Indonesian Journal of Education Research (IJoER)
Vol. 5, No. 4, August 2024, pp. 166~177
ISSN: 2722-1326, DOI: 10.37251/ijoer.v5i4.1008

Mathematics Teachers' Perceptions of The Positives of Blended Learning In Jordan

Mohammad Ali Ghunaimat[1], Esraa Ahmad Alawneh[2]
[1]Department of Curriculum and Instruction, Yarmouk University, Irbid, Jordan
[2]Mathematics Teacher, Arab Episcopal School, Ministry of Education, Irbid, Jordan

Article Info

Article history:

Received Jun 10, 2024
Revised Aug 6, 2024
Accepted Aug 23, 2024
Online First Aug 25, 2024

Keywords:

Mathematics Teachers
Blended learning
Teaching Mathematics
Perspective

ABSTRACT

Purpose of the study: The study aimed to reveal mathematics teachers' perceptions about the positives of blended learning in Jordan.

Methodology: The researcher followed a descriptive research approach, by designing the study tool (a questionnaire) to verify Mathematics teachers' perceptions of the positives of blended learning in Jordan. Calculating frequencies and averages of mathematics teachers' response values. Descriptive research is used in field research and helps define positives of blended learning accurately and clearly. The size of the study population was (179) teachers. And The participants of study sample members were 135 teachers.

Main Findings: The findings of the study showed that mathematics teachers' perceptions of the positives of blended learning are high, and the most prominent positives are: blended learning facilitates interpretation of mathematics curriculum content, The utilization of blended learning strategies increases student-teacher interaction, and in the teaching of mathematics, blended learning improves individual learning.

Novelty/Originality of this study: Explaining the positives of blended learning from mathematics teachers' perceptions in teaching mathematics helps mathematics teachers rely on this approach as an effective and active teaching strategy. The findings of the study also help educational decision-makers in Jordan know the positives of blended learning and thus move forward in supporting and encouraging this type of learning.

Corresponding Author:
Mohammad Ali Ghunaimat
Department of Curriculum and Instruction, Yarmouk University, Shafiq Irshidat st، Irbid, Jordan
Email: m_ghnemat@hotmail.com

1. INTRODUCTION

Jordan's educational system is interested in keeping pace with modernization and development in all areas of teaching, and follows up on what proves its effectiveness in providing useful learning that benefits the educational system as a whole, including teachers, students, curricula, and others. In order to effectively increase students' learning outcomes, technological advancements should be included into the educational process. Teachers can take advantage of advances in technology to enhance students' skills and competences through variety of learning strategies [1]. It demonstrates how crucial it is for educators to be technologically literate in terms of their understanding of and ability to use technology in classroom [2]. Improving learning outcomes can be achieved by utilizing suitable learning models, such as a based-on technology learning model to successfully enhance students' learning achievement, the selection of an approach to learning needs to be carefully considered, particularly in the case of mathematics, which is frequently cited as one of the most challenging courses [3]. One of the main techniques used in large class instruction is didactic teaching. The main issue,

though, is that it doesn't provide direct instructional supervision, which lessens the chances for participatory learning. A new approach to education known as "Blended Learning" may be utilized to solve this issue [4] .The blended learning model, that has been widely implemented, combines classroom interaction and online learning [5].

Blended learning refers to the incorporation of technology into the educational setting. To able to ensure the ultimate success of students, a comprehensive understanding of their distinct requirements is essential for the implementation process. Due to flexibility of technology, teachers can tailor curricula and instructional strategies to the specific requirements of each student [6]. The blended learning paradigm is praised for its use of modern technology for helping students' study while also preparing them for future technological developments as the generation grows [7]. Such learning objectives must be met with effective pedagogy and assessment. The BL teaching approach is one of these educational practices that is becoming more and more popular [8].

The definitions of blended learning from Garrison [9] and Graham [10] are the two that are most frequently cited in the literature. The former states that " blended learning is a thoughtful combination of online experiences learning with face-to-face classroom actions " [9]. Contrarily, blended learning systems mix in-person training with computer instruction, according to Graham's definition of blended learning [10], blended learning is defined by Alebaikan & Troudi [11] as "the integration of ordinary in-person class activities with online activities." According to Staker and Horn [12] "students move between various methods of learning, at least a few of which is via the internet, on an established timetable or at the teacher's discretion" in a blended learning environment.

Blended learning encompasses more than only assigning students to use computer once or twice a week to complete homework or other chores. According to Yudt and Columba [13], blended learning is deliberate, systemic organization and delivery of instructional content consisting of self-paced, student-centered e-learning and traditional, more than teacher-centered face-to-face education. When used well, blended learning combines the most desirable aspects of e-learning with the more effective traditional teaching strategies to produce the educational approaches that improves contextual learning, raises student engagement, develops learner control, self-reliance, independence, responsibility, and self-discipline all characteristics of constructivist learning, particularly as defined by John Dewey, Jean Piaget, and Lev Vygotsky [4].

Blended learning approaches can be organized into parallel or sequential phases and are flexible enough to be tailored to students with different preferred learning styles and demands. Teachers and students can share access to resources and student work across all interaction modes while using the technology in co-located small groups, E-learning environments, and traditional learning environments [14]. Depending on how much material, delivery, and learning demonstration are tailored to each student's needs and interests, blended learning may also be referred to as individual instruction. Either way, it speaks to how technology may use to customize training to each student's unique needs [15]. Blended learning is new approach to education that integrates learning online in a remote environment with in-person instruction, complete with all of its advantages and disadvantages [16].

