning, comprehending application, and evaluation-higher form of thinking.

The paper presents a study conducted in March-June 2020, belong students who are using video tools in learning in the math and science domain about the level of higher-order thinking skills, compared to the others used a traditional tool.

2 The need for higher-order thinking skills, video tools and digital skills

Regarding the need for HOTS and digital skills in the labor market, there are numerous arguments. As McLean (2018) said, there are ninety-two of future jobs that can like digital skills and forty percent of future jobs would call people who will tack together and work with confidence in digital environments. According to OECD (2019), researchers reinterred the idea of digital skills combined with high order thinking skills using at future work as a highlight that learners coming into classrooms in 2018.

Other ideas suggest that the digital skills aren't any longer perceived as a need move and this is a right for each child, to an adaptative world. In the curricula domain, it is a concern to replicate this idea- forty second of Australians believed that the present program is run out of time and half-hour aren't assured that kids are being ready for future jobs (Cowan, 2018). Schools are being able to incorporate video-games to create additional innovative and interesting teaching strategies.

In research realized by the OECD Programme for the International Assessment of Adult (2016) about three key domains((literacy, numeracy, and problem solving) for adult skills important in the labor market, there are evaluated a total of 50250 adults (aged 16-65). The results show that a connected profit is that the wage premium is related to digital skills. Peoples who don't have any expertise in working ICT earn eighteen less per hour, on average, than those that perform below level one within the research. When we take different suppositions into consideration, such as age, gender, academic profile, proficiency in attainment, and accomplishment the results suggest that digital skills are a special need for those people. A great example is the use of e-mail at job-workers with no expertise in working with ICT tools that can earn 6% less per hour than those who have not used the bottom level of proficiency (OECD, 2016). Workers, measured at level two or three in downside finding working with ICT tools earn twenty-sixth percent/ hour than those performing below level one. Staff with higher skills who used digital environments are paid more because they can involve bigger use of processing information and skills.

In the age of disinformation and fake news, it is crucial to use critical thinking digital skills in online contents (like in video-games) to evaluate the quality of messages, to extract the valuable arguments and to understand the nature and the source of resources (Dede, 2010).

Krueger (2020), from the International Society for Technology in Education (ISTE), said that working with video-games, students are practicing their higher-level thinking skills when they explore ICT tools to resolve more easily their homework or to collaborate others. Another project using HOTS with technology engaged is developed by Eileen Murph, when founded ThinkCERCA, a brilliant framework to help teachers using video-games to engage learners in critical thinking in social sciences, English, science, and math.

In developing methods to explain the significance of using video-games in learning, researchers (Cotton, 1988; Marso & Pigge, 1993) talks about the teaching practices in revealing that often the majority of time spending in the classroom is based on assessing lower-order skills, like recall of memorizing and this is not a needs. The changing world called skills beyond comprehension, like thinking about information, analyze them, synthesize concepts, evaluate arguments, create new content, and useless, making connections (Miscovich, 2017).

In research conducted by Ruth (2017) the results explain the connected relation between thinking and video games. The author used mixed methods to collect quantitative and qualitative data from nursing students about their perspective of using video-games to improve thinking. The results obtained confirm the research questions that students using video-games are practicing deeper thinking and is a real need to having different instructional approaches to engagement learning.

McMahon (2009) examined the relationship between students working with video-games and their development of higher-order thinking skills and the results confirms that there is a significant correlation between the students' computer skills and the development of critical thinking skills and there is a significant correlation between the length of time spent within the video-games

environment and the development of critical higher-order thinking skills. The research instruments used were the Level of Technology Implementation (LoTI), the Australian Schools Computer Skills Competition (ASCSC), and Ennis' Weir Critical Thinking Essay Test (EWCTET). This approach is closely identified with the work of Ganapathy and Kit Wai (2017) and can conclude a strong relationship between HOTS and the video-games. In her review, the author highlights the impact of video-games on promoting HOTS among secondary school teachers in ESL classrooms and so the video-games booster learners' usage of deeper thinking skills. This paper provides a framework for the importance of the effect of video-games practices in mathematics and science on future teachers' students' development of thinking skills.

