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HOW DO EAST JERUSALEM HIGHER EDUCATION STUDENTS PERCEIVE THEIR HIGH SCHOOL LEADERS' ROLE IN INTEGRATING DIGITAL TECHNOLOGIES FOR MATHEMATICAL LEARNING AND ACADEMIC PERFORMANCE? A MIXED-METHODS STUDY

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Abstract:
The study is about East Jerusalem students and how they think about technology in their schools. Technology is important for East Jerusalem students to learn math. This study examines how students from East Jerusalem studying mathematics at university view the role of their school leaders in using digital technologies to help them learn math more effectively and do well in school. The study asked 29 students to fill out a questionnaire and held in-depth conversations with 12 of them. The questionnaire responses were analyzed using a computer program, and the conversations were analyzed to identify common themes. The results showed that the students had limited access to technology and used it regularly. The students said they had the most graphing calculators. They did not have much adaptive learning software. The school leaders were somewhat supportive of using technology. There was a big difference between what they said and what they actually did. Technology had two effects on the students: it helped them see things better and get feedback, but it also made them less good at doing math in their heads when they relied on it too much. The biggest problems the students had were that the technology did not work, the internet was slow, and their teachers did not know how to use it well. The students were sometimes better at using technology than their teachers. The skills they learned in school helped them feel more confident when they got to college and had to take math classes. The students thought that schools should invest in training teachers to listen to what students have to say, ensure students have a place to learn, and help students prepare for college. This study helps us understand how school leaders can use technology to support student learning in East Jerusalem. It gives school leaders, education policymakers, and teachers practical ideas to consider. Using technology effectively is not just about having the right equipment but also about training teachers, ensuring leaders support their use, and ensuring that what students learn in high school

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prepares them for college. East Jerusalem students need school leaders who understand how to use technology to help them learn math better.

Keywords: educational leadership, technology integration, mathematics education, student perceptions, East Jerusalem, digital learning, teacher training

1. Introduction

1.1. General Background

Digital technologies have become very popular around the world. They have completely changed the way we teach and learn math. Math was hard to understand because it relied on symbols and step-by-step procedures. It was not easy to grasp; now we have software and other tools that help us see math more clearly. We also have manipulatives that make big math ideas easier to understand. More students are starting to understand math. They are even having fun learning it. Then the COVID-19 pandemic hit. Everything changed even faster; schools had to start using tools right away (Attard, Holmes, 2022). The pandemic made teachers and students rethink what learning should be. We had to move away from traditional classrooms and whiteboards. The way we teach math and other subjects is no longer the same; digital technologies and math are changing together. Math is becoming easier to learn because of these technologies (Abu Abed, Abu Abed & Daron, 2026; Viberg, Gronlund, & Andersson, 2023). East Jerusalem's schools face a mess of challenges, everything from tangled administration and patchy resources to shaky infrastructure and insufficient teacher training. It's hard to ignore how important digital technology has become for teaching math in this region, especially with all those barriers in the way. The schools find themselves caught between the Palestinian Authority and Israeli municipal rules, which complicates things and makes even basic improvements tough. There's plenty of research on using tech in math classrooms and on the role leadership plays in making that happen, but most of it overlooks what matters to students (Abu Khdair, 2025). Instead, the focus lands on what teachers think, how administrators rate their own progress, or just crunches numbers about tech and grades. Students who ultimately bear the consequences of these decisions rarely get a chance to weigh in. And even when studies look at Palestinian schools in general, East Jerusalem's unique situation hardly gets proper attention. On top of that, almost nobody asks university students, who've seen both high school and college math lessons, to look back and share what worked and what didn't. This study sets out to change that, asking math students from East Jerusalem universities how they remember their high school leaders handling digital technology in math.

