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Research Article

The Effect of Hybrid Teaching Strategy via Mobile Applications in Education on Students' Mathematics Achievement

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Abstract
In our digital age, traditional teaching methods have become unattractive to students, making education that combines interactive visual media, audio media, and collaborative media in a hybrid form provide an engaging and effective learning experience. This research highlights the impact of the hybrid teaching strategy via mobile phone applications in education on college students' achievement in mathematics. The research divided the students into two groups, an experimental group and a control group. When conducting the test, the research community was taken from students of the Principles of Mathematics course at the university for the second semester of the academic year 2021/2022. The sample was taken from 60 students who were deliberately selected and divided into an experimental study group (30) students who were studied according to the hybrid teaching strategy via mobile phone applications in education and a control group (30) students who were taught in the usual way. The equivalence of the two groups was taken into account according to the variables: the student's age, intelligence, and grades in previous mathematics courses. An achievement test was prepared, and the data was collected, analyzed, and processed statistically using the (t) test. The results obtained indicated the superiority of the experimental group over the control group, which confirms the positive impact of using hybrid education in teaching mathematics. The implementation of mobile applications indicates the need for professional development activities for teachers, students, and educational administrations in an adequate and thoughtful manner.

Keywords: Hybrid Teaching, Mathematics Achievement, Mobile Applications, Strategy

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1. INTRODUCTION

We are all aware that the educational system today faces challenges represented in the rapid development in all aspects of life economically, socially, and culturally, to keep pace with civilization progress, and what this requires of preparations for transformation from outdated traditional methods. Education, from indoctrination and passivity in the role of the learner as a receiver of information and a storehouse for it to a producer and creator of knowledge, and this requires new strategies, methods and tools that depend on investing in technology and work and consolidating the principle of knowledge economy, focusing on production and quality, not quantity and empty stuffing, i.e. preparing the student for life, entering the future actively, and being a part of it. Change and progress keep pace with everything that is achieved in terms of knowledge, its producer, not its consumer (King, 2021) (see Figure 1).

Hybrid learning through Internet applications is an intersection between face-to-face teaching in the traditional classroom and distance teaching through the Internet. Education is characterized according to the hypotheses of blended learning in providing the benefits of communication between individuals and the ease of sharing information with flexibility in carrying out tasks and conducting discussions between Students and their teachers via the Internet. It is necessary for the student to realize this strategy and how to benefit from it. A lot of research has been written on distance education, but few of them touched on

the impact of co-education on academic achievement in mathematics at the university education stage in Jordan, the majority of previous studies on education from a distance, an increase in achievement and an improvement in the performance of students has been shown, with a positive attitude towards this type of teaching and the time, effort and money it saves. But at the same time, there are some challenges that require teachers to meet face to face, and here lies the need to test the success of the strategy of integrating face-to-face teaching in the traditional classroom and distance teaching through the Internet, so this research came to fill the need and shed light on this issue (Barron, 2010).

