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Abstract

This is a descriptive study to investigate one of the most critical issues faced by teachers in evaluating their students' performance at the university level during COVID-19. It aimed to specify the exams' problems faced by the Jordanian universities' teaching staff members, and the strategies they used to face cheating by their students in online exams. The researchers built a questionnaire of 33 items under (3) main headings, and sent by email to a random sample of 120 out of 995 teaching staff members in two Jordanian universities, University of Jordan and Arab Open University/ Jordan, in the academic year 2020/2021. The study revealed that most of the staff members faced a number of problems, especially with the effort needed for the preparation of online exams, and the advanced ways of cheating being used by their students. It also showed that they used several strategies to face those problems such as open-ended questions to assess knowledge achievement, and project application to assess students' skills, as well as using cameras to control exams monitoring.

Introduction

It is needless to say that CORONA pandemic presented a package of unprecedented challenges to the entire educational system. E-education has become a reality in schools and universities all over the world, and digital technology has undoubtedly provided advanced multimedia and communication devices that have profoundly contributed to these challenges. In the absence of clear educational policies in most institutions, decision makers have faced significant challenges in managing the educational process remotely (Zhang et al., 2020). Abduh (2021) also confirmed that challenges faced during COVID-19 have forced education systems to look for innovative strategies and techniques as well as effective and non-traditional teaching methods. This has obviously encouraged students to deal with modern educational tools with virtual learning environments (Chrtistano, 2020). Thus, attention has turned to the use of educational platforms for various stages, especially after they proved effective communication during the pandemic (Bilen & Matros, 2021).

Students' evaluation is one of the important components of the educational process. That is why development of educational systems has always been accompanied with a development in the evaluation methods, and the most important challenge that has emerged all over the world is how to use cross-platform examinations to evaluate what students have learned (Cuadrado-García et al., 2010). The world has therefore turned to e-evaluation which utilize information networks, software and multimedia applications to provide evaluation tools that help teachers measure students' achievement through diverse quantitative and qualitative data (Bahar & Asil, 2018).

Although electronic evaluation is often based on the same philosophical basis as the traditional evaluation in terms of its application of educational theories, it requires automating the evaluation process with a comprehensive reliance on online learning in virtual environments (Rolim & Isaias, 2019). The evaluation process has begun with a broad shift from its traditional paper and pen to the electronic style of evaluation that allows the use of text, image, audio, video and interactive virtual environments, because it is the effective entry point for the development of education, improving its quality and effectiveness and improving its efficiency under the circumstances imposed by the pandemic. This is the basis of educational development and the most important element of the educational system (Bahar & Asil, 2018).

It might be necessary here to point out the changes in evaluation patterns over time, as the traditional evaluation has often been based on direct questions targeting lower thinking skills by memorizing information, while the diversity of electronic evaluation expands using higher understanding and thinking skills such as analysis, problem solving and high performance that need performance-based evaluation to assess students' achievement (Appiah & Van Tonder, 2018). This led to using projects as evaluation tools and displaying direct audio and image communication using a front and rear camera that clearly show the student and his surroundings (Guangul et al., 2020). In addition, new formats have been developed in the electronic evaluation that fit this type of evaluation as a time strategy, as questions that should be answered in a short time, allowing students to call more information to their memory (Appiah & Van Tonder, 2018).

Electronic evaluation does not only mean multiple choice questions. It allows evaluating students through simulation programs, wiki sharing sites, blogs, self-reviews, peer reviews, and open-answers questions, which measure higher levels of cognitive abilities and practical skills in terms of using problem-solving methods, critical thinking, creative thinking and decision-making. Students may make presentations on specific terms requiring peer excellence and diversification in cognitive and skilled activities using computer and Internet technologies (Gamage et al., 2020). Although academic cheating is not new, online learning has widened the phenomenon to be a globally growing one that electronic evaluation is facing many problems with, the most important of which is the reliability, credibility and accuracy of electronic evaluation (Kharbat & Daabes, 2021; Kearns, 2012). The Corona crisis globally contributed to the high rate of cheating due to the lack of direct control over students during the examinations, increasing its prevalence and negatively affecting the integrity and credibility of the learning process and its results (Awdry & Ives, 2020). Technological developments have undoubtedly contributed to the diversity of electronic cheating methods some of which are in the form of groups through social media, each of its members solves a part of an exam, and then shares the answers with the others. Students may also navigate the web and get answers through search engines or specialized websites. As the world of information scarcity moves from a world of abundant information, it has become difficult for faculty members to assess whether students' work is their own or from other sources such as books and research or by paid teachers or elder students (Gamage et al., 2020). Hollis (2018) previously revealed that there is an expanded industry that provides specialized services under the supervision of specialized teachers to answer test questions, worksheets and so on.

