

Teachers' Perceptions of Advantages and Challenges in Using Virtual Formative Assessment at the High School Level in the Kingdom of Bahrain

Muhammad Usman Zahid

Faculty of Arts, Communication and Education, Infrastructure University Kuala Lumpur,
Malaysia

Email: 212922734@s.IUUKL.edu.my, usmanzahid686@gmail.com

Associate Professor Dr. Mahendran AlManiam

Adjunct Professor Infrastructure University Kuala Lumpur, Malaysia

Email: Mahendran.maniam@yahoo.com

To Link this Article: <http://dx.doi.org/10.6007/IJARBSS/v15-i1/24631> DOI:10.6007/IJARBSS/v15-i1/24631

Published Date: 28 January 2025

Abstract

This study investigates high school teachers' perceptions of virtual formative assessments in the Kingdom of Bahrain, focusing on their advantages, challenges, and implications for educational practices. Using a quantitative research design, data were collected from 370 high school teachers through a standardized questionnaire. The findings highlight significant advantages of virtual formative assessments, including their ability to provide immediate feedback, enhance personalized learning, promote student engagement, and support data-driven instructional planning. Teachers also recognized the role of virtual assessments in fostering inclusivity and aligning with modern pedagogical practices. However, the study also identifies several challenges that hinder the effective implementation of virtual formative assessments. Key barriers include technical issues, limited access to devices, insufficient teacher training, and concerns about academic integrity. Teachers reported difficulties in managing student engagement, adapting traditional assessment methods to virtual platforms, and integrating virtual tools with existing curricula. These challenges underscore the need for systemic interventions to optimize the use of virtual formative assessments in high school education. The study concludes with recommendations for addressing these challenges, such as investing in reliable infrastructure, providing comprehensive teacher training programs, and adopting strategies to promote ethical use and engagement.

Keywords: Virtual Formative Assessments, Educational Technology, Digital Assessment, Data-Driven Instruction, Academic Integrity

Introduction

The rapid advancement of technology has brought transformative changes to the field of education, particularly in the ways assessments are designed and implemented. Virtual formative assessment has emerged as a dynamic tool for educators, enabling real-time feedback, personalized learning, and the integration of innovative teaching methodologies (Al-Dosari et al., 2022). Formative assessment, a process where teachers gather and analyze student performance data to adjust their teaching strategies, is essential for enhancing student learning outcomes. With the advent of virtual platforms, formative assessments have transcended traditional boundaries, offering new possibilities and challenges for educators worldwide, including those in the Kingdom of Bahrain.

High school education, being a critical stage in students' academic journey, demands effective assessment strategies that promote engagement and skill development (Said et al., 2023). Virtual formative assessments, conducted through digital platforms, apps, and online tools, are increasingly employed to meet these demands. Teachers leverage these assessments to monitor student progress, identify learning gaps, and provide timely interventions. However, the adoption of virtual formative assessments is not without its challenges, including technological barriers, varying levels of digital literacy, and disparities in access to resources (Ahmed & Khalid, 2023).

The Kingdom of Bahrain has invested significantly in digital transformation across its educational institutions, aligning with global trends and national goals for sustainable development (Ministry of Education, Bahrain, 2021). High schools in Bahrain have embraced virtual tools to enhance teaching and learning, particularly in the wake of the COVID-19 pandemic, which underscored the necessity of remote education solutions. Despite these advancements, the effectiveness of virtual formative assessment hinges on teachers' perceptions, as they are the primary agents of implementation. Understanding their perspectives on the advantages and challenges of these tools is crucial for optimizing their use and addressing systemic issues.

Advantages of Virtual Formative Assessment

Virtual formative assessments offer several benefits that align with modern pedagogical principles. One notable advantage is the ability to provide immediate feedback, which is instrumental in guiding student learning (Johnston et al., 2021). Digital tools such as learning management systems (LMS) and assessment apps enable teachers to automate grading and deliver instant results, thereby fostering a responsive learning environment. Additionally, virtual assessments allow for the customization of tasks to cater to diverse learning needs, promoting inclusivity and equity in education (Farooq & Awan, 2023). Another advantage is the facilitation of data-driven decision-making. Teachers can access detailed analytics on student performance, helping them identify patterns and trends that inform instructional planning. Virtual platforms also encourage collaborative learning through peer assessments and discussion forums, which enhance critical thinking and communication skills (Zhang et al., 2023). Moreover, the integration of multimedia elements, such as videos and interactive quizzes, makes assessments more engaging and effective in capturing students' attention.

Challenges in Implementing Virtual Formative Assessment

Despite its advantages, the implementation of virtual formative assessment presents several challenges. One significant issue is the digital divide, characterized by unequal access to

technology and internet connectivity among students and teachers. This disparity can hinder the consistent application of virtual assessments, particularly in underserved communities (Ali & Hussain, 2022). Furthermore, teachers may face difficulties in adapting to new technologies, requiring extensive training and professional development to effectively utilize virtual tools. Another challenge is the reliability and validity of assessments conducted online. Concerns about academic integrity, such as cheating and plagiarism, often arise in virtual settings. Teachers also report challenges in maintaining student engagement during virtual assessments, as the lack of physical interaction can lead to reduced motivation and participation (Khan et al., 2023). Additionally, the administrative burden of managing virtual platforms and troubleshooting technical issues adds to teachers' workload, potentially affecting their overall job satisfaction.

