«مقاله پژوهشی»

واکاوی روش‌های کاهش تقلب در آزمون‌های آنلاین در دانشگاه پیام‌نور استان اصفهان

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چکیده

رواج و گسترش به‌کارگیری آزمون‌های آنلاین در تمامی دانشگاه‌ها و به ویژه در دانشگاه پیام نور و تجربه استفاده از آزمون‌های آنلاین در شرایط کرونا، ضرورت بررسی راهکارهای کاهش تقلب در این نوع آزمون را مطرح نمود. بنابراین هدف این پژوهش، واکاوی روش‌های کاهش تقلب در آزمون‌های آنلاین در دانشگاه پیام نور استان اصفهان بود. روش پژوهش کیفی از نوع تحلیل مضمون انجام شد. حوزه مورد مطالعه شامل کلیه دانشجویان مشغول به تحصیل و اساتید دانشگاه پیام نور استان اصفهان در نیمسال دوم سال تحصیلی ۱۴۰۰–۱۴۰۱ بود. با استفاده از روش نمونه‌گیری هدفمند از نوع ملاک محور و تا رسیدن به اشباع نظری تعداد ۲۶ دانشجو و ۱۲ استاد به عنوان نمونه انتخاب شدند. ابزار جمع‌آوری اطلاعات مصاحبه نیمه‌ساختار یافته بود. شیوه تجزیه و تحلیل داده‌ها به روش «آتراید– استرلینگ» با نرم‌افزار MAXQDA 2020 انجام شد. یافته‌های حاصل بیانگر ۱۴۳ مضمون پایه، ۹ مضمون سازمان‌دهنده و ۴ مضمون فراگیر از دیدگاه دانشجویان و ۱۶۶ مضمون پایه، ۱۴ مضمون سازمان‌دهنده و ۵ مضمون فراگیر از دیدگاه اساتید بود. یافته‌های پژوهش نشان داد که راهکارهای کاهش تقلب در آزمون آنلاین از دیدگاه اساتید و دانشجویان عبارتند از«راهکارهای تغییر در طراحی آموزشی اساتید»، «راهکارهای فناورانه»، «راهکارهای مربوط به ساختار سامانه‌ای آزمون»، «راهکارهای سطح نهادی» و همچنین وجه تمایز دیدگاه اساتید نسبت به دانشجویان«راهکارهای خودراهبری دانشجویان» بود.

واژه‌های کلیدی

آزمون آنلاین، تقلب تحصیلی، راهکار کاهش تقلب، دانشگاه.

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ORIGINAL ARTICLE

Analysis of methods for reducing cheating in online exams at Payam Noor University in Isfahan Province

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ABSTRACT
The prevalence and expansion of the use of online tests in all universities, especially in Payam Noor University, and the experience of using online tests during the Corona situation, raised the need to investigate strategies to reduce cheating in this type of test. Therefore, the aim of this research was to investigate methods to reduce cheating in online tests at Payam Noor University, Isfahan Province. A qualitative research method of content analysis was used. The study area included all students studying and professors at Payam Noor University, Isfahan Province in the second semester of the academic year 2021-2022. Using a purposive sampling method of criterion-based type and until theoretical saturation was reached, 26 students and 12 professors were selected as samples. The data collection tool was a semi-structured interview. The data analysis method was carried out using the "Attride-Stirling" method with MAXQDA 2020 software. The findings indicated 143 basic themes, 9 organizing themes, and 4 overarching themes from the students' perspective and 166 basic themes, 14 organizing themes, and 5 overarching themes from the professors' perspective. The research findings showed that the strategies for reducing cheating in online exams from the professors' and students' perspectives include "solutions for changing the professors' educational design," "technological solutions," "solutions related to the system structure of the exam," "institutional-level solutions," and also the distinguishing feature of the professors' perspective towards students was "students' self-management solutions.".

KEYWORDS
Online exam, academic cheating, cheating reduction strategy, university.

Introduction

The development of ethics is one of the most important goals of the education system in most societies. One of the specific areas in which ethics and moral values are of particular importance is the field of education and acquiring knowledge. (Sabziyan, Ghadampour, Mirdrikund, 2017). Today, the official education institution (and consequently higher education) along with families is responsible for educating and training students and tries to convey social values and norms to them. (Frost, Mehram and Amin Khandaghi, 2017) Because academic ethics in a completely effective way causes adherence to and adherence to values such as not cheating, relying on personal effort and effort in obtaining academic achievements, observing honesty, integrity, and following human and moral teachings to acquire knowledge. (Sabziyan et al., 2017).One of the problems that educational institutions and universities have always faced and have been trying to deal with more seriously in the last decade and that always threatens academic ethics is cheating. (Qasemzadeh, Khamsan and Astgoo Moghadam, 2019). First, it is better to examine the word "cheating" in its root: Cheating in Persian and in the Dehkhoda dictionary means tampering with matters at one's own will (Dehkhoda dictionary, under the word "cheating"). In the common language, cheating means going back from one state to another, changing, taking advantage of something for one's own benefit and the detriment of another, being wrong and deceitful. (Zakir Salehi, 2010:12) Cheating in other dictionaries is also defined as being the equivalent of dishonesty, hypocrisy, deceit, lies, betrayal, hypocrisy and falsehood, and is defined in different ways in different fields. (Alikhah and Bulaghi, 2014). Cheating is derived from the root "heart" in

Arabic. "The heart of a thing" means to turn it from its form or state in a way that overturns it. (Louis Maalouf, Al-Munjadah 1965: 648 quoted by Zakir Salehi, 2010:12). Webster's Online Dictionary explained the verb "to cheat" as follows: "to use an unfair or dishonest method to gain an advantage." (Abdaoui, 2018) The Oxford Dictionary defines fraud as "fraud, deceit, and trickery." In French, the word "froud" means trickery and deceit, and in general, any deceptive act, and is used idiomatically to mean escaping from obligations. (Zakir Salehi, 2010:13).

