On-line examinations with proctoring: features, students' preferences and related factors, academic honesty

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ABSTRACT: The number of students choosing modern distance learning is gradually increasing, which indicates a growing popularity of distance education. This study was focused on investigating the features of remote electronic examinations with a proctoring system at *S. Seifullin* Kazakh Agrotechnical University (KATU), Astana, Kazakhstan. Students' preferences and related factors, as well as academic dishonesty during the recent pandemic were also addressed. Data were collected through a Google Forms survey from students of the Faculty of Energy and the Technical Faculty of the KATU. Among 560 students that participated in the survey, the vast majority, close to 70%, chose remote examinations and believed that on-line examinations with a proctoring system are enough to assess educational achievements. Students noted important factors related to the examination: the level of knowledge of the subject, preparation time, examination questions and theory, practice, compliance with laboratory materials, the number of questions, honesty in the examination. They have also proposed some measures to reduce academic dishonesty.

INTRODUCTION

The development of information technology has led to the research and emergence of new technologies, new equipment and new models, thereby contributing to the transformation of traditional educational ideas, concepts and models, as well as the transformation of methods and forms of education [1]. Despite the use of proctoring technology in distance learning for some time, it has become of particularly great importance in the context of the global transformation of distance learning in connection with the Covid-19 pandemic. Over the past years, 2021 to 2022, thousands of university students in Kazakhstan took on-line examination tests outside the university under the control of virtual proctoring systems, such as Oes, Examinationus, Aero, ProctorEdu and Oqylyq available from vendors or developers. These proctoring systems are less dependent on having *live* proctors who supervise students taking examinations *via* video link [2].

This research is focused on investigating the factors that students face when taking a traditional examination or a remote examination, to study the problems of academic integrity by comparing traditional and remote examinations with proctoring during a pandemic. The research involved 560 students of the Faculty of Energy and the Technical Faculty of *S. Seifullin* Kazakh Agrotechnical University (KATU), Astana, Kazakhstan.

When taking a traditional examination or a distance examination, students face various issues and problems. A survey administered to the 560 above-mentioned students explored various factors influencing students' preference for on-line examinations, how courses are accessed/assessed, factors related to students' intentions to deceive, their misbehaviour during remote electronic examinations, and measures that can be taken to reduce or eliminate such behaviour.

LITERATURE REVIEW

During the Covid-19 pandemic, the transition period from in-person to on-line education presented teachers and students with various problems in the learning/teaching process and maintaining academic integrity in the assessment of learning. This was especially evident in the absence of a policy on educational tools, including proctoring software associated with on-line learning and testing. There is widespread concern that cheating has been made easier by advances in technology that provide a large number of innovative tools for unauthorised assistance to students in ways that are difficult to detect [3][4]. Proctoring can be viewed from several perspectives, for example, a proctoring system can be considered both in economic terms and in terms of making a profit in private organisations [5][6].

Scientists studied some popular examination methods, such as real-time screening with a computer webcam and a biometrics-based screening that tracks student mouse movements, as well as head and eye movements to detect fraudulent activities [7][8]. After discussing various advantages and disadvantages of these two approaches, a complex proctoring

method that combines both of these methods has been proposed [9][10]. Along with possible problems and solutions, an architectural design of this prototype, which is currently being developed for implementation, was proposed, and proposals were made to extend its benefits to examinations in traditional classrooms [9][10]. Although on-line testing has been around for decades, students taking on-line examinations without a proctor take longer to complete the testing and have higher scores that call into question academic integrity [11][12]. To detect and prevent fraud during the examination, it is necessary to remotely identify the test taker and control the examination process [13-15].

MATERIALS AND METHODS

To better understand student preferences regarding examination methods and various factors influencing their choices, a structured survey was designed and distributed among students of the Faculty of Energy and the Technical Faculty. A total of 560 students participated, with the majority belonging to the Faculty of Energy (63.1%) and the rest hailing from the Technical Faculty. The survey contained questions related to demographics (faculty affiliation, gender), examination preferences (traditional *versus* remote with proctoring), factors related to the examination and factors related to academic achievements. Table 1 contains the structured survey used for this study.

Table 1: Survey questions and possible answers.