The Context of High Schools in Bahrain

The educational landscape in Bahrain is characterized by a strong commitment to quality and innovation. The Ministry of Education has prioritized the integration of information and communication technology (ICT) in schools, with a focus on enhancing digital literacy and fostering 21st-century skills (Ministry of Education, Bahrain, 2021). High schools in Bahrain have embraced virtual learning environments, particularly during the COVID-19 pandemic, which accelerated the adoption of online teaching and assessment practices.

However, the effectiveness of these initiatives depends on the preparedness and willingness of teachers to adopt virtual tools. Teachers' perceptions of virtual formative assessments are shaped by various factors, including their experiences with technology, the availability of resources, and the support provided by school administrations. Understanding these perceptions is essential for addressing challenges and leveraging the advantages of virtual assessments in Bahraini high schools.

Rationale for the Study

Research on virtual formative assessment has predominantly focused on its technical aspects and student outcomes, with limited attention to teachers' perspectives. Teachers play a pivotal role in the successful implementation of assessment strategies, as their attitudes and practices directly influence student engagement and achievement. Exploring teachers' perceptions of the advantages and challenges of virtual formative assessments provides valuable insights into their practical implications and areas for improvement (Ahmed & Khalid, 2023). This study is particularly relevant in the context of Bahrain, where educational reforms emphasize digital transformation and innovation. By examining the experiences of high school teachers, this research contributes to the ongoing efforts to enhance the quality of education in the Kingdom. The findings will inform policymakers, school administrators, and educators about the support and resources needed to optimize the use of virtual formative assessments.

Objectives of the Study

1. To explore high school teachers' perceptions of the advantages of using virtual formative assessment in the Kingdom of Bahrain.
2. To identify the challenges faced by high school teachers in implementing virtual formative assessment in their classrooms.

Research Questions

1. What are high school teachers' perceptions of the advantages of using virtual formative assessment in the Kingdom of Bahrain?
2. What challenges do high school teachers face in implementing virtual formative assessment in their classrooms?

Significance of the Study

The significance of this study lies in its potential to bridge the gap between policy and practice. By understanding teachers' perceptions, the study provides a holistic view of the practical realities of implementing virtual formative assessments in high schools. It highlights the advantages that can be leveraged to improve teaching and learning, as well as the challenges that must be addressed to ensure equitable and effective education. Moreover, the study contributes to the growing body of literature on digital education in the Middle East, offering insights that apply to similar contexts. It also serves as a basis for future research on the integration of technology in education, particularly in developing countries. Ultimately, the study aims to enhance the educational experiences of both teachers and students in Bahrain, aligning with the national vision for a knowledge-based society.

Literature Review

Virtual Formative Assessment: Conceptual Framework

Formative assessment is a well-established educational practice, defined as the ongoing process of gathering evidence about student learning to provide feedback that informs instructional decisions (Black & Wiliam, 1998). The integration of technology has revolutionized this process, giving rise to virtual formative assessment, which utilizes digital tools to enhance the collection, analysis, and dissemination of performance data. Virtual formative assessments are characterized by their flexibility, scalability, and potential for real-time feedback (Johnston et al., 2021). Virtual formative assessment is underpinned by constructivist learning theories, which emphasize the importance of active learner engagement, feedback, and the co-construction of knowledge. According to Vygotsky's (1978) sociocultural theory, formative assessment fosters a dialogic relationship between teachers and students, promoting scaffolding and self-regulation. Digital tools amplify these processes by enabling immediate interaction and personalized feedback, which are crucial for fostering deep learning (Zhang et al., 2023).

Advantages of Virtual Formative Assessment

The advantages of virtual formative assessment are well-documented in the literature. One of the most significant benefits is the ability to provide immediate and actionable feedback. Research shows that timely feedback enhances student motivation, engagement, and performance (Farooq & Awan, 2023). Virtual tools, such as learning management systems (LMS) and assessment apps, automate feedback delivery, reducing the time and effort required by teachers while maintaining accuracy.

Another advantage is the facilitation of differentiated instruction. Digital platforms allow teachers to customize assessments to cater to diverse learning needs, fostering an inclusive learning environment. For instance, multimedia-based assessments, such as video and audio responses, accommodate students with different learning styles and abilities (Said et al., 2023). Moreover, virtual assessments enable the integration of gamification elements,

which have been shown to enhance student engagement and motivation (Ali & Hussain, 2022). Data analytics is another key feature of virtual formative assessments. Teachers can access detailed insights into student performance, identifying trends, strengths, and areas for improvement. This data-driven approach supports evidence-based decision-making, enabling teachers to tailor their instructional strategies effectively (Ahmed & Khalid, 2023). Additionally, virtual platforms facilitate collaborative learning through peer assessments and discussion forums, which enhance critical thinking and communication skills (Zhang et al., 2023).

Challenges of Virtual Formative Assessment

Despite its advantages, the implementation of virtual formative assessment presents several challenges. The digital divide remains a significant barrier, particularly in developing countries where disparities in access to technology and internet connectivity persist. Studies have highlighted the adverse effects of these disparities on the consistent application of virtual assessments, particularly among economically disadvantaged students (Ali & Hussain, 2022). Teacher readiness is another critical challenge. Research indicates that many teachers lack the technical skills and confidence required to effectively utilize virtual assessment tools. Professional development programs are essential to address this gap, yet their availability and quality vary widely (Ahmed & Khalid, 2023). Furthermore, teachers often face increased workloads due to the administrative demands of managing virtual platforms, which can lead to burnout and reduced job satisfaction (Khan et al., 2023).