2. Literature Review

Over the past decade, leadership in tech-driven education has been reimagined. Leadership is no longer about administrative tasks; it is about having a vision, making sound decisions about resources, and creating a culture that truly encourages innovation (Hallinger, 2021; Okumuş et al., 2019). Educational leaders are at the center of digital technology adoption and need vision and resource support. In Palestine, particularly in East Jerusalem, digital leadership is a critical topic. Shqirat examined how digital leadership helps manage crises in 2024 and gathered perspectives from teachers at local secondary schools. Idkadek delved deeper in 2025, presenting a model for leading virtual teams in self-managed schools, including individual roles, team dynamics, and virtual strategies. Recently, researchers have been studying how digital technology is being used in math education. They highlight tools such as whiteboards, simulations, and adaptive platforms that make math classes more engaging and student-centered. These tools enable students to interact and learn in more engaging ways. Mata examined the stages of digital transformation in South African secondary math classrooms in 2024. She broke it down into four areas: teachers' digital skills, digital leadership, the technology infrastructure, and how digital teaching actually feels. Gyasi, Zheng, and Long showed in 2021 how adaptive platforms customize lessons to match each student's ability. Leadership continues to emerge as the key to bringing technology into schools. Uzorka and Kalabuki explored how advances in technology and leadership are changing student experiences and outcomes in Ugandan higher education in 2024. They found four trends: digital learning spaces, data-driven decision-making, remote and blended learning, and improved collaboration and communication. Because of these changes, schools need targeted development to boost teachers' digital literacy. Geiger, Bennison, and Abidin found in 2024 that students who learn with tools make significant improvements. The interactive, lively technology keeps them engaged and creates new learning environments. Geiger noted that students become better at working with math concepts and that technology helps them understand them more deeply (Geiger, 2022). Attard and Holmes highlighted how visualizations and simulations make tough ideas more accessible. Abu Abed and Daron's (2026) research shows that using intelligence in math lessons encourages students to take charge of their own learning and solve real problems.

2.1. Identified Research Gap

In the previous section, we noticed that there's a lot written about bringing technology into math classrooms and about how leadership makes that happen. But we still don’t know much about what students think, especially about their own school leaders’ roles in all this. Most research focuses on what teachers say, how principals rate themselves, or on crunching numbers about tech access and test scores. When it comes to students, especially those who’ve moved on to university and can look back at their secondary school experiences with a fresh perspective, nobody's really asked for their thoughts. That kind of insight is pretty much missing from the picture.

3. Materials and Methods

3.1. Research Methodology

We used a mixed-methods research design in this study — combining numbers and stories to get a clear picture of how higher-education math students from East Jerusalem view their school leaders' use of digital technology for math learning and academic success (Creswell & Clark, 2017). Why go mixed? It helps us pull together the hard data and the real-life context, so we don't miss the full story. We used a convergent parallel design. We distributed structured questionnaires for the quantitative component and conducted semi-structured interviews for the qualitative component. This way, we could cross-check our findings and dig deeper into what students really think and experience. It just makes sense given the exploratory nature of the research — it isn't just about measuring opinions; it's about understanding the complicated lives these students lead in East Jerusalem. The quantitative part gave us numbers: patterns, how often things happen, and what connects. The qualitative side brought us real stories — students shared how they remembered their leaders' behavior, whether tech was available, and how it all affected their learning and their preparation for university.

3.2. Population and Sample

The researcher examined students from East Jerusalem who did not travel far from home. These students from East Jerusalem finished school in East Jerusalem and then went to universities near East Jerusalem. They attended universities such as Hebrew University, Bethlehem University, Al-Quds University, Hadassah College, Azrieli College of Engineering, and Al-Quds Open University. Some students from East Jerusalem were taking many math classes, and some had already finished them. To be in the study, students from East Jerusalem had to have finished school there and be willing to talk about their time in high school there. The researcher wanted to hear students' stories in East Jerusalem about what it was like to go to school there. The researcher got 29 students from East Jerusalem to answer their questions. All the students from East Jerusalem were women. There were 26 women, 2 men, and 1 student from East Jerusalem who did not specify their gender. Most students from East Jerusalem were between twenty-one and twenty-six years old. Some students from East Jerusalem were as young as 18, and others were in their late 20s. Students from East Jerusalem came from various schools, including Mount Scopus Secondary School for Girls, Al-Ma'muniyya School, Al-Ibrahimiyya College, Abu Ghosh Secondary School, Al-Shabat Comprehensive School for Girls, Sur Bahir Secondary School for Girls, and many others. The students from East Jerusalem were studying various subjects, such as nursing, computer science, engineering, chemistry, social sciences, and math. Really, any subject that students from East

Jerusalem need to do well in. The main universities that students from East Jerusalem went to were Bethlehem University, Al-Quds University, Hebrew University, and Azrieli College of Engineering. The researcher chose 12 students from East Jerusalem to interview in person because they had responded to the survey and seemed willing to talk about their time at university and what it was like to go to school there.

3.3. Study Tools

The researcher developed two tools to collect data for this study: a questionnaire that participants completed and an unstructured interview.

