Does Online Education Ensure Effective Teaching and Evaluation of Geography? A Romanian Perspective of 5th Graders

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Abstract

Online education developed greatly during the Covid 19 Pandemic. Although there were online learning and teaching resources before 2020, they were not sufficiently tested or used. In modern geography, students must develop their skills, knowledge, be motivated and involved in geographic inquiry. Our objectives are related to the research question of this study, namely how students perceive this new form of evaluation, online evaluation, and whether they have certain preferences related to the tools used in online assessment (Google Forms and Wordwall). Data on students' perceptions regarding these online assessment tools were collected through an online questionnaire on a sample of 85 fifth graders. The analysis methods were word cloud analysis and multivariate statistical analysis. The results obtained showed that students are open to online assessment through new methods. Moreover, this type of assessment offers them a simpler alternative to learn, with them better understanding or easily remembering the taught lesson. The appearance of the two user-friendly interface platforms or the easy to use mode is an important variable perceived by students, as they can induce in students the joy of participating in an online competition. There are also negative aspects reported by them, especially related to concerns regarding the internet connection or to time given being too short. The usefulness of these tools is not to be neglected at all, given that the target group has been continuing online education for more than a year and the teaching-learning process must adapt to the current context.

Keywords: *Geography, education online, Google Forms, Wordwall, Word cloud analysis, Redundancy Analysis*

Rezumat. Educaţia online asigură o predare şi evaluare eficientă a Geografiei? O perspectivă românească a elevilor de clasa a 5-a

Învăţământul online s-a dezvoltat mult în timpul Pandemiei de Covid 19. Deşi existau resurse online de învăţare şi predare şi înainte de anul 2020, acestea nu erau suficient testate sau folosite. In geografia modernă, elevii trebuie să îşi dezvolte competenţe, cunoştinţe, să fie motivaţi şi implicaţi în cercetarea geografică. Obiectivele noastre sunt legate de întrebarea de cercetare a acestui studiu şi anume cum percep elevii această nouă formă de evaluare, evaluarea online şi dacă au anumite preferinţe legate de instrumentele folosite în evaluarea online (Google Forms şi Wordwall). Datele legate de percepţia elevilor faţă de aceste instrumente de evaluare online au fost colectate printr-un chestionar online, pe un eşantion de 85 de elevi din clasa a V-a (10, 11 ani). Metodele de analiză au fost word cloud analysis şi analiza statistică multivariată. Rezultatele obţinute au arătat că elevii sunt deschişi la evaluarea online prin noile metode. Mai mult, acest tip de evaluare le oferă o alternativă mai simplă pentru a învăţa, înţelegând mai bine sau reţinând cu uşurinţă lecţia predată. Aspectul celor doua platforme interfaţă (exemplu interfaţă prietenoasă) şi modul de utilizare (uşor de folosit) reprezintă o variabilă importantă percepută de elevi, şi anume acestora le poate induce bucuria de a participa la o competiţie online. Există şi aspecte negative semnalate de ei, legate mai ales de îngrijorarea privind conexiunea la Internet şi timpul prea scurt. Evaluarea online rămâne o alternativă în această perioadă. Utilitatea acestor instrumente nu este deloc de neglijat în condiţiile în care grupul ţintă continuă învăţământul online de mai bine de un an şi procesul de predare-învăţare trebuie să se adapteze actualului context.

Cuvinte-cheie: *Geografie, educaţie online, Google Forms, Wordwall, analiza norului de cuvinte, analiza redundanţei*

Introduction

Among the containment and mitigation strategies for the pandemic, the governments of the Central and Eastern European states, including Romania, imposed in March 2020 (more precisely on the 13th of March) schools closure and in-person classes were suspended (Popescu, 2020). In this context, online education developed a lot during the Covid 19 Pandemic. Although there were online learning and teaching resources before 2020, they were not sufficiently tested or used. In modern geography, students must develop their skills, knowledge, be motivated and be involved in geographic inquiry (Favier & Van der Schee, 2011) and these goals can be achieved through technology as well. The pandemic has forced the rapid digitalization of the educational process and has done so by employing e-

learning platforms as a means of continuing courses, by our use of digital resources and class technology, making it much more accessible and more efficient than before the pandemic (Yunus & Salehi, 2012).