One of the most difficult aspects is to provide an acceptable definition of cheating, which is controversial among students and professors (Omid Moghaddam, Khamesan, & Ayati, 2012). Maftik (2006) calls cheating an "instrumental crime" because it provides a type of non-monetary reward (e.g., the ability to obtain a higher score than students who did not cheat) for the student. (Quoted by Alivardinia, Janalizadeh, & Omrani Dehkahan, 2015). According to Murdock & Anderman (2006), cheating is a selfish and immoral act to raise one's status and position outside the law, however, it is a fact of life in many educational institutions today. (Quoted by Bahrami, Hassanzadeh, Zandi, Ermi, & Miri, 2015). McIntosh (1997) defines cheating as a violation of principles of right and justice, as well as a violation of specific laws or standards of behavior. (Quoted by Mirzaei, Seif, and Ebrahimi Qavam, 2010). Prescott (1989) also writes: Cheating is a deceptive behavior that is not shown in the efforts of an individual or others. (Quoted by Mirzaei et al., 2010). Abdaoui (2018) considers cheating as depriving, misleading, or deceiving another by trickery. Academic cheating has various types and several classifications have been proposed for it. The

following classifications are among the important classifications in this field: 1- Rettinger and Kramer classification: They have divided the types of academic cheating into cheating on tests and cheating on homework (or plagiarism). 2- Gaberson and Rosens classification: a) Cheating by giving or receiving information from others; b) Cheating by using prohibited substances or information; c) Cheating by escaping the evaluation process. (Quoted from Omid Moghaddam et al., 2012).In the last century, which is the transition period from the industrial age to the information and communication age, education has undergone significant changes in terms of both quantity and quality compared to the past. (Vakil Jezzi, Eghbalian Nooranizadeh, Akafzadeh Savari, Ghazawi Khorasgani, 2010). In such a way that online education has become a permanent tool that has increased its scope in education markets around the world. (Edzima, 2020). Before 2020, reports show that 30% of students in US colleges and universities were enrolled in at least one online course. (Allen and Seaman, 2014 cited in Holden, Norris, and Kohlmeier, 2021) and 44% of research respondents also taught at least one online course. (Jashik and Lederman, 2018, cited in Holden et al., 2021) According to Allen and Seaman (2015), in online education, 80 percent or more of the course content is presented online. Blended learning also presents 30 to 79 percent of the course content online. (Quoted in Adzima, 2020) This indicates the breadth and importance of using online education. However, with the expansion of the penetration of electronic tools in various contexts and various educational and research processes, the need for electronic testing has also increased. (Habibi, Aghapour, Fatemi, Khodayari, Homayni Damirchi, and Rahimi, 2016). Because in any educational system, evaluation is considered a fundamental

issue, and no education is valuable without evaluation and feedback, and students need to be able to recognize their shortcomings and problems and try to fix them. (Zaerthabet, Pourghaneh, Besharti, Khoshrang, Ebrahimi Nia, 2019). One of the common online assessment methods used in higher education is online testing. (Boiteshwaru, Ki Reddy, & Bilani, 2017). We use the term "online testing" to designate a specific type of ICT-based assessment or e-assessment that can be used for diagnostic, formative, and summative purposes. (Boiteshwaru et al., 2017).

With the entry into the Corona crisis, a paradigm shift has occurred from face-to-face learning and traditional education to advanced learning using online technology. (Asghari, 2020) and during this period, most schools and universities were forced to switch to online education. (Bilen and Matros, 2021). Of course, it is worth noting that in the context of the Covid-19 pandemic (global Corona pandemic), in-person examination supervision has been impossible in many areas. (Holden et al., 2021) and this has brought with it problems. Including cheating during online exams, which is a major and necessary challenge, because the lack of supervision during online exams increases the level of opportunity for cheating. (Hilton, Levy and Dringos, 2016). According to Globally, 58 out of 84 countries surveyed by UNESCO postponed or changed the dates of exams, and most universities had traditional classroom and paper-based assessments instead of standard online assessments. (UNESCO, 2020) This reluctance to conduct online tests is due to the lack of confidence in online tests, and the online environment suggests that there is no security in such environments for assessment. (Ngqondi, Blessing Muanke, and Maeva, 2021). In fact, the presence of technology in the unethical practice