Sajer et al. (2012) called educators and decision makers to strengthen ways to reduce electronic cheating, build the learner's personality on virtue and self-esteem, revive morality and grow self-control among students by

developing and raising the inner conscience from a young age and enhancing trust in parents to contribute to reducing cheating. On the other hand, online education requires moving towards alternatives to the traditional evaluation if we are to be effective (Al-Anazi, 2021), diversifying alternative evaluation forms, giving challenging duties, adopting strategies that uniquely teach students, and communicating through discussion forums with students to learn about their ideas, inclinations, interests and behavior, which contributes to the development of their skills and ability to solve their life problems(Gamage et al., 2020). Hussein et al. (2020) noted the need for tools and monitoring mechanisms, including direct monitoring when a human observer is available, data transfer encryption, recorded review, automated surveillance, browser closure features, computer operation closures, key press alerts, facial identification tester options, image comparison, 360-degree webcam features and camera mobility. In the same context, Artificial Intelligence (AI) systems have been used to monitor students, allowing analysis of their movements and environment and determining whether potential cheating behavior would be possible (Kharbat & Daabes, 2021).

A related software used in Australia is e-proctor, which is used for electronic protection, or so-called online surveillance through the use of AI applications, in which students' movements are analyzed with access to students' computer microphones and webcams. Malaysia used surveillance with a 360-degree motion camera to detect students' workspaces to ensure that there were no unauthorized materials (Cerimagic & Hasan, 2019). In Korea, students are required to maintain voice and visual contact with observers at all times, and must first verify their identity by employing several techniques to verify the identity of the person conducting an online exam, a strategy of three steps that were used on 86 students; the first was to ask student to send a signed moral pledge, the second was to track the movement of the face through a software when holding the exam, and the third was when the student session was to be identified by a camera while having random questions (Lee et al., 2020). In Singapore, personal verification techniques were used through voice, image and clicks on the computer keyboard (González-González et al., 2020; Kharbat & Daabes, 2021).

Despite previously mentioned strategies and techniques to face electronic cheating, the problem still faces the integrity and credibility of the electronic evaluation. While some faculty members prefer electronic exams over traditional methods for students' evaluation (Adebayo & Abdulhamid, 2010; Adegbija et al., 2012), others resist the idea because they believe that electronic evaluation is not fair (Dwivedi et al., 2012; Kuikka et al., 2014). This prompted the researchers to conduct this study in order to look into this phenomenon and how faculty members at Jordanian universities face it, and how they see the ways to reduce it.

The Corona pandemic has pushed educational institutions into an e-learning space and expanded the use of online education. By the end of 2020, there were many queries in the minds of both students and teachers, most of them about assessment and evaluation mechanism. States issued decisions commensurate with their respective circumstances by adopting online education in different forms with regard to e-evaluation (Huber & Helm, 2020; Gamage et al., 2020). These decisions have caused concern among institutions' staff members about the integrity and credibility of electronic evaluation. In order to find out the facts about cheating in the electronic evaluation issue, we read the UNESCO Report (United Nations Educational, Scientific and Cultural Organization [UNESCO] (2020), which confirms that faculty members are not convinced of the results of students' tests when

switching to online education, due to electronic cheating. A survey of faculty members in the United States of America, 93% predicted that online learning would be more vulnerable to academic deception. Other studies also have shown high rates of electronic cheating (Adzima, 2020).