Following a search on E-information base in Web of Science - Core Collection, Science Direct Freedom Collection, Elsevier, Wiley Journals, Springer Link Journals, Google Scholar, the following applications were identified, under the name of new methods of learning- teaching geography: GIS in Geography classes, Google Earth, Google Maps in Geography classes, Virtual reality into learning and teaching. As evaluation methods we mention, Google Forms, Kahoot, Quizlet, Padlet, Setera, Wordwall. In our study, we have chosen to discuss evaluation methods. We have selected the most used evaluation method in Romanian schools, respectively Google Forms, and one less used by teachers, namely Wordwall.

Google Forms is an application created by Google that allows the application of tests and surveys in the educational environment. Recently, this application has gained great popularity among teachers and students due to its usefulness as an assessment tool (Fransen et al., 2011; Taylor & Doehler, 2014) and due to its instructive nature (Adams, 2008; Denton, 2012; Mallette & Barone, 2013). Among the advantages of this application we list: (1) it can be accessed by several users at the same time; (2) quick access to students' answers that are stored in Google spreadsheet (Insua, 2015); (3) answers can be viewed after the session (Simpson, 2012); (4) it can be used by a large number of students, up to 100; (5) at the end of the test the application collects a series of statistical data through which the teacher can verify which questions have not been solved by the student. Thus, some knowledge that has not been acquired can be discussed by the teacher together with the students (Nguyen et al., 2018).

The Google Forms application menu allows one to choose multiple answers, insert images, videos, etc. From this point of view, it is appreciated as an active learning tool that fosters the development of cognitive skills (Allen, 1995). The results obtained from the evaluation of students can be used by teachers to improve teaching (Gilchrist & Zald, 2008). Not to be neglected is the aspect of time consumption, Google Forms greatly reducing the time allocated by teachers to correct tests because the score can be generated automatically (Ardid et. al., 2014). The results are reliable and are stored in the form of non-editable diagrams (Agrawal & Maurya, 2016). Another advantage of the application is its accessibility, so during the pandemic all educational institutions in Romania used the e-learning platform Google Classroom which directly provides this tool for assessing students.

Google Forms in the version of Google Suite for Education (G-Suite for Education) is a complex application that allows material management, evaluation and analysis of results (Sari et al., 2020). Experimentally, studies have been undertaken that have demonstrated the effectiveness of using the Google Forms application in developing critical thinking, problem solving. In chemistry, Google Forms has been applied to quantify learning efficiency (Sari et al., 2020). In technical terms, this application is very advantageous, since it offers unlimited storage space, high level of security, easy connection.

Wordwall is an easy-to-use platform because it does not require advanced digital skills from users, it provides teachers with a large number of ready-made templates in which they will enter the content of the test. The templates are very varied in structure ranging from quizzes, anagrams, questionnaires to interactive mini-games (Van Drom, 2019) etc. Among the advantages there are to be mentioned: interactive items that can be grouped in different activities, the activities themselves, through their diversity, can be applied to all levels of study. Moreover, a community is created at the level of users, social interaction is facilitated, interactivity is fun. This tool can be used exclusively for individual study (Lewis, 2017). Moreover, although it is an online digital tool, it also offers the possibility to print all the resources.

Some disadvantages regarding the online assessment for Google Forms and Wordall have been identified in the literature, such as: teachers cannot control students during the assessment, students can discuss with each other (Kerka & Wonacott, 2000), the instability of the connection to internet (Mansor, 2012). Given that the tests are conducted online, students may experience emotional stress, frustration (Mansor, 2012) which could have a negative impact on the student. Some studies have highlighted other limitations such as the haste of some students to finish quickly (Azmina et al., 2017) and the impossibility of mathematical symbols being inserted (Nguyen et al., 2018).

Our working hypothesis is related to the fact that although there are several assessment tools available, some are more preferred than others. We point out why and try to capture the students' openness to the new online assessment method. The research questions are: (1) how do students perceive this form of assessment, namely, online assessment? (2) what are the students' preferences regarding the two assessment tools, namely Google Forms and Wordwall?

Data and Methods

Instruments

Data were collected from 85 students in the 5th grade, students aged 10-11 from middle school, from two schools, namely Tudor Vianu National College of Informatics from Bucharest and C. Porumbescu Middle School from Comănești, Bacău County. The evaluation of the students was done after teaching two consecutive lessons from the chapter dealing with Atmosphere, lessons in which the students were evaluated as follows: test 1 - in Google Forms - Warm climate zone; test 2 - in Wordwall - Temperate and cold climate zone. The collection of data on students' perceptions of the two assessment tools, Google Forms and Wordwall, was done by applying a questionnaire also made using Google Forms (Annex 1, additional material). It included 2 questions with several possible answers and 11 questions with a single answer. For the statistical analysis, the perception questionnaire was structured on 13 questions, these being grouped in 3 large clusters.

