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Research Article

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Dual Perspectives: Investigating University Students' Attitudes and Perceptions of Online Exams in the Post-Pandemic Era

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Abstract

This study investigates university students' attitudes and perceptions toward online exams in the post-pandemic era, with a focus on gender-based differences. Conducted at King Khalid University's Tehama branch, the study employed a quantitative research design, collecting data from 61 undergraduate students using a validated and reliable questionnaire. Descriptive and inferential analyses revealed that students generally held positive attitudes toward online exams, valuing their flexibility, efficiency, and inclusivity. However, concerns about technical reliability, academic dishonesty, and emotional engagement were prevalent. Male students exhibited slightly more favourable perceptions than their female counterparts, although no significant differences in attitudes were observed. These findings highlight the dual nature of online exams as both a promising and challenging tool in higher education. The study underscores the need for improved technical infrastructure, inclusive assessment designs, and policies that enhance fairness and engagement. Recommendations for practice include investment in robust technologies, training for students and educators, and the integration of collaborative and interactive elements into online exams. The study's insights contribute to the growing discourse on technology-driven education and offer a foundation for future research to explore intersectional factors, longitudinal trends, and comparative assessments of online and traditional modalities.

Keywords: online exams, post-pandemic education, student attitudes, student perceptions, higher education, Saudi Arabia, quantitative research.

1. Introduction

The COVID-19 pandemic has profoundly impacted higher education, compelling institutions worldwide to transition from traditional in-person instruction to online platforms. This abrupt shift has significantly influenced teaching methodologies, learning experiences, and assessment practices (Bond, 2020; Hodges et al., 2020) [1,2]. While initial adaptations were made under emergency conditions, the post-pandemic era presents an opportunity to evaluate and refine these online educational practices.

A critical area of focus is the assessment process, particularly online examinations. The rapid implementation of online assessments introduced challenges such as ensuring academic integrity, addressing technical issues, and managing student engagement [3,4]. Understanding students' perceptions of these assessments is essential, as their attitudes can significantly influence their academic performance and overall learning experience [5].

Recent studies have highlighted diverse student experiences with online assessments. For instance, research indicates that while some students appreciate the flexibility of online exams, others express concerns regarding fairness and the effectiveness of e-proctoring systems [6]. Moreover, issues related to academic dishonesty have been exacerbated in the online environment, with both students and educators acknowledging an increase in unethical behaviors during online exams [7].

Despite the growing body of literature on online learning and assessment during the pandemic, there is a paucity of research focusing on the post-pandemic context, especially within specific cultural and institutional settings. This study aims to fill this gap by examining the attitudes and perceptions of students at King Khalid University's Tehama branch regarding online examinations in the aftermath of COVID-19. By analyzing these perspectives, the research seeks to provide insights that can inform the development of more effective and equitable assessment strategies in higher education.

1.1. Research Statement of the Problem

Research Questions

This study seeks to answer the following key question:

1. What are university students' attitudes and perceptions of online assessments in the post-COVID-19 context?

To address this question, the following sub-questions are posed:

- What factors influence students' motivation to participate in online assessments?
- Are there significant differences in attitudes and perceptions between male and female students?
- What are the perceived advantages of online exams from the students' perspective?
- What are the perceived disadvantages or challenges associated with online exams?

1.2. Research Hypothese

The study tests the following hypotheses:

- **H0:** There is no significant difference between male and female students' attitudes toward online exams in the post-COVID-19 era.

- **H1:** There is a statistically significant difference between male and female students' perceptions of online exams in the post-COVID-19 era.

1.3. Research Significance

This study is significant for both academic research and practical application in higher education. While numerous studies have examined online education during the COVID-19 pandemic, many were conducted under emergency conditions, with students having limited familiarity with virtual learning and assessment tools. This research is unique in exploring students' attitudes and perceptions in the post-pandemic context, where they have developed greater familiarity and experience with online exams.

By focusing on students at King Khalid University's Tehama branch, this study provides culturally and institutionally specific insights into the effectiveness and challenges of online assessments. The findings can inform policy decisions related to online assessment design, implementation, and evaluation in higher education. Understanding factors influencing student attitudes-such as academic integrity, technological readiness, and exam design-can help educators and administrators create more equitable and effective online assessment systems [1,4].

Furthermore, this study contributes to the growing body of literature on post-pandemic education by addressing gaps related to gender-based differences in attitudes and perceptions. Research indicates that gender differences exist in students' access to and use of information and communication technology (ICT), attitudes toward technology, and digital knowledge and skills [8,9]. By examining these differences, the study offers practical recommendations for developing inclusive and student-centered assessment practices in virtual environments.

In summary, this research aims to provide actionable insights that can enhance the quality and equity of online assessments in higher education, particularly in the post-pandemic era.