Jordan is not isolated from global concern about the credibility of electronic evaluation, as the pandemic caused successive decisions on the mechanism and form of exams at different levels and disciplines of education (Ministry of Higher Education and Scientific Research, 2020a), reflecting the confusion caused by the pandemic. Local newspapers and media referred to unrealistic results, as they called them, obtained by a number of students and questioned the results of national exams (Mazher, 2021), and that a new type of cheating has emerged called "electronic cheating" through the use of smart applications as social media, thereby reducing the credibility, reliability and accuracy of exams' results (Kiswani & Sabi, 2020). Along their direct experience at the university level, the researchers have witnessed a number of problems related to this vital issue. These indicators underscore the need to provide sufficient data on the phenomenon of electronic cheating and ways to reduce it, particularly in Jordanian universities, to help the planners and educational decision-makers to accurately formulate policies that contribute to the integrity of academic evaluation which requires an in-depth study of this issue on precise and clear methodological bases.

Method

This is a descriptive study which aimed at collecting and analyzing data on the real situation of the problem being studied.

Questions of the Study

To achieve the objectives of the study, the researchers stated the following questions:

- What strategies have the faculty members at Jordanian universities tried to reduce electronic cheating?
- What problems have the faculty members faced in implementing these strategies?
- Are there statistically significant differences at the level ($\alpha \leq 0.05$) in the overall average degree of strategies used among the faculty members at Jordanian universities and the problems they faced due to gender?
- Are there statistically significant differences at the level ($\alpha \leq 0.05$) in the overall average degree of strategies used among the faculty members at Jordanian universities and the problems they faced due to their teaching experience?
- What are the faculty members' proposals to reduce electronic cheating**?**

Importance of the Study

- It may reveal the use of certain strategies to reduce electronic cheating that can be adopted or developed by faculty members at other universities.
- It may contribute to enriching research in other countries on the phenomena of electronic cheating and

how to reduce it.

- Decision makers in Arab and foreign universities may help develop their strategies to reduce this phenomenon.

Limitations of the Study

- The study was conducted in summer semester of 2020-2021 school year.
- It is limited to identifying strategies to use electronic technologies to reduce cheating during the CORONA pandemic and problems faced in this respect.
- It is limited to the faculty members at the two universities chosen for the study.
- The results of this study were determined by the reliability of the tool used by the researchers and also by the sincerity and objectivity of the respondents. They can only be circulated to the community from which the sample of the study was taken.

Procedural Definitions

Electronic cheating: A type of cheating done by using modern technology through the use of smartphone applications including WhatsApp and Team Viewer ... etc., which falsifies the performance of the learner and weakens the credibility of electronic evaluation.

Strategies to reduce electronic cheating: Techniques and procedures by the faculty members in the two universities to reduce electronic cheating.

Study Community and Sample

The study community consists of 995 faculty members of the Technical Tafila University, and Princess Sumaya University in the Jordanian capital, Amman, in the 2020/2021 academic year, according to the statistical report of the Ministry of Higher Education and Scientific Research (2020b). The sample of the study was 120 teaching members selected randomly of the study community (see Table 1).

Table 1. Sample Distribution According to Gender and Educational Experience

Variable		n	Percent (%)
Gender	Male	89	74.2
	Female	31	25.8
	Total	120	100.0
Educational experience	Less than 5 years	14	11.7
	5 to less than 10 years	32	26.7
	More than 10 years	74	61.6
	Total	120	100.0

Instrument of the Study

To achieve the objectives of the study, the researchers built a questionnaire of 33 items under (3) main headings to get answers about the following issues:

- Strategies used by teachers to face electronic cheating.
- Problems they faced in implementing these strategies.
- Proposals for the developing anti-cheating strategies.