The first cluster, perception / evaluation method (questions 1, 2, 3, 4, 13) has the following keywords: motivation, open to new methods, easy to learn, easy to remember, classic evaluation methods. We used multiple choice questions, the answer received the code 1 for present, 0 for absent.

The second cluster, online evaluation, like / dislike (questions 5, 6), has the following keywords: results/score immediately, don't get bored / it's funny, enjoy the competition, not enough time to read and understand the questions, time too short, concerns regarding the internet connection, hardly remember the details, the difficulty of the questions, the surprise of an unannounced quiz, don't like online evaluation.

The third cluster, about using Google Forms / Wordwall tools (questions, 9, 10, 11, 12) has the keywords: easy to use; user-friendly interface; user-unfriendly interface; too hard to use; lack of animations and video images.

Methods

The first statistical method chosen was Word cloud analysis, as a method of visual representation of the keywords in the three clusters (Atenstaedt, 2017). The size of the keyword identifies the central point of the analysis, in our case, the highest number of answers associated with a keyword. The word size shows the number of respondents to that item.

From the SPSS 27 package we chose to use the Pearson Coefficient. It is used in research as a method to indicate the direction of a linear association when the two variables have a normal distribution (Mukaka, 2012). Moreover, it shows an association between two variables (Wackerly et al., 2008) an association that does not necessarily imply a causal relationship.

Redundancy Analysis. Using the R software, the Vegan package, we used Redundancy Analysis (RDA) to identify and understand the links of interdependencies, determined by the action of different causes and conditions, which more or less influence the analysed phenomenon (Legendre & Legendre, 1999). Keywords were grouped into explanatory variables (about using Google Forms / Worldwall) and response variables (Online evaluation: like / dislike).

Results

The survey indicated that most of the students, 82.35%, had been evaluated several times, 13 only once and only two students did not know this form of evaluation. Of the two Google Forms and Wordwall tools, students prefer Google Forms (55 students versus 33 students for Wordwall).

In Table 1 we summarized the keywords, the number of answers and the number of the question in the questionnaire. For the first cluster (Fig. 1) the keyword that received the highest number of responses is Open to new methods (61 responses). The fewest answers (45, 43 answers) are related to the keywords easy to learn and easy to remember.

Fig. 1: Word cloud

Applying the Pearson Coefficient, we identified possible associations between the keywords in the three clusters (Table 2). Thus, this index provided support for grouping keywords into explanatory variables and response variables to perform Redundancy Analysis (RDA).

Table 1a: Number of answers per question (from which keywords were extracted)

Cluster_1	Questions/ Key words				
Perception / evaluation method	***Q1*** *motivation*	***Q2*** *open to new methods*	***Q3*** *easy to learn*	***Q4*** *easy to re-member*	***Q13*** *classic evalua-tion methods*
	50	61	43	45	54

Table 1b: Number of answers per question (from which keywords were extracted)

Cluster_2	Questions/ Key words									
Online evalua-tion: like/dis-like	***Q5***					***Q6***				
	Results score im-medi-ately	*don't get bored /it's funny*	*enjoy the competi-tion*	*don't like online evalua-tion*	*time too short*	*concerns regard-ing the internet connec-tion*	*hardly remem-ber the details*	*the diffi-culty of the ques-tions*	*not enough time to read and to under-stand the ques-tions*	*the sur-prise of an unan-nounced quiz*
	39	26	22	19	53	48	17	8	24	17

Table 1c: Number of answers per question (from which keywords were extracted)

Cluster_3	Questions/ Key words				
About using Google Forms /Worldwall	***Q9/Q10***		***Q11/Q12***		
	easy to use	*user-friendly in-terface*	*user-unfriendly*	*too difficult to use*	*lack of anima-tions and video images*
	62/34	23/49	25/17	13/38	47/27