Question		Possible answers
Demographics	1. Which faculty are you from?	- Faculty of Energy - Technical Faculty
	2. What is your gender?	- Male - Female
Examination preferences	3. Which type of examination do you prefer at the university?	- Traditional method - Remote examination with proctoring
	4. Is there enough time allotted for the examination?	- Enough time for the examination - Not enough time for the examination - No difference
	5. How would you describe the number and level of questions in the examination?	- High level/5 questions - Intermediate level/10 questions - Low level/25 questions
	6. Have you engaged in dishonesty during the e-examination? If so, in what form?	- No dishonesty in the examination - Help from friends - Look for answers from all possible sources
Factors related to the examination	7. How does your level of knowledge on the subject affect your performance in the examination?	- Affects - Does not affect - No difference
	8. Do examination questions correspond to the theoretical material?	- Yes - No - Sometimes
	9. Do examination questions align with the practical material?	- Yes - No - Sometimes
	10. Do examination questions correspond to the laboratory material?	- Yes - No - Sometimes
Factors related to academic achievements	11. What grade point average (GPA) do you expect after using a particular examination method?	- High - Low - Without changes
	12. What was your actual grade after using a particular examination method?	- High - Low - Without changes
	13. Were you able to achieve the curriculum goals after using a particular examination method?	- Yes - No
Attitudes and behaviours towards remote testing	14. Would you like to take written examinations and final tests remotely and at a convenient time?	- Yes - No - Not sure
	15. During testing, do you rely only on your own knowledge?	- Yes - No - Not sure
	16. What actions did you take during testing?	- None of the listed - Help from other people - Use of the lecture materials - Search for information on the Internet

	17. Would you follow the distance testing rules if you were under video surveillance during testing?	- Yes - No - Not sure
	18. In your opinion, how should learning achievements be assessed and learning outcomes monitored in a distance learning environment?	- An objective assessment of learning achievements and control of learning outcomes is impossible in the conditions of distance education - On-line examinations posted on on-line platforms with the use of a proctoring system are sufficient - Not sure

Data collected from the survey were analysed to discern patterns, preferences and factors influencing student choices. The relationship between academic majors, gender and examination preferences was also studied. Statistical analyses were performed to determine any significant correlations or patterns present in the dataset.

RESULTS

Demographics

Figure 1 provides a visual representation of the demographic breakdown of the survey participants. In the stacked bar chart, gender and faculty affiliation are displayed side by side, allowing for easy comparison of the two categories. The *gender* bar reveals that of the 560 students, 340 (60.7%) were male and 220 (39.3%) were female. Consequently, males represented a majority of the participants. According to the *faculty* bar, students from the Faculty of Energy constituted a significant proportion with 353 (63.1%) participants, whereas the Technical Faculty accounts for 207 (37%) students. The chart further emphasises that the Faculty of Energy had a slightly larger representation compared to the Technical Faculty among the respondents. In tandem, the gender distribution tilts toward a male majority, but both genders were considerably well-represented in the study.

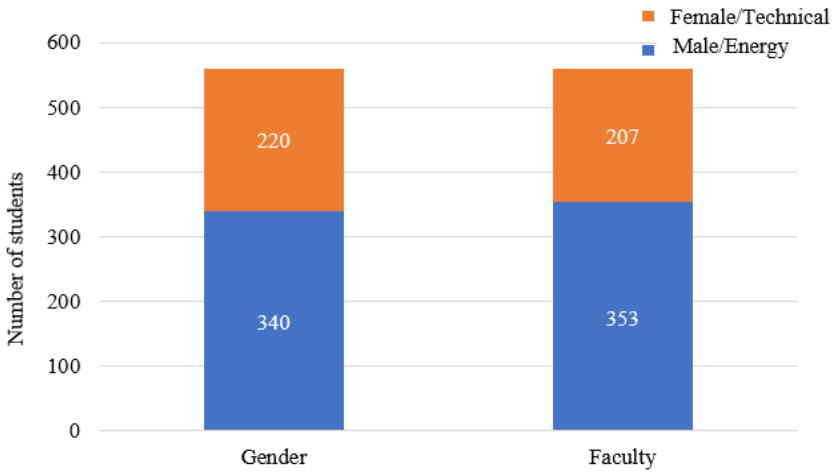

Figure 1. Demographic distribution of participants.

