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Preservice Science Teachers' Opinions on E-Exams

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ABSTRACT

With the development of information technologies in the new century, changes are experienced in every area of life and its reflections are seen in different areas. One of its reflections in the field of education is E-exams, which have been used as an alternative to paper and pencil exams for years. Academic studies are needed for the integration of E-exams in the field of education and training. Thus, this new technology can be used efficiently in the field of education. Students' views, which are at the center of education and training, are of special importance for the proper use of the E-exam. In this study, student views on E-exam applications in science education are examined. The study was carried out with students studying science at a higher education level. A prepared questionnaire form was used as a data collection tool. The findings obtained revealed that student views towards E-exams in science education were significantly positive and that E-exams, compared to k-exams, were positively welcomed by the student.

Keywords: E-exam, Science instruction, Internet

INTRODUCTION

Evaluation and development of education and training are on the agenda of all countries as an important issue. Within education the level of attainment in the determined goals is constantly evaluated by making different evaluations at different levels. Evaluation is carried out at every stage, starting from the basic level of education all the way to higher education. The purpose of higher education is to develop student qualifications professionally. Evaluation of this development is necessary to evaluate the level of achieving the set goals. Evaluation, learning, and reasoning is an important area in higher education (Joughin, 2009). Measurement and evaluation in higher education and supporting the learning process both provide benefits for important topics such as evaluating students' success in lesson needs and maintaining the standards of the profession or discipline for which students are prepared (Joughin, 2009).

As a measurement tool, exams allow students to evaluate their performance in a particular area by comparing them to a certain standard or by comparing them to other students (Woolfolk, Hughes, & Walkup, 2008). In education, two types of exams are used in student assessments: norm-based evaluation and criterion-based evaluation (Evers & Walberg, 2004). In norm-based exams, evaluation use is based on a previously accepted norm. The norms determined include the norm groups in the classroom or throughout the school, provincial-district, and nationwide (Woolfolk et al., 2008). Small diameter is generally the norm, such as all students in the class determine the top three students in a class; group norms in determining successful students in higher education are the students who pass the exam throughout Turkey. Another type of assessment criteria-based exam reveals what the

examinees can or cannot do in a specified area. Instead of being compared to a group, there is a predetermined criterion through which evaluation is made (Woolfolk et al., 2008). For example, if students who take a higher education course must earn least a 70% to pass, the determined criteria are sufficient and the student is considered successful or unsuccessful according to this criterion.

The types of questions used in exams determine the evaluations based on a criterion. There are many variations, such as match type, multiple-choice, right-wrong type, and open-ended questions (Borich, 2013). The course teacher evaluates students according to various question types and a determined success criterion. These exams are usually held face-to-face in a specific classroom setting at schools. However, as a reflection of the results of the development in technology, measurement and evaluation processes have started to be performed without the need for a specific place, time, or special examiner or supervisor. It is possible to examine two categories: exams in the field of education, exams performed in a certain time and place (K-Exams), and electronic exams that do not require a special time and place (E-Exam). Since an E-Exam is held in a computer environment, it is a type of exam that can be performed repeatedly in different computer environments and at different times.

It is predicted that E-Exams, which will take place in the measurement and evaluation system of the future, will replace K-Exam (Wise, 2019). Increased computerization, especially in social and education systems, indicates that this will happen earlier than expected. In order to provide this transition appropriately, depending on the desired goals, the academic studies conducted and to be conducted provide significant knowledge. An examination of relevant literature on E-Exam applications in education shows that it has been used in different fields and for different purposes; a wide variety of useful information has been obtained. Some studies in this area are presented below.