3.3.1. Questionnaire

We created a questionnaire using Google Forms and divided it into six parts. This instrument was chosen based on the guidelines established by Scharauf (2016) and Kwiek (2017). Each part focused on something we wanted to know more about. First, we asked for basic information. We wanted to know things like their gender, age, what kind of school they went to, what they studied, and which university they are at now. We also asked them to assess how good they are at math. This helped us understand who was taking the questionnaire. Next, we looked at what kind of technology students have. We asked them about things like computers, the internet, and math tools like GeoGebra and Desmos. We also asked about platforms and whether they have good tech support. Students told us how often they use these things, from never to every day. Then we looked at what the people in charge do with technology. We asked students whether their principals and math department heads think technology is important, provide resources, and help teachers learn. We also asked whether they care about equality and whether they listen to students. Students answered these questions by saying whether they strongly disagree or strongly agree. The next part was about whether students like using technology in math class. We asked them whether they think it is useful and easy to use, and whether their teachers and friends like it. Students answered these questions the same way as before. After that, we asked students about how technology affects their learning. We wanted to know whether it helps them understand math better, whether it is distracting, and whether it makes learning fun. Students told us what they think by answering whether they strongly disagree or strongly agree. Finally, we asked students about how ready they are for university. We wanted to know whether they feel prepared to use technology in math class, whether they are confident, and whether they think they are as good as their friends. At the end, we asked students what they would change about how technology is used in their math classes.

3.3.2. Semi-Structured Interviews

We wanted to know more than numbers, so we conducted semi-structured interviews. This approach aligns with qualitative strategies recommended by Cataldi, Sena, and Fitzpatrick (2016). The questions were the same as those in the questionnaire, but this time we wanted to hear real stories and honest thoughts. We asked about the technology they remembered using in school, how they thought their leaders supported them, examples of when technology worked or did not work, how all this affected their math skills or motivation, the problems they had, and what they thought about how high school prepared them for math at university. Each interview took 30 to 40 minutes. We spoke in Arabic because that is what the participants were most comfortable with, so the conversations felt real and relaxed. Sometimes we met in person, and other times we used video calls. We recorded every interview after getting permission, then wrote down everything word for word to look at the details later.

3.3.3. Validity and Reliability of the Study Instrument (Questionnaire)

Experts in administration, educational administration, and curriculum and instruction reviewed the questionnaire. There were five experts on this panel. They evaluated the questionnaire to determine whether the questions were clear and appropriate for the intended topics, whether all important topics were included, and whether it was suitable for the people who would be answering it. The experts provided feedback, which was used to revise the questionnaire. The changes focused on how the questions were worded and how the topics were organized, improving the questionnaire's validity. The scores for each question were compared with the score for the topic it addressed. The results showed that all of these comparisons were significant, meaning they were not just due to chance. The correlation values ranged from 0.42 to 0.78, indicating a fairly strong relationship. This means that the questionnaire is internally valid. The scores for each topic were also compared with the score for the entire questionnaire. The scores from the topics were compared to each other, too. The results showed that all comparisons were positive and significant, indicating that the questionnaire is measuring what it is supposed to measure. This also confirms that the questionnaire is consistent and that the topics are related. The educational administration experts and the other experts reviewed the questionnaire and confirmed it was sound. The questionnaire is about administration and related areas, such as educational technology, curriculum, and instruction.

3.3.4. Data Analysis

I reviewed the questionnaire responses and examined the basics, such as how often people chose certain answers, the averages, and the spread of the answers. This helped me identify patterns in what the participants said. The interviews and open-ended responses were handled differently. For these, I used a method called analysis. I followed the steps outlined by Braun and Clarke in their 2006 framework. First, I got to know the data well. Then I started coding the responses. After that, I looked for themes in the responses. I checked the themes I found to make sure they were correct. Next, I named the themes. Finally, I wrote down what I discovered. I did all of this work by myself, creating the codes and themes from the beginning. I kept the study's main ideas in mind as I worked on the questionnaire responses, the interviews, and the open-ended responses.

4. Results

I analyzed responses from 29 students in East Jerusalem who completed a questionnaire. I also interviewed 12 of them. I used a method that combines numbers and words to understand what they said. For the numbers part, I used a computer program called SPSS to look at things like how many people said the thing, what percentage that was, and the average answer. For the words part, I looked for themes in what the students said using a framework that two researchers, Braun and Clarke, came up with in 2006.