2. Literature Review

The COVID-19 pandemic profoundly impacted higher education systems worldwide, prompting a rapid shift from traditional in-person instruction to online learning and assessment. This transition introduced significant opportunities and challenges that continue to shape the post-pandemic educational landscape. While prior studies have explored various facets of online education during the pandemic, a comprehensive understanding of students' attitudes and perceptions in the post-pandemic era remains limited, particularly in specific cultural and institutional contexts such as Saudi Arabia. This review critically examines the existing literature on online learning and assessment, emphasizing the transition to online education, students' attitudes, perceived benefits, and persistent challenges, while identifying gaps that this study seeks to address.

2.1. The Transition to Online Learning and Assessment

The COVID-19 pandemic catalysed an unprecedented shift to online learning and assessment globally. While this transition demonstrated the potential of digital education in providing accessibility and continuity during emergencies [10], its execution was often marked by significant challenges. Basilaia and Kvavadze (2020) [7] argue that the rapid adoption of online platforms exposed structural inequities, such as disparities in internet access and digital literacy, which disproportionately affected students from underprivileged backgrounds. Similarly, Hodges et al. (2020) [2] highlight that much of the transition constituted "emergency remote teaching," lacking the pedagogical rigor of intentionally designed online learning systems. These critiques underscore the need to distinguish between makeshift responses to crises and sustainable models for online education.

In the Saudi Arabian context, Albaqami and Alzahrani (2022) [11] found that instructors struggled with insufficient preparation time and a lack of technical expertise, which hindered effective implementation of online teaching. While instructors acknowledged the advantages of digital tools, they expressed concerns over maintaining academic standards in a virtual environment. This reflects a broader issue in online education-whether traditional metrics of quality and rigor can be effectively translated into virtual spaces.

2.2. Students' Attitudes Toward Online Exams

Students' attitudes toward online exams are shaped by a complex interplay of factors, including technical challenges, perceptions of fairness, and prior experience with online learning environments. Bilen and Matros (2021) [6] report that students often appreciate the flexibility of online exams but remain skeptical about their reliability and integrity. These findings align with Praselyanto et al. (2022) [12], who emphasize that negative attitudes among students frequently stem from external factors, such as unstable internet connections and an unsuitable home environment for focused learning.

In contrast, Al-Jarf (2024) [13] observed that while 36% of Saudi students preferred distance learning for its convenience and flexibility, a significant proportion (40%) favored face-to-face instruction due to higher engagement and perceived learning outcomes. This highlights a critical gap in online education: the inability to replicate the interactive and participatory elements of in-person assessments. Such findings call for the development of hybrid assessment models that combine the strengths of online and traditional systems.

2.3. Perceived Benefits of Online Exams

When designed effectively, online exams offer unique advantages that extend beyond traditional assessments. Cheng et al. (2020) [5] found that online exams can foster self-paced learning and provide immediate feedback, enabling students to identify areas for improvement more efficiently. Similarly, Pellegrini et al. (2020) argue that the integration of artificial intelligence in online assessments has the potential to enhance personalization and support critical thinking.

However, these benefits are often contingent upon institutional readiness and technological infrastructure. Tadesse and Muluye (2020) [14] highlight that while online exams can be empowering for disabled students, their success relies heavily on accessibility features and adaptive tools. Without these, the inclusivity promised by digital assessments remains largely theoretical. This underscores the need for targeted investments in technology to ensure equitable access to the advantages of online assessments.

2.4. Challenges of Online Exams

The challenges associated with online exams are manifold and deeply entrenched. Academic dishonesty remains one of the most pressing concerns, with Flaherty (2020) [3] noting that the absence of robust monitoring mechanisms in virtual

environments has led to a marked increase in cheating. Although e-proctoring technologies have been introduced to mitigate this issue, they often raise privacy concerns and exacerbate student anxiety [4].

Technical limitations further complicate the implementation of online exams. Basilaia and Kvavadze (2020) [7] found that in developing countries, unreliable internet connectivity and limited access to devices significantly hinder the effectiveness of virtual assessments. Additionally, Mahyoob (2020) [15] highlights the psychological impact of online exams, noting that many students feel isolated and disconnected in virtual settings, which can adversely affect their academic performance and mental well-being. These findings suggest that addressing the technical and emotional dimensions of online assessments is essential for their long-term viability.

2.5. Post-Pandemic Perspectives

The post-pandemic era offers a critical opportunity to reevaluate online assessment practices and address the shortcomings exposed during the crisis. Venkatesh et al. (2020) [8] emphasize the importance of investing in robust technological infrastructure and developing clear guidelines for virtual assessments to enhance their credibility and effectiveness. Furthermore, understanding demographic differences in attitudes and experiences, such as those observed by Kim et al. (2023) [9] in gender-based preferences for ICT use, can inform the design of more inclusive assessment models.