Online evaluations have a positive effect on student learning strategies (Zlatovic, Balaban, & Kermek, 2015). One study, carried out at a university as an innovation step in education, looked at the results of interactive online evaluations: students were shown to perform better academically, and even students with low motivation levels used this technology (Ibabe & Jauregizar, 2010). The number of questions in online exams can be changed at any time. Interactive multiple-choice tests can be used as an alternative to written tests, especially considering the time spent (Karl et al., 2007). Computerized tests have several advantages, such as ease of timing, instant scoring ability, and advanced security (Vrabel, 2004). The comfort of students in computer exams is related to computer experiences. However, neither computer experience nor anxiety shows any significant correlation with performance in computer testing. While the students performed much better on the paper test than the computer test, no statistical difference in the ranking in the two evaluation forms was revealed (Lee & Weerakoon, 2001). This shows that online exams can be used as an alternative to paper and pencil exams. Another study found that using computer-based assessment with constructive and fast computer-based feedback reduces the difference in success of a new generation of digital students (Helfaya, 2019). In particular, the age of getting acquainted with the technology of each new generation can be considered to increase as a result of interaction with earlier and newer technologies. Another result from the same study revealed that many participants valued the E-media study compared to the K-exam assessment and appreciated the timely and constructive feedback they received (Helfaya, 2019). Whether there is a significant change in the performance of the students that depends

on the screen in the E-Exam is another subject examined. In paper and pencil tests, students perform reading, writing, and problem solving in a certain area. In an E-Exam, this field is the computer screen. In a study examining the effect of the size of the screen on student performances, there was no significant evidence to support the positive impact of a large, high-resolution display on student performance (Chen & Perie, 2018).

Analyzing these studies shows that E-exam applications provide different kinds of benefits, but there are specific situations related to the application within each subject area. In order to make the transition from K-exams to E-exams, the specific conditions of each field should be examined in detail. This provides the opportunity to obtain necessary information in the creation of an appropriate e-exam system or systems by making different applications in different types of courses according to educational level. In this context, e-exam application in the field of science education at a higher education level and evaluation of the results obtained are important for the transition to the e-exam system in the future or for the use of these exams in case of need in the existing system. The applications made in science education, which are one of the usage areas of the e-exam, can specifically determine whether these exams require field-specific differences.

This study investigated the opinions of students concerning E-exams at a university level in the field of science education. An answer to the following question was sought: What are the students' views on E-exam application in science education? Within the scope of this research question, answers to the following sub-questions were sought.

- What are the opinions of the students towards E-exams in science teaching in terms of practicality and usefulness?
- What kind of affective effect does the E-exam have on students in science teaching?
- How is the reliability of the exam evaluated by the students since the E-exam is conducted electronically?

METHOD

This study, in which student views were evaluated for the use of E-exams in science education, was carried out with a special work group at higher education. Information about the work group, the data collection tool, data analysis, and how to apply the exam are given below in detail.

E-exam application

Exam application was done in one step, at the end of the subject, in the school and classroom environment. Students participated in the exam with their mobile phones. Wireless internet access was provided in the classroom, thus providing the necessary infrastructure for students without an internet package to connect to the internet for free. Before the concept test was administered a few sample question-answer applications were carried out so the students could get to know the system and needed guidance could be provided to the students. The students were told the following before the e-exam: “Each student will be asked the same questions, but the questions that come to you each instant will differ. For example, while one person sees question number 3 on the screen, their friend will see question number 9. However, you will answer the same 20 questions in total”. “Socrative” software was used for the exam application interface. The students entered the system by writing their school student numbers and answering the questions. After the exam, the opinions of the students about the E-exam were collected via a questionnaire.

Participants

Participants in this study live in Turkey's eastern area and attend a recently established university, studying in the Faculty of Education Science Education Department and "Special Teaching Methods". There was a total of 16 students, 6 males and 9 females. One participant did not give information about gender status. In the sample selection, purposeful sampling from non-probability techniques was used (Gürbüz & Şahin, 2014). The reason for choosing Special Teaching Methods course was to critically evaluate the use of E-exam, which can be considered new compared to the paper and pencil tests in traditional education. The students needed to have a certain level of pedagogical knowledge (classroom management, assessment and evaluation, learning psychology, teaching planning, teaching methods, etc.). Thus, the students were likely to make more qualitative criticisms while evaluating the E-exam application with their pedagogical knowledge. The study was conducted with all students who took the course.