Table 2: Association of keywords within the three clusters

Clusters		Key words			
C_1 Perception/eval-uation method	Pearson Cor-relation	**Motivation**	**Open to new methods**	**Easy to learn**	**Easy to re-member**
		-0.131*	-0.326**	-0.302**	-0.369**
C_2 *Online assess-ment: like/dislike*	Pearson Cor-relation	**Don't get bored/it's funny**	**Enjoy the competition.**	**Not enough time to read and to under-stand the questions**	**The surprise of an unan-nounced quiz**
		-0.368**	-0.327**	-0.209*	0.486**
C_3 *About using Google Forms /Worldwall*	Pearson Cor-relation	**Google Forms -easy to use (V16)**	**Google Forms-user friendly interface (V17)**	**Dislake Google forms -lack of ani-mations and video images**	**Dislake Word-wall -user un-friendly inter-face**
		-0.938****	0.492**	-0.481**	0.236*

* A correlation coefficient from -0.25 to 0.25 means a very weak or zero correlation.

** A correlation coefficient from 0.25 to 0.50 (or from -0.25 to -0.50) means a weak correlation acceptable degree of association).

*** A correlation coefficient from 0.50 to 0.75 (or from -0.50 to -0.75) means a moderate to good correlation.

**** A correlation coefficient from 0.75 to 1 (or from -0.75 to -1) means a very good correlation

This type of analysis (RDA) was used to answer the second research question, "What are the students' preferences regarding the two assessment tools?", starting from the assumption that they like and dislike these two tools. The first RDA analysis focuses on what students like about online assessment. The keywords from the three clusters have the following grouping for explanatory variables, the keywords extracted from the questions being related to the two tools EV1 Google Forms - easy to use; EV2 Google Forms- user friendly interface; EV3 Wordwall-easy to use. For response variables the keywords were associated with their perception of these new methods RV1 Open to new methods; RV2 Easy to learn; RV3 Easy to remember; RV4 Results/Score immediately; RV5 Don't get bored / it's funny; RV6 Enjoy the competition (Fig. 2a).

The second RDA analysis focused on what students do not like about online assessment. The data was grouped as follows: explanatory variables EV1- Google Forms - user unfriendly interface; EV2 - Google Forms - interface too hard to use; EV3-Google forms - lack of animations and video images; EV4- Wordwall- unfriendly user interface; EV5-Wordwall - interface too difficult to use; EV6-Wordwall - lack of animations and video images. These variables grouped the keywords extracted from the questions related to what they do not like about the two tools.

For response variables RV1- I Don't like online evaluation; RV2-Time to short; RV3- Concerns regarding the internet connection; RV4 Hardly remember the details; RV5 The difficulty of the questions; RV6 - Not enough time to read and understand the questions; RV7- The surprise of an unannounced quiz (Fig. 2b).
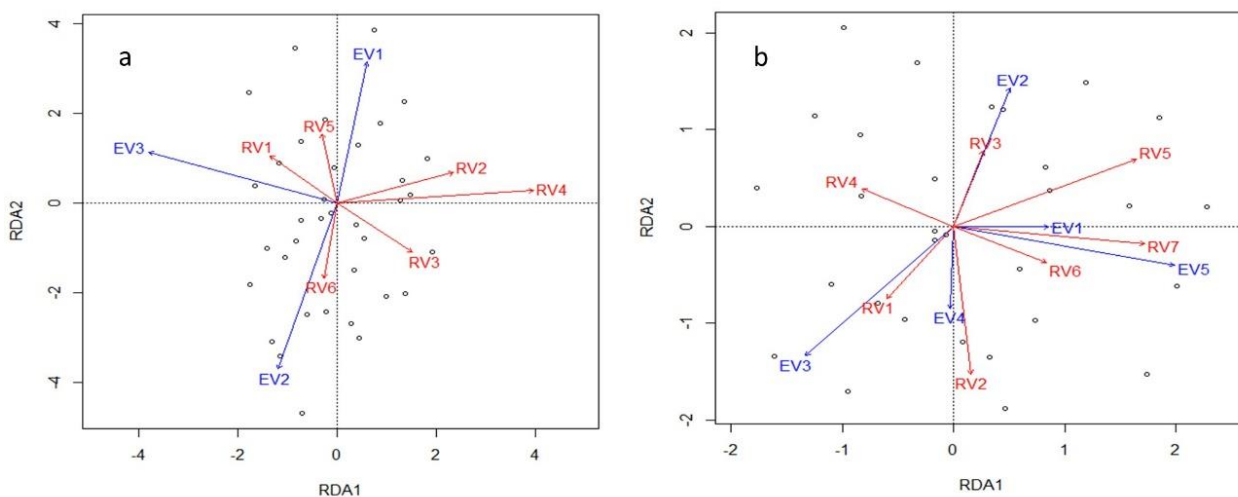

Fig. 2: Redundancy analysis

Discussions

How do students perceive online assessment?