of electronic cheating has facilitating effects that increase its scope and extent. It seems that cheating with electronic tools in tests is in its infancy and will grow greatly in the near future if the tests are conducted in person and remotely. (Haghighi and Farajollahi, 2014). Many universities reported widespread cheating on online exams that were held in the spring of 2020, and the problem became so widespread that even the media addressed it. For example, a recent article in the Washington Post and Inside High Ed (Newton-Lederman, 2020 cited in Bailen and Matros, 2021). The importance and necessity of research, both theoretically and practically, addressing the issue of "academic or academic cheating" is important in two or more aspects: 1- If a learner becomes accustomed to doing unethical things in the educational environment, his or her future career will be contaminated with unethical issues, which is more important in the higher education system, given that students enter the job market after completing their studies. (Sharafi and Alibeigi, 2013) 2- If learners spend their education period cheating, their knowledge and information will not be of the desired and acceptable level, and this will lead to their inefficiency, which can cause irreparable losses to the society. (Sharafi and Alibeigi, 2013; Omid and Montazeri, 2011). The aforementioned negative effects of cheating in educational environments require planning to reduce its incidence in the online environment among students. Especially since this high prevalence of cheating has caused concern among those involved in the educational system during the COVID-19 pandemic and online exams.Therefore, given the necessity of using online tests during the coronavirus pandemic in the world and the environmental crisis in our country, paying attention to online tests and gaining more knowledge about this type of test and strategies to reduce cheating in it and

preparing the conditions and framework for its implementation is increasingly being considered as a serious educational field in all educational systems, especially higher education, today. Payam Noor University, as a mother university in the field of blended learning and new technologies, has entered the field of online tests earlier than other universities, and also needs to make progress in this field more than other universities due to the centralized tests it holds in all its centers and units across the country. Therefore, it is necessary to conduct more research on how to improve the quality of online tests and reduce cheating. Therefore, this research, considering the greater knowledge of students and professors at Payam Noor University regarding the comprehensive dimensions of an online exam compared to other universities, intends to answer the question by analyzing and analyzing information from students and professors at Payam Noor University: What are the solutions to reduce cheating in online exams at Payam Noor University in Isfahan Province?

Research background

Omid and Montazeri (1400) in their article titled "Strategies for Reducing Cheating in Virtual Tests," which was conducted using a review and library method, have discussed some strategies for reducing cheating in online tests. The results of their studies indicate that understanding strategies for reducing cheating in online tests (such as approving and informing codes of ethics, determining teacher empowerment courses, determining the appropriate time for online tests, using online and webcam-based cameras, using browser lock by disabling Internet access outside the LMS, etc.) and observing them in tests can make an important contribution to reducing learners' cheating in these tests.In a two-page review article titled

"Letter to the Editor: Cheating in Virtual Exams and Preventive Strategies," Iraqian Majer, Jooybari, Sanagoo, and Yaqoubi (1400) have mentioned some of the strategies such as: more allocation for assignments throughout the course, using artificial intelligence and its algorithms such as examining eye movements or typing patterns or keystrokes, informing students of the consequences of academic dishonesty, limiting the start and end times, displaying each question for a limited time and separately, not being able to return to the previous question, randomizing the display of questions and the order of questions and options, prohibiting taking pictures of questions and copying them, and also controlling the student through the webcam of a laptop or mobile phone at the time of the exam.

Hosseini (1400) in his research entitled "The Relationship between Religiosity and Religious Attitudes with the Tendency to Cheat in Students' Exams," which he conducted using a descriptive-correlation method, concluded that both variables of religiosity and religious attitude, with no tendency to cheat, have the ability to predict the tendency to cheat. Based on the results obtained, he suggests that by providing training aimed at increasing religious beliefs and awareness and religious attitudes in students, the basis for reducing the rate of cheating in academic fields can be provided.In their research, Mousavi Salehi, Esfijani, and Zamani (2019) designed a framework for assessing the quality of MOOC (abbreviated as "MOOC"), which in its evaluation index and learning tasks, states indicators to determine the accuracy and precision of the evaluation. They referred to indicators such as the use of strategies to prevent cheating (face registration via webcam, typing pattern, etc.), determining the possibility of retaking the test, and measures to

prevent cheating in the test (random selection of questions, changing test questions each time it is repeated, etc.).Karimi Meridani, Behbahani, Ebadi, and Choupani (2019) conducted a study titled "Design and Implementation of an Online Exam System to Evaluate Students and Improve the Quality of Education." The findings of the study indicate that there is a significant and greater difference in the end-of-semester scores of students who participated in online exams compared to those who did not participate. The innovation of the proposed method in this study is to hold online exams continuously and weekly because it reduces the time for student evaluation and encourages them to study courses simultaneously with the recently taught materials, and everyone can participate in it.In his editorial, which was conducted in the form of a review and library, Mohammadpour Karizki (2021) points out three approaches to reducing cheating in online tests: 1- Allocating half of the total score to online assignments, seminars, projects, and activities; 2- Using a unique test for each student or learner (proportionate to the number of students): Random or arbitrary selection of several questions from a question bank for their greater satisfaction; 3- Online interviews as an inspection of the assessment are a suitable approach for detecting and detecting cheating.Bilen and Matros (2021) conducted evidence of cheating on online tests during the COVID-19 lockdown based on online chess communities, in two groups with and without cameras among learners enrolled in an intervention course at a public university in the spring of 2020. For this intervention course, three face-to-face midterms and an asynchronous online final exam were held, with online test questions presented randomly and without going back to the previous question. The research findings showed that the best feasible