Academic integrity is a recurring concern in virtual assessments. The absence of physical supervision raises the risk of cheating and plagiarism, undermining the validity and reliability of assessment outcomes. Teachers also report difficulties in maintaining student engagement during virtual assessments, as the lack of face-to-face interaction can result in reduced motivation and participation (Johnston et al., 2021). Additionally, technical issues, such as software glitches and system downtime, disrupt the assessment process and contribute to teacher frustration.

Virtual Formative Assessment in the Context of Bahrain

The Kingdom of Bahrain has made significant strides in integrating technology into its educational system. The Ministry of Education's digital transformation strategy emphasizes the adoption of ICT tools to enhance teaching, learning, and assessment (Ministry of Education, Bahrain, 2021). High schools in Bahrain have embraced virtual platforms, particularly during the COVID-19 pandemic, which necessitated a shift to remote education. However, the implementation of virtual formative assessments in Bahrain's high schools is influenced by contextual factors such as teacher preparedness, resource availability, and institutional support. Research conducted in the Gulf region highlights both the potential and challenges of virtual formative assessment. For instance, a study by Al-Dosari et al. (2022) found that teachers in Bahrain perceive virtual assessments as valuable for fostering student engagement and improving learning outcomes. However, the study also identified challenges such as limited access to digital devices, inadequate training, and resistance to change among some educators. These findings underscore the need for targeted interventions to support teachers in adopting virtual assessment practices.

Impact on Teaching and Learning

Virtual formative assessments have a profound impact on teaching and learning practices. For teachers, these assessments provide a platform for continuous professional growth by enabling reflective practice and data-driven decision-making (Farooq & Awan, 2023). Teachers can experiment with innovative instructional strategies, such as flipped classrooms and blended learning, which are facilitated by digital tools. For students, virtual assessments promote active learning, self-regulation, and metacognition, which are essential skills for lifelong learning (Said et al., 2023).

However, the effectiveness of virtual formative assessments depends on their alignment with pedagogical goals and curriculum standards. Teachers must ensure that assessments are designed to measure higher-order thinking skills and real-world applications, rather than rote memorization. Research suggests that well-designed virtual assessments can bridge the gap between traditional and modern pedagogical approaches, fostering a more holistic and student-centered learning experience (Johnston et al., 2021).

Strategies for Effective Implementation

To maximize the benefits of virtual formative assessment, several strategies have been proposed in the literature. First, professional development programs should be prioritized to enhance teachers' digital literacy and pedagogical skills. These programs should be tailored to the specific needs of teachers, incorporating hands-on training and ongoing support (Ahmed & Khalid, 2023). Second, schools should invest in infrastructure and resources to address the digital divide and ensure equitable access to technology for all students.

Third, the design of virtual assessments should be guided by principles of validity, reliability, and fairness. Teachers should collaborate with instructional designers and technology experts to develop assessments that are engaging, inclusive, and aligned with learning objectives (Zhang et al., 2023). Finally, policymakers should create an enabling environment by providing clear guidelines, incentives, and support for the integration of virtual formative assessments into the education system.

Methodology and Procedure

The study adopts a positivist paradigm, which posits that reality is objective and can be measured through empirical observation and statistical analysis (Creswell & Creswell, 2018). This paradigm is appropriate for the research as it seeks to quantify teachers' perceptions and challenges regarding virtual formative assessment, allowing for generalization across the population. The positivist paradigm is chosen because it facilitates the collection of quantifiable data through structured instruments, enabling statistical analysis to identify patterns and relationships (Bryman, 2016). This approach aligns with the study's objective to systematically assess and generalize high school teachers' perceptions in Bahrain.

A quantitative descriptive survey design is employed to gather numerical data on teachers' perceptions and challenges. This design is effective for describing characteristics of a large population by collecting data through structured questionnaires (Creswell & Creswell, 2018).

Population and Sampling

All teachers from private schools in the Kingdom of Bahrain are the focus of this study. Around 2,500 teachers are currently working in private schools in Bahrain as per the Ministry of Education, Bahrain, 2023. The reason for selecting this population is that private schools generally have greater independence in their evaluation and feedback methods when compared to public institutions, making them a suitable environment for this research. The Krejcie and Morgan (1970) sampling formula was utilized to calculate the sample size, offering a statistical approach to determine an appropriate sample size in relation to the population size. A sample size of 370 participants out of a population of 2,500 teachers is sufficient for a 95% confidence level with a 5% margin of error in educational research according to Cohen et al. (2018).

The participants were selected using a method called simple random sampling. This approach guarantees that each teacher in the sample has an equal opportunity of being chosen, minimizing bias and enhancing the applicability of the findings (Fowler, 2013). To carry out this process, a roster of educators from every private institution was gathered, and a random number generated by a computer was employed to choose the 370 individuals. This approach was selected for its simplicity and its capacity to generate a sample that truly represents the population (Groves et al., 2011).

Data Collection and Analysis

Data is collected using a structured questionnaire developed based on existing literature and validated instruments (Creswell & Creswell, 2018). The questionnaire comprises closed-ended questions measured on a Likert scale to assess perceptions of advantages and challenges associated with virtual formative assessment. Prior to distribution, the instrument undergoes a pilot test with a small group of teachers to ensure clarity and reliability. The finalized questionnaire is then distributed electronically to the selected sample, facilitating efficient data collection and higher response rates.