Likert scale was adopted in the questionnaire, (strongly agree, agree, neutral, do not agree, strongly do not agree) and it represents (5, 4, 3, 2, 1) respectively. The following equation was used to determine the answer levels: The upper limit of the scale - the minimum scale ÷ the number of categories required: (5-1) ÷3=1.33, and then add (1.33) to the end of each category. Thus, the following metric was adopted for results analysis: (1.00-2.33) Low, (2.34-3.67) medium, (3.68-5.00) high degree. The validity and stability of the questionnaire were approved, the first by (5) referees in the field of education, and the second by applying the questionnaire and reapplying it two weeks later on a reconnaissance sample of 30 students of the study community from outside its sample. Cronbach Alpha equation was used to justify the internal consistency and the stability of reapplication of the areas and the overall score as shown in Table 2.

Table 2. Internal Cronbach's Alpha Consistency Coefficient

Dimension	n	Stability coefficient by Cronbach's alpha	Stability coefficient by Re-test
Strategies followed to prevent electronic cheating	11	.93	.91
Problems encountered in applying electronic cheating prevention strategies	9	.89	.86
Suggestions for developing strategies to prevent cheating in electronic exams.	10	.87	.84

Table 2 shows that the stability coefficient of Cronbach's Alfa was between (0.87) and (0.93), and in the reapply manner was between (0.84) and (0.91). These values are acceptable for the purpose of the study.

Results

The First Question

"What strategies have the faculty members at Jordanian universities tried to face electronic cheating?" To answer this question, the mean, standard deviation and the level of use of strategies were calculated as shown in Table 3. Table 3 shows that the means of answers to the strategies were between (3.52) and (4.13), and that four of the strategies were at a high level while the rest at mid-level. It is clear that the mean of the overall degree of the strategies was (3.77) which is at a high level.

Table 3. Mean, Standard Deviation, and Level Strategies' Level

Classification	Role of E-exam	Mean	SD	Using level
1	Stating discussion questions that reveal student's knowledge.	4.13	.77	High
2	Using cameras in exams' administration.	4.04	.938	High
3	Encouraging students to do projects.	4.02	.78	High
4	Arranging students' achievements in portfolios.	3.98	.88	High
5	Encouraging students to send weekly ideas about their lessons.	3.67	.96	Moderate
6	Replacing exams with other assessment strategies.	3.66	1.03	Moderate
7	Replacing exams with assignments that require explanation of the answering method.	3.63	1.06	Moderate
8	Recognizing each student's writing style through normal or low-importance tasks.	3.63	1.01	Moderate
9	Assigning time limits in designing the exams.	3.62	1.12	Moderate
10	Using weekly quizzes as a part of evaluation.	3.61	.89	Moderate
11	Using activities as a part of evaluation.	3.52	1.08	Moderate
12	Overall score for the strategy axis	3.77	.58	High

The Second Question

"What problems did the faculty members face in implementing these strategies?" To answer this question, the mean, standard deviation and level of problems have been calculated. Table 4 explains this.

Table 4. Mean, Standard Deviation, and Problems' Level

Classification	Problem	Mean	SD	Using level
1	New forms of cheating (such as students' dependence on smart phone applications to exchange information)	4.29	.67	High
2	Electronic evaluation needs time to prepare.	4.09	.82	High
3	Preparing electronic evaluation requires a great deal of effort.	4.07	.86	High
4	Measuring students' expressive abilities.	3.91	.86	High
5	Preparing appropriate evaluation with clear specifications and criteria.	3.78	.96	High
6	Lack of adequate programs for similarity detection.	3.78	.96	High
7	Preparing consistent activities with educational content.	3.70	1.07	High
8	Preparing suitable questions for students with special needs.	3.69	1.06	High
9	Preparing question banks.	3.66	1.02	Moderate
	Total score of problems	3.89	.68	High

Table 4 indicates that the problems ranged from (3.66) to (4.29) with a general mean (3.89), and all except one were at an average level, that is "Preparing question banks".

The Third Question

"Are there statistically significant differences at the level ($\alpha \leq 0.05$) in the average overall degree of strategies used to reduce electronic cheating and the problems faced due to gender?" To answer this question, the mean, standard deviation, and the value of the t test for the overall score of faculty responses were calculated at the strategies and the problems faced in using those strategies according to the respondents' gender variable. Table 5 illustrates this.