3 Research Methodology

3.1 Study purpose

The study looked at the effect of using video tools in mathematics and science on future teachers' students' development of higher-order thinking skills (self-perceived questionnaire). The HOTS meaning, in this research, is defined by Bloom`s taxonomy of learning (cognitive skills) and includes analysis, synthesis, and evaluation skills.

So, to that, were framed a series of hypotheses that could be accepted or rejected based on statistical analysis:

1.1 H0: There is no significant correlation between using video tools and the development of students in higher-order thinking skills.

H1: There is a significant correlation between using video tools and the development of students higher-order thinking skills

1.2 H0: There is no significant correlation between using video tools and the development of students in higher-order thinking skills in maths.

H2: There is a significant correlation between using video tools and the development of students in higher-order thinking skills in maths.

1.3 H0: There is no significant correlation between using video tools and the development of students in higher-order thinking skills in science.

H3: There is a significant correlation between video tools and the development of students in higher-order thinking skills in science.

To test the hypotheses were used SPSS and calculated the reliability coefficients, the correlation coefficients between data gained from these instruments, and the ANOVA test.

3.2 Sample

Participants included future teachers, students enrolled in a teaching program, from a technical university, voluntarily. The total number of students involved in research was initially 316, but, after several steps in research, remains 172). The research group (N=86) was the state of students who have selected the courses of the teaching program and are using video tools for learning science and maths(123 male students and 49 female students).

3.3 Research instrument

This study used the quantitative approach, a questionnaire of higher cognitive processes was adapted, tested, and selected designed to evaluate the attitude of future teachers using video tools for learning in science and maths. The indicators included in the index of video tools practices in mathematics and science using HOTS skills are presented in Table no.2(Likert-type questions). As can be seen, 17 indicators for science and 14 indicators for maths are selected in the final research instrument used. The reliability coefficient of pretest data was .84, while the coefficient derived from the posttest data procedure is reported as .82, which means that data research was valid. The respondent was testing by an anonymous survey, using G.Form while teaching program beginning classes (March-June 2020).

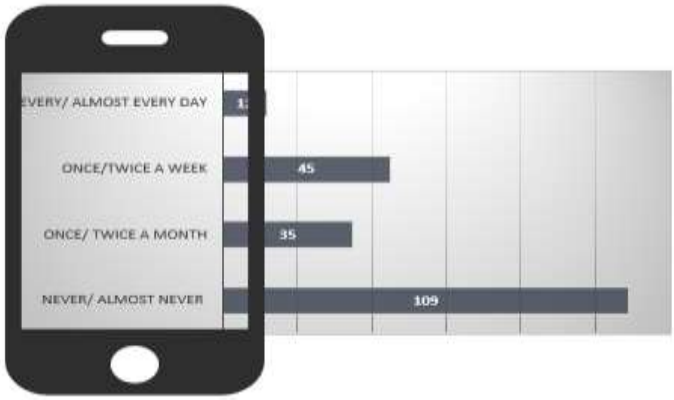
Math indicators	Science indicators
Use of video tools for mathematics Using video tools for playing simulations in maths Frequency of use of computer or a tablet at maths for mathslearning Students using video tools s to look up for information in maths Students explaining their understanding in mathematics using video tools Students explaining style and structure of text in mathematics using video Students drawing inferences and generalisations from text in mathematics using video tools Students identifying main ideas of text in mathematics using video tools Students comparing text with their own experiences in mathematics using video tools Opportunities for students to explain their ideas in mathematics using video Making predictions about what will happen next in mathematics using video tools Students using video tools to practice skills and procedures in maths Students using video tools to process and analyse data in maths Solving problems with no obvious method of solution in maths using video tools	Use of video tools for science Using of video tools for playing simulations in science Frequency of use of computer or a tablet at maths for science learning Students using video tools to look up for information in science Students explaining their understanding, using video tools in science Students explaining style and structure of text using video tools in science Students drawing inferences and generalisations from text using video tools in scienceStudents identifying main ideas of text using video tools in science Students comparing read text with their own experiences in science using video tools Opportunities for students to explain their ideas in science using video tools Making predictions about what will happen next in science using video tools Observing and describing phenomena, using video tools, in sciences Students designing and planning science experiments using video tools Students using video tools to practice skills and procedures in science Students using video tools to process and analyse data in science Processing and analysing using video tools in science Students drawing conclusions from an experiment in science using video tools