In Saudi Arabia, Albaqami and Alzahrani (2022) [11] argue for the need to provide ongoing professional development for educators to improve their digital competencies. This aligns with global calls to move beyond emergency measures and adopt sustainable, evidence-based strategies for online education [10]. By critically examining the successes and failures of pandemic-era assessments, educators and policymakers can create hybrid models that leverage the strengths of both online and traditional systems.

The existing literature provides valuable insights into the opportunities and challenges of online learning and assessment, particularly during the pandemic. However, a significant gap remains in understanding students' attitudes and perceptions in the post-pandemic era, where familiarity with online tools has matured. This study seeks to fill that gap by focusing on students at King Khalid University's Tehama branch, providing culturally specific insights into their experiences. By addressing gender-based differences, institutional readiness, and the psychological impact of online exams, this research contributes novel perspectives to the field and offers actionable recommendations for designing more effective, inclusive, and sustainable online assessment systems in higher education.

3. Research Methodology

3.1. Research Design

This study employs a descriptive quantitative research design to examine university students' attitudes and perceptions of online examinations in the post-COVID-19 era. A quantitative approach was selected due to its ability to systematically collect and analyze data to identify trends and relationships [16]. The study focuses on understanding students' experiences, highlighting factors influencing their attitudes, and exploring potential differences based on gender.

3.2. Population and Sampling

The target population comprises undergraduate students from King Khalid University's Tehama branch. A total of 61 students (23 males and 38 females) were selected through simple random sampling to ensure unbiased representation. All participants had prior experience with online exams during the COVID-19 pandemic, which provided a basis for evaluating their perceptions in the post-pandemic context. The diversity in academic disciplines within the sample enhances the generalizability of the findings to broader educational settings.

3.3. Data Collection Instruments

Data were collected using a structured electronic questionnaire designed to measure students' attitudes and perceptions of online exams. The questionnaire comprised 30 items divided into two constructs:

1. **Attitudes (15 items):** Focused on motivation, preferences, and emotional responses to online exams.
2. **Perceptions (15 items):** Addressed perceived benefits, challenges, and overall fairness of online assessments.

A five-point Likert scale was employed, ranging from 1 (strongly disagree) to 5 (strongly agree), to capture the intensity of participants' responses. The questionnaire underwent expert validation by three academic referees to ensure content validity and clarity [17]. A pilot test with 15 students was conducted, yielding a high reliability coefficient (Cronbach's alpha = 0.87), indicating strong internal consistency.

3.4. Data Collection Procedures

Ethical approval for the study was obtained from the Research Ethics Committee at King Khalid University. Prior to participation, students were provided with detailed information about the study's objectives and procedures. Informed consent was obtained electronically, ensuring that participants understood their rights, including confidentiality and the voluntary nature of their involvement. The questionnaire was distributed online through institutional email to maximize accessibility and participation.

3.5. Data Analysis

Quantitative data were analyzed using the Statistical Package for the Social Sciences (SPSS, version 26) to ensure accurate and systematic examination of the collected responses. The analysis followed several sequential steps designed to validate, summarize, and interpret the data in line with the study's objectives.

3.5.1. Data Screening and Preparation: Before conducting the main analyses, the dataset was screened for missing values, outliers, and response inconsistencies. Normality of data distribution was checked using the Kolmogorov–Smirnov and Shapiro–Wilk tests, while skewness and kurtosis values were examined to confirm that they fell within the acceptable range (±2), indicating suitability for parametric testing. Reliability of the questionnaire was assessed using Cronbach's alpha, which yielded coefficients above 0.80 for both constructs—attitudes and perceptions—signifying strong internal consistency.

3.5.2. Descriptive Statistical Analysis: Descriptive statistics, including means, standard deviations, frequencies, and percentages, were computed to summarize the participants' demographic characteristics and their responses to each questionnaire item. These analyses provided an overview of students' general attitudes and perceptions toward online exams and helped identify overall trends and patterns in the data.

3.5.3. Inferential Statistical Analysis: To test the study's hypotheses and determine whether statistically significant differences existed between male and female students, two inferential techniques were employed: Independent Samples t-Tests: Conducted to detect significant mean differences in attitudes and perceptions between male and female students.

Chi-Square (χ^2) Tests: Applied to examine categorical relationships and to validate the robustness of gender-based comparisons across the two constructs. All statistical tests were performed at a significance level (α) of 0.05, ensuring that only relationships and differences with a 95% confidence level were considered meaningful. The findings were interpreted in the context of prior literature and theoretical frameworks to provide practical and evidence-based insights into students' experiences with online assessments.