Table 5. Total Score of Strategies and Problems

Dimension	Gender	Number	Mean	SD	t-Sample	Free degree	Siq
Strategies	Female	31	4.23	.34	5.67	118	.000
	Male	89	3.61	.57			
Problems	Female	31	3.97	.81	.77	118	.446
	Male	89	3.86	.63			

The results shown in Table 5 indicate that the t value of the strategies was equal to (5.67) and significant at the level (α =0.01) because the corresponding statistical significance value was smaller than this level. This means that there are statistically significant differences at the level (α=0.01) in the overall degree of the strategies attributable to the respondents' gender variable. Referring to the male and female means at the strategies; it is clear that the female mean was higher than that of males. Table 5 also shows that the t value of the problems was equal to (0.77) and was not statistically significant at the level (0.05) because the statistical significance value was smaller than this level.

The Fourth Question

"Are there statistically significant differences at the level ($\alpha \leq 0.05$) in the overall mean of strategies used to reduce electronic cheating among faculty members at Jordanian universities and the problems they faced due to the differences in teaching experience?" To answer this question, the mean and standard deviation of the overall score of faculty responses were calculated for strategies used and problems faced according to their teaching experience. Table 6 explains this.

Table 6. Responses on Strategies According to Teaching Experience

Dimension		Number	Mean	SD
Strategies	Less than 5 years	14	3.93	.30
	5 to less than 10 years	32	4.16	.47
	More than 10 years	74	3.58	.58
Problems	Less than 5 years	14	3.99	.66
	5 to less than 10 years	32	3.92	.71
	More than 10 years	74	3.85	.68

The results presented in Table 6 show that there were apparent differences in the overall mean score of the faculty responses at the strategies used to reduce electronic cheating and the problems they faced in using these strategies according to their teaching experience. To verify whether these differences are statistically significant, a single variance analysis test was used. Table 7 shows the results of the analysis.

Table 7. One-Way Analysis of Variance Results

Dimension	**Contrast source**	**sum of squares**	**degrees of freedom**	**Mean of squares**	**Value F**	**Indication level**
Strategies	In group	965.09	2	482.54	14.290	.000
	Between group	3950.91	117	33.77		
	Total	4916.00	119			
Problems	In group	23.61	2	11.81	.310	.734
	Between group	4448.36	117	38.02		
Total		4471.97	119			

The analysis of variance shown in Table 7 shows that the F value of the problems was 0.31 which is not statistically significant because the corresponding indication level value was greater than (0.05). This indicates that there were no differences in the degree of problems due to the variable teaching experience. On the other hand, the teaching experience variable had no clear impact on the level or degree of problems they had encountered in using strategies to reduce electronic cheating. Table 7 also shows that the F value of the strategies was (14.92), a statistical significance at the indication level ($\alpha = 0.01$) because the corresponding indication level value was less than (0.01). This means that the variable teaching experience played a role in the level of use of these strategies among the faculty members. To determine the source of these statistically significant differences in the strategies, Scheffé Test was used for multiple post comparisons as Table 8 shows.

Table 8. Scheffé Test for Multiple Dimensional Comparisons

Years of experience (a)	Years of experience (b)	The difference between the two averages (a-b)	standard error	Siq
5 to less than 10 years	More than 10 years	6.41216*	1.22947	.000

* The difference is statistically significant at the level ($\alpha = 0.01$)

The results of Scheffé Test in Table 8 show that the statistically significant difference in the overall degree of the strategies was between faculty members with teaching experience (5 to less than 10 years), those with teaching experience (10 years and older), in favor of the group (5 to less than 10 years).

The Fifth Question

What are the proposals of faculty members to reduce electronic cheating?" To answer this question, the mean, standard deviation and level of faculty proposals to reduce electronic cheating have been calculated. Table 9 explains this.