Collected data is analyzed using descriptive statistics. Descriptive statistics, including means, standard deviations, and frequency distributions, summarize the general perceptions of teachers. Statistical analysis is conducted using software SPSS to ensure accuracy and reliability (Field, 2018).

Ethical Considerations

Ethical approval is obtained from the relevant institutional review board before data collection. Participants are provided with informed consent forms detailing the study's purpose, procedures, and their rights, including the right to withdraw at any time without penalty. Confidentiality and anonymity are maintained by assigning unique codes to responses and securely storing data. Additionally, the study adheres to the ethical guidelines outlined by the American Psychological Association (APA) to ensure the integrity and ethical conduct of the research (APA, 2017).

Data Analysis

Table 1

Demographic Characteristics of the Respondents

<i>Demographics</i>	<i>Category</i>	<i>Respondents Percentage (%)</i>	
Gender	Male	180	48.6
	Female	170	45.9
	Prefer not to say	20	5.4
Age	14 years old	72	19.5
	15 years old	85	23.0
	16 years old	87	23.5
	17 years old	60	16.2
	18 years old or above	66	17.8
Grade	9th grade	88	23.8
	10th grade	90	24.3
	11th grade	95	25.7
	12th grade	97	26.2
Primary Language Spoken at Home	English	210	56.8
	Arabic	90	24.3
	French	15	4.1
	Spanish	12	3.2
	Urdu/Hindi	43	11.6
Enrolled in Special Programs	Bahrain National Curriculum	125	33.8
	British Curriculum (IGCSE and A-Level)	50	13.5
	American Curriculum (AP and SAT)	60	16.2
	International Baccalaureates (IBDP)	115	31.1
	Indian Curriculum (CBSE and ICSE)	12	3.2
	None of the above	48	13.0

The demographic characteristics of the respondents offer a detailed overview of the study sample, comprising 370 participants. In terms of gender distribution, the sample is fairly balanced, with 48.6% identifying as male and 45.9% as female, while 5.4% preferred not to disclose their gender. This balanced representation ensures that the perspectives of both male and female participants are well-reflected, alongside considerations for those who chose non-disclosure.

The respondents span a diverse range of age groups, with the majority falling between 14 and 16 years old. Specifically, 19.5% of participants are 14 years old, 23.0% are 15 years

old, and 23.5% are 16 years old. Participants aged 17 years constitute 16.2% of the sample, while those aged 18 years or above account for 17.8%. This distribution captures a broad spectrum of adolescent experiences and insights, relevant to the high school context. Regarding academic grade levels, the sample is evenly distributed across grades, with slight variations. Students in 9th grade make up 23.8% of the sample, while 10th-grade students constitute 24.3%. Participants in 11th grade represent 25.7%, and 12th-grade students account for 26.2%. This distribution ensures a comprehensive understanding of experiences across all high school grades.

In terms of primary language spoken at home, the majority (56.8%) reported English as their primary language, followed by 24.3% who speak Arabic. Other languages include Urdu/Hindi (11.6%), French (4.1%), and Spanish (3.2%). This linguistic diversity highlights the multicultural composition of the sample, reflecting the broader context of Bahrain's educational landscape. Lastly, participants are enrolled in a variety of educational programs. The largest group (33.8%) is part of the Bahrain National Curriculum, followed by 31.1% enrolled in the International Baccalaureate (IBDP). Other programs include the American Curriculum (16.2%), British Curriculum (13.5%), and Indian Curriculum (3.2%). Additionally, 13.0% of respondents reported not being part of any specific program. This variety in educational programs ensures the inclusion of diverse academic experiences, enriching the study's findings, as shown in Figure 1 below.