3.6. Ethical Considerations

This study adhered to the ethical principles outlined in the Declaration of Helsinki [18]. Participant anonymity and data confidentiality were strictly maintained. Data were stored securely on encrypted systems, accessible only to the research team. Participants were assured that their responses would be used solely for academic purposes.

4. Results

Table 1: Distribution of sample members according to demographic variables.

Variable	Categories	Number	Percentage
Sex	Male	23	37.7%
	Female	38	62.3 %
Age	18-20 year	24	39.3%
	21-23 year	31	50.8%
	24-26 year	6	9.8%
Specialization	Management	5	8.5%
	English language	40	65.5%
	Information system	8	13.1%
	Accounting	8	13.1%

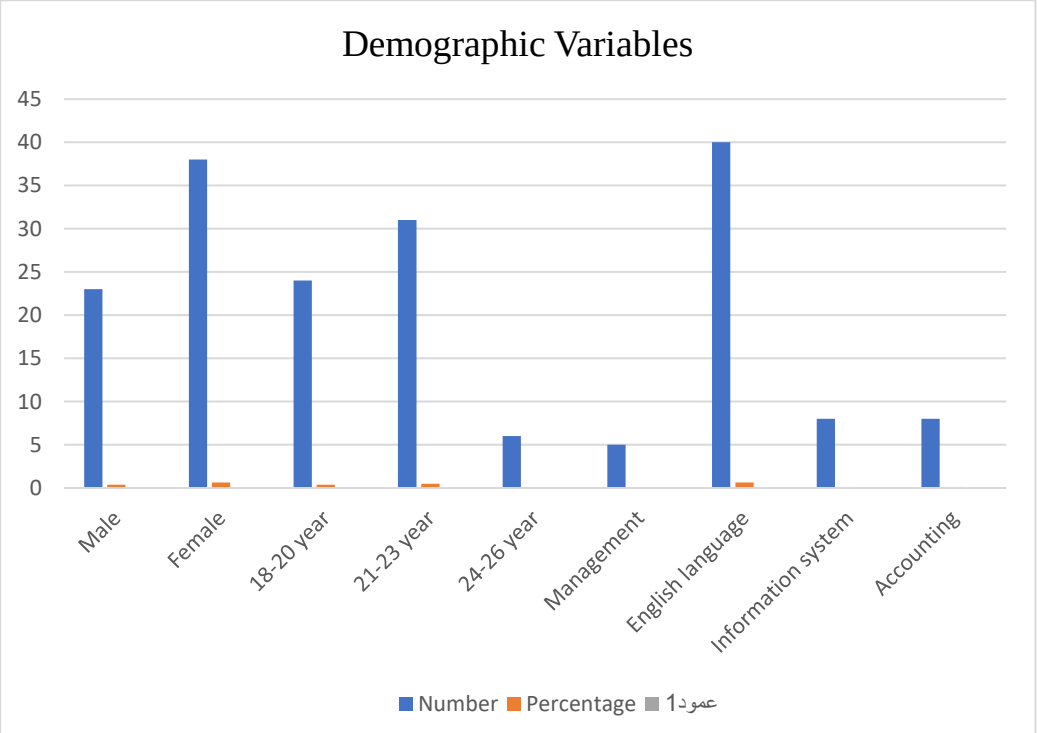

Figure 1: Distribution of sample members according to demographic variables.

Table 2: Pivots of study.

Pivot number	Pivots of the study	Number of paragraphs	Mean	Standard deviation
1.	Dependent variable: (Online tests acceptance)		4,03442623	0,688691
2.	Independent variable: (Students' Attitudes towards Online Test)	15	4,46557327	0,899829
3.	Independent variable: (Students' perception towards online test)	15	3,603278689	0,563191
Total	30			

Table 3: Summary of the results of the responses.

##	Students' perception towards online test	Mean	Std. Deviation
1	[Students with poor sight problems can be affected by online test]	3.410	**1.2567**
2	[Students can cheat if the test is online]	3.290	**1.3826**
3	[Online test can be affected by the inconvenient electricity]	3.902	**1.2343**
4	[Online test can be affected by the internet disconnection]	4.180	**1.0084**
5	[Online test requires high training in technological skills]	3.131	**1.3598**
6	[Online test can be distracted by social media or other sites]	3.295	**1.4183**
7	[Online test cause a sense of isolation]	3.066	**1.4361**
8	[Online test is satisfying assessment tool]	3.869	**1.2312**
9	[Online test leads to self-esteem]	3.984	**1.0407**
10	[Online test is dissatisfying testing tool]	2.934	**1.4930**
11	[Online test helps disabled students]	4.426	**0.9212**
12	[Online test helps me to score high grades easily]	4.082	**1.0847**
13	[Online test doesn't develop my handwriting skills]	3.508	**1.3369**
14	[No one offers helps me if I don't understand a question in an online test]	3.475	**1.3242**
15	[I feel confused while doing the online test]	3.377	**1.4043**

Table 3: Summary of the results of the responses.