Kind of blended learning are classified according on the models of engagement they promote. Thus, blended learning encompasses five primary models a state to Alammary, Sheard, and Carbone [17]: (1) In-person teacher-led: Students receive training directly from teachers with minimal interaction. (2) Face-to-face collaboration: An instructional method that promotes groups projects and other forms of cooperation among students in classroom. (3) teacher-led online instruction: teachers oversee student progress, establish interactions, and teach remotely. (4) Collaborating virtually: Students are urged for taking part in online conversations and work in virtual groups. (5) Online self-paced learning: Students are permitted to study independently, at their own speed, and to take initiative regarding time and location by, for example, reading online or viewing videos.

The blended learning model consists of four components: (1) live, synchronous, face-to-face learning practice, discussion, and display methods; (2) virtual synchronous learning, where students and teacher interact through e-learning programs during their own education time; (3) independent asynchronous learning, where students can obtain the program's material to learn independently at home or at school; and (4) asynchronous collaboration, where students can discuss the material on the program's discussion forums [18].The approach to blended learning offers a chance to emphasize our function as teachers while supporting technology that students are accustomed to and will carry with them throughout their academic and life journeys. Blended learning is educational approach which has to be investigated if we want the greatest education possible for our students [19]. Multiple supports must be given to a student, class, and individual organizations to ensure the efficacy for learning technique within the blended learning paradigm [20].

Through integrated learning, the student has opportunity to participate in mathematical activities. Blended learning is the stage that occurs between in-person instruction and modular distance learning. At this time, kids may become used to studying the varied skills in a modern classroom setting. However, teachers had to devote twice as much time to teaching this ability in order for students for achieving the department's standards for competence. Effective communication is a prerequisite for making mathematics more useful. To successfully converse, the student must learn mathematics, just like any other topic [21].

Giarla [22] claims that flexible schedules that may be customized for each student enable to get knowledge at own rate through blended learning. Students have enough time to react to their modules since they have enough time to finish the work at home. With the assistance of their guardians and parents, they can finish it on time and submit it in while their in-person classes.

Even though blended learning has many advantages, it also heavily relies on technological tools and resources. As a finding, educators should make sure digital tools are current and easy to use [23]. According to Mukhtaramkhon [24] certain learners may find online learning challenging or unfeasible as a finding of uneven access to resources. According to Mukhtaramkhon, students who lack IT literacy may have major challenges while attempting to access the curriculum materials, which is why having excellent technical support is crucial. A mixed teaching-learning approach's acceptability depends on the diversity of students, including their gender additionally age [25].

Blended learning extends the classroom into a digital realm where traditional teaching's constraints can be surmounted. It is faster to identify students' requirements using the online component and integrate them with the interpersonal components of the actual classroom for creating a strong learning system [20]. Online resources for mathematics education improve students' abilities to investigate and visualize mathematical topics and ideas while also accommodating the time constraints of teachers. Furthermore, in real-world scenarios, face-to-face components facilitate simultaneous communication and knowledge developing [26].

According to Surjono [27] blended learning improves normal face-to-face learning for students in terms of achievement and involvement levels. The majority of students also see the using of blended learning favorably. In the opinion [28] blended learning activities give educators and learners several opportunities to receive feedback and exchange perspectives. Tang & Chaw [29] mentioned students gain from using the blended learning paradigm, particularly from its flexibility with regard for timing, location, and accessibility. According to Tuomainen [30] the blended learning approach can improve students' learning preferences, autonomy to be accountable for own learning, and students' excitement for learning, it allows for ease and adaptability in time management.

Ceylan & Kesici [31] proposed blended learning is a teaching strategy by using technology and prioritizes interaction between the student and the teacher in order to boost engagement, independence, and achievement. With assistance from the teachers, it is focused on the requirements of the student. One teaching strategy that has a good effect on both teachers' and students' instruction is blended learning. Teachers may identify each student's unique learning needs through one-on-one interactions with them, which enables them to modify or create lesson plans that best meet the needs of their students as they advance in their education [32]. In addition to investigating the advantages of web-based technologies in mathematics education, blended learning aids in diversifying the instructional delivery of mathematics curricula [33].

There are several challenges for teachers in blended learning. These issues can see from the unique angles that academic institutions, teachers, and students have to offer [34]. viewed through the lens of educational institutions, contend that one of challenges in implementing blended learning is the shortage of training that the faculty members receive on topics pertaining to advanced teaching techniques and technology application knowledge, in addition to the financial outlay necessary to put this teaching strategy into practice [35]. Another issue is that students do not know what blended learning is. Atweh et al [36] revealed that some of the difficulties associated with this teaching approach include restricted access to the websites and related resources, connection issues, a deficiency of instructional resources, and curriculum compatibility with blended learning.

Using digital technologies to teach and learn mathematics broadens educational opportunities and increases the number of answers available for various mathematical issues. In classroom, teacher and students can benefit from interactive tools. Using blended learning, education may be made more engaging by fusing the traditional and digital worlds. In actuality, face-to-face classroom communication combined with technological tools can foster inventive thinking abilities and explore creative alternatives. Mathematics instruction may be done anywhere and anytime, with the use of blended learning, which allows us to share momentum and collaborative information [37].Technology-enabled collaborative learning in mathematics education is characterized by the way the internet may be used in a blended learning setting, introducing new research challenges and online courses [38]. Rivera [39] asserted that blended learning can give teachers the freedom and flexibility to incorporate extra online activities to help their special needs students with reading and arithmetic. Because students with varying learning needs and levels can work together in the same classroom on various subject areas and goal activities, blended learning environments have the potential to be more inclusive. This can lead for increasing opportunities for special education inclusion initiatives [40].