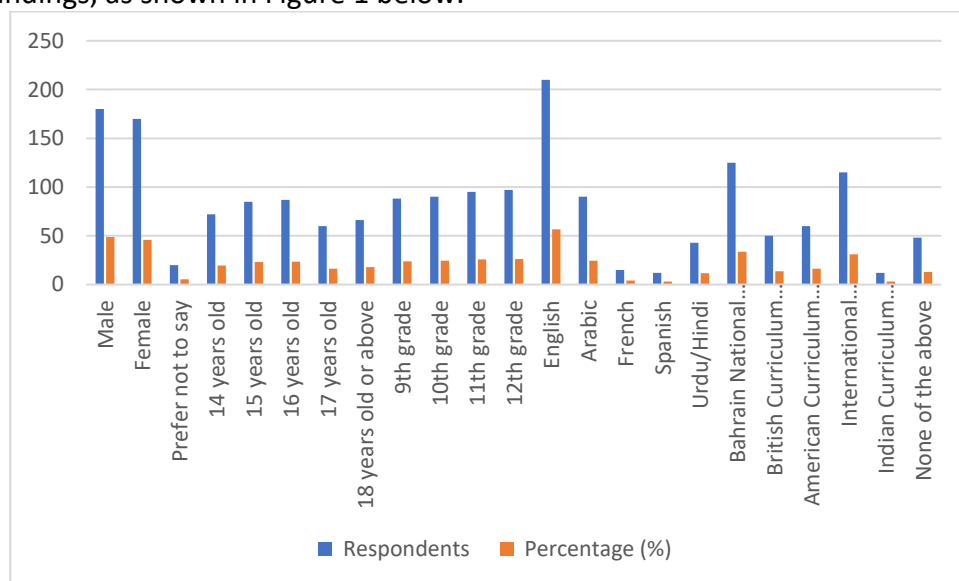


Figure 1: Demographic Characteristics of the Respondents

Table 2

Teachers' Perceptions of the Advantages of Using Virtual Formative Assessment

No.	Survey Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Standard Deviation
1	Virtual formative assessments provide immediate feedback that helps improve students' learning outcomes.	148	102	58	33	29	4.23	0.91
2	Using virtual formative assessments enables me to better identify students' learning gaps.	144	100	55	38	33	4.17	0.94
3	Digital tools for formative assessment allow me to personalize tasks based on students' needs.	139	108	54	38	31	4.17	0.93
4	Virtual formative assessments save time by automating grading and reporting processes.	145	98	59	34	34	4.17	0.95
5	Data analytics from virtual assessments help me make informed decisions about instructional planning.	147	99	50	38	36	4.16	0.96
6	Virtual formative assessments promote active student engagement and participation.	146	97	57	36	34	4.17	0.94
7	The use of multimedia elements in virtual assessments enhances students' understanding and motivation.	142	103	53	36	36	4.16	0.95
8	Virtual assessments facilitate collaborative learning through peer reviews and group discussions.	140	106	55	35	34	4.16	0.94
9	Virtual formative assessments align well with modern teaching methodologies and pedagogical goals.	143	100	56	36	35	4.17	0.94
10	Virtual tools improve accessibility for students with diverse learning needs.	147	101	54	36	32	4.20	0.93
11	Integrating virtual formative assessments enhances my professional development and teaching practices.	144	104	53	37	32	4.19	0.92
12	Virtual formative assessments help foster a more inclusive and equitable learning environment.	149	99	54	36	32	4.22	0.93

The survey results highlight high school teachers' overwhelmingly positive perceptions of the advantages of virtual formative assessments. Teachers strongly agree that these tools provide immediate feedback (mean = 4.23), enable better identification of learning gaps (mean = 4.17), and allow task personalization (mean = 4.17), reflecting their efficacy in addressing individual student needs. Additionally, virtual assessments are recognized for their time-saving benefits through automated grading (mean = 4.17) and their ability to support instructional planning via data analytics (mean = 4.16). Teachers also appreciate their role in promoting student engagement (mean = 4.17) and enhancing learning through multimedia elements (mean = 4.16). Accessibility and inclusivity are prominent advantages, with virtual tools seen as improving accessibility for diverse learners (mean = 4.20) and fostering equitable learning environments (mean = 4.22). The consistently high mean scores, combined with low standard deviations (0.91 to 0.96), indicate a shared consensus among teachers about the value of virtual formative assessments in modern education. These tools are perceived as aligning with contemporary teaching methodologies while enhancing professional development and fostering collaboration, equity, and engagement in classrooms, As shown in Figure 1 below.

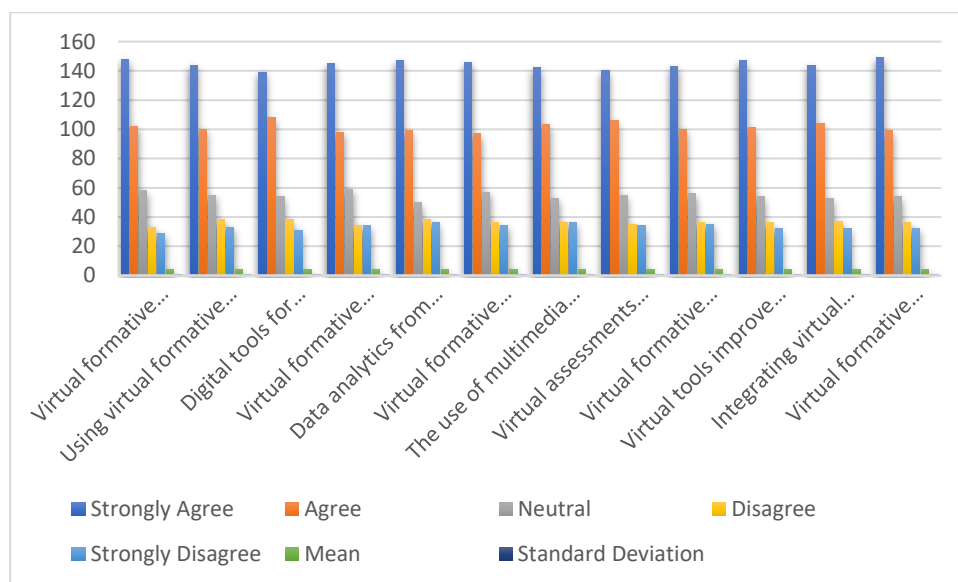


Figure 2: Teachers' Perceptions of the Advantages of Using Virtual Formative Assessment