##	Students' Attitudes towards Online Test	Mean	Std. Deviation
1	[. Online test motivates me to score good grades]	4.508	**0.8291**
2	[Online test develops my critical thinking abilities]	4.459	**0.8864**
3	[Online test gives me a sense of privacy]	4.557	**0.7858**
4	[Online test makes me feel secured]	4.443	**1.0412**
5	[Online test saves me time]	4.656	**0.7502**
6	[Online test inspires me]	4.246	**1.0272**
7	[Online test gives me a sense of freedom]	4.410	**0.8242**
8	[Online test enables me to know my mistakes directly]	4.689	**0.7197**
9	[Online test makes me feel less stressed]	4.426	**1.0717**
10	[Online test saves me efforts]	4.492	**.8684**
11	[Online test saves me money]	4.361	**1.1259**
12	[Online test is fair assessment tool]	4.328	**0.9953**
13	[Online test gives me self-confidence]	4.426	**0.9567**
14	[Online test provides a perfect testing environment]	4.443	**0.8470**
15	[Online test gives me immediate feedback]	4.541	**0.7654**

4.1. Conditions for scale reliability:

4.1.1. Validity of the scale

Virtual validity :The content validity test for the scales' statements was conducted by evaluating the validity of the concept and the validity of its questions in terms of wording and clarity, which may be due either to differences in meanings according to the culture of society or because of translating the scales from one language to another. The researcher presented the questionnaire to several academic referees and specialists in the field. The study consisted of (3) referees, to analyze the

questionnaire statements and to determine the extent of compatibility between the statements of each scale, then accept and modify some of the statements, and after recovering the questionnaire from the arbitrators, then making the amendments that were suggested to it, and thus the questionnaire was designed in its final form

4.1.2. Reliability of the scale:

A survey sample was selected, after the distribution was arranged from the highest grade to the lowest grade. Two categories were selected from both ends of the distribution, one of which represents 33% of the individuals who obtained the highest grades, and the second represents 33% of those who obtained to the lowest scores, and then the differences between the averages of the upper and lower groups were calculated. As shown in Table 4.

Table 4: shows the value (t) of the differences between the upper and lower group of the questionnaire variables.

Variable	Category	Mean	Std. Deviation	(T) Value	Significance level
Students' Attitudes	highest	4.98	.04	4.45	**0.000**
	lowest	4.16	0.57		
Students' perception	highest	4.55	0.45	8.91	**0.000**
	lowest	3,.4	0.46		

It is clear from the table that there are fundamental differences between the averages of the upper category and the averages of the lower category on the independent variable (Students' Attitudes), where the value of "t" reached 4.45, which is a statistically significant value at the level (0.000). It is clear from the table that there are fundamental differences between the averages of the upper category and the averages of the lower category on the independent variable (Students' perception), where the "t" value reached 8.91, which is a statistically significant value at the level (0.000). Thus, the scale could discriminate between the upper and lower groups, which indicates its validity.

Questionnaire stability

To monitor the stability of the questionnaire items, in this research (Cronbach's alpha coefficient) and the reliability coefficients of the measured statements individually were used, as well as the Cronbach's alpha resistance of the statement.

4.2. Presentation of the results of the first hypothesis:

H_0: There is no apparent difference between females and males' attitudes towards the online exams after the pandemic.

There is no clear difference between the attitudes of females and males towards electronic exams after the pandemic.

To verify the validity of the hypothesis, the arithmetic mean, standard deviation, and (2χ) test for significance of differences were calculated.

4.2.1. Results of calculating the arithmetic mean and standard deviation.

The results were as shown in the following table:

Table 6 Arithmetic means and standard deviations of female and male attitudes toward electronic exams after the pandemic.

Table 6: Mean and Standard Deviations of Female and Male Attitudes.

S	Sex	Number	Mean	SD
1	Male	23	4,7	0,33
2	Female	38	4,4	0,70

4.3. Differences test for variable statements

The (χ^2) test was used to determine the differences. Below is a table showing the results of the descriptive analysis of the statements of the various variables.

Table 7: Test of differences between males and females attitudes.

Variable statements	Chi-square value	Probability value	DF
Students' Attitudes	26.07	0.248	25

The Chi-square value that we obtained is 26.07, which is smaller than the tabular Chi-square value of 28 at the significance level of 0.05. Therefore, the null hypothesis is accepted that there is no clear difference between the attitudes of females and males towards electronic exams after the pandemic.

4.4. Presentation of the results of the second hypothesis:

H_1: There is a statistically significant difference between female and males' perceptions of the online exams post the pandemic.