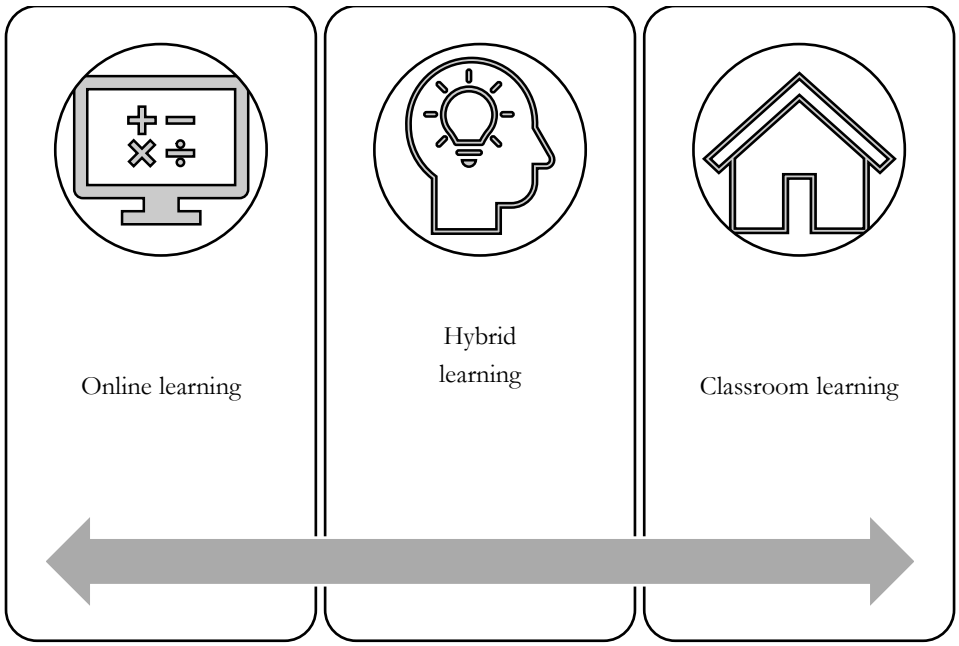

Figure 1. Hybrid Teaching

Comparing the advantages of hybrid online and traditional education is the main purpose of this research, i.e. what can be done to enhance student achievement and avoid everything that hinders it. This strategy addresses the defects resulting from the Internet environment and deals with it in a unique way. It is an approach in education that agrees between traditional education during the classroom and applied through the Internet. It was done in the beginning to facilitate the transfer of students' learning through the Internet and reduce fear and awe towards the learning environment through the Internet. In the classroom based on the hybrid strategy, the teacher uses modern technologies via the Internet (Kraft, 2017). (see Figure 2).

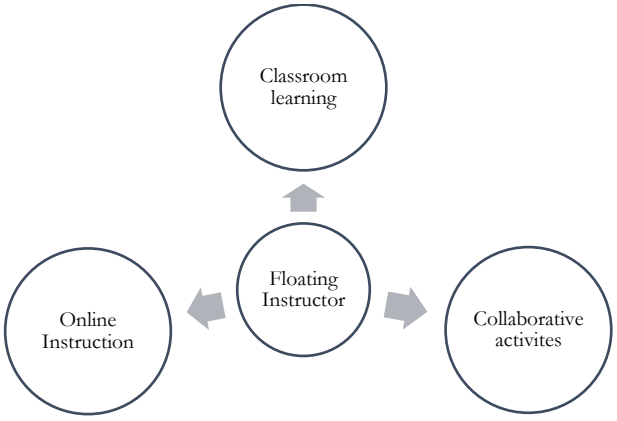

Figure 2. Simple Model of Hybrid Teaching

Today, all countries of the world seek to raise the level of learners and their academic achievement in mathematics, and international tests have shown that there is a great weakness in academic achievement

in mathematics in many countries of the world, so that countries are looking for a solution. This problem is solved by taking advantage of technology and study methods based on electronic platforms, as this age is characterized by students' attachment to social media via the Internet and they tend to use and monitor them, which makes it a haven to communicate with them and create positive attitudes towards mathematics, which may lead to an increase in their understanding and comprehension, Thus improving their academic achievement in mathematics (Guinness, 2012).

The hybrid teaching strategy through the Mobile Applications in Education is based on increasing the student's ability to communicate in mathematics so that he can read concepts and terms correctly and be able to write the text of theories and their proofs in a logical and sequential manner. Mathematics at the Cartesian level, which stimulates the student's ability to think, link, analyze and organize through his visual and auditory abilities, and observation that integrates all this through the strategy around which this research revolves, and the search for what can be achieved to reach the results that we want to reach. Therefore, this research came to put its results to serve the educational field and open the door for educational researchers to increase interest in this strategy.

The research is limited to the research community, and it was taken from the students of the principles of mathematics course at the University for the second semester in the academic year 2021/20222. The results of some recent educational studies showed that the traditional method Teaching, in which the teacher plays the main role, and the student A listener and receiver does not make a generation that can face life. To achieve active learning, students must be Engaged in experimentation and thinker and proficient in analysis and installation and He evaluates what is taught and what is given to him, because the hybrid teaching strategy via the Mobile Applications in Education is in fact a strategy that motivates students to think and build their effective personality (Thomas et al., 2022).

The challenge facing the implementation of mobile applications in education is the control of students and the lack of cooperation between the students themselves, the lack of technical support in the school and keeping up with the application of the standards of the curricula (Samsonova, 2020).

There is an urgent need to know the implementation of mobile applications in education and their effectiveness. However, it is useful to know how teachers evaluate mobile applications in education changes that must be made in their roles and practices in the implementation of education and become aware of the new changes that are required. Therefore, this study came to fill the gap for the literature on the implementation of mobile applications in education (Van Alphen et al., 2022).

Although the effectiveness of implementing mobile applications in education has been well researched, there is limited research related to the implementation of mobile applications in education in Jordan. This study contributes to presenting the results that Jordanian mathematics teachers consider the application of mobile phone applications in the education method (Yu et al., 2020).

Educators believe that mobile devices may be one of the best educational means for teaching mathematics because they have different tools that make them effectively able to teach mathematics and with new teaching methods and application of different educational strategies. It helps in attracting and increasing the attention of all students, achieves a modern vision in teaching, and provides the opportunity to respond to students' remarks quickly and contribute to developing solutions to educational problems in a realistic and tangible manner (Lavoie et al., 2021).