solution is an online test policy in which a camera takes pictures of each student's computer screen and room.Dandier and Maxwell (2020) conducted a study titled "Cheating in Online Courses: Evidence from Online Monitoring." The study was conducted as a pilot study in an online North American Geography Microeconomics course using a webcam recording software for three exams per course, recording irregular events (eye movements or decreased vision and facial recognition or recognition of an unknown person in the form of a camera). The findings of the study showed that online monitoring using a webcam is an effective tool for reducing academic dishonesty in online courses.Howard (2019) found a pattern in a study comparing test scores of three groups of learners: the first group was online (unprotected), the second group was on-site (protected), and the third group was online-supervised (using remote software). His findings suggest that the average performance of the online (unprotected) group was comparable to the performance of the two control groups. Online (unprotected) learners spent more time on exams, indicating that they were trying to search for answers during the test. The findings of this study suggest that online search or online monitoring serves as a tool to reduce cheating during high-stakes times.In their article titled "Predicting the Use of Online Tests in 21st Century Learning Assessment; A Review of the Research Literature," Boyteshwarlu et al. (2017) consider cheating to be one of the challenges and issues related to the use of online tests and point to some of the tactics to prevent cheating that have been examined in previous studies. Such as randomizing questions, delivering a single question per page, using multiple versions of a test, not using the same questions from previous semesters, and instructor vigilance.Alessio, Malai, Maurer, Beiler, and Rubin (2017) conducted a study of 147 students enrolled in nine online undergraduate courses to test whether online test scores were lower when proctored than when unproctored. In four of the nine courses, instructors used either Soft Secure or another software called Respondus Monitor. The findings showed that unproctored students scored 17 points higher on the test than those with proctoring. This large difference suggests that unproctored students engaged in academic dishonesty.Hilton, Levy, and Dringos (2016) conducted a study to investigate the inhibitory effect of webcam-based monitoring (monitoring with monitoring) on maladaptive behavior during online tests. The study was conducted in an experimental design with an experimental group and a control group in Jamaica. One group was monitored by web-based mindful monitoring (MBWP) with software (CAPA) and the other group was unmonitored (NM). The findings of the study showed that there was no statistically significant difference between the scores of the two groups, although they concluded that those who were not monitored experienced higher levels of engaging in maladaptive behavior.

Research methodology
This research is a qualitative research and is of thematic analysis type. The method used for data analysis is thematic analysis in the style of Attride-Stirling (2001). One of the effective methods of qualitative analysis is thematic analysis. Thematic analysis is a method for identifying, analyzing and reporting patterns in qualitative data. Drawing a thematic network is one of the appropriate methods in thematic analysis that Attride-Stirling developed in 2001. What the thematic network offers is a map similar to a web. The thematic network, based on a specific process, systematizes basic themes (codes and key points of interviews and text),

organizing themes (themes obtained from combining and summarizing basic themes) and overarching themes (higher themes that encompass the principles governing the text as a whole); then these themes are shown in the form of web maps, diagrams and prominent themes at three levels along with the relationships between them. (Attride-Stirling, 2001). The study area included all undergraduate and graduate students familiar with and involved in online exams and indicators of cheating, and all professors concerned about cheating at Payam Noor University, Isfahan Province, in the academic year 2021-2022. In qualitative research, the study subjects are selected based on their connection to the research topic. Their selection is not intended to form a statistical sample of the entire population (Flik, 2008, cited in Omid Moghaddam et al., 2012). Using a purposive sampling method of criterion-based type, initially by introducing cheating students by professors and then using a snowball method, each cheating student was introduced to a skilled student in this field and professors skilled in reducing cheating in online exams. Also, through the introduced professors, other professors concerned and sensitive to cheating were identified and selected as a sample. Therefore, in this study, 24 students and 10 professors were selected as a sample up to theoretical saturation. In order to ensure greater reliability, the interview was continued with 2 students and 2 professors beyond saturation, so the final sample size was determined to include 26 students and 12 professors. The data collection tool was a semi-structured interview with 3 interview questions and the interview was conducted between 40 and 60 minutes over a period of one month. Of course, it is also worth mentioning that due to the sensitivity of the research topic, some students and professors avoided participating in the research and expressing their experiences clearly. Therefore, by talking to the students and assuring them that their information would not be made available to anyone in any way, their trust was gained. In addition, an attempt was made not to ask the names of the students and professors in the interview so that the sensitivity of the topic would be reduced in their opinion and they would be more comfortable expressing their experiences during the interview process. Also, throughout the interview, an attempt was made to ensure the perceptions presented by the interviewer to recount the main content and to confirm and complete the content by the interviewee. In analyzing qualitative data from interviews with students and professors, the Attride-Stirling thematic analysis method was used to categorize and organize basic, organizing, and overarching themes, and to form a thematic network using MAXQDA 2020 software.

Research findings

After the researcher has collected, extracted, and categorized the data, a new stage of the research process, known as data analysis, must begin. In the analysis stage, the important point is that the researcher must analyze the information and data in the direction of an important goal, namely answering the research question or questions and evaluating his hypotheses. (Hafeznia, 1400: 267). In response to the main research question, the strategies for reducing cheating presented by professors and students were examined and analyzed in two separate sub-questions. Sub-question one: What are the strategies for reducing cheating in online tests from the students' perspective?

