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CHALLENGES OF DISTANCE LEARNING DEVELOPMENT IN NATURAL SCIENCE SUBJECTS IN PRIMARY SCHOOLS DURING THE SARSCOV-19 PANDEMICS IN RNM

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Abstract

The research is based on the qualitative analysis of distance learning development in the natural sciences during the time of the SarsCov-19 virus pandemic in the Republic of North Macedonia. The research was conducted in April 2020 or one month following the interruption of the educational process at all education levels in RNM. 50 teachers of primary schools, who teach in the Albanian language of instruction, took part in the research, out of a total of 18 public schools and two private ones. The teachers 51,7% of the teachers teach in rural areas, and 42,9% in urban areas. In RNM, 61 % of the teachers have access to electronic tools, 26,8% partly and 12,2% do not have access to electronic tools to organize online teaching. 65% of students have access to electronic tools for distance learning, and 45% do not. The teachers use the following online platforms to deliver their classes: Zoom 31,7% of the respondents, Edmodo 24,4 %, 22% Google classroom, 19,5% other, and only 2.4% Meet. The experimental part is conducted individually such as: 46% of the teachers state that 50-75% of the students attend the experimental part, 20,5% state that 75-100% attend it, and 33.5% state that 50% of the students attend the experimental part. A coherent and technological system needs to be developed and implemented, as well as policies, projects and generated contents, that will enable distance learning.

Keywords: distance learning, pandemic, natural sciences, online education platform, primary school, RNM

1. Introduction

Teachers of all subject matters, as well as the teachers of natural sciences, at a time of SarsCov-19 pandemic, of moral and spiritual crises, did their best to mobilize students and deliver the online distance learning process during the 2019/2020 school year in RNM. The organization was on an individual basis, and later on was assisted by training the teachers on how to use the online platforms in several educational institutions. The Ministry of Education did not propose a unified online platform, program, or curricula adjusted to the State of Emergency.

The COVID-19 pandemic resulted in the closure of the vast majority of schools worldwide [9][10]. Many schools moved to online remote learning via platforms including Zoom, Google Classroom, Microsoft Teams, D2L, and Edgenuity [4][5]. Concerns arose over the impact of this transition on students without access to an internet-enabled device or a stable internet connection.

Distance learning may enable students who are unable to attend a traditional school setting, due to disability or illness such as decreased mobility and immune system suppression, to get a good education [6]. Children who are sick or are unable to attend classes can attend them in "person" through the use of robot proxies. This helps the students to have experiences of the classroom and social interaction that they are unable to receive at home or the hospital, while keeping them in a safe learning environment. Distance education may provide equal access

regardless of socioeconomic status or income, area of residence, gender, race, age, or cost per student [2]. Applying universal design strategies to distance learning courses as they are being developed (rather than instituting accommodations for specific students on an as-needed basis) can increase the accessibility of such courses to students with a range of abilities, disabilities, learning styles, and native languages [1].

Students attempt to participate in distance education without proper training with the tools needed to be successful in the program. Students must be provided with training opportunities (if needed) on each tool that is used throughout the program. The lack of advanced technology skills can lead to an unsuccessful experience. Schools have a responsibility to adopt a proactive policy for managing technology barriers [7]. Time management skills and self-discipline in distance education is just as important as complete knowledge of the software and tools being used for learning.

The results of a study of Washington state community college students showed that distance learning students tended to drop out more often than their traditional counterparts due to difficulties in language, time management, and study skills [3].

Educators should be able to adapt existing learning theories for the digital age, while at the same time using the principles of connectivism to guide the development of effective learning materials. What is needed is not a new stand-alone theory for the digital age, but a model that integrates the different theories to guide the design of online learning materials.

To select the most appropriate instructional strategies, the online developer must know the different approaches to learning. Strategies should be selected to motivate learners, facilitate deep processing, build the whole person, cater to individual differences, promote meaningful learning, encourage interaction, provide relevant feedback, facilitate contextual learning, and provide support during the learning process.

Teaching and learning of science concepts and practices have traditionally been an interactive process. That interaction most often takes place in classrooms and includes the passive consumption of lectures, intermingled with hands-on work in laboratories or field locations. These activities are interspersed with student interaction with textbooks, computers, and the completion of learning activities such as problem sets. Distance and distributed education afford new possibilities (especially related to increasing access) at the same time as it reduces the capacity for traditional science instructional models and activities. [8]

Today's distance education systems include resources for individual study (intrapersonal dialogue) such as self-instruction texts, Web-based instructional systems, video recordings, etc., and resources for interpersonal dialogue such as tutorials, telephone counseling, synchronous and asynchronous conferencing, and email.