The survey indicates that students are open to assessment through new methods, although some of them also prefer the classic method of assessment. From the first set of questions from cluster 1 (Perception / evaluation method) where the questions had multiple answers, although most of the answers were obtained for open to new methods, however, more than half of the students answered that they would not gives up the classic method of evaluation. This answer could explain the fact that the sudden transition from classic, traditional education to online education did not completely change students' perception of the assessment process. Moreover, in such a short time, students have struggled to acquire

digital content (Ilovan & Ciupe, 2020). Other answers were associated with the fact that students feel calmer, more relaxed if they are evaluated by this method compared to the classic one, in the classroom. From the analysis of the perception questionnaire, this new type of assessment offers a simpler alternative to learn, better understand or easily remember the lesson being taught. The answers to the question "do you like being evaluated online" showed that most students are interested in finding out the test results/score immediately. Moreover, students see this type of assessment as a fun game that does not bore them. Those who have been assessed online several times, seem to associate this type of learning with the fact that it helps them learn more easily. Also, based on their responses, it resulted that they like the competition with their colleagues in an online environment as well, not only in a traditional class.

There are also negative aspects of this type of assessment that students noted through the types of responses associated with the online evaluation cluster: like and dislike. Thus, the biggest fear that the 90.58% of students (n= 77) have is related to the allotted time (too short), hence they cannot complete their test because they do not have time to read and understand the questions. Also, another problem is related to the concern that they could loose the internet connection during the test. The difficulty of the questions in the online format t were mentioned only by 29.41% of students (n=25) from the entire sample. It was also found that the preference for online assessment is not associated with learning motivation, but only with aspects related to the fact that they find it more fun and they do not get bored.

Are Google Forms and Wordwall the right tools for evaluation?

The students in the target group were evaluated online at geography on the contents taught during the respective class using Google Forms and Wordwall as tools for dynamizing the time and as a form of obtaining feedback. It was explained to the students that the purpose of the tests was not to evaluate their school performance, their ability to retain much and quickly what was taught at that time, but their familiarization with the online teaching-learning method.

To identify students' preferences for the two tools and the possible interdependencies between preferences, perception and technical features of the two tools, the general methodology implemented by Legendre & Legendre, (1999) provides our study with answers related to each response variables was regressed on the explanatory variables. The two types of variables from the two types of RDA analysis (Fig. 2a,b) show that there are significant correlations between the chosen variables (Pătru-Stupariu et al., 2017). Thus, it can be seen that the angle between a response variable and a quantitative explanatory variable reflects their correlation (Legendre et al., 2011).

For the first RDA analysis (Fig. 2a) the most representative correlation is made between EV2 Google Forms- user friendly interface / RV6 Enjoy the competition. According to Ausubel and Robinson (1981), the assessment has six main functions, in the current research we organized a type of online assessment with motivational function. The short tests applied at the end of teaching sessions were meant to raise the students` motivation to stay connected throughout the whole lesson, taking into account that one of the biggest disadvantages of online learning is represented by the lack of control upon the students` distance activities. This statement is explained also by the interdependence relationship

between EV2 Google Forms- user friendly interface/RV6 Enjoy the competition, which indicates that the friendly interface of the used tool acts like a stimulus upon the students` needs to compete with each other. This correlation can explain that competition can be an important motivational factor for students (Licorish et al., 2018). The answers given by students indicate that they can experience a strong feeling of self-efficiency (Bandura,1994), confidence in their abilities to fulfil their tasks (Bandura, 1997; Pajares, 1996; Zimmerman, 2000) even within the online context.

Another correlation is given by EV1 Google Forms - easy to use / RV5 Don't get bored / it's funny; EV3 Wordwall; -easy to use / RV1 Open to new methods. Our analysis shows that these three correlations explored the benefits of online assessment from a pedagogical point of view, focusing on: learning motivation, opening students to new methods, students' ability to learn easily, to memorize, etc., by reporting on how students perceive assessment tools (Google Forms and Wordwall). Thus, a friendly interface can induce the joy of participating in a competition for the students. The other correlations show that the ease with which one uses a tool can eliminate the part of boredom from a classic form of evaluation. Moreover, this new form is associated with a fun activity. It was found that the preference for online assessment is also associated with learning motivation. All this explains why students are open to new methods of assessment.