Table 1. Classification of themes for strategies to reduce cheating in online exams (from the students' perspective)

Comprehensive theme	Organizing themes	Basic themes
Solution for change in educational design	Changes in the way tests are administered and scored	Standardization of the level of test questions, presenting conceptual, analytical, open-ended and descriptive questions, changing the test method to explanatory and descriptive, designing questions according to high cognitive levels, continuous and process evaluation throughout education, using other evaluation tools in addition to the test for evaluation, allocating part of the score to class activity and attendance, changing the test method by presenting practical and project work or presenting for course evaluation, allocating research work and essays, holding visual and live tests, using open-book tests
	Dealing with cheating groups	Professor's membership in cheating groups in the name of a student, intimidating students into joining the cheating group Using spies and infiltrators in cheating groups
	Changes in the teaching style of professors	Changes in the teaching methods of professors, teaching appropriate to the virtual environment, using question and answer methods
	Changing the type of interaction and motivation of students	Creating a positive and good relationship between students and professors, methods for compensating for test scores, strengthening attention to internal goals in the individual, increasing motivation to study among students.
Technological solutions	Exam security solutions	Using webcams to monitor students during exams, using facial recognition technology to authenticate students, using browser lock software during exams, encrypting and making book files non-searchable.
Solutions related to the test system structure	Test question design capabilities in the system	Limiting the number of times you can take the test, changing the order of multiple-choice questions, testing everyone at the same time, using cheat-proof questions, displaying a single question on each test page, not returning to the previous question, creating a question bank by professors and different questions for students, randomizing or changing the order of questions
	Time capability in the system	Time limit, considering the time appropriate to the test level (no less, no more)
Institutional Level Solutions	Coordinated actions of different parts of the university	Changing university policies in changing the type and level of memorization exams, reducing the rigor of exams due to concerns about students being accepted at any cost, creating a minimum appropriate internet infrastructure, using electronic exams on campus, making exams in person and reducing cheating, reducing the volume of exam resources and textbooks, reducing exam stress in students by organizers.
	The role of cultural and counseling units	Building a culture to reduce cheating, examining the causes and roots of cheating in universities, and using the experience of other countries in strategies to reduce cheating.

In response to the second sub-question, strategies for reducing cheating in online tests were analyzed from the perspective of professors.
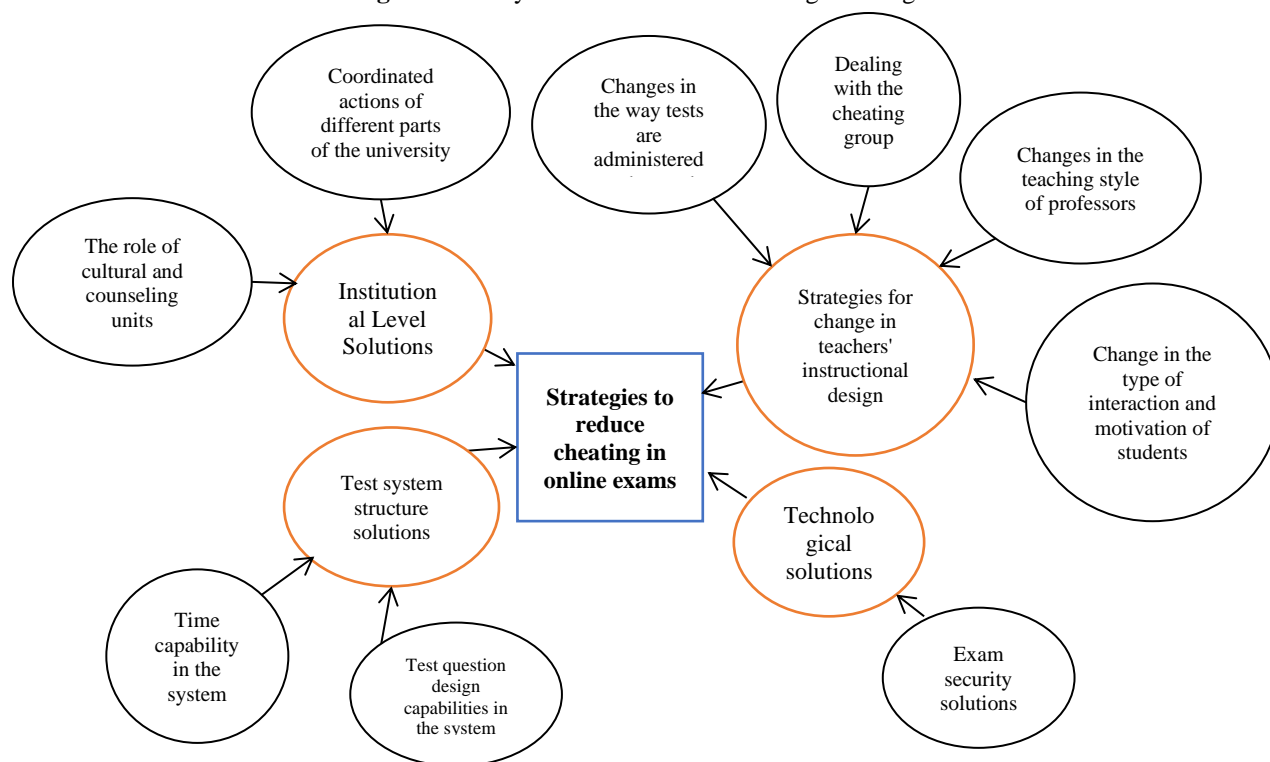
Table 2. Classification of themes for strategies to reduce cheating in online exams (from the perspective of professors)