It has been shown that hybrid education can be implemented through the following steps, pericles.Study guide assignment supporting exercises self-summary troubled by the problem, feedback., reinforcement, misclassifies on inquiry and communication tutorial stage learning summary homework., feedback evaluation, after class, strengthen blind spots finish homework results combination summary stage detection.

Lavoie et al. (2021) compared a two-semester research work mixed with the time of Internet use. In the first term, the time was reduced by 67% for teaching in the traditional classroom using video over the Internet, and in the second term, the time was reduced by 33% by focusing on interactive homework via the Internet. The results in students' achievement in three tests were 17% higher than the test scores of students who studied traditionally. This study shows the positive relationship between student achievement and blended learning.

Moreover, other studies indicated that (Tomczak et al., 2019) held a traditional classroom each week, published the material on the Internet during the rest of the week, and supplemented the rest of the lectures remotely. Students' attendance at lectures, especially the weekly lecture, and the rate of increase in achievement of the final and total scores of the tests (see Figure 3).

Figure 3. Hybrid Teaching

Tullis et al. (2022) conducted an extensive comparison by conducting face-to-face interviews with university students to compare teaching through three different strategies: the online teaching strategy, the traditional teaching strategy, and the blended teaching strategy. He conducted face-to-face meetings with university students in the online teaching strategy, eleven sessions, and the students spoke in a mixture of teaching strategy in five sessions, and the two traditions held full face-to-face meetings with university students. We may find variables and a combination of factors that can contribute to the student's progress. (Wanner et al., 2020).

Weinberger et al. (2021) used the same teachers the hybrid teaching strategy and the traditional teaching strategy (while others used different teachers), he made face-to-face meetings with undergraduate students in a mixture teaching strategy at different times and collected data from different students Classrooms are run simultaneously which resulted To collect data on different students. The type of media used was not uniform. The results showed that there is another variable that may affect the progress and improvement of the student, which is time, media, and diversity. The study showed a positive co-education. (Weinberger et al., 2022).

Exploiting the available means to achieve the goal is the strategy with a scientific system(Whiting et al., 2022). The proposed strategy is based on showing videos, posters and pictures from lifeIn a sequential group form, the evaluator asks the student to select and extract what he wants. Merge Learning is an educational process that the learner receives inside the classroom or outside the classroom. To modify his behavior towards the desired goal (Williams et al., 2022).

The strategy of hybrid teaching via the Mobile Applications in Education is based in its theoretical basis on cognitive theorists, and its main philosophy is to reinforce the idea Creating an effective education that takes into account the student and the vision of the times, the student's culture and the society in which he lives determines what the student needs to learn (Xi et al., 2022).

Vygotsky developed the area theory of proximal growth in which the student learns When introducing new information to him out of his reach. Cognitive learning theory focused on thinking during learning, where Piaget stressed the need to focus on developing the child's logic (Williams et al., 2022).

Constructivism is a theory whose philosophy is based on the active building of knowledge for the student through communication and interaction with others in the surrounding environment and with knowledge itself according to his abilities(Weinberger et al., 2022).

The hybrid teaching strategy via the Mobile Applications in Education has a set of principles that are linked to the student and the lecturer, and encourages and helps in increasing interaction, cooperation and

positive work from all parties involved in the educational process to create a human and social relationship through constructive cooperation. The strategy of hybrid teaching through the Mobile Applications in Education depends on the student, his capabilities and needs as a center for education so that the student is a thinker, creator and analyst, taking into account their individual differences, and the teacher is the model, the guide, the guide and the supporter, the expert in the content that suits the student and presents this through the courses and training he receives on Use of technological techniques (Wanner et al., 2020).

Hybrid teaching strategy via the Mobile Applications in Education . The individual differences of students from all social, intellectual and economic trends deepen thinking and move away from indoctrination and blind repetition and encourage students to actively participate in the activities and tasks you offer them (Tullis et al., 2022).

Tomczak et al. (2019) confirms that deep learning is distinct because its goal is learning for the sake of knowledge, and not the goal of exam success. The strategy of hybrid teaching via the Mobile Applications in Education is based on activities that reduce negativity in negative education, such as listening passively by the student, boredom from the lesson, lack of focus, distraction, and dropping out of attendance for the lesson, etc. It motivates students, and for the teacher, it facilitates the education process through the hybrid teaching strategy through the Mobile Applications in Education , considering the individual differences between students.

Whiting et al. (2022). There is no strategy, style, or method of teaching that works permanently, and what determines what we need depends on a complex set of variables related to the nature of the curriculum, its components, philosophy, and its various fields. The only way for us is to combine these methods, strategies, and methods to achieve our goals.