Table 1: Correlation Coefficients between Domains and Total Questionnaire Score

Domain	Correlation Coefficient (r)	Significance Level
Availability and Usage of Digital Technologies	0.71**	0.01
Leadership Behaviors and Support	0.68**	0.01
Teachers' Reliance on Technology	0.65**	0.01
Classroom Interaction and Communication	0.73**	0.01
Impact of Technology on Mathematics Learning	0.74**	0.01
Challenges and Difficulties	0.69**	0.01
Student Adaptation to Technology	0.67**	0.01
Technology in Assessment and Evaluation	0.72**	0.01
University Readiness and Academic Preparation	0.70**	0.01

(**) Significant at 0.01 level
Source: SPSS analysis results of the questionnaire

4.2. Reliability of the Instrument

Reliability was assessed using three methods:

4.2.1. Cronbach's Alpha

Cronbach's alpha was computed for each domain and for the entire questionnaire. In educational research, a value of 70 or higher is considered acceptable.

Table 2: Cronbach's Alpha Coefficients for Questionnaire Domains

Domain	Number of Items	Cronbach's Alpha Coefficient
Availability and Usage of Digital Technologies	8	0.86
Leadership Behaviors and Support	10	0.89
Acceptance of Technology	5	-
Impact of Technology on Mathematics Learning	8	0.87
University Readiness and Academic Preparation	5	0.84
Subtotal (Closed-ended items)	36	0.92
Demographic Information	6	-
Open-ended Question	1	-
Questionnaire as a Whole	43	0.92

Source: SPSS analysis results (Cronbach's Alpha).

According to Cronbach's alpha values, all domains show high reliability (above 0.80), and the questionnaire itself shows very high reliability (0.92), confirming the instrument's suitability for the study.

4.2.2. The Spearman-Brown Coefficient

The Spearman-Brown coefficient was calculated by dividing the items within each domain into two halves (odd- and even-numbered items).

Table 3: Reliability Coefficients using Split-Half Method

Domain	Spearman-Brown Coefficient
Availability and Usage of Digital Technologies	0.83
Leadership Behaviors and Support	0.87
Impact of Technology on Mathematics Learning	0.85
University Readiness and Academic Preparation	0.81

Source: SPSS analysis results (Split-Half method)

The split-half reliability coefficients ranged from 0.81 to 0.87, indicating that the instrument was reliable.

The questionnaire was pilot-tested on a sample of 10 students not included in the study, with a two-week interval between the two administrations. The correlation between the two administrations was 88 for the total questionnaire, indicating high stability over time.

The questionnaire was distributed to 35 students, and 29 valid responses were collected and statistically analyzed, yielding a response rate of 82.9%. Additionally, 12 semi-structured interviews were conducted with a subset of participants. Results for each of the ten underlying concepts are presented, including arithmetic means, standard deviations, frequencies, and percentages, supported by qualitative quotes from interviews. Quantitative (descriptive statistics - frequencies, percentages, means, standard deviations) and qualitative (thematic analysis of interviews) analyses are presented.

Table 4: Arithmetic Means and Standard Deviations for Availability and Usage of Digital Technologies Items

No.	Item	Mean	Std. Deviation	Frequency Level
1	Computers or laptops were available for mathematics learning	2.86	1.42	Medium
2	Internet access was reliable and fast enough for mathematics activities	2.76	1.21	Medium
3	Dynamic geometry software (e.g., GeoGebra, Desmos) was available	2.41	1.15	Low
4	Graphing calculators were available	3.24	1.52	High
5	Online learning platforms (e.g., Google Classroom, Moodle) were used	2.66	1.33	Medium

6	Adaptive learning software (e.g., Khan Academy, IXL) was used	2.28	1.08	Low
7	Technical support was available when technical problems occurred	2.48	1.24	Medium
8	Overall, how often did you use digital technologies in mathematics classes?	2.83	1.44	Medium

Note: Overall Mean for the Domain: 2.69 (Medium Level)
Source: SPSS analysis results (arithmetic means and standard deviations)

The overall mean for technology availability and use was 2·69 out of 5, indicating a medium level. Graphing calculators were the most accessible and most used technology, averaging 3.24 (high level), with 19 participants (65.5%) reporting they were available often or daily. Adaptive learning software was the least available, with a mean of 2.28, whereas 14 participants (48.3%) reported that it was never available. Also, 11 participants (37.9%) reported that computers were available often or daily, whereas 9 participants (31%) reported that they were never available, highlighting significant variation in technological infrastructure across schools.

These findings were confirmed in interviews. "*In practice, what I used almost daily was the smart boards in the classroom, where the teacher used to show graphs*," said one participant. But another from a different school said: "*Technology was not available in mathematics classes as it is today*."