There have been a number of research and studies that have investigated the impact of blended learning in education and teaching mathematics, and the existence of positives of blended learning in teaching mathematics. Egara & Mosimege [41] looked into the effects of blended learning on secondary school arithmetic retention and achievement. The study used a pre-test-post-test quasi-experimental design with a non-equivalent control group. students from both secondary schools were specially chosen to participate in the study. Then,

using a simple random sampling process, the SS 1 students from each school were divided into experimental and control groups. The learners in the experimental group utilized a blended learning approach, whilst the control group followed the conventional way. The groups had a 4-week interventional session following a pretest in week 1. A posttest was given in week six, and a retention test (post-post-test) was conducted four weeks after the posttest. According to the findings, students who received tutoring in mathematics through blended learning did better in terms of achievement and retention than students who received teaching through traditional methods. It shown that the mean achievement scores of students getting blended learning coaching in mathematics did not reveal any significant gender differences. There was a significant gender difference in the average retention scores of students who learnt mathematics through blended learning, with a preference for female students.

Tong et al [42] looked over 25 papers that were found in the Scopus database between 2019 and 2022. Additionally, blended learning is used to teach the majority of mathematics subtopics, especially in classes on teaching approaches, where the flipped model, mixed model, and online practicing model are the three models that are most frequently used. The study's evaluation served as the basis for this analysis. Blended learning helps preservice teachers develop their knowledge, abilities, and attitudes. However, it also brings with it a host of concerns related to professional and digital competence, learning resources, technology infrastructure, and student involvement and knowledge for teachers.

Lofranco [43] conducted study with the goal of identifying how learners progressed in mathematics through blended learning. In this study, twenty-two people participated. With descriptive analysis, it is qualitative. The learners' current level of learning in this particular subject was assessed using an Early Grade Mathematics Assessment and a self-made survey questionnaire on the factors affecting the learners' growth. According to the EGMA results, 32.64% of the items were properly answered by the respondents. It suggests that just half of the students in the class are familiar with mathematical ideas. Survey respondents appeared to agree with the factors listed, with a mean score of 2.68 (0.16 SD). They have ample time in-person classes to fully comprehend the topics, which further demonstrates the benefits of blended learning.

According to Arau and Gitirana [44] blended learning improves pre-service teachers' attitudes toward learning and engagement, self-efficacy, and beliefs about integrating technology. It also has a positive effect on the growth of pre-service teachers' TPACK abilities, higher-level thinking, separate learning and research skills, and interpersonal skills. However, there are several obstacles to overcome when integrating blended learning into teacher education. These include issues with technology and infrastructure, the caliber of course materials and resources, the amount of time needed to prepare lessons, and—above all—the professional growth and ICT competencies of teachers.

Uyen and Ngan [45] determined whether the flexible method of blended learning is beneficial for teaching the mathematics subsections of coordinates in the plane by enhancing students' academic performance, abilities for independent study, and attitudes toward learning. A quasi-experimental study was carried out to evaluate the academic performance, self-study abilities, and learning dispositions of 46 students in the traditional techniques control group and 44 students in the model of blended learning experimental group. According to the study, students' academic progress in the experimental class was positively impacted by blended learning when compared to the control group. Moreover, blended learning enhanced student-teacher relationships and enhanced academic performance, self-study skills, and learning attitudes, according to observations and the results of a poll of students' opinions.

Dewi et al [46] determined how well the integrated learning approach works for improving students' grasp of mathematical concepts. This research used a non-equivalent control group in a quasi-experimental design. While the control group received instruction using the traditional learning model, the experimental group received instruction through blended learning. Students at State High School Sewon in Yogyakarta - Indonesia, made up the study's population. Thirty students each made comprised the experimental and control groups out of the sixty tenth graders in the 2019–2020 school year. To collect the data, a test apparatus was used, and the sampling method employed was cluster sampling. T-tests and descriptive statistics were employed to evaluate the data. The study's conclusions showed that the blended learning model performs significantly better than the standard educational approach in terms of improving students' comprehension of mathematical concepts. This suggests that increasing students' conceptual grasp of mathematics can be achieved by the incorporation of blended learning into mathematics training.

By examining journal articles pertaining to blended learning for teachers in China during the previous 20 years, Huuang and Wang [47] examined the study areas and developments in this field. The findings indicate that blended learning strategies used by Chinese teachers are mostly found in the context of teacher preparation in elementary and secondary education, with an emphasis on imparting technology- and educational technology-related knowledge and abilities. Huuang and Wang [47] drew attention to the paucity of theoretical and experimental research as well as the shallow depth of the study on the effects of blended learning on educators. Thus, it's imperative to broaden the study's focus, learn from previous studies conducted abroad and from real-world experience, and carry out in-depth investigation on the variables and impacts affecting blended learning among Chinese educators. After that, create a strong local structure for blended learning for educators by

utilizing ICT (information and communication technology) to supply the theoretical underpinnings and practical guidelines needed to create professional development courses for Chinese educators.

Frazier [48] investigated into how blended learning affected students' attitudes regarding arithmetic as well as their math achievement. In particular, during the two triangle-themed study units. The study's findings indicate that student achievement in mathematics has increased by an average of 25 points. All students have shown inconsistent improvement and shifts in their attitudes toward the subject. According to 62% of students, blended learning increased their level of engagement. Nuri [49] carried out by Eleven pertinent publications about blended learning were found, with a focus on the outcomes of integrating it into all feasible learning programs with different educational levels. The findings show that using blended learning to teach mathematics is a very real possibility. Based on study findings, blended learning has the potential to enhance outcomes for learning, activity, interest, motivation, comprehension, and even create opportunities for students to develop their communication skills, independence, and teamwork.