Table 9. Means, Standard Deviations, and Levels of Recommendations

Using level	SD	Mean	Suggested	Classification
High	.52	4.37	Diversification of electronic evaluation methods	1
High	.64	4.33	Distribution of test marks to multiple items of the electronic evaluation	2
High	.57	4.29	The use of techniques to verify the personality of the examiner.	3
High	.67	4.27	Employing software to detect electronic cheating.	4
High	.62	4.24	Providing programs that prevent hackers during the application of electronic evaluation.	5
High	.64	4.24	Recording all the examination events.	6
High	.67	4.17	Providing special platforms for electronic evaluation.	7
High	.69	4.15	Providing accurate standards for preparing electronic evaluation.	8
High	.76	4.13	Using cameras to monitor students during exams.	9
High	.83	3.97	Utilizing accurate software to track movements of the mouse pointer.	10

Table 9 shows that the mean of teachers' recommendations to reduce electronic cheating ranged from (3.97) to (4.37). It should be noted that all these recommendations were at a high level, indicating their importance in reducing electronic cheating. However, three of them received the top three grades: 1, 2, and 3.

Discussion

Depending on previous research findings, teaching staff members all over the world have faced a number of problems in evaluating their students, and so was the case in Jordan, especially at the university level during COVID-19. This study showed that the teaching staff members in two Jordanian universities used three main strategies to face electronic cheating: "Building discussion questions that reveal the students' knowledge", "Using cameras in the management of the exam" and "Sharing students in projects". This may be due to the importance they feel of evaluating not only student's knowledge, but also their understanding and creative thinking as well as skills and practical objectives achieved. This finding is consistent with Appiah & Van Tonder (2018) who emphasized the need to use different simulations and methods like creative projects to evaluate students' learning. On the other hand, three problems were faced by the teachers and got the highest ranking of importance: "New electronic applications that help students cheat", "Electronic evaluation needs time to set up", "Electronic evaluation setting needs a great deal of effort". These results may be due to the diversity of cheating methods among students, whether through peers or through use of Internet applications or mobiles. This finding agrees with Awdry & Ives (2020) who showed that students share answers with their colleagues through Internet applications. This makes it necessary to train faculty members on how to prepare tests in a way that prevents these types of cheating.

The study also reviled that the female faculty members used the strategies of facing electronic cheating at a higher

level than their male colleagues. This result may refer to the keenness of female faculty members to use question-based strategies that show students' knowledge, which may suggest that the ability of females to socialize this was more than males. This finding agreed with Cuadrado-García et al. (2010) who confirmed gender differences in the use and evaluation of e-learning. However, and as far as problems are concerned, no statistically significant differences between female and male faculty members were shown. This finding meets with Abduh, (2021) who studied the challenges teachers face in e-learning during the closure of COVID-19 and the problems faced by faculty members of both genders. Also, the teaching experience variable seemed to have no clear impact on the degree of problems the teachers encountered in using strategies to reduce electronic cheating.

The results also showed that teachers with (5 to less than 10 years) of teaching experience were more familiar with e-learning and more willing to integrate technology into the educational process, may be because they had fresh skills of using technology in addition to a kind of experience achieved during their first few years of teaching experience. This finding agrees with Al-Anazi (2021) who revealed that the response of faculty members with teaching experience (less than 5 years) and those with teaching experience (5 to less than 10 years) was better than those teachers with longer experience towards using various strategies to reduce cheating.

Conclusion

The conclusion of this study may well be applicable to other universities in the world. The study has come to a conclusion that electronic cheating has been a big problem facing teaching staff members at the university level in Jordan during COVID19 Pandemic. So, they have experienced several problems related to the lack of time and skills to set up electronic evaluation that they can accurately assess their students' knowledge, skills and creative thinking online. They used electronic exams, discussion questions, projects sharing as well as using cameras in the management of the exams. The female faculty members used the strategies of facing electronic cheating at a higher level than their male colleagues, while the teachers with (5 to less than 10 years) of teaching experience were more familiar with e-learning and more willing to integrate technology into the educational evaluation process.

Recommendations

Depending upon the findings and conclusion of the study, the researchers may recommend more training for teaching staff members at the university level as to be well acquainted and accurately skilled in preparing various types of electronic exams for online evaluation. There is a serious need to counter the spread of electronic cheating and to increased reliance on technology to maintain the accuracy and integrity of electronic evaluation.

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