4.3. Leadership Behaviors and Support for Technology Integration: Quantitative (Descriptive statistics - Frequencies, Means, Standard Deviations) and Qualitative (Thematic analysis of interviews)

Table 5: Arithmetic Means and Standard Deviations for Leadership Behaviors Items

No.	Item	Mean	Std. Deviation	Agreement Level
1	The principal clearly articulated that technology was a priority for mathematics	3.10	1.34	Medium
2	The principal invested school resources in technology for mathematics (computers, software, training)	3.14	1.41	Medium
3	The principal encouraged mathematics teachers to experiment with new digital tools, even if they sometimes failed	3.34	1.38	Medium
4	The principal used technology personally and modeled digital culture	2.90	1.26	Medium
5	Technology resources were distributed equitably among all mathematics classes	3.14	1.30	Medium
6	The mathematics supervisor or department head provided training and support for technology use	2.97	1.24	Medium
7	Students were asked to share their opinions on technologies that could help them learn mathematics	2.90	1.26	Medium
8	The school celebrated successes when teachers or students used technology creatively	3.07	1.33	Medium

9	When technical problems occurred, leaders took them seriously and worked to resolve them	2.86	1.18	Medium
10	Overall, how supportive were your school leaders of technology use in mathematics learning?	3.21	1.27	Medium

Note: Overall Mean for the Domain: 3.06 (Medium Level).
Source: SPSS analysis results (arithmetic means and standard deviations)

The average score for leadership behaviors was 3.06 out of 5, which is an average result. The principal did a good job of encouraging math teachers to try new digital tools, earning a score of 3.34. On the other hand, leaders did not do a good job of dealing with technical issues, earning a score of 2.86. People had opinions about this. One person said the principal was good at getting technology for the classroom. They even got computers for the lab. Another person said it took time to get help when problems came up. Most people said their leaders were open to ideas about technology and supportive when it came to using technology. However, there was a problem. The leaders said they wanted to use technology, but they did not always follow through on this. The principal and other leaders talked about using technology, but they did not always support it as they said they would. Leadership behaviors like these are important. The leaders need to work on them. The score for leadership behaviors shows that there is room for improvement.

4.4. Teachers' Reliance on Technology and Integration Practices: Qualitative (Thematic Analysis of Interviews) Supported by Descriptive Quantitative Data

Table 6: Frequencies of Sub-themes for Teachers' Reliance on Technology (from interviews)

No.	Sub-theme	Frequency	Frequency Level
1	Intelligent Integration	7	High
2	Failed Integration	7	High
3	Teacher Reliance	5	Medium
4	Remote Learning (COVID-19)	5	Medium

Source: Thematic analysis results of interviews.

When you look at how teachers use technology, it's all over the place—some do it really well, others not so much. You can spot three main ways teachers approach tech in the classroom. First, there's what I'd call the "*Intelligent Integration*." Seven people talked about this high-level approach. One student explained, "*For spatial and three-dimensional geometry, our teacher took us to the lab and used GeoGebra. Honestly, it was fantastic. We got to see how changing coefficients affected the function's shape and actually interact with it right there—not just staring at numbers on the blackboard*." Someone else mentioned, "*Our math teacher used a data show in the computer lab. She'd tweak the coefficients in some graphing software, and we could watch the curve jump around in real time. That made so much more sense than chalk and board*." Then there's the "*Failed Integration*," which also came up seven times at a pretty high level. Here's what that looks like. One student said, "*The teacher would just hit the button to show the next step and basically just read it out. The lesson felt stiff—*

honestly, it was pretty bad." Another person remembered a teacher who tried to use software for tough algebra problems. The problem was that he couldn't really use the program. He spent ages just trying to enter the data, and the

4.5. Classroom Interaction and Communication Enhanced by Technology: Qualitative (Thematic Analysis of Interviews)

Table 7: Frequencies of Sub-themes for Classroom Interaction Enhanced by Technology

No.	Sub-theme	Frequency	Frequency Level
1	Interaction between students and teachers	10	Very High
2	Interaction among students themselves	10	Very High
3	Digital communication beyond class time	6	Medium to High

Source: Thematic analysis results of interviews.

The qualitative findings make one thing clear: technology brought everyone closer together. Interaction took off—not just between students, but with teachers, too. One student put it simply: "*Technology really helped increase the interaction between the teacher and students*." Another described afternoons in the lab, huddled around a screen, splitting into small groups to tackle tricky math problems. They talked, tossed around ideas, and worked through puzzles as a team. That teamwork turned hard work into something actually fun—almost like a friendly competition to see who could crack the problem first. There's another layer, too. Students didn't stop talking about math just because the class ended. With WhatsApp groups, they reached out to each other—and to their teacher—whenever they got stuck. If someone hit a wall with the tough five-unit material late at night, they'd snap a photo and send it over. The teacher didn't leave them hanging either; sometimes she'd reply with a quick hint, other times with a voice message walking through the steps. Suddenly, the teacher felt less distant, almost as if she were right there, guiding them outside of class. That's the real power of digital connection.