Student Preferences: Traditional or Remote Examination with Proctoring

During the survey, students were asked which form of taking the examination at the university they prefer: the traditional method or the remote examination with proctoring. Some respondents from the Faculty of Energy (30.4%) preferred traditional examinations at the university, while the majority of this Faculty's students (69.6%) preferred remote electronic examinations with proctoring. The minority of respondents from the Technical Faculty (31.3%) preferred traditional examinations at the university, while the rest of this Faculty's students (68.7%) preferred remote electronic examinations with proctoring. This was found to be largely related to students' academic specialisation ($p = 0.009$). However, examination preference was found to be unrelated to the gender of students ($p = 0.019$).

Students were asked about examination dishonesty during remote examinations. Possible factors that may underlie this behaviour include student gender and examination-related factors (effort/time required to prepare, examination questions appropriate to the learning material). There was no significant difference between male and female students regarding misconduct on the examination. However, examination-related factors, such as effort/time have been found to be significantly related to student failure on the e-examination. Although the majority of students reported that they spent more effort and time preparing for the e-examination remotely, the percentage of students who spent less effort and time preparing for the examination was higher among students who did not pass the examination fairly, for example, with the help of friends (34.23%) or they searched for answers from all possible resources (28.49%).

During the survey, students were asked about factors that may affect their desire to take traditional examinations and remote examinations with proctoring (Table 2). Students named factors related to the examination, such as the level of knowledge in the subject, preparation time, compliance of examination questions with theoretical, practical, laboratory material, number of questions, dishonesty in the examination. Students also named other factors that include academic achievement: expected GPA, actual GPA and achievement of curriculum goals. More than half of the respondents (62.01%) reported that it takes a lot of time and effort to prepare for remote electronic examinations, and the level of knowledge affects the successful completion of the subject. A high percentage of students answered that theoretical materials (59.12%), laboratory work (50.55%) and practical materials (60.44%) do not correspond to the examination questions.

Factors Related to the Examination

When asked if there is enough time allotted for the examination, more than half of the students (62.05%) answered that it is enough. Depending on the structure of the examination, the authors found that all of the above factors do not affect students' choice of electronic examinations ($p > 0.05$). When asked about the number and level of questions, almost half of the respondents (49.54%) chose the medium level/10 questions. Students were asked if they engaged in examination misconduct and dishonesty during remote e-examinations. A large proportion of the students (88.07%) reported no dishonesty or misconduct on the proctored examination, while other students reported that they seek help from friends (3.08%) or from all other possible sources (8.85%). It should be noted that this was found to be largely due to students' preference for the type of examinations.

Factors Related to Academic Achievement

Factors related to academic achievement were also considered in terms of whether they influence students' preference for traditional or electronic examinations. Fifty-one point forty-three percent of all students expected the GPA to be higher with traditional learning. In regard to electronic examinations with proctoring, 18.10% expected a lower GPA. However, later scores in distance electronic examinations showed that only 36.08% of the students had a high average score, 35.82% reported that the average score did not change and 28.10% received a low average score. It should be noted that about 47.98% of all students were unable to achieve their goals with the help of remote electronic examinations with proctoring, and 44.36% of all students were unable to achieve their goals in the traditional examination.

Attitudes and Behaviours towards Remote Testing

Remote testing is a pivotal aspect of contemporary educational assessments. Most students from both the Faculty of Energy (69.6%) and the Technical Faculty (68.7%) prefer e-examinations with proctoring. While 67.8% report to rely on their own knowledge during these tests, 32.2% may seek external assistance, highlighting the challenges of ensuring remote academic honesty. However, 76.7% would respect test rules under video surveillance, suggesting proctoring's potential effectiveness. Although 86.7% view proctored on-line examinations as apt for distance education, 13.3% remain sceptical about genuine assessments in such a format. The key to remote testing's success lies in merging technology with academic standards.

Table 2: Factors influencing students' choice of e-examinations.