Data Collection Tools

Two measurement tools were used for this study, which was carried out for student views and evaluation regarding E-exam application in science education at a higher education level. The first of these was the questionnaire of student opinions about the E-exam prepared by (Ö. Yılmaz, 2016). The survey evaluated an E-exam with three sub-factors: practicality and usefulness (α = 0.88), affective effect factor (α = 0.82), and reliability (α = 0.81). The Cronbach alpha reliability coefficient calculated for the questionnaire containing 17 items in total was α = 0.87. This measurement tool, which had a high coefficient for reliability, was used to examine student views. The second measurement tool was the "element" subject comprehension test in the science field. This test consisted of 20 questions. There was no reliability and validity study for this test prepared by the teacher. The exam was not prepared for general evaluation, of course. The test was used to determine the level of comprehension of the students about the subject. Four questions in the test, which included multiple choice and right and wrong type questions, were prepared in the form of 16 image question type (IQT). It is easier to prepare an image question type in E-exams than K-exams. The use of IQT is limited, especially since there is limited area for questions in K-exams. While there is an opportunity to use IQT without any limitations in an E-exam, the number of questions is kept low since it is intended that students have an exam application similar to the current K-exams.

Data Analysis

In the questionnaire, which included three sub-factors, some questions were straight while others were inverse question type negative. Corrections were made for the reverse question types while performing the analysis. While the correction was made, since the scoring interval for the survey items was 1-5, the correction was made as 6-X (x: scoring given to the statement). Thus, the questionnaire data determines 1 minimum participation and 5 maximum participation levels for all items. In the scoring interval, 3 midpoints and qualitative indecisions were determined; the score at the bottom of this value was evaluated as a negative opinion, and the value at the top was considered positive. Since the sample is a single group, a single sample t-test (one sample t-test) was performed while carrying out statistical analysis. SPSS computer software was used for statistical analysis. Again, percentage, frequency, average, and standard deviation parameters were used in order to make sense of the data.

RESULTS

The findings obtained in this study, in which students' opinions are evaluated

regarding the E-exam application in science education, are given below.

As seen in Table 1, more than half of the participants were female (56.3%). However, in general, the proportion of females and males is close in the study group. The group of participants is suitable in this sample. The participant age range was 20-24 years and the average age was 22. As final year students, the age range and average are at the expected level. The Cronbach alpha reliability coefficient calculated for the survey was $\alpha = 0.86$. This value shows that the survey is reliable.

Tablo 1. Participant Gender Distribution

	Frequency (f)	Percent (%)	Valid Percent	Cumulative Percent
No-answer	1	6.3	6.3	6.3
Male	6	37.5	37.5	43.8
Female	9	56.3	56.3	100
Total	16	100	100	

Table 2 shows that student opinions differ significantly among the three sub-factors in the survey. Students generally have positive views towards the E-exam. In addition, Table 3, in which the students' opinions are analyzed on the basis of items, shows in which fields the opinions of the students differ significantly.

Table 2. One Sample t-test: Sub-factors

Sub-Factors	N	Mean (X)	Standard deviation (Sd)	Standard error (Se)
Practicality and Usability	16	27.93*	6.85	1.71
Affective effect	16	22.81*	3.20	.80
Reliability	16	11.62*	2.24	.56

*P< 0.05

The findings obtained after the one sample t-test regarding the items at which students' opinions differ significantly are shown in Table 3. Table 3 shows that all items received an above average score. It is a conclusion from Table 3 that all opinions are positive. Again, the t-test in which the significant difference was investigated shows there was a significant difference ($p < 0.05$) in all the items except for five. Within the scope of a science education course, the views of science students regarding E-exams are positive.