4.6. Impact of Technology on Mathematics Learning: Quantitative (Descriptive Statistics) and Qualitative (Thematic Analysis of Interviews)

Table 8: Arithmetic Means and Standard Deviations for Impact of Technology on Mathematics Learning Items

No.	Item	Mean	Std. Deviation	Agreement Level
1	Technology helped me visualize abstract mathematical concepts	3.79	1.18	High
2	Technology allowed me to focus on understanding concepts rather than being occupied with calculations	3.45	1.27	Medium
3	Sometimes, technology itself was confusing or difficult to use, distracting me from learning mathematics	3.34	1.20	Medium
4	Technology allowed me to work at my own pace and choose what to focus on	3.55	1.21	High

5	Technology gave me immediate feedback that helped me learn from my mistakes	3.79	1.18	High
6	Technology helped me collaborate with my peers in solving mathematics problems	3.48	1.27	Medium
7	Using technology made mathematics more interesting and enjoyable	3.69	1.23	High
8	Overall, technology enhanced my mathematics learning	3.69	1.20	High

Note: Overall Mean for the Domain: 3.60 (High Level).
Source: SPSS analysis results (arithmetic means and standard deviations).

Technology definitely changed the game for math learning. People gave it a pretty solid score—about 3.6 out of 5—and the biggest wins? Students could actually see tough concepts come to life and get feedback right away. Both perks nailed a 3.79. But it's not all sunshine. One student pointed out that using software and apps let her see how graphs shifted instantly whenever she tweaked the numbers, which made functions way easier to understand. Still, she was blunt: relying on calculators and apps with built-in solutions made everybody lazy. Nobody wanted to slog through equations or mess with hand simplifications. That laziness slowed them down, killed their adaptability, and left them scrambling during big exams like the Bagrut. Those tests force you to write every step yourself, with zero tech backup. Stressful doesn't even begin to cover it.

4.7. Challenges and Difficulties in Technology Integration: Qualitative (Thematic Analysis of Interviews)

Table 9: Frequencies of Challenges in Technology Integration

No.	Challenge	Frequency	Frequency Level
1	Technical Malfunctions and Equipment Failures	8	Very High
2	Poor Internet Connectivity	7	High
3	Insufficient Teacher Training	6	Medium
4	Lack of Alternative Strategies	6	Medium
5	Weak Administrative Responsiveness	5	Medium

Source: Thematic Analysis Results of Interviews.

People pointed out five major challenges. One person described how the smart board would suddenly stop working right in the middle of a tricky lesson. Sometimes the touchscreen failed, or the connection to the server holding all the educational materials dropped. That's stressful, especially when class time's tight. Another person mentioned internet issues. Slow connections and endless loading really make things harder. Training was another problem. Teachers didn't get enough training on these new tools, so they struggled to use them.

4.8. Student Adaptation to Technology: Qualitative (Thematic analysis of interviews)

Qualitative analysis shows students picked up new technology quickly—and with real excitement. One participant put it this way, "*We adapted to new tech quickly. Truth is, our generation grew up right as the whole tech boom started, so we were always curious. Scientific calculators, computers—they just seemed like tools to help us learn better and save time, especially when the math got tricky.*"

Table 10: Frequencies of Sub-themes for Student Adaptation to Technology

No.	Sub-theme	Frequency	Frequency Level
1	Student Adaptation	9	Very High
2	Mode of Adaptation (Rapid Learning)	9	Very High
3	Spontaneous Student Feedback	8	Very High

Source: Thematic analysis results of interviews

Another student chimed in: "*We'd figure out new math or engineering software in a few minutes. Sometimes we even stepped in to help teachers when they struggled with screen settings or getting presentations to play. Honestly, we just love screens and tech—it feels almost natural.*"

4.9. Technology Use in Assessment and Evaluation: Quantitative (Descriptive statistics) and Qualitative (Thematic analysis of interviews)

Table 11: Arithmetic Means and Standard Deviations for Technology in Assessment and Evaluation Items

No.	Item	Mean	Std. Deviation	Agreement Level
1	My secondary school technology experiences prepared me well for university mathematics and digital requirements	3.07	1.25	Medium
2	I felt confident using technology for mathematics when I entered university	3.24	1.27	Medium
3	Compared to students from other secondary schools, I felt well-prepared in terms of technical skills for mathematics	2.90	1.26	Medium
4	The technical skills I learned in secondary school helped me succeed in university mathematics courses	3.10	1.29	Medium

Note: Overall Mean for the Domain: 3.08 (Medium Level).
Source: SPSS analysis results (arithmetic means and standard deviations).