Fazal [6] presented the results of a quantitative comparison study that looked into how 413 sixth-grade students' arithmetic achievement was affected by blended learning, specifically using the station rotation approach. The Measure of Academic Progress (MAP) and the State of Texas Assessments of Academic Readiness (STAAR) scores were utilized. Based on the teachers' answers to a survey about how much of their class was face-to-face instruction and how much was blended learning, student groups were chosen. To find out how the scores of students taught in mixed learning classes and traditional totally face-to-face courses differed, a t-test was used. The results demonstrated that students receiving instruction through BL outperformed students in a totally face-to-face setting on the MAP assessment ($M = 11.12$, $SD = 7.88$; $t(411) = 3.02$, $p < .01$). However, STAAR scores for face-to-face instruction were higher ($M = 29.96$, $SD = 11.84$) than for blended learning ($M = 26.75$, $SD = 11.06$); $t(411) = -2.85$, $p < .01$. When it came to promoting math learning progress, blended learning outperformed satisfying grade level requirements. These results suggest that blended learning can be beneficially implemented in schools, especially for students who require more academic support in a single school year and are academically behind.

Lin et al [4] investigated how junior high school students' attitudes toward mathematics and their learning achievement were affected by blended learning approach. Using a pre-test–post-test control group design, a quasi-experiment was carried out to look into the effects of combining traditional instruction with the online learning platform Moodle. The results of the ANCOVA and MANCOVA analyses demonstrated that the experimental group's students benefited from the blended learning experience, which improved their attitudes toward learning mathematics in a mixed atmosphere as well as their learning outcomes. According to preliminary findings, high-ability and male students were more interested in the mixed learning setting. Following their experience with blended learning, students provided excellent feedback regarding the use of the Moodle educational platform for mathematics.

It is clear from previous studies and theoretical literature that there is a growing interest in blended learning as an educational approach that combines the usual method of teaching with the role of educational technology. Studies and research have proven the effectiveness of blended learning in teaching mathematics, providing students with mathematical concepts, and creating flexible learning motivation. Given that mathematics teachers are considered an important part of the educational process in Jordan, as their perceptions play a role in drawing up educational policies and are the focus of attention of educational decision-makers in Jordan, the study came to reveal mathematics teachers' perceptions regarding the positives of blended learning and its effectiveness in teaching mathematics in Jordan.

The study aimed to reveal mathematics teachers' perceptions towards applying blended learning in Jordan. Ministry of Education in Jordan adopted blended learning after experiencing circumstances that made regular teaching difficult to implement. The Ministry includes blended learning within its educational programs, and provides the necessary capabilities and means for implementing it effectively and dynamically. The Ministry has provided a television educational platform (Darsak), and also requires teachers to include blended learning within their semester plans. Therefore, the study seeks for determining the positives of blended learning in teaching mathematics by knowing the perceptions and viewpoints of mathematics teachers towards the application of blended learning in teaching mathematics. The study includes questions:

1) What are mathematics teachers' perceptions of the positives of blended learning in Jordan?
2) Are there statistically significant differences ($a = 0.05$) in mathematics teachers' perceptions of the positives of blended learning in Jordan depending on variable of the academic qualifications of mathematics teachers?

The significance of study lies in revealing the positives of blended learning in mathematics teaching from the perspective of mathematics teachers themselves. It highlights prominent advantages of blended learning and demonstrates its effectiveness in teaching mathematics. By using its tool, the study provides a set of advantages of blended learning in teaching mathematics. Through its findings, it will also present mathematics teachers' point of view towards blended learning, which supports mathematics teachers in implementing this type of learning with their students. It will also provide real information to makers of the educational escape in

Jordan towards blended learning, and its impact on teaching. This is reflected in educational policies, the mechanism for implementing them, and providing the necessary support for that. The study also sheds light on the impact of mathematics teachers' academic qualification (educational qualification or non-educational qualification) they obtained.

The study limited to all mathematics teachers work in all government schools affiliated with the Directorate of Education in the Bani Ubaid region in Irbid Governorate in Jordan, who teach mathematics curricula in the Collins basic stage in 2024-2025. The number of basic government schools reached 54. The study attempted to identify the positives of blended learning in mathematics teaching from the perspective of mathematics teachers in Jordan. The study limited to perceptions of mathematics teachers according to the variables of their academic qualification.

2. RESEARCH METHOD

2.1. Types of Research

The study used the descriptive approach to determine the perceptions of mathematics teachers regarding the positives of blended learning in Jordan. The study tool was a questionnaire prepared by the researcher.

2.2. Population and Research Sample

The study community is made up of all mathematics teachers who study the math for the basic stage in the Directorate of Education, the Bani Obeid region in Irbid governorate for the year 2024-2025, where the number of mathematics teachers (179) according to the data of the Directorate of Education was the Bani Obeid region in Irbid governorate for the same year. The selection of the study sample according to the simple random sample method, consisting of (135) was a teacher; That is, 75.4% of the study population. Table (1) shows repetitions and percentages by scientific qualification. The non-educational qualification is the qualification obtained by the mathematics teacher from the specializations of non-educational colleges (scientific college), such a master degree in mathematics, while the educational qualification is the qualification obtained by the mathematics teacher from educational colleges (humanities college), such master degree in teaching and learning mathematics.

Table 1. Repetitions and Percentages of Mathematics Teachers by Type of Scientific Qualification (Educational Qualification, Non-Educational Qualification)

Groups	Repeated	Percentage
Educational Qualification	25	18.5
Non-Educational Qualification	110	81.5
All	135	100.0

2.3. Study Instrumentation

The researcher developed the questionnaire of the study in the light of the study literature, where the identification consisted one part: Mathematics teachers' perceptions of the positives of blended learning in Jordan. and the number of paragraphs is (15). The questionnaire resolution was Likert Five Scale. The fifth level indicates that the degree to which the positives of blended learning for the basic stage is very high, and the higher the teacher's answer. Closer to the first level, the degree to Mathematics teachers' perceptions of the positives of blended learning in Jordan decreased. The arithmetic averages for the degree of inclusion were classified into five levels: Very few (1.00- 1.8), Few (1.8-2.6), Medium (2.6-3.4), High (3.4-4.2), Very high (4.2-5), according to the following equation: (Highest value - minimum value) ÷ Number of levels. (5-1)/5=4/5=0.8

2.4. Validity and Reliability

To ensure the veracity of the questionnaire, the researcher presented the preliminary picture of it to a group of arbitrators with knowledge and experience in this field. The preliminary picture of the identification was 10 arbitrators. The arbitrators' observations included a number of suggestions, such as redrafting some paragraphs, increasing the number of subparagraphs, clarifying some paragraphs, shortening some paragraphs, and the paragraph should be of a single and uncomplicated purpose, and suggesting that the paragraphs should be linked to mathematics curricula. Subsequently, an amended questionnaire was prepared in accordance with the previous arbitrators' suggestions and was again submitted to six former arbitrators. Their suggestions were limited and few, and the final identification was prepared by the researcher on the basis of the suggestions and guidance of all arbitrators.