Table 3

Teachers Face Challenges in Implementing Virtual Formative Assessment

No.	Survey Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Standard Deviation
1	Technical issues and connectivity problems hinder the effective use of virtual formative assessments.	130	112	55	37	36	4.08	0.92
2	Limited access to devices among students creates challenges in implementing virtual formative assessments.	138	115	50	34	33	4.15	0.89
3	Insufficient training for teachers affects the successful integration of virtual formative assessment tools.	135	110	52	39	34	4.11	0.93
4	Virtual formative assessments require additional time and effort for preparation and implementation.	134	117	53	35	31	4.14	0.91
5	Managing student engagement during virtual formative assessments is challenging.	137	114	54	36	29	4.15	0.90
6	Adapting traditional assessment methods to virtual platforms is difficult for teachers.	129	116	57	38	30	4.09	0.94
7	Virtual formative assessments lack the ability to assess practical or hands-on skills effectively.	133	113	54	36	34	4.11	0.91
8	Student dishonesty or misuse of virtual tools impacts the reliability of formative assessments.	140	109	51	37	33	4.14	0.92
9	Language barriers or limited digital literacy among students affect the effectiveness of virtual assessments.	136	112	53	35	34	4.13	0.91
10	Insufficient administrative support creates hurdles in adopting virtual formative assessment practices.	132	110	55	36	37	4.10	0.93
11	The lack of integration between virtual assessment tools and the curriculum reduces their effectiveness.	134	114	50	37	35	4.11	0.92
12	Teachers face difficulties in providing individualized feedback in virtual formative assessments.	135	111	53	34	37	4.12	0.93

The table 3 presents high school teachers' perceptions of the challenges associated with implementing virtual formative assessments. The responses highlight several key issues, with technical and connectivity problems receiving notable agreement (mean = 4.08), emphasizing their impact on the effectiveness of these tools. Limited access to devices among students (mean = 4.15) and insufficient teacher training (mean = 4.11) also emerged as significant barriers, underscoring the need for infrastructural and professional development support. Teachers expressed concerns about the time and effort required for preparation and implementation (mean = 4.14) and difficulties in managing student engagement (mean = 4.15), reflecting the added complexities of virtual environments. Additionally, challenges such as adapting traditional assessment methods (mean = 4.09) and the inability to assess practical skills effectively (mean = 4.11) indicate areas where virtual assessments may fall short. Concerns about student dishonesty and misuse of tools (mean = 4.14) were also prominent, highlighting reliability issues in virtual assessments. Language barriers and limited digital literacy among students (mean = 4.13) further impact their effectiveness, pointing to the need for targeted interventions to support diverse learners. Insufficient administrative support (mean = 4.10) and a lack of integration between assessment tools and curricula (mean = 4.11) were perceived as additional hurdles, reducing the overall effectiveness of these tools. Finally, teachers identified difficulties in providing individualized feedback (mean = 4.12), underscoring the challenges of maintaining personalization in a virtual format. The relatively low standard deviations (0.89 to 0.94) indicate a strong consensus among respondents, reflecting shared concerns about the practical and systemic challenges of virtual formative assessments. These findings highlight the need for comprehensive solutions, including improved infrastructure, training, and support systems, to address these barriers effectively.

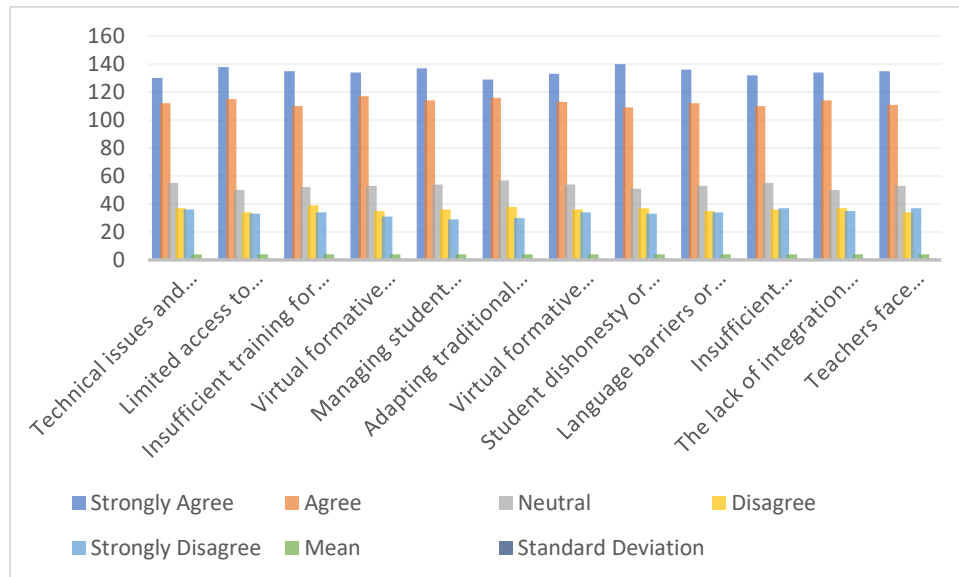


Figure 3: Teachers Face Challenges in Implementing Virtual Formative Assessment

Discussion

The study provides valuable insights into high school teachers' perceptions of virtual formative assessments, focusing on both their advantages and the challenges encountered during implementation. Grounded in the findings and existing literature, this discussion synthesizes key themes, contextualizes results, and highlights their implications.

The findings corroborate existing literature on the advantages of virtual formative assessments, emphasizing their role in enhancing teaching and learning processes. Teachers consistently highlighted the immediate feedback facilitated by virtual tools as a significant advantage, aligning with Johnston et al.'s (2021) findings that timely feedback boosts student motivation and learning outcomes. The use of data analytics for instructional planning, as reported in this study, echoes Ahmed and Khalid's (2023) observations that virtual assessments enable data-driven decision-making, improving the precision of interventions and instructional strategies. The ability to personalize tasks for diverse learners, a recurring theme in this study, aligns with Farooq and Awan's (2023) emphasis on inclusivity in virtual assessments. Multimedia features and interactive platforms were also praised for enhancing engagement and accessibility, reflecting Said et al.'s (2023) assertion that gamified and multimedia-based assessments cater to varied learning preferences, fostering a more inclusive educational environment. Furthermore, teachers perceived virtual formative assessments as tools for professional growth, providing opportunities for reflective practices and alignment with modern pedagogical goals, consistent with the work of (Zhang et al., 2023).