On average, technology use in assessment scored 3·08 out of 5—a pretty middle-of-the-road result. When we looked more closely, it was clear that teachers weren't strangers to tech in their evaluations. One student explained, "*Sure, technology showed up in the evaluation process, but only to a point. Teachers turned to digital platforms and Google Forms for online homework and quick quizzes, mostly to see if we really understood a topic.*" Another student highlighted instant feedback—a big deal for them. "*With tech-based assessments, I* *got my score the second I hit 'submit.' Even better, the system pointed out exactly where I messed up a calculation and explained the right answer. So, I could fix my mistakes right away, without waiting around for days*."

4.10. University Readiness and Academic Preparation: Qualitative (Thematic Analysis of Interviews)

Table 12: Frequencies of University Preparation Aspects through Technology

No.	Aspect	Frequency	Frequency Level
1	Breaking the Software Barrier (Creating Familiarity)	7	High
2	Scientific Research and Self-Directed Learning	6	Medium
3	Analytical Skills	4	Medium
4	Presentation Skills	4	Medium

Source: Thematic analysis results of interviews.

People pointed out four ways technology helped them get ready for university. Regarding software, one person said, "*I already knew how to handle equations and statistical tables, so I wasn't intimidated at all*." On research skills, someone else shared, "*I picked up scientific research and learned how to teach myself back in school, mostly through math programs and self-guided projects*."

4.11. Student Recommendations for Improving Technology Integration: Qualitative (Thematic Analysis of Interviews and Responses to Open-ended Questionnaire Questions)

Table 13: Frequencies of Student Recommendations for Improving Technology Integration

No.	Recommendation	Frequency	Frequency Level
1	Investment in Teacher Empowerment (Training)	8	Very High
2	Listening and Seeking Feedback	7	High
3	Providing a Supportive Environment	7	High
4	Project-Based Learning	7	High
5	Linking School and University	6	Medium
6	Clear Strategies	6	Medium

Source: Thematic analysis results of interviews and open-ended responses.

People shared six main recommendations. The top one? Invest in teacher empowerment. One person put it bluntly: "*If teachers aren't trained intensively and psychologically in how to use technology in their subjects, those devices just end up as expensive decorations, or worse, a burden*." Another argued, "*Technology shouldn't be optional for teachers. It needs to be part of the curriculum*."

5. Discussion

The research shows that technology in East Jerusalem schools is pretty hit-or-miss. On average, technology is just one of them. A medium level overall, but some East Jerusalem schools do a lot better than others. You can find graphing calculators everywhere in East Jerusalem schools, but if you look for adaptive learning software, you will hardly find it. This mix is not random. It is tied to how education works in East Jerusalem, with a bunch of authorities running things and no clear vision for it. That does not exactly help the quality of education in East Jerusalem.

All of this aligns with what Shqirat found in 2024. They argued that East Jerusalem schools need to move beyond old-school management and invest in leadership. Now, support for leaders in East Jerusalem who are trying to make that shift is mixed. There is a lot of talk about technology in East Jerusalem, but less action. Their research also links electronic leadership in East Jerusalem to the handling of frequent educational crises there. There are many bosses in East Jerusalem, but not enough direction.

When it comes to using technology in the classroom in East Jerusalem, not all teachers are on the same page. Teachers in East Jerusalem with solid training make technology feel natural. Students understand ideas better, and classes in East Jerusalem run smoothly. If teachers are not prepared, the technology just eats up time and frustrates everyone. Other studies in Palestine show that e-learning often struggles because teachers are not ready, lack the necessary skills, or lack equipment. It is not all bad in East Jerusalem. Technology in East Jerusalem made it easier for students to talk, share, and learn outside of school hours. Apps like WhatsApp pulled students into learning communities, helped them get feedback, and made the whole process more interactive. This article indicates that online tools in East Jerusalem can push classrooms closer to student-centered learning, especially when used effectively. WhatsApp, for example, gave math students a space to ask for help and learn from each other. Something you do not get on paper in Jerusalem, which aligns with Murphy (2025). In short, technology in East Jerusalem helps unlock abstract ideas, boosts understanding of graphs, provides fast feedback, and keeps students motivated. Score one for technology in East Jerusalem, but there is a catch there.