To extract the indicators of validity construction of the scale, the coefficients of each paragraph and between the overall grade, between each paragraph and its attachment to the area to which it belongs, and between the areas and the total degree, were extracted in a survey sample from outside the study sample consisting of (30) teachers, the correlation coefficients of the paragraphs with the tool as a whole ranged from

(0.38-0.89) to (0.39-0.89). Correlation coefficients is (0.86) were of acceptable and statistically relevant scores, indicating an appropriate degree of construction validity.

To ensure the reliability of the study tool, it was verified using the test-retest method by applying the scale, and re-applying it two weeks later to a group of (30) teachers outside the study sample, and then the Pearson correlation coefficient was calculated between their estimates the two times. The reliability coefficient was also calculated using the internal consistency method according to the Cronbach Alpha equation, the results showed according to the Cronbach Alpha equation and the repetition reliability, the internal consistency coefficient is (0.83), and repeated reliability is (0.88).

2.5. Data Analysis

Researchers use two types of data analysis to process data, namely quantitative data collection. Data analysis is a step taken after all data from respondents have been collected. The data that has been collected is then analyzed using a descriptive statistical approach. The guidelines that will be applied to convert raw scores obtained from teachers into standard scores (grades) with perceptions of the positives of blended learning in Jordan.

2.6. Research Procedures

The researcher reviewed the previous literature related to blended learning and its role in teaching mathematics, then built the research tool in the form of a questionnaire according to the five-point Likert scale. And verified the characteristics of validity and reliability, and the degree of validity in determining the perceptions of mathematics teachers towards blended learning in teaching mathematics. The sample was selected according to the simple random sample of mathematics teachers who teach mathematics in government schools according to the data of the study population. The study tool was distributed to mathematics teachers electronically via Google Documentary. Then the data was collected, analyzed, and the results were reached.

3. RESULTS AND DISCUSSION

3.1. Result

The questionnaire designed specifically for this study yielded answers to the study questions, which are presented in the study's results.

The first question: To answer this question, the arithmetic means and standard deviations were extracted for the degree of mathematics teachers' perceptions of the positives of blended learning in Jordan, and the table (2) below shows this.

Table 2. Arithmetic Means and Standard Deviations For The Degree To Mathematics Teachers' Perceptions of The Positives of Blended Learning In Jordan, Arranged In Descending Order According To The Arithmetic Means.

No	Rank	Paragraphs	Arithmetic Mean	Standard Deviation	Degree
1	3	Blended learning improves individual learning in the teaching of mathematics.	3.70	.819	High
2	6	The application of blended learning approaches improves mathematical research and inquiry procedures.	3.61	.743	High
3	14	Students who use blended learning approaches are better able to demonstrate responsibility for their education.	3.37	.601	Medium
4	15	It takes less time and effort to modify student learning management when blended learning approaches are used.	3.37	.796	Medium
5	9	The use of blended learning approaches improves the student's social communication abilities.	3.57	.771	High
6	13	Blended learning approaches bridge the knowledge gap between mathematics and practical applications.	3.42	.863	High
7	2	The utilization of blended learning approaches increases student-teacher interaction.	3.70	.742	High
8	7	Blended learning encourages group and collaborative learning when teaching mathematics.	3.59	.761	High
9	11	Blended learning provides an ability for correct students' errors and conceptual errors in mathematics.	3.56	.731	High

10	12	Using blended learning helps achieve the desired results of teaching mathematics.	3.52	.827	High
11	4	Blended learning provides modern teaching strategies in mathematics teaching.	3.66	.620	High
12	5	When teaching mathematics, blended learning Considering the learning preferences of the students.	3.64	.790	High
13	1	Blended learning facilitates interpretation of mathematics curriculum content	3.70	.844	High
14	10	Blended learning increases results in mathematics achievement.	3.56	.835	High
15	8	Students become active participants during the process of learning and the centred of attention when blended learning is used.	3.57	1.010	High
		positives of blended learning	3.56	.563	High

Table (2) shows that the arithmetic means ranged between (2.70-3.74), where paragraph No. (13), which states, "blended learning facilitates interpretation of mathematics curriculum content," came in first place, with a arithmetic average of (3.70). in Second rank was paragraph No. (13), which "The utilization of blended learning approaches increases student-teacher interaction", with an arithmetic average of (3.70). While Paragraph No. (4), which "It takes less time and effort to modify student learning management when blended learning approaches are used.," came in last place, with a mean of (3.37). The arithmetic average for mathematics teachers' perceptions of the positives of blended learning in Jordan as a whole was (3.56). It`s rank High.

The second question: To answer this question, the arithmetic means and standard deviations were extracted for mathematics teachers' perceptions of the positives of blended learning in Jordan on the scale of use according to the academic qualification variable. To show the statistical differences between the arithmetic means, the "ONE WAY ANOVA" test was used, and the table (3) below shows this.