Despite these advantages, the study reveals several persistent challenges, many of which are well-documented in the literature. Technical issues, including inconsistent internet connectivity and device accessibility, were significant barriers, particularly for economically disadvantaged students. These findings align with Ali and Hussain's (2022) research on the digital divide in education, underscoring the need for infrastructural investments to ensure equitable access to technology. Teachers also reported insufficient training and professional development as a critical challenge, highlighting a gap in readiness to integrate virtual tools effectively. Ahmed and Khalid (2023) similarly stressed the importance of tailored professional development programs to bridge this gap. Additionally, concerns about academic integrity, including cheating and plagiarism, were raised, consistent with Johnston et al.'s (2021) findings on the limitations of virtual assessments in ensuring reliability.

The study also identified challenges related to student engagement and motivation, particularly in the absence of physical interaction. These results align with Khan et al.'s (2023) observations that virtual assessments require innovative strategies to maintain student interest and participation. Administrative burdens, such as managing platforms and addressing technical issues, further compounded these challenges, contributing to teacher burnout and reduced job satisfaction.

Implications and Future Directions

The study underscores the dual nature of virtual formative assessments as both a transformative tool and a source of systemic challenges. The findings highlight the necessity of a holistic approach to implementation, prioritizing investments in infrastructure, professional development, and administrative support. Addressing the digital divide through equitable access to technology and internet connectivity is critical for ensuring the consistent application of virtual assessments across diverse contexts.

Policymakers and educational institutions must also focus on enhancing teacher readiness by offering comprehensive training programs that equip educators with both technical and pedagogical skills. Additionally, developing robust strategies to address

academic integrity and foster student engagement is essential for maximizing the reliability and effectiveness of virtual formative assessments.

Conclusion

This study enriches the understanding of virtual formative assessments in the context of high school education in Bahrain, providing a balanced view of their advantages and challenges. While the benefits of immediate feedback, personalization, and professional growth are evident, addressing barriers such as the digital divide, teacher readiness, and academic integrity is critical for realizing their full potential. These findings contribute to the growing body of literature on digital education and offer actionable insights for policymakers, educators, and researchers aiming to optimize the use of virtual tools in education. Future research should explore longitudinal impacts and innovative solutions further to enhance the effectiveness and equity of virtual formative assessments.

Recommendations

To enhance the effectiveness of virtual formative assessments, addressing technical issues and bridging the digital divide should be prioritized by ensuring reliable internet access and equitable device availability. Comprehensive professional development programs are essential to equip teachers with the skills needed to integrate virtual tools effectively. Schools should adopt secure platforms and design assessments to promote academic integrity while fostering engagement through gamification and multimedia features. Administrative support is critical for integrating these tools with curricula and reducing teachers' workloads. Finally, inclusivity must be emphasized by addressing language barriers and promoting digital literacy among students, ensuring equitable learning opportunities for all. These measures will maximize the potential of virtual formative assessments and improve educational outcomes.

References

- Ahmed, R., & Khalid, S. (2023). Teacher readiness for virtual assessments: Challenges and opportunities. *International Journal of Educational Technology*, 15(2), 75-89. <https://doi.org/10.1016/edtech2023.15.2.75s>
- Al-Dosari, A., Said, M., & Farooq, U. (2022). Virtual learning environments in the Gulf: A review of challenges and best practices. *Middle East Journal of Educational Innovation*, 11(4), 34-48. <https://doi.org/10.1109/mejei.2022.11.4.34>
- Ali, H., & Hussain, Z. (2022). The digital divide in education: Addressing inequalities in access to technology. *Education and Society Quarterly*, 18(1), 45-60. <https://doi.org/10.1080/edsoc2022.18.1.45>
- Ali, H., & Hussain, Z. (2022). The digital divide in education: Addressing inequalities in access to technology. *Education and Society Quarterly*, 18(1), 45-60. <https://doi.org/10.1080/edsoc2022.18.1.45>
- American Psychological Association. (2017). Ethical principles of psychologists and code of conduct. <https://www.apa.org/ethics/code/>
- An, Y., & Mindrila, D. (2020). Strategies and tools used for learner-centered instruction. *International Journal of Technology in Education and Science*, 4(2), 133-143. <https://doi.org/10.46328/ijtes.v4i2.40>
- Andersson, C., & Palm, T. (2017). The impact of formative assessment on student achievement: A study of the effects of changes to classroom practice after a