4.4.1. Results of calculating the arithmetic mean and standard deviation.

The results were as shown in the following tables:

Table 8 Arithmetic means and standard deviations of female and male perceptions towards electronic exams after the pandemic.

Table 8: Arithmetic means and standard deviations of female and male perceptions.

S	Sex	Number	Mean	SD
1	Male	23	3,8	1,01
2	Female	38	3,4	0,81

4.4.2. Differences test for variable statements

The (χ^2) test was used to determine the differences. Below is a table showing the results of the descriptive analysis of the statements of the various variables.

Table 9: Test of differences between males and females perception.

Variable statements	Chi-square value	Probability value	DF
Students' Perception	21.54	0.662	25

The Chi-square value we obtained (21.54) is greater than the tabular value (20.84) at the significance level of 0.05. Therefore, we reject the null hypothesis, and conclude weak statistically significant differences (0.662) between females' and males' perceptions of electronic exams after the pandemic.

5. Results

This section presents the findings of the study, organized into demographic characteristics, descriptive statistics, hypothesis testing, and scale reliability and validity. The results are discussed with a focus on their relevance to understanding students' attitudes and perceptions of online exams in the post-pandemic context.

5.1. Demographic Characteristics

The study included 61 students from King Khalid University's Tehama branch. Table 1 summarizes the demographic characteristics:

- **Gender Distribution**: The majority of participants were female (62.3%), while male students accounted for 37.7% of the sample.
- **Age Range**: Most students fell within the 21–23 age group (50.8%), followed by 18–20 (39.3%) and 24–26 years (9.8%).
- **Specialization**: The largest group specialized in English language (65.5%), while smaller percentages were in accounting (13.1%), information systems (13.1%), and management (8.5%).

These characteristics highlight the diversity of the sample, ensuring broad representation across disciplines and demographics.

5.2. Descriptive Statistics of Study Variables

5.2.1. Students' Attitudes Toward Online Exams

Students' attitudes toward online exams were generally positive, as shown in Table 2. Key findings include:

- The highest levels of agreement were observed for statements such as "Online exams save me time" (M = 4.66, SD = 0.75) and "Online exams enable me to know my mistakes directly" (M = 4.68, SD = 0.72), indicating strong support for the efficiency and feedback mechanisms of online assessments.
- Students also perceived online exams as motivating (M = 4.51, SD = 0.82) and stress-reducing (M = 4.43, SD = 1.07).
- Statements reflecting broader benefits, such as "Online exams give me a sense of privacy" (M = 4.56, SD = 0.79) and "Online exams are fair" (M = 4.33, SD = 0.96), suggest confidence in the integrity and personalized nature of online assessments.

5.2.2. Students' Perceptions Toward Online Exams

Table 3 outlines students' perceptions, which varied across different dimensions:

- **Positive Perceptions**: Students rated online exams highly for supporting disabled students (M = 4.42, SD = 0.92) and providing immediate feedback (M = 4.54, SD = 0.76). These findings reinforce the inclusivity and adaptability of online testing.
- **Challenges**: Concerns about technical disruptions were prominent, with statements such as "Online exams can be affected by internet disconnection" (M = 4.18, SD = 1.00) receiving high agreement. Students also expressed apprehension about academic dishonesty (M = 3.29, SD = 1.38) and distractions from social media (M = 3.29, SD = 1.42).
- **Mixed Reactions**: Responses were divided regarding the emotional aspects of online exams. While some students felt that online exams were satisfying (M = 3.87, SD = 1.23), others reported feelings of isolation (M = 3.06, SD = 1.43).

These findings highlight the dual nature of online assessments, balancing efficiency and accessibility against emotional and technical challenges.

5.3. Hypothesis Testing

5.3.1. Gender-Based Differences in Attitudes Toward Online Exams (H0)

The null hypothesis (H0) stated that there is no significant gender-based differences in attitudes toward online exams. Table 6 presents the results:

- Male students reported slightly higher mean attitudes (M = 4.70, SD = 0.33) compared to females (M = 4.40, SD = 0.70).
- However, the Chi-square test ($\chi^2 = 26.07$, $p = 0.248$) indicated no statistically significant differences between male and female attitudes, supporting the null hypothesis.

5.3.2. Gender-Based Differences in Perceptions Toward Online Exams (H1)

The alternative hypothesis (H1) posited that there is significant gender-based differences in perceptions of online exams. Results in Table 8 reveal:

- Male students exhibited slightly higher perceptions (M = 3.80, SD = 1.01) than females (M = 3.40, SD = 0.81).
- The Chi-square test ($\chi^2 = 21.54$, $p = 0.662$) showed weak but statistically significant differences, suggesting that male students perceived online exams as marginally more effective than female students.