For the second analysis (Fig. 2b) there are several correlations identified between the two variables. The one that tends towards the perfect collinearity of vectors is the one between EV2-Google Forms - interface too hard to use / RV3-Concerns regarding the internet connection. The following three correlations are significant by the angle made by the two vectors of the variables (they were read clockwise). The first one, EV1- Google Forms - user unfriendly interface / RV7- The surprise of an unannounced quiz. Second one, EV4-Wordwall- unfriendly user / RV2-Time to short. Third one, EV3-Google forms - lack of animations and video images / RV1-Don't like online evaluation.

The interdependence relationship between EV1-Google forms- user friendly interface/RV7- The surprise of an unannounced quiz makes us aware of the emotional function which can have either a pozitive or negative contribution upon the school proficiency (Doğan, 2016). Although the students were at home, in a familiar environment for them, far from teachers or peers, the unannounced quizzes still had an important emotional impact on them. The emotion management, the building of the students self-confidence, the psychological dimension of evaluation are just a few of the main aspects we should consider when speaking about online learning.

The interdependence relationship EV1 Google Forms- easy to use/RV5 I don`t get bored/it`s funny, according to Carter (2013), using Google forms in the classroom made the assessment process easy. Our research also emphasizes the positive impact on our students taking into account the fact that they don`t get bored, most apps are tools which support the motivation (Diab, 2019) of those students who were not generally interested in getting involved into the classroom talks (Wang, 2015). In this analysis group it can be seen that it is not the assessment methods that are representative of what the students do not like, but the technical aspects. What is evident from the correlations presented above is the students' perception related to concerns regarding the internet connection, followed by time too short or the surprise of an unannounced quiz.

This difference in perception in favor of Google Forms can be generated by the structure of the included items, a greater variety of short answer items, multiple choice items, association type items. Students have the opportunity to build complex answers. Moreover, Google Forms is preferred because this tool has a friendly interface that would explain an association with an increase in the frequency of those who memorize more easily using this tool. Google Forms were a very useful tool in evaluating the contents of the Earth's climates because it allows the insertion of case studies to develop student's synthesis capacity and the formation of transversal geography- biology skills.

Unlike Google Forms, the Wordwall applied to our sample of 85 students included a quiz questionnaire template with multiple choice items. Students liked Google Forms more than Wordwall because Wordwall is an application that does not allow you to combine types of items, therefore, the tests can only be very short and to the point. This is why students perceived time as a problem when using this assessment tool.

Multivariate statistics has shown us that the usefulness of these tools is not negligible in the conditions in which the target group continues online education for more than a year and the teaching-learning process must adapt to the current context.

Conclusions

Our research started from a working hypothesis to demonstrate the links between students' preferences for methods used in online assessment, in terms of their benefits, and the technical features of the two assessment tools used in our analysis - Google Forms and Wordwall. The three research methods used, Word cloud analysis, simple statistical analysis and multivariate statistical analysis, have shown that the working hypothesis is confirmed. Thus, significant correlations were identified between the response and explanatory variables. The obtained results

allowed the identification of the answers to the two research questions. On the first question: How do students perceive this new form of assessment - online assessment, the results showed that although students are open to new methods, more than half would not give up the classic assessment. Students acknowledge the benefits of online evaluation such as results/score immediately, don't get bored / it's funny, enjoy the competition but the aspects related to the evaluation time, the stability of the internet connection, etc. should not be neglected at all. The results of the research showed that students prefer Google Forms because some technical aspects, such as the friendly interface or easy to use, have considerably influenced their perception. Teaching and evaluation through applications developed in the online environment are starting to become more and more used tools in Romanian schools. Online evaluation remains an alternative during this period.

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Author contribution

Ileana Pătru-Stupariu: ideas and conceptualization of the manuscript, questionnaire conceptualization, data processing software R methodology, investigation, formal analysis, writing - original draft.
Diana-Corina Petculescu: questionnaire conceptualization, data collection, investigation, writing - original draft, preparation for submitting.
Mărioara Pascu*: questionnaire conceptualization, data processing software SPSS, writing - original draft, investigation, preparation for submitting.

Authors have read and agreed to this version of the manuscript.

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