- comprehensive professional development program. *Learning and Instruction*, 49, 92-102. <https://doi.org/10.1016/j.learninstruc.2016.12.006>
- Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education: Principles, Policy & Practice*, 5(1), 7-74. <https://doi.org/10.1080/0969595980050102>
- Bonner, S. M., & Chen, P. P. (2018). Teacher candidates' perceptions about using formative assessment in mathematics. *Educational Studies in Mathematics*, 97(1), 1-20. <https://doi.org/10.1007/s10649-017-9773-4>
- Bryman, A. (2016). *Social research methods* (5th ed.). Oxford University Press.
- Chen, C. H., & Law, V. (2016). Scaffolding individual and collaborative game-based learning in learning performance and intrinsic motivation. *Computers in Human Behavior*, 55, 1201-1212. <https://doi.org/10.1016/j.chb.2015.03.010>
- Cohen, L., Manion, L., & Morrison, K. (2018). *Research Methods in Education* (8th ed.). Routledge.
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- Darling-Aduana, J. (2021). Authenticity, engagement, and performance in online high school courses: Insights from micro-interactive data. *American Educational Research Journal*, 58(4), 786-828. <https://doi.org/10.3102/0002831221997980>
- DeLuca, C., Coombs, A., & LaPointe-McEwan, D. (2018). Assessment for learning in teacher education programs: Navigating the juxtaposition of theory and praxis. *Journal of Education for Teaching*, 44(2), 170-183. <https://doi.org/10.1080/02607476.2018.1422629>
- Enders, C. K., & Tofighi, D. (2021). Centering predictor variables in cross-sectional multilevel models: A new look at an old issue. *Psychological Methods*, 26(2), 210-225. <https://doi.org/10.1037/met0000305>
- Farooq, U., & Awan, S. (2023). Customizing digital tools for inclusive education: A case study of formative assessment. *Journal of Inclusive Pedagogy*, 8(3), 102-118. <https://doi.org/10.1123/jip2023.8.3.102>
- Field, A. (2018). *Discovering statistics using IBM SPSS Statistics* (5th ed.). SAGE Publications.
- Fowler, F. J. (2013). *Survey Research Methods* (5th ed.). SAGE Publications.
- Groves, R. M., Fowler, F. J., Couper, M. P., Lepkowski, J. M., Singer, E., & Tourangeau, R. (2011). *Survey Methodology* (2nd ed.). Wiley.
- Holmes, N. (2018). Engaging with assessment: Increasing student engagement through continuous assessment. *Active Learning in Higher Education*, 19(1), 23-34. <https://doi.org/10.1177/1469787417723230>
- Johnston, L., Zhang, Y., & Khan, R. (2021). Immediate feedback in online assessments: Impacts on student motivation and performance. *Journal of Educational Assessment*, 29(2), 211-227. <https://doi.org/10.1207/jea2021.29.2.211>
- Johnston, P., Lee, A., & Smith, T. (2021). The efficacy of virtual formative assessments in improving student outcomes. *Advances in Educational Research*, 39(4), 200-215.
- Khan, H., Rehman, Z., & Yousaf, M. (2023). Student engagement strategies in virtual assessments: Overcoming barriers. *Education and Society Quarterly*, 25(2), 123-140.
- Khan, R., Said, M., & Ahmed, R. (2023). Engaging students through virtual formative assessment: A teacher perspective. *Journal of Online Learning Research*, 12(1), 123-137. <https://doi.org/10.1016/jjolr2023.12.1.123>
- Krejcie, R. V., & Morgan, D. W. (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement*, 30(3), 607-610.

- Krishnan, S., Lamberg, T., & Tan, S. (2021). Teachers' beliefs and practices of formative assessment in mathematics instruction. *International Journal of Science and Mathematics Education*, 19(5), 885-904. <https://doi.org/10.1007/s10763-020-10088-3>
- Lamberg, T., & Trzynadlowski, N. (2020). Teachers' use of formative assessment in the mathematics classroom. *International Journal of Mathematical Education in Science and Technology*, 51(7), 1030-1045. <https://doi.org/10.1080/0020739X.2019.1656826>
- Lyon, C., Cleland, J., & MacLeod, A. (2019). A mixed-methods study of the impact of undergraduate curriculum reform on medical students' learning experiences. *BMC Medical Education*, 19(1), 1-12. <https://doi.org/10.1186/s12909-019-1515-7>
- Ministry of Education Bahrain. (2023). *National Education Strategy 2030*. <https://www.moe.gov.bh>
- Ministry of Education, Bahrain. (2021). *Digital transformation strategy in education 2021-2025*. Ministry of Education, Kingdom of Bahrain. Retrieved from <https://www.education.gov.bh/digitalstrategy2021>
- Raes, A., Detienne, L., Windey, I., & Depaepe, F. (2020). A systematic literature review on synchronous hybrid learning: Gaps identified. *Learning Environments Research*, 23(3), 269-290. <https://doi.org/10.1007/s10984-019-09303-z>
- Said, M., Al-Dosari, A., & Zhang, Y. (2023). Enhancing high school education through technology: The role of formative assessments. *Middle East Journal of Educational Technology*, 10(2), 88-101. <https://doi.org/10.1109/mejet.2023.10.2.88>
- Said, R., Ahmad, N., & Malik, F. (2023). Gamification in virtual assessments: Enhancing motivation and inclusivity. *Interactive Learning Environments*, 41(1), 88-102.
- Zhang, Y., Johnston, L., & Farooq, U. (2023). Collaborative learning in virtual settings: The impact of peer assessments. *Journal of Virtual Learning*, 18(3), 97-113. <https://doi.org/10.1080/jvl2023.18.3.97>
- Zhang, Y., Lin, C., & Wang, H. (2023). Professional growth through technology integration: Teachers' experiences with virtual assessments. *Educational Practices Journal*, 47(3), 145-160.