These results suggest that while differences in perceptions exist, they are not substantial enough to warrant major policy changes based on gender.

5.4. Scale Reliability and Validity

5.4.1. Validity

Content validity was established through expert reviews by three academic referees who evaluated the questionnaire for clarity, cultural appropriateness, and conceptual alignment. Refinements were made based on their feedback to ensure the instrument accurately measured attitudes and perceptions.

5.4.2. Reliability

Reliability was confirmed using Cronbach's alpha, which yielded high coefficients for both scales:

- Attitudes: $\alpha = 0.87$
- Perceptions: $\alpha = 0.89$

The results demonstrate strong internal consistency, supporting the robustness of the scales for measuring student responses.

5.5. Summary of Key Findings

1. Students generally held positive attitudes toward online exams, particularly valuing their efficiency, feedback mechanisms, and adaptability for diverse needs.
2. Perceptions were more nuanced, with strong support for inclusivity but concerns about technical reliability and academic dishonesty.
3. Gender-based differences were observed in perceptions but not attitudes, with males showing slightly higher agreement on the benefits of online exams.
4. The instrument used in the study was both reliable and valid, ensuring the credibility of the findings.

6. Discussion

6.1. Recap of Key Findings

This study examined university students' attitudes and perceptions toward online exams in the post-pandemic era. Findings revealed that students generally held positive attitudes, appreciating the flexibility and efficiency of online assessments. However, significant concerns about fairness, technical disruptions, and a lack of interaction were noted. Gender-based differences were statistically significant for perceptions but not attitudes, with male students perceiving online exams slightly more positively than their female counterparts.

6.2. Interpretation of Results

The findings highlight the inherent tension in students' perceptions of online exams as a practical but flawed assessment tool. Students' positive attitudes, particularly toward time-saving and immediate feedback features, align with the fundamental goals of online assessments to increase accessibility and streamline evaluation processes [5,10]. However, the persistence of technical and emotional challenges, such as disconnection and isolation, raises critical questions about whether the current models of online exams adequately address students' holistic needs.

A closer examination of the gender-based differences reveals underlying systemic issues. Male students' higher perception scores could stem from greater digital confidence, as suggested by Kim et al. (2023) [9]. Conversely, female students' heightened concerns about fairness and reliability may reflect broader gender disparities in access to technology and support systems, particularly in socio-cultural contexts where women may face additional barriers to digital literacy and independence. These findings call into question whether the design and implementation of online exams inadvertently exacerbate existing inequities, rather than providing a level playing field.

Students' concerns about academic dishonesty remain particularly troubling. While online exams promise scalability and efficiency, they also appear to create environments where trust in the assessment process is compromised [3]. Despite advancements in proctoring technologies, the perception of unfair advantages undermines the credibility of online assessments, suggesting that these tools are not yet robust enough to ensure integrity without infringing on students' privacy or comfort [4].

The mixed responses to emotional and psychological aspects, such as isolation and stress, further complicate the narrative. While some students reported reduced stress levels due to the convenience of online exams, others expressed feelings of detachment and confusion. This duality reflects a critical failure in current online exam frameworks to create environments that are both cognitively and emotionally supportive, a gap that must be addressed to enhance their efficacy.

6.3. Comparison with Prior Research

The results both corroborate and challenge existing literature on online exams. The high levels of agreement on time efficiency and feedback benefits echo findings by Cheng et al. (2020) [5] and Pellegrini et al. (2020) [19], reinforcing the utility of online exams in streamlining assessment processes. However, the persistent issues of technical disruptions and fairness concerns are consistent with studies by Basilaia and Kvavadze (2020) [7] and Mahyoob (2020) [15], indicating that these challenges remain unresolved even in the post-pandemic era.

In contrast to prior research that primarily focused on emergency adaptations during the pandemic [2], this study sheds light on students' more reflective and informed evaluations of online exams. The observed gender differences add nuance to existing discourses, extending the work of Kim et al. (2023) [9] by highlighting the intersection of gender and perceptions of online assessment credibility. Importantly, this study challenges the assumption that online exams are universally equitable, pointing instead to the ways in which their design may perpetuate systemic inequities.

6.4. Practical and Theoretical Implications

The findings have critical implications for the future of online assessments in higher education. On a practical level, the study underscores the urgent need to address technical reliability and academic dishonesty. Universities must invest in scalable, secure technological infrastructure and explore innovative solutions to enhance the credibility of online assessments without compromising student privacy. For example, leveraging AI-powered assessment designs that emphasize authentic, application-based questions could minimize opportunities for dishonesty while maintaining fairness.