Table 2. Indicators included in index of video-games using in mathematics and science using HOTS

3.4 Results and discussion

Regarding the testing of the first hypothesis, if the students use video tools for learning in science and maths, the data below confirm this. Looking at the use (Graph no1) in mathematics, it can be observed that most students do not use video tools at all or almost at all (N = 109), once / twice a week (N = 35), once / twice a month (N = 35) or very few use ICT tools every / almost every day. If we look at the situation in science, the situation is different: most students (N = 92) use video tools once / twice of the week, followed by those who do not use at all or almost at all (N = 83), while 45 students use video tools for every / once a day or once / twice a week (N = 15). This means that digital instruments are used more often in the field of science.

Graph 1. Video tools using in learning science(frequency)



Graph 2. Video tools using in learning maths (frequency)

Regarding the testing of the second hypothesis, the use of video tools demonstrated better HOTS skills than HOTS students using traditional tools, as can be seen in Table no3, there are statistically significant differences. The one-way ANOVA test, used on posttest data presents the differences between groups. The results shows that was significant difference of HOTS improvement for these future teachers(Table no.4).

Variable	Sum of Significance	df	F-value	Significance of F
Treatment Between	1 242.957	1	9.764	0.003**
Within groups	9797.517	86		
Comparison Between	.107	1	0.002	0.968**
Within groups	5576.786	86		

** Significant at the 0.01 level

Table 4. Summary of data showing the differences among research groups(posttest data)

Looking at the latter hypothesis, if students using video tools demonstrate better use HOTS in maths and science than students using traditional tools, the statistical results confirm this. The evidence from data research presented in Table no.5 suggests that there are difference between the scores on science and maths HOTS. About science HOTS, the most interesting piece is about the synthesis skills with maximum scores in posttest data, and in maths a clear example is about evaluation skills improved.

Group tested	Indicators	M	SD

	Posttest no use of	Analysis	18.93	4.06
Science	video tools	Synthesis	22.51	14.07
HOTS		Evaluation	23.00	6.43
	Posttest video	Analysis	22.19	3.82
	tools use	Synthesis	26.00	7.80
		Evaluation	24.32	4.28
Maths HOTS	Posttest no use of	Analysis	19.05	3.23
	video tools	Synthesis	23.05	5.17
		Evaluation	15.21	4.72
	Posttest video	Analysis	19.32	4.23
	tools use	Synthesis	21.47	4.60
		Evaluation	20.36	3.48

Table 5. Summary of data showing the differences among research groups(HOTS), in science and maths

4 Conclusion

Video-games will have a major part to play in personalized learning experiences, based by data research obtained in this paper in that 98% of respondents see video as having a part to play in personalized learning experiences.

About the results of the obtained research, this research achieved its purpose, namely to demonstrate the importance of using video tools for personalizing learning, in the field of thinking skills development (HOTS). So there is a significant correlation between using video tools and the development of students in higher-order thinking skills, there is a significant correlation between using video tools and the development of students in higher-order thinking skills in maths and there is a significant correlation between video tools and the development of students in higher-order thinking skills in science, but in special circumstances. We do not have a concrete explanation of what are the specific video tools that improve students' thinking skills (HOTS), but it is important to mention that students looked for helpful options to meet the need for face-to-face teaching during the COVID 19 pandemic.

Although the use of ICT tools in education brings many benefits to learning and individualizing learning, it is important to note that the right to quality education is regulated for all children, not just those who may have digital tools. Therefore, in the present study, it is important to mention that the respondents had their own resources for using ICT tools and not provided by school institutions. In extensive research, Dogaru and Anghel (2019) drew attention to the existing risk factors in Romania, in terms of access to education, digital resources, and the limited support offered by schools to students in risk categories.

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