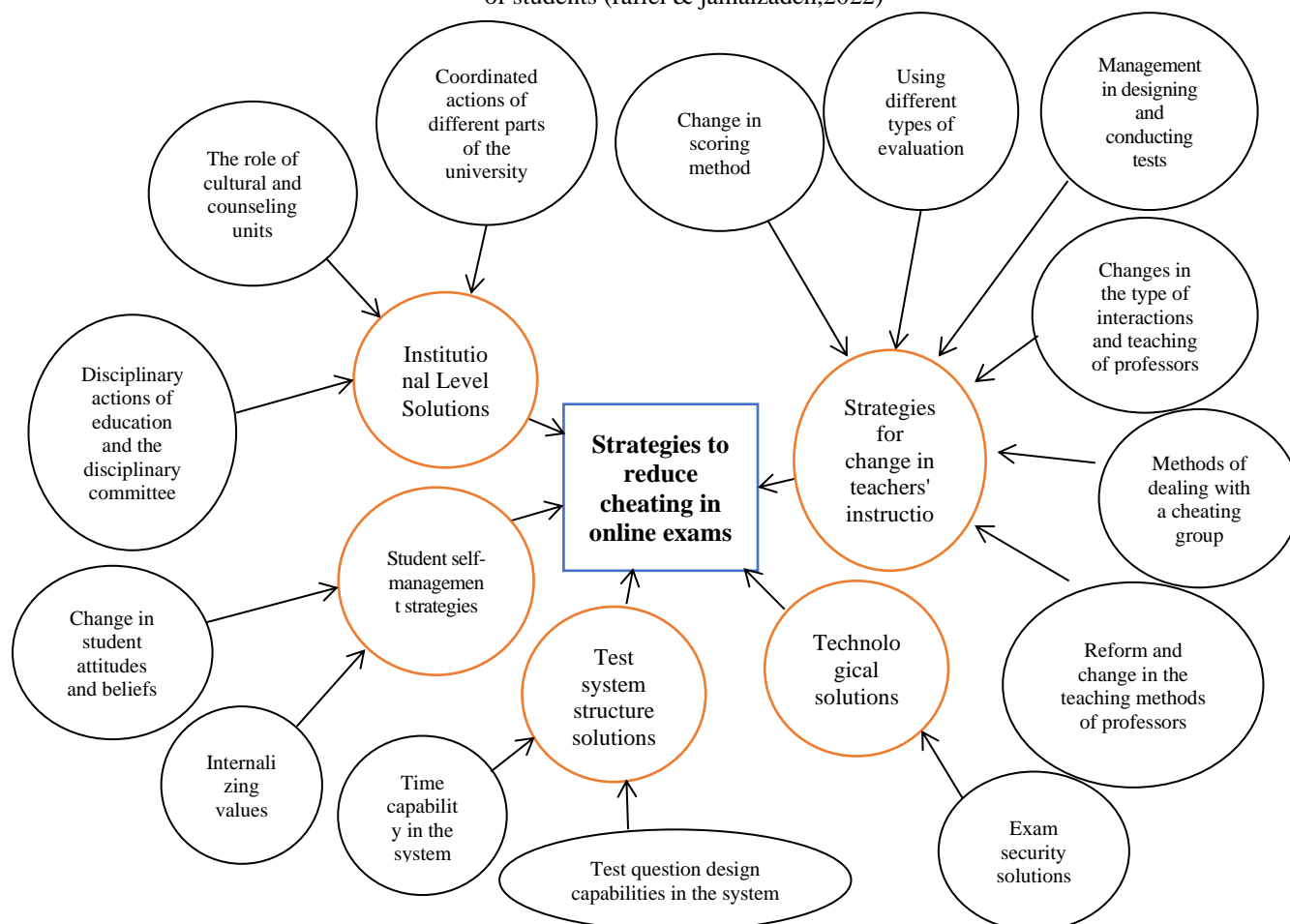| Comprehensive theme	Organizing themes	Basic themes
Solution for change in educational design	Change in scoring method	Breaking down and simplifying student scoring, allocating scores to practical work, allocating scores for active attendance and presentation in online classes - Paying attention to class attendance parameters Informing students about how to score
	Using different types of evaluation	Forming study groups for practical lessons and recording their performance, requiring attendance and answering daily questions via audio and video, making voice calls to some students randomly, studying and taking notes from newly introduced books, evaluating and critiquing research articles, peer evaluation, using electronic portfolios for students, using projects throughout an academic semester, assigning practical work and homework for evaluation, dividing the book content into fewer pages and continuously evaluating it, and continuously evaluating students throughout the semester.
	Test design and administration management	The teacher's intelligence in analyzing test results, tracking entry and exit times and the duration of the online test, managing the appropriate time for the test, designing analytical conceptual questions, not using previous semester questions or not designing questions by the student, giving importance to class discussions in designing questions, paying attention to the type and level of difficulty in designing questions, designing questions scattered from different parts of the book, changing the criteria and evaluation method.
	Changes in the type of interactions and teaching of professors	The teacher talking about the wrongness of cheating and its consequences, talking to students about the goals and mission of learning, positive communication between teachers and students with internal controllers, flexibility in the teacher's behavior with students, forming commitment among students, teacher commitment and accountability, encouraging students to redefine their motivation to study, the teacher being supportive and trustworthy towards students, creating peace of mind among students, valuing hard-working students, paying more attention to encouraging discussions than punitive discussions, monitoring and providing feedback to students with external controllers, preventing cheating with proper student guidance, warning students about continuous study of difficult courses.
	Methods of dealing with cheating groups	Using peer pressure to prevent cheating, professor membership in cheating groups to prevent this, creating a lack of coordination and cohesion in group formation with pressure from the professor
	Reform and change in the teaching methods of professors	The use of a creativity-oriented educational system by teachers, the use of a new flipped classroom teaching method in virtual education, the activity-oriented nature of the class, the adoption of a creative and inclusive approach to classroom management, and the diversity in the use of different creative teaching methods by teachers.
Using technological solutions	Exam security solutions	Live remote monitoring with webcams and cameras, authentication using new technologies, student authentication in online exams
Solutions related to the test system structure	Test question design capabilities in the system	Displaying a single question on each test page, the ability to not return to the previous question, changing the order of questions and answers, creating an extensive question bank for online testing, and randomizing questions