In distance learning, simultaneous stimulation theories are lacking, as well as the problem-solving theories and the development of experiments has been complicated.

In RNM, during the coronavirus COVID-19 pandemic, the students' motivation to attend the online classes has gradually declined and their participation in online tests is not complete. They did not have a training course using distance learning tools. Bearing this in mind, this research aims at documenting this period of the state of emergency and its impact on the delivery of the natural sciences subject matters in the primary schools, and to create a foundation for drafting customized digital curricula. By analyzing the needs and shortcomings during this period, we can redesign our teaching in the future by introducing innovative electronic technologies to our classes,

which include the interactive educational platforms and the evaluation of online students' tests. The new educational platforms like Edmodo, Google Classroom, Quizlet, Wakelet for education, etc., there is a range of didactic tools for online delivery of classes, such as: quizzes, polls, video demonstration options, PowerPoint or group work, as well as formative evaluation. The only impediment during the pandemic in RNM, which seems to be difficult for the teachers, is the lack of such platforms in native languages and lack of training for professional use. Ditto, a student coping with a new situation should get accustomed and to create a new outlook on their engagement during online classes, where individual commitment is most expressed.

2.Work objective

The research has been done with the aim of providing us with a reflection on the manner of distance teaching delivery in a state of emergency, and the level of science teachers' readiness to cope with the didactic-methodological, technological and communication needs of distance learning, in a newly emerged, unpredicted and unplanned situation.

3. Work methodology

The research has been conducted in an online survey, using the SurveyPlanet application, providing us with cumulative results in percentages. The survey sample includes 50 teachers of natural sciences of 18 primary schools and two private ones in NRM, out of which 20 were biology teachers, 9 chemistry teachers, 6 physics teachers and 15 math teachers. 51,7% teach in rural and 42,9 % in urban areas. The area of research includes primary schools of: Kumanovo, Skopje, Tetovo, Gostivar, Kicevo, Struga and their villages.59,5% of respondents are female and 40,5% male.

The survey consists of 20 multiple choice questions, which includes questions related to the basic information of the teachers profile (gender, area, subject of teaching), basic information for the methods, materials and digital platforms used for the distance learning during the period of pandemic lockdown, basic information for the students activities during this period of time, level of possession of electronic means for the development of distance learning by students and teachers of the natural sciences, the reflection of the teachers for the level of preparation for this situation and solutions for the next period of time and the next school year (2020/2021), which unfortunately will also find us in pandemic situations.

3. Results

Since the SarsCov-19 pandemic virus was an unpredicted situation, the education system throughout the world, including the Republic of North Macedonia, faced multidimensional challenges like: the lack of distance learning platforms unique for all schools at the national level, lack of applications in native languages, professional unpreparedness of teachers and students to use online education tools, lack of electronic communication technology of a significant number of students, and lack of policies and projects, which would generate new ideas to overcome the crisis.

Regarding the question of how many teachers deliver the distant learning in your school, the respondents stated that: 66,7% of all teachers deliver the distance learning process, and 33,3% partly delivered the distance learning in their school. 54,8% stated that have received training from

the school management on how to use education platforms and 45,2% stated that they had not received any training, and on the other hand the respondents stated that: 73,2 % of the students had not been on how to use the online education platform and only 26,8% had been trained.

In terms of the equipment for teachers and students with the necessary electronic tools, like laptops, cellular, IPads, etc., for distance learning, the respondents stated that: 61 % of the teachers have electronic tools, 26,8% partly and 12,2% that not all teachers have the necessary tools to deliver the distance learning education process. On the other hand, they stated that 65% of the students have electronic tools for distance learning, and 45% did not.

On the student attendance and activity in classes, the following results were obtained: 46,4% of the natural science teachers responded that student attendance had been between 75-100% in online classes, 39% stated that student attendance had been between 50-75%, and only 14,6 % stated that 25-50% attend online classes.