Table 3. Arithmetic Means, and Standard Deviations For The Effect of Academic Qualification On The Degrees of Mathematics Teachers' Perceptions of The Positives of Blended Learning In Jordan On The Usage Scale.

	Qualification	Numbers	Arithmetic Mean	Standard Deviation	Std. error
Positives of Blended Learning	Non-educational	110	53.94	3.82	0.36
	Educational	25	52.12	5.18	1.03
	Total	135	53.60	4.15	0.35

It is clear from the previous table that there are apparent no differences, and a determination in favour of any academic qualification tested ONE WAY ANOVA test for the effect of academic qualification on the degrees of mathematics teachers' perceptions of the positives of blended learning in Jordan.

Table 4. One-Way Anova Test For The Effect of Academic Qualification On The Degrees of Mathematics Teachers' Perceptions of The Positives of Blended Learning In Jordan.

Qualification	Sum of Squares	df	Mean of Squares	F Value	Statistical Significance
Betwwen Groups	67.88	1	67.88	4.03	0.047
Within Groups	2240.31	133	16.84		
Total	2308.19				

It is clear from table (4) that there are no statistically significant differences (a = 0.05) due to the effect of academic qualification in of mathematics teachers' perceptions of the positives of blended learning in Jordan.

3.2. Discussion

The findings revealed that math teachers believed blended learning had advantages when it came to teaching mathematics. The results showed, according to the perceptions of mathematics teachers, that blended learning plays a high role in education mathematics, providing students with the appropriate time and place for the operations of learning, through the variety of sources of knowledge. It provides electronic references that the

mathematics teacher may provide to students. Mathematics teachers believe through their perceptions that blended learning is important in education mathematics and its application is indispensable. Accordingly, mathematics teachers encourage the incorporation of technology into mathematics education, and consider technology to have an essential part in the operations of learning, since it is a role that lies effectively when integrated into the usual approach to teaching mathematics. It is clear from the findings that Jordan's educational system employs technology in the educational operations, and urges teachers to make maximum use of integrating technology into education, while maintaining the usual method of teaching. This lies in encouraging Jordan's educational system in blended learning. Arau and Gitirana [44] mentioned a blended learning improves pre-service teachers' attitudes toward learning and engagement, self-efficacy, and beliefs about integrating technology.

The most prominent positives of blended learning from perceptions of teachers are that blended learning facilitates the interpretation of the content of the mathematics curriculum, it includes several areas: numbers and operations, algebra, geometry, probability, and measurement. Blended learning gives freedom to search for sources of knowledge, besides expand acquisition of mathematical concepts and skills in the event of learning difficulties. That`s result agreed with Lofranco [43] who suggests the students in the class are familiar with mathematical ideas when using blended learning.

Mathematics teachers' perceptions included that blended learning increases the process of interaction between students themselves, and between students and the teacher, through the availability of means of interaction and communication through which students can present their discussions and questions to mathematics teachers at any time. Blended learning can also include mathematics teachers using means of communication with students, Providing assignments and feedback to them. Mathematics teachers believe blended learning encourages individually learning and independently, and this makes students rely on themselves for learning mathematics, and they bear responsibility for their learning, with the necessity of supervision and follow-up from mathematics teachers to avoid any mistakes that students may make.

Blended learning creates a new learning experience for students, meets the needs of some students, and provides learning resources that suit them. Blended learning also enhances communication and interaction with students themselves, through the availability of digital communication channels, through which students exchange their mathematical ideas and provide assistance to each other. Blended learning techniques also enhance self-learning by providing explorable educational resources and motivating students to research and conclude. Blended learning provides great flexibility in accessing educational content anytime, anywhere, making the learning process more accessible to students. The use of technology also improves learners' interaction with educational content. Blended learning is more efficient because it combines two learning styles in a way that achieves the highest possible quality. Uyen and Ngan [45] stated a blended learning enhanced student-teacher relationships and enhanced academic performance, self-study skills, and learning attitudes.

As previously mentioned, blended learning changes the place and time of learning to more flexible places and times, as well as the ability to change learning resources and tools. This helps save money by reducing the expenses required for this type of education compared to traditional types. It is also clear that blended learning saves the effort that traditional educational methods may require. Providing the opportunity to join blended learning programs without having to commit to a specific time that may not suit the students or the teacher. Blended learning provides greater interaction and coordination between the teacher and the student, whether this interaction is synchronous or asynchronous. Taking into account individual differences between students, as each student can take the paths that suit his needs and capabilities. Expanding the circle of learning to become the entire world instead of being limited to the classroom. Providing the flexibility that enables students to catch up with their colleagues and not fall behind them, in the event that he is exposed to some life circumstances that would delay him from the rest of the students in traditional education.

The lack of effect could be related to the study variable: academic qualifications of teachers, as they did not play a role in creating variations in the perceptions of positives of blended learning in education mathematics. Thus, all math teachers agree that positives of blended learning have a high role in teaching. Mathematics teachers believe that positives of blended learning are important and necessary in teaching by employing its philosophy in order to encourage students to acquire mathematical concepts and mathematical thinking skills. The academic qualification obtained by mathematics teachers focuses on the significance of applying effective and advanced teaching strategies because of the importance mathematics is to the academic stages in Jordan, as the higher diploma and master's programs include educational courses that focus on modern teaching approaches and methods, and their effectiveness in education mathematics.

The importance of this study lies in the adoption of blended learning in teaching by the educational system in Jordan, especially teaching mathematics. The results of the study help in the perceptions of mathematics teachers towards the advantages of blended learning in teaching mathematics. The role played by the experimental approach in learning and teaching mathematics, which helps mathematics teachers in building and designing their study plans, and provides a wide scope for stimulating students' motivation towards learning mathematics. The results also help curriculum designers and educational leaders in clarifying the role of

mathematical activities and exercises in using blended learning, in order to provide all the means and capabilities that mathematics teachers need, and to provide them with appropriate qualification courses, given the importance of educational preparation and qualification for mathematics teachers in Jordan.