	Time capability in the system	Time limit, reduced deadline for entering the exam
Solutions for student self-management	Internalizing values	Activating the internal control system in students Strengthening the individual's internal goals and motivations Internalizing the value of doing the right thing in students
	Change in student attitudes and beliefs	Improving individual capabilities Specifying the purpose of education by the student Creating a sense of shame in cheating students Creating self-reliance among students Changing beliefs in students
Institutional Level Solutions	The role of cultural and counseling units	Creating a private, free market economic and higher education system Creating a sense of job, social, and economic security in individuals Creating motivation in individuals by changing social and employment conditions Strengthening religious support in students The need for revision and free choice in the selection of university resources by professors
	Coordinated actions of different parts of the university	Intensifying supervision with various methods Providing strong infrastructure for evaluation Holding in-person exams in case of excessive student violations in online exams Measures taken by the exam support system or professors towards groups Informing students of instances of cheating before holding online exams Informing students of the consequences of cheating in online exams Holding briefing sessions and conferences regarding informing the rules
	Disciplinary actions of education and the disciplinary committee	Creating fear among students about dealing with cheaters Heavy penalties for cheating Developing rules specifically for online exams Developing and implementing strong and decisive rules about dealing with cheaters

After completing the interviews and coding them, as well as extracting basic themes from both the students' and professors' perspectives (143 basic themes extracted from the students' perspective and 166 basic themes extracted from the professors' perspective), the researcher categorized the themes in the table based on the Stirling method and placed them in three categories of basic themes, organizing themes, and overarching themes in order to arrive at the theme network. According to the results obtained from the tables above, the theme network related to this study consists of 4 and 5 overarching themes from the perspectives of both groups of students and professors, respectively, each of which consists of organizing themes and basic themes.

Figure 1. Network of themes for strategies to reduce cheating in online exams from the perspective of students (rafiei & jamalzadeh,2022)

Figure 2. Network of themes for strategies to reduce cheating in online exams from the perspective of professors (rafiei & jamalzadeh, 2022)

Discussion and Conclusion

The present study was conducted with the aim of investigating and analyzing the strategies for reducing cheating in online exams from the perspectives of students and professors at Payam Noor University in Isfahan Province. The findings indicated 143 basic themes, 9 organizing themes, and 4 comprehensive themes from the students' perspective, and 166 basic themes, 14 organizing themes, and 5 comprehensive themes from the professors' perspective. The results of the study indicated that the perspectives of students and professors in presenting strategies for reducing cheating were almost similar, and commonalities were seen in the most important strategies expressed. In general, the comprehensive themes from the perspectives of both professors and students, considering the commonalities and differences, referred to 5 categories of strategies, which are: "strategies for changing educational design by professors", "technological strategies", "strategies related to the institutional level", "strategies related to the test system structure", and the distinguishing feature of the professors' and students' perspectives, which places special emphasis on "strategies related to student self-management", was obtained, which is explained in detail.

In terms of strategies for changing teachers' instructional design, this study is consistent with the results of Omid and Montazeri (1400) in that the teaching method of teachers is effective in the tendency to cheat and teachers should be empowered in the field of teaching and online exams. Also, the strategy for changing the scoring method and using different types of evaluation in terms of breaking down the score and assigning the score to practical work, homework, and online activities is consistent with the approach expressed by Mohammad Pourkarizki (2021). In terms of technological solutions, this study is consistent