As for the delivery of classes during the natural sciences classes, the following results were obtained:

- Teachers of the natural sciences use the following online teaching platforms: Zoom 31,7% of respondents Edmodo 24,4 %, 22% Google classroom, 19,5% other, and Meet only 2.4%.
- Students in contrast to regular teaching, only 61% debate, 36,6% partly debate and 2,4% do not debate, and as for the regular attendance of doing their homework 58,5 % do their homework completely, and 41,5% partially.
- The experimental part is delivered individually, as follows: 46% of teachers state that 50-75% of students do the experimental part, 20,5% state that 75-100% do the experimental part, and 33.5% state that experiments are done by below 50% of the students. Experiments, in 45% of cases, have been presented with pictures, in 20% of cases with Power Point, 17,5% with videos, and 17,5% of students do not do the part of experiments.
- Student grading at the natural science subjects is done as follows: 26,8% formative grading/evaluation, 28,6 % summary grading, and 46,3% combined grading.
- 31,7% of the respondents have not applied for online tests and 68,3% have applied.

39% of those teachers who applied for the test, stated that 60-90% of students have taken part in tests, and 22% stated that 90-100% of students take the online tests and the others 49% stated that the participation of the students on the online tests was under 60%.

- 73,2 % of the teachers responded that distance learning cannot substitute classic teaching, and explained it as follows: there is lack of direct demonstration; not all experiments can be shown on video; there are technical difficulties for students that attend online classes on their phones; internet crashes, eton linec.26,8% of the natural science teachers claims that distance learning could substitute the classic teaching.
- None of the schools has an online library, and only 58,5 % of respondents use online books, as usual in a different language than native, most frequently in English.

4. Conclusions

Natural science teachers on RNM face with difficulties in demonstrating their experiments; there is lack of video-materials or educational games in student language of instruction, and they are forced to redesign their classes in the absence of adapted curricula. Teachers have not found professional support by the Ministry of Education and Science for purchasing online education platforms or online books during the period of SarsCov-19 pandemic.

34,1% of the natural science teachers have communicated using the live online meeting platforms (31,7 % Zoom and 2,4% Meet). The other largest percentage of 65,9% has used platforms that do not provide a student-teacher direct visual contact, such as Google Classroom, Padlet, Viber, etc.

The main obstacle of student non-participation in online learning is the lack of electronic tools, low motivation, and lack of knowledge of how the education platforms work.

Grading in natural science subjects, in 46,3% of cases was done applying a combination of a formative and a summary method.

Education systems in the Balkans are often outdated and teachers lack sufficient knowledge in using electronic tools to deliver the online class/Appendix 1). This has caused great disparities among and within the countries, among the private and public schools, and between rural and urban areas in terms of knowledge and resources at disposal. Unlike the public schools, the private schools have provided training for their students on how to use online platforms.

In RNM, there is a delivery of activities, projects, or initiatives regarding online learning, however those are sporadic and uncoordinated to implement the “open education” concept. These activities, with international support (such as the Global Teacher Academy, T4 Education /Appendix 2) require a functional axis that would integrate them into the system. A coherent and technological system needs to be developed and implemented, as well as policies, projects, and generated contents. All these models should be coordinated and integrated both by the individual that implements them and the user that uses these resources. In this case, resources shall be an online service or a website, which will be a building bridge among those who use and develop activities – the Ministry of Education and science, teachers, and students. To select the most appropriate instructional strategies, the online developer must know the different approaches to learning. Strategies should be selected to motivate learners, facilitate deep processing, build the whole person, cater to individual differences, promote meaningful learning, encourage interaction, provide relevant feedback, facilitate contextual learning, and provide support during the learning process.

During the lockdown, teachers will be focusing on core curriculum content, meeting the needs of vulnerable pupils as well as enhancing student engagement, mixing between activities, types of assignments, and differentiation techniques to support a range of pupils.

Teachers, students, and parents are all grappling with this radical transition from the blackboard and smart boards to virtual classes. The catchword for all the schools is to offer modules that are engaging, flexible, and high on quality. However, this change also came with its fair share of challenges like poor internet connectivity, users not following instructions, training of teachers, and updating their skills online, and so on.

Nomenclature

RNM Republic of North Macedonia
SarsCov-19 Sars corona virus 2019

Appendix

1- During the pandemic and many webinars were held by non-governmental organizations for education in the Balkans, like from MIOS Tuzla, Bosnia and Herzegovina, Zbornica CG, Croatia, etc. Therefore, the conclusion by teachers was that the current education systems are old and don't give support for distance learning.
2- Global Teacher Academy and T4 Educations are global networks of teachers, that support teachers from all around the world in improving the teaching on distance by training them by webinars.

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