This study was limited to all mathematics teachers who work in schools affiliated with the Bani Obeid region in Irbid Governorate - Jordan, and teach mathematics curricula for the basic stage in the second academic year 2023-2024 AD. The number of mathematics teachers in that directorate reached (179). The study tool was also limited to a questionnaire prepared by the researcher after reviewing previous literature. The study attempted to verify the Mathematics Teachers' Perceptions of The Positives of Blended Learning in Jordan. The study was limited to mathematics teachers' answers according to academic qualification (Non-educational, Educational).

4. CONCLUSION

From the results of the study, mathematics teachers believe that blended learning is very useful for teaching mathematics. Mathematics teachers see from the teachers' point of view that blended learning facilitates the explanation and interpretation of the content of the mathematics curriculum, including the concepts and skills it contains. This increases the interaction between the teacher and the students. The results show that mathematics teachers support that blended learning develops students' self-learning and individual learning.

ACKNOWLEDGMENTS

The study thanks all the teachers of mathematics who replied to the study tool and expressed their point of view regarding the positives of blended learning in education mathematics.

REFERENCES

[1] Hermino, A., & Arifin, I., "Contextual character education for students in the senior high school.," *European Journal of Educational Research*, vol. 9, no. 3, pp. 1009-1023, 2023.

[2] Tang, C., & Chaw, L., "Readiness for blended learning: Understanding attitude of university students," *International Journal of Cyber Society and Education*, vol. 6, no. 2, pp. 79-100, 2013.

[3] Tohir, M., Maswar, M., Atikurrahman, M., Saiful, S., & Pradita, D. A. R., "Prospective teachers' expectations of students' mathematical thinking processes in solving problems," *European Journal of Educational Research*, vol. 9, no. 4, pp. 1735-1748, 2020.

[4] Lin, Y,. Tseng, C,. and Chiang, P., "The Effect of blended learning in Mathematics Course," *Eurasia Journal of Mathematics Science and Technology Education*, vol. 13, no. 3, pp. 741-770, 2017.

[5] Miyaji, I., & Fukui, H., "Change in knowledge and awareness in teacher education on Satoyama environmental learning: Through a blend of learning spaces, methods and media," *European Journal of Educational Research*, vol. 9, no. 4, pp. 1663-1674, 2020.

[6] Fazal, M., & Bryant, M., "blended learning in middle school math: The question of effectiveness," *Journal of Online Learning Research*, vol. 5, no. 1, p. 49–64, 2019.

[7] Iyer, R., & Pitts, J., "Teaching math to my scholars: Inner-City Middle School students," *Journal of Education and Learning*, vol. 6, no. 3, pp. 243-250, 2017.

[8] Heilporn, Géraldine; Lakhal, Sawsen; Bélisle, Marilou, "An examination of teachers' strategies to foster student engagement in blended learning in higher education," *International Journal of Educational Technology in Higher Education*, vol. 18, no. 1, pp. 25-31, 2021.

[9] Garrison, D. Randy; Kanuka, Heather, "Blended learning: Uncovering its transformative potential in higher education," *The Internet and Higher Education*, vol. 7, no. 2, pp. 95-105, 2004.

[10] Graham, Charles R, The Handbook of Blended Learning: Global Perspectives, Bonk: Pfeiffer, 2006.

[11] Alebaikan, R., & Troudi, S, "blended learning in Saudi universities: challenges and perspectives.," *ALT-J*, vol. 18, no. 1, pp. 49-59, 2010.

[12] Staker, H., & Horn, M. B., Classifying K-12 blended learning., Innosight Institute, 2012.

[13] Yudt, K., & Columba, L., "The effects of blended learning in pre-service elementary mathematics teachers' performance and attitude," *National Teacher Education Journal*, vol. 10, no. 1, pp. 17-25, 2017.

[14] Stahl, G., "Redesigning Mathematical Curriculum for Blended Learning," *education science*, vol. 11, no. 1, pp. 16-25, 2021.

[15] Flores, L, "What we learned about personalized learning," in *Taking stock of 2017*, 2018.

[16] Setiawan, A. A., Muhtadi, A., & Hukom, J, "blended learning and student mathematics ability in Indonesia: A meta-analysis study," *International Journal of Instruction*, vol. 15, no. 2, pp. 905-916, 2022.

[17] Alammary, A,. Sheard, J,. and Carbone, A, "blended learning inHigher Education: Three Different Design Approaches," *Australasian Journal of Educational Technology*, vol. 30, no. 1, pp. 102-111, 2014.

[18] Dewi, I,. Dwi, S,. Sugiman, B,. & Endri, Y, "Effectiveness of the blended learning Model to Improve Students' Achievement of Mathematical Concepts," *Journal of Education and e-Learning Research,* vol. 8, no. 4, pp. 423-430, 2021.

[19] B, Wimpey., Effects of blended learning on Student Achievement and Motivation in a Mathematics Classroom, 2021.

[20] Borup, J., Graham, C. R., West, R. E., Archambault, L., & Spring, K. J., "Academic communities of engagement: An expansive lens for examining support structures in blended and online learning," *Educational Technology Research and Development,* vol. 68, no. 2, pp. 807-832, 2020.

[21] Mulwa, E., "Difficulties Encountered by Students in the Learning and Usage of Mathematical Terminology: A Critical Literature Review," *Journal of Education and Practice,* vol. 6, no. 13, pp. 1-10, 2015.

[22] Giarla, A., "What Are The Benefits Of Blended Learning?," 2022.

[23] Luo, Y, "The opportunities and limitations of blended learning and the flipped classroom for second language teaching," *Social Sciences & Humanities,* vol. 14, no. 1, pp. 190-194, 2021.