If people in East Jerusalem rely heavily on technology, they might forget how to do basic math calculations. It is a balancing act. In East Jerusalem, schools are still trying to figure things out. Some researchers, such as Mensah, Fokuo, Karadaar, Gurah, Damoah, and Ansu (2026), found that technology helps students understand math better and has an overall effect. However, there are still some problems. For example, students in East Jerusalem often feel unsure about their math skills. Not everyone in East Jerusalem knows how to use technology with confidence; it is not about being nervous.

The biggest problem in East Jerusalem is the sheer number of issues it faces. A major issue is unreliable internet access. Teachers in East Jerusalem also lack training. School leaders in East Jerusalem are slow to respond, and there are no backup plans when things go wrong. This makes sense in a place like Palestine, where the internet isn't great, and the power can go out at any minute. Unreliable internet, no training for teachers, slow responses from school leaders, and no backup plans when things go wrong are all problems in East Jerusalem. Shqirat conducted a 2024 study that not only identified problems in East Jerusalem but also urged schools there to build crisis teams and promote leadership to tackle these issues. The good news is that students in East Jerusalem have quickly adapted to technology. They learn software quickly and even help their teachers in East Jerusalem fix tech problems. There is a difference between the older and younger generations. Kids in East Jerusalem are growing up with technology. They use it more confidently than adults in East Jerusalem; for example, some research shows that kids often take charge of technology. They decide how technology fits into their lives and learning. Sometimes they even teach their teachers in East Jerusalem about technology, which Mary John established in 2025.

In East Jerusalem, technology is used for quizzes, homework, and more. The instant feedback gives students in East Jerusalem an edge. They do not have to wait for days to find out how they did. They learn what they got wrong right away and can fix it, which helps them learn more effectively. Technology-driven assessments help students in East Jerusalem correct their mistakes quickly. So, the idea is clear. Schools should build evaluation plans using tools. The tech skills that students learn in school in East Jerusalem will also help them in university.

Students who are comfortable with school software find it easier to use programs or to teach themselves. Looking ahead, online learning helps students in East Jerusalem meet today's demands. It helps them with thinking, problem-solving, and self-learning. All these skills are essential for the world. Some researchers say it is time to revive learning programs, update the digital curriculum, and fix the tech infrastructure in schools in East Jerusalem, such as Abu Abed, Abu Abed, Daron (2026).

Students in East Jerusalem have clear priorities; they want schools to invest in teacher training, provide opportunities for teachers to share feedback, create supportive learning environments, offer more project-based lessons, and build stronger links between schools and universities in East Jerusalem. They also want strategies for the effective use of technology in East Jerusalem. Overall, their ideas align with earlier studies, such as Abu Khdair (2025): teachers and prep schools need to move beyond old-school leadership, and administrative roles should go to people who truly understand technology in East Jerusalem.

6. Conclusion

This study examined what university math students think about the role of school leaders in the use of technology in math education in East Jerusalem. The study used a mixed-methods approach, collecting data through questionnaires and interviews with university students reflecting on their high school experiences. The findings showed that while school leaders generally hold attitudes toward digital technology, there is a significant gap between their plans and what actually happens in schools.

Technology use is inconsistent: tools like graphing calculators are commonly available, but advanced digital learning platforms and educational software are rarely used. The study found that teachers are key to making technology work in the classroom. Teachers who are trained use digital tools to help students better understand math concepts, make class more engaging, improve communication, and support learning outside of school. However, teachers lack training in using technology effectively, which reduces teaching quality and leads to missed learning opportunities. Digital technology supports visualization, collaboration, and motivation. Relying too much on technology can weaken students' math skills, especially during exams without calculators.

Some challenges were identified, including unreliable internet, technical problems, limited teacher training, lack of support, unequal technology resources among schools, and no backup plans.

Despite these challenges, students demonstrated strong digital skills, quickly adapting to new technologies and often helping teachers use digital tools. The study concludes that using technology successfully in math education requires more than just providing devices. It needs teacher training, stronger school leadership, better digital infrastructure, fair distribution of technological resources, closer collaboration between schools and universities, and clear policies that support the sustainable use of technology. Future research should include more diverse groups, long-term studies that follow students from school to university, and comparative research across educational contexts to better understand the long-term impact of digital technology on math education and student achievement.

Conflict of Interest Statement

The author declares no conflicts of interest.

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