with the research of Omid and Montazeri (1400), Araghian-Mojard et al. (1400), Bailen and Matros (2021), Dandir and Maxwell (2020), Howard (2019), Aliso et al. (2017), and Hilton et al. (2016), in that it considers the use of webcams to monitor students and prevent cheating effective. These solutions are also in line with the results of the research by Omid and Montazeri (1400), Araghian Mojard et al. (1400), and Mousavi Salehi et al. (1399) due to the expression of biometric solutions and browser lock software. Another category of proposed solutions that refers to the use of technologies in detecting and preventing cheating is "technological solutions". Among the exam security solutions stated by professors and students, we can mention the use of webcams for live monitoring of students during the exam, student authentication for entering the exam through biometric features, and the use of browser lock software during the exam. In explaining "solutions related to changes in the educational design of professors", solutions such as changes in the method of holding the exam and scoring, the use of different types of evaluation, modification and change in the teaching method of professors, changes in the type of interactions and encouragement of students, sometimes creative solutions to deal with the cheating group, as well as solutions related to the management of designing and holding the exam from the perspective of professors and students were mentioned. For this reason, the university should hold empowerment courses for professors on online exams and methods for reducing cheating, and reduce existing software and hardware limitations and problems so that professors can more easily use new teaching methods such as flipped or inverted classes in their classes.

The third category of solutions is related to "solutions related to the system structure of the test". The research findings are consistent with the

research of Boyteshwarloo et al. (2017), Mohammad pourkarizki (2021), and Mousavi Salehi et al (2019) in terms of system capabilities related to test design, such as question banks, displaying a single question per page, etc. This category of solutions refers to two organizing themes, capabilities related to test design in the system and time capabilities in the system. From the perspective of students and professors, using the capabilities included in the Reline system for test design, such as limiting the number of times you can take the test, changing the order of multiple-choice questions, displaying a single question per page, not returning to the previous question, creating an extensive question bank, changing the order of test questions, and using cheat-detector questions can help reduce cheating in online tests. Another feature of the Reline system is the time feature in the system, which was mentioned by the interviewees, which refers to a time limit (but with a standard appropriate to the questions) and a reduction in the time limit for entering the test, and in this way, collusion of students in cheating groups can be reduced. In terms of the fact that the time in the online test should be appropriate and limited, the present study is in line with the research of Omid and Montazeri (1400), Karimi Meridani et al. (1399), and Bailan and Matros (2021). However, it is worth noting that considering a very limited time also has its drawbacks and problems, such as creating stress in students and internet problems. Therefore, it is suggested that the time be considered appropriate to the level of the test.

The fourth category of solutions, which also distinguishes the two perspectives of students and professors, refers to "solutions related to student self-management." Among the practical solutions of professors and students in this area, one can mention internalizing values and changing students' attitudes and beliefs. In order to

internalize values, one can mention measures such as activating the internal control system in students, strengthening goals and internal motivation in the individual, and internalizing the value of doing the right thing in students. In order to realize the change in students' attitudes and beliefs, one can mention promoting individual capabilities, specifying the purpose of education by the student, creating a sense of shame in cheating students, creating self-reliance among students, and changing students' beliefs. Creating a sense of shame in cheating students is related to Braithwaite's theory of shame dissociation, which is discussed in the sociology of deviance.

The fifth and final category of solutions derived from the research findings is "institutional-level solutions." These solutions refer to solutions related to the actions of the university's educational, cultural, counseling, and disciplinary institutions. From the perspective of students and professors, the actions in this area can be examined in three categories: (coordinated actions of different parts of the university), (role of cultural and counseling units), and (disciplinary actions of education and the disciplinary committee). Among the proposed solutions related to the coordinated actions of different parts of the university, we can mention changes in university policies in changing the type and level of memorization tests, reducing the rigor of tests and paying attention to the concern of students being accepted at any cost, creating a minimum internet infrastructure, on-site electronic testing, reducing the volume of resources, the need for revision and free choice in the selection of resources by professors, intensifying monitoring, informing about instances of cheating, informing students about the consequences of cheating, and holding briefing sessions. The university's cultural and counseling units can also take effective steps to reduce cheating. Some of the measures mentioned by

students and professors include creating a culture to reduce cheating, investigating the reasons and root causes of cheating in universities, using the experiences of other universities, creating a private economic and higher education system, creating a sense of job security, creating motivation in individuals with changing social and employment conditions, and strengthening religious support in students. The research findings are in line with Hosseini's research (1400) in terms of the measures taken by cultural units and university counseling to strengthen students' cultural and religious support. Of course, in the meantime, we should not ignore the disciplinary measures of the education sector and the disciplinary committee, which can play a deterrent role. Among these measures mentioned by professors, we can mention creating fear in students about cheating, severe punishments for cheating, developing special rules for online exams, and developing and implementing strong and decisive rules regarding dealing with cheaters.

Finally, it should be said that just as professors acknowledged that their experiences in various exams indicate that no online exam can be designed and implemented in a way that completely and 100% prevents all cheating in this relatively unknown and ambiguous environment, but awareness of the strategies for reducing cheating in online exams and observing them in exams can make an important contribution to reducing student cheating in these exams and improving the quality of online exams. Therefore, it is suggested that in addition to setting strong and coordinated disciplinary rules that can be implemented between different parts of the university on the one hand and informing students and professors about these rules, necessary measures be taken in line with the security infrastructure of exam holding systems and teaching these capabilities to professors, as well as in line with student self-management and how to

internalize and change beliefs and strengthen internal motivation and the internal control system of students in classrooms and cultural units and university counseling.

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