Table 3. One Sample t-test: All items

Items	N	Mean (X)	Standard deviation (Sd)	Standard error (Se)
1.Questions on the internet exam would be more clear.	16	3.69*	1.13	.28
2.I prefer the online exam to the paper-pencil exam.	16	3.19	1.16	.29
3.I liked that the exam was on the internet.	16	3.81*	.98	.24
4.I would like all exams to be on the internet.	16	3.13	1.08	.27
5.The online exam is more organized than the paper-pencil exam.	16	3.75*	1.18	.29
6.The questions on the online exam measured my learning better.	16	3.13	.95	.23
7.The online exam was effective and useful.	16	3.94*	1.18	.29
8.I prefer the online exam rather than the paper-pencil exam.	16	3.31	1.01	.25
9.The online exam was more stressful than the paper-pencil exam. (R)	16	3.50	1.26	.31
10.I was more concerned about the exam in the online exam. (R)	16	3.81*	1.10	.27
11.It was difficult for me to adapt to the online exam. (R)	16	3.88*	.88	.22
12.After the online exam, I felt that I was more tired than the paper-pencil exam. (R)	16	3.94*	1.18	.29
13.I would like all the exams to be paper-pencil. (R)	16	3.81*	.98	.24
14.In the online exam, it was more difficult to read the questions than the paper-pencil exam. (R)	16	3.88*	.95	.23
15.The selection of questions was appropriate in the online exam.	16	3.81*	1.04	.26
16.The difficulty of the questions was appropriate in the online exam.	16	3.88*	1.02	.25
17.Questions were distinctive in the online exam.	16	3.94*	.57	.14

* p< 0,05

Five items were examined closely in Table 3, revealing there was no difference at the $p < 0.05$ significance level: 1)

students' preference for the online exam over paper-pencil exam (item 2); 2) asking for all exams to be on the internet (item 4); 3) the questions in the online exam to measure learning better (item 6); 4) choosing the online exam instead of the paper-pencil exam (item 8); and 5) feeling that the online exam is more stressful than the paper and pencil exam (item 9)). Conversely, the answers given to the other items are examined (at the significance level of $p < 0.05$) shows that the online exam can be used in science lessons, and in this context, students do not have a negative opinion.

DISCUSSION

The opinions of the students towards E-exams in science education are examined and some important results emerge. Student opinions about E-exams are generally positive. Most of these views are statistically significant. With the widespread use of the internet this seems to be an expected situation, considering that not only students but also teachers are positive about the online learning environment (R. Yılmaz, Gümüş, & Okur, 2005). However, there is indecision in student opinions about E-exams (Çiğdem & Tan, 2014). An important factor is that students who express negative opinions do not feel comfortable using technology (Başol, Ünver, & Çiğdem, 2017). However, considering that there may be university-based differences in student opinions regarding whether or not online education applications will have positive results (Tanyıldızı & Semerci, 2005), adapting to this new technology is seen as the most important factor in achieving the desired positive effect in E-exams.

Questions asked online can be asked at the most appropriate point of teaching. This can be tried at any time in any field in which the student is trained (Jordan, 2013). However, regardless of the field, students should first solve the adaptation problem for this new E-exam technology. Considering that each new generation is compatible with technology better than previous generations, this does not seem to be a recently observed problem. In addition, providing diversity in the use of E-exams - which are supported by students with positive opinions and are often preferred to over K-Exam - is necessary in order to reveal in detail the factors that cause negative opinions. In terms of academic success, the fact that the students are more successful in the E-exam compared to the K-exam (Yağcı, Ekiz, & Gelbal, 2015) shows that the E-exam has the potential to replace the K-exam. It also shows there is high potential for science education and students studying in this field to be ready for such a change in the near future.

CONCLUSION

With the developing information technologies in this new century, changes are experienced in every area of life and its reflections are seen in different areas. One of its reflections in the field of education is E-exams, which have been used as an alternative to K-exams for years.

The purpose of the current study was to determine student views towards E-exams in science education. The student views were significantly positive and they preferred E-exams over K-exams.

Although E-exams have the potential to replace the usual K-exams as a measurement tool, the integration of the new exam system in the field of education should be ensured by using it with K-exams for a while.

Users need to be a certain level of technology literate for E-exams, and it seems that students do not have a significant problem in this field. In particular, the introduction of each new generation to technology at an early age shows that they will get better in this field. However, new academic studies are required for teachers to adapt to these new

technological developments and use them effectively.

Note: In this study the concept of "E-exam" is used for exam types in the literature in which questions such as E-exam exam, computer assisted exam, online exam, electronic exam… are asked through a technological tool and their answers are given through a technological tool. The concept of "K-exam" was used for the type of exam created using paper and pencil, in which questions were asked on paper and answers were given on paper, in order to provide integrity in the general writing flow and to be more understandable.

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