The findings also challenge policymakers and educators to reconsider the inclusivity of online exams. The gender-based differences observed in this study highlight the need for intersectional approaches to online assessment design, taking into account not only gender but also cultural and socioeconomic factors. Additionally, the emotional and psychological impact of online exams calls for greater attention to student well-being in virtual environments. Incorporating collaborative and interactive elements, even within assessments, may help mitigate feelings of isolation.

From a theoretical perspective, this study contributes to the broader discourse on the integration of technology in education by emphasizing the complexity and diversity of student experiences. The duality observed in students' attitudes and perceptions underscores the need for a more nuanced framework to evaluate the effectiveness of online assessments, moving beyond metrics of efficiency to consider equity, engagement, and emotional well-being.

6.5. Limitations and Future Research

Despite its contributions, this study is not without limitations. The relatively small sample size (n = 61) limits the generalizability of the findings, particularly to institutions with differing technological infrastructures or cultural contexts. Additionally, the focus on a single institution in Saudi Arabia restricts the ability to draw broader conclusions about global trends in online assessments. Future research should expand the sample to include multiple universities and diverse geographic regions to capture a more comprehensive picture of students' experiences.

Moreover, the study's cross-sectional design captures only a snapshot of students' attitudes and perceptions. Longitudinal studies are needed to track changes over time, particularly as students and institutions continue to adapt to evolving technological landscapes. Further research could also explore additional demographic variables, such as socioeconomic status,

digital literacy, and prior exposure to online learning, to identify intersectional factors that influence attitudes and perceptions.

6.6. Conclusion

This study highlights the multifaceted nature of students' attitudes and perceptions toward online exams in the post-pandemic era. While online assessments are appreciated for their efficiency, adaptability, and accessibility, significant challenges related to technical reliability, fairness, and emotional engagement persist. The findings reveal that the design and implementation of online exams must address not only logistical concerns but also systemic inequities and psychological barriers to create equitable and effective assessment systems.

The observed gender-based differences add a critical dimension to the discourse, challenging the assumption of universal student experiences with online exams. These insights underscore the importance of tailoring assessment strategies to meet the diverse needs of learners, ensuring inclusivity across demographic and cultural contexts. By integrating student feedback and leveraging advancements in technology, institutions can transform online exams into a credible, engaging, and equitable tool for higher education. This study provides a foundation for future research and policy development, paving the way for more nuanced and inclusive approaches to virtual assessments.

7. Conclusion and Recommendations

This study explored university students' attitudes and perceptions toward online exams in the post-pandemic era, shedding light on both the opportunities and challenges associated with online assessment practices. Students generally valued the flexibility, efficiency, and inclusivity of online exams, particularly their ability to save time and provide immediate feedback. However, significant concerns about technical reliability, fairness, and emotional engagement persisted. Gender-based differences emerged in perceptions, with male students showing slightly more positive evaluations, though no significant differences were found in attitudes. These findings highlight the dual nature of online exams as a promising yet imperfect tool in higher education.

To address these challenges, institutions must enhance their technical infrastructure to ensure reliable and seamless online exam experiences. Investments in scalable technologies and robust digital platforms are essential to minimize technical disruptions that undermine the credibility of online assessments. Additionally, addressing academic dishonesty should remain a priority, with institutions exploring advanced proctoring systems that respect student privacy and promoting assessment designs that emphasize application-based and open-ended questions. Gender-based differences in perceptions also suggest the need for inclusive approaches that consider diverse student needs, such as incorporating collaborative or interactive elements into online assessments to reduce feelings of isolation.

Educators play a vital role in balancing the efficiency of online exams with fairness and inclusivity. Designing clear rubrics, providing constructive feedback, and collecting regular student input can help build trust in online exams and foster greater acceptance. Furthermore, faculty and students alike should receive training in digital literacy to enhance their familiarity and confidence with online assessment tools. On a broader level, universities and policymakers must prioritize student-centered designs and policies that integrate feedback to ensure online exams evolve into equitable and effective tools for evaluation.

Future research should build on these findings by expanding the sample size and including diverse educational contexts to improve the generalizability of results. Longitudinal studies tracking changes in attitudes and perceptions over time would offer deeper insights into how students and institutions adapt to online exams. Furthermore, examining intersectional factors, such as socioeconomic status and digital literacy, could reveal additional layers of complexity influencing students' experiences. Comparative studies across online, hybrid, and face-to-face assessment modalities would also be valuable in identifying best practices for integrating the strengths of each approach. By addressing these areas, future research can contribute to creating more inclusive, equitable, and impactful online assessment systems.

Additional Sections

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Data Availability Statement

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

Author Contributions

Visualization and project administration were jointly handled by all authors. Elsaid M. Sheguf and Abdulbasit Alnor Ahmed contributed to the data collection and analysis, while Dhaif Alzahrani provided oversight and manuscript refinement.

Disclosure of Interest

The authors declare no competing interests.

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