Variable	Total	Student preferences for the e-examination		*p*-value
		Traditional examinations (%)	Distance examinations with proctoring (%)	
Factors related to the examination				
Level of knowledge on the subject				
Affects	59.55	57.09	62.01	0.115
Does not affect	22.87	24.09	21.66	
No difference	17.57	18.82	16.33	
Examination questions correspond to the theoretical material				
Yes	31.12	29.28	32.97	0.002
No	59.12	60.02	58.22	
Sometimes	9.75	10.70	8.81	
Examination questions correspond to the practical material				
Yes	33.02	30.08	35.97	0.001
No	60.44	62.62	58.27	
Sometimes	6.53	7.30	5.76	
Examination questions correspond to the laboratory material				
Yes	22.51	21.05	23.97	0.005
No	50.55	50.02	51.08	
Sometimes	26.94	28.93	24.95	

Time				
Enough time for the examination	62.05	62.09	62.01	0.121
Not enough time for the examination	24.37	28.09	20.66	
No difference	13.17	9.01	17.33	
Number of questions/level of questions				
Level high/5 questions	37.51	31.05	43.97	0.780
Intermediate level/10 questions	49.54	49.00	50.08	
Low level/25 questions	12.95	19.95	5.95	
Dishonesty in examinations				
No dishonesty in the examination	59.06	30.05	88.07	0.189
Help from friends	8.55	14.03	3.08	
Look for answers	32.38	55.92	8.85	
Factors related to academic achievement				
Expected grade point average				
High	48.72	51.43	46.02	0.612
Low	16.82	15.55	18.10	
Without changes	34.45	33.02	35.88	
Actual grade point average				
High	33.75	31.43	36.08	0.001
Low	29.32	30.55	28.10	
Without changes	36.92	38.02	35.82	
Achieving the goals of the curriculum				
Yes	53.83	55.64	52.02	0.000
No	46.17	44.36	47.98	

DISCUSSION

It has been reported that distance learning is inferior to face-to-face learning and offline learning when it comes to trust in the learning outcomes and diplomas and certificates issued based on these results, due to the problems of students' verification and recognition of their behaviour during testing [16][17].

Students were asked about possible measures that could be considered to reduce dishonesty in examinations. These include other solutions for testing, changing the structure of the examinations (using different forms, oral examinations (16.5%), reducing the number of questions/pages, reducing time limits), changing the way of assessment (oral examinations, replacing examinations with other forms of assessment) and treating the grade as a mandatory pass/fail rather than the actual grade.

The main measures considered by the surveyed students included replacing the examination with other forms of assessment (45.2%), using different forms of examination (39.1%), using on-line proctoring for verification (56.2%). They also mentioned examination structure changes, such as one-sided examinations, a reduction in the number of questions per page (16.5%) and a reduction in time limits (10.5%). Oral examinations (6.8%), written examinations (5.2%) were considered by students as a measure to reduce dishonesty in examinations.

Respect for the principles of academic integrity in earlier years teaches students the right choice of priorities, organisation and productivity, and also provides strong knowledge and skills that cannot be obtained by unfair copying from all possible sources. It helps to build a tradition of academic integrity from the student years and, above all, to establish ethical standards throughout life and gives a sense of victory.

CONCLUSIONS

This study involved 560 students of the Faculty of Energy and Technical Faculty of *S. Seifullin* Kazakh Agrotechnical University. Some respondents from the Faculty of Energy (30.4%) preferred traditional examinations at the university, while the majority of this Faculty's students (69.6%) preferred remote electronic examinations with proctoring.

The minority of respondents from the Technical Faculty (31.3%) preferred traditional examinations at the university, while the rest of this Faculty's students (68.7%) preferred remote electronic examinations with proctoring. Examination preference is not related to the gender of students ($p = 0.019$).

Moreover, 86.7% of the students surveyed would like to take the final examinations remotely at a convenient time, and a similar percentage of the respondents believe that on-line examinations posted on on-line platforms using a proctoring system are enough to assess educational achievements in distance learning. Also, 67.8% of the students would take the on-line examination without the help of inappropriate sources. Eighty-three percent of the respondents would like to continue the educational process remotely, 92% of them consider their marks during the examination to be fair.

Students considered the following factors related to the examination: the level of knowledge in the subject, preparation time, compliance of examination questions with theoretical, practical, laboratory material, number of questions and honesty in the examination. They also pointed out other factors that include academic achievement: expected GPA, actual GPA and achievement of curriculum goals. The main measures proposed by students to reduce academic dishonesty in examinations included replacing the examination with other forms of assessment, using different forms of examination, using on-line proctoring for verification.

The results of this study could be useful for planning academic strategies on the problems of remote electronic examinations at the KATU and other universities.

ACKNOWLEDGEMENTS

This research was supported by project no. AP09259657 Research and development of an automated proctoring system for monitoring students' knowledge in the context of distance learning.

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