[24] Mukhtaramkhon, K., "Advantages and disadvantages of blended learning in higher education," *Journal of Pedagogical Inventions and Practices,* vol. 9, no. 1, pp. 14-19, 2022.

[25] Khechine, H., Lakhal, S., Pascot, D., & Bytha, A, "UTAUT model for blended learning: The role of gender and age in the intention to use webinars," *Interdisciplinary Journal of E-Learning and Learning Objects,* vol. 10, no. 1, pp. 33-52, 2014.

[26] S. Martínez, F. Guíñez, R. Zamora, S. Bustos, and B. Rodríguez, "On the Instructional Model of a B blended learning Program for Developing Mathematical Knowledge for Teaching," *ZDM Mathematics Education,* vol. 52, no. 5, pp. 877-891, 2020.

[27] Surjono, H. D., Muhtadi, A., & Wahyuningsih, D, "The implementation of blended learning in multimedia courses for undergraduate students in Indonesia," *International Journal of Information and Education Technology,* vol. 7, no. 10, pp. 783-786, 2017.

[28] Albhnsawy, A., & Aliweh, A. M, "Enhancing student teachers' teaching skills through a blended learning approach," *International Journal of Higher Education,* vol. 5, no. 3, pp. 131-136, 2016.

[29] Tang, C. Chaw, L, "Readiness for blended learning," *International Journal of Cyber Society,* vol. 6, no. 2, pp. 79-100, 2013.

[30] Tuomainen, S, "A blended learning approach to academic writing and presentation skills," *International Journal on Language, Literature and Culture in Education,* vol. 3, no. 2, pp. 33-55, 2016.

[31] Ceylan, V. K., & Kesici, A. E, "Effect of blended learning on academic achievement," *Journal of Human Sciences,* vol. 14, no. 1, pp. 308-315, 2017.

[32] C. &. H. K. Attard, "An exploration of teacher and student perceptions of blended learning in four secondary mathematics classrooms," in *Math. Educ*, 2020.

[33] Awodeyi, A. F., Akpan, E. T., & Udo, I. J., "Enhancing teaching and learning of mathematics: adoption of blended learning pedagogy in University of Uyo," *International Journal of Science and Research,* vol. 3, no. 11, pp. 40-45, 2014.

[34] R. A. Rasheed, A. Kamsin, and N. A. Abdullah, "Challenges in the Online Component of Blended Learning: A Systematic Review," *Computers & Education,* vol. 144, no. 2, pp. 1077-1084, 2020.

[35] S. Srinivasan, J. A. L. Ramos, and N. Muhammad, "A Flexible Future Education Model- Strategies Drawn from Teaching during the COVID-19 Pandemic," *Educ. Sci,* vol. 2, no. 2, pp. 557-562, 2021.

[36] B. Atweh, B. Kaur, G. Nivera, A. Abadi, and S. Thinwiangthong,, "Futures for Post- Pandemic Mathematics Teacher Education: Responsiveness and Responsibility in the Face of a Crisis,," *ZDM Mathematics Education,* vol. 55, no. 1, p. 65–77, 2023.

[37] Kaur, A, "Effectiveness of teaching mathematics through blended learning," *International Journal Of Creative Research Thoughts,* vol. 9, no. 6, pp. 749- 753, 2021.

[38] Borba MC, Askar P, Engelbrecht J, Gadanidis G, Llinares S, Aguilar MS, "Blended learning, e-learning and mobile learning in mathematics education," *ZDM,* vol. 48, no. 5, p. 589–610, 2016.

[39] Rivera, J, "The blended learning environment: A viable alternative for special needs students," *Journal of Education and Training Studies,* vol. 5, no. 2, pp. 79-84, 2017.

[40] Fisher, J. F, 3 tops on incorporating special education into your blended-learning design, Christensen Institute, 2015.

[41] Egara, F,. & Mosimege , M., "Effect of blended learning approach on secondary school learners' mathematics achievement and retention," *Education and Information Technologies,* vol. 3, no. 1, pp. 10-17, 2024.

[42] Tong, D.H., Uyen, B.P., Ngan, L.K., "blended learning in Mathematics Teacher Education: A Systematic Review," *International Journal of Emerging Technologies in Learning,* vol. 18, no. 17, p. 196–222, 2023.

[43] Lofranco, V, "blended learning And Its Impact On Learners' Learning Progress In Mathematics," *Ignatian International Journal For Multidisciplinary Research,* vol. 1, no. 3, pp. 220-231, 2023.

[44] Arau´ jo Filho R, Gitirana V, "Pre-service teachers' knowledge: Analysis of teachers' education situation based on TPACK," *The Mathematics Enthusiast,* vol. 19, no. 2, p. 594–631, 2022.

[45] Uyen, B.P., Ngan, L.K. , "blended learning in Mathematics Teacher Education: A Systematic Review.," *International*

Journal of Emerging Technologies in Learning, vol. 18, no. 17, pp. 196-222, 2023.

[46] Dewi, I,. Dwi, S,. Sugiman, B,. & Endri, Y. , "Effectiveness of the blended learning Model to Improve Students' Achievement of Mathematical Concepts," *Journal of Education and e-Learning Research,* vol. 8, no. 4, pp. 423-430, 2021.

[47] Yanfen Huang, Lin Wang. , "An Analysis of Research Themes and Trends of Teacher blended learning in China," *Science Innovation,* vol. 9, no. 6, pp. 234-243, 2021.

[48] Frazier, A. Y., "The Impact of blended learning Upon Mathematics Attitudes and Academic Achievement: An Action Research Study.," (Doctoral dissertation), 2020.

[49] Nuri, B. , "Why are mathematics teachers advised to use blended learning in the learning process?.," in *Journal of Physics: Conference Series. 1397 012080.*, 2019.