One of the most important characteristics of the hybrid teaching strategy through the platform is the independence of the student, integration, and cooperation between the students. The teacher creates the opportunity for the student to gain a new skill to apply the hybrid teaching strategy through the methods of the Mobile Applications in Education . We need appropriate preparations, logistical and technical equipment, and intensive and continuous training to achieve the goal (Wanner, 2020) (see Figure 4).

Figure 4. Hybrid Teaching

Hybrid teaching strategy via the Mobile Applications in Education , depending on several methods. The researcher has set a set of steps for this strategy according to specific criteria, and it is a presentation of pictures of daily reality and the surrounding environment that contain forms related to the lesson. The students are assigned to extract the shapes and monitor them for each student separately, using a prepared list. Then define the shape and its properties. Explanation of various examples using Mobile Applications in Education . Assign the student to give a shape or number from the surrounding environment. In choosing to distribute the tasks according to the individual differences of the students, the student's level of achievement and the nature of the scientific material, he considers the presentation of everything that is appropriate to the nature of mathematics to make it interesting, understandable, and applicable.

2. METHODS

The current study sheds light on the effect of the hybrid teaching strategy via mobile phone applications in education on the achievement of university students in mathematics. The research divided the students into two groups, an experimental group and a control group. When conducting the test, the research community was taken from the students of the Principles of Mathematics course at the university for the second semester of the academic year 2021/2022. The sample was taken from (60) male and female students who were deliberately selected and divided into an experimental study group (30) that was studied

according to the hybrid teaching strategy via mobile phone applications in education, and a control group (30) that was taught in the usual way. The equivalence of the two groups was taken into account according to the variables: the student's age, intelligence, and grades in previous mathematics courses. An achievement test was prepared. The data collected from the students' academic records are: the student's age, intelligence, and grades in previous mathematics courses. The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) data processing program. The first part included a descriptive analysis of the data by calculating the frequencies of each variable and the means of each semester for the two groups. The second part led to a comparison

After reviewing the study plan for the subject Principles of Mathematics and its analysis, he found (45) specific behavioral goals. A test was prepared according to Bloom's levels, and it was presented to a group of educators specializing in mathematics. Their opinions and observations were recorded and considered. (20) questions were set based on the objective. It was applied to students from other peoples as an exploratory sample. To ensure clarity of the answering instruction paragraphs, and to calculate the answering time, the test was applied to (60) students from different races found that (60) minutes is enough to take the test.

The discrimination coefficient was calculated through statistical analysis for each paragraph, and it was between (0.30–0.80), that's fine. Difficulty coefficient (0.37 - 0.72), which is acceptable. The validity of the test (80%) is acceptable. The researcher concluded that the test is valid for measurement, as it confirms the validity of the content by making a test map, clarifying the objectives, and distributing the necessary time per topic. It was judged and approved by (80%). Statistical analyzes were done. And according to the ease coefficient, the difficulty coefficient, and the discrimination coefficient. and content validity coefficient

As for the stability, the Couder-Richardon-21 equation was used, and according to the equation, it obtained (0.80), which is acceptable. Thus, that is, the test is accepted for its validity and stability, and it is applicable (see Table 1).

Table 1. Specifications for the Achievement Test

Behavioral Goals			**Remember**	**Comprehension**	**Application**	**Analysis**	**Summation**
			10	**16**	**14**	**5**	**45**
Chapter	The number of hours	Relative Weight	Weight 22%	Weight 36%	Weight 31%	Weight 11%	100%
5	11	38%	2	3	2	1	8
6	18	62%	3	4	4	1	12
Sum	29	100%	5	7	6	2	20

3. RESULTS

The researcher put the following hypothesis: There are no statistically significant differences at the significance level (0.05) between the experimental group of the hybrid teaching strategy through mobile phone applications in education and the control group (see Table 2).

Table 2. The Achievement Test

Groups	**No.**	**Mean**	**Var.**	**Std. Div**	**t-test**		**Calculated Tabular at the Level (0.05)**
					Calculated	**Tabular**	
Experimental	30	40.366	41.765	6.463	3.545	2000	Statistical Significance
Control	30	35.566	66.379	8.147			

Table 2 shows that 3.545 is higher than the tabular value, and this indicates that there are statistically significant differences, which means accepting the alternative hypothesis and rejecting the null hypothesis. The researcher believes that using the hybrid teaching strategy via the Mobile Applications in Education developed students' skills in mathematics.

4. DISCUSSION

The results of the study showed an improvement in the students' level through hybrid learning (Samsonova, 2020). A, indicating the effectiveness of hybrid learning. Thus, the exercises based on hybrid learning were successful in helping teachers in teaching mathematics. The study also found that hybrid learning and the aids provided were useful and provided assistance in the areas of mathematical understanding and enabled the teacher to enhance participation in regular lectures. The current study emphasizes the importance of hybrid learning in exchanging information and enhancing skills (Fuller et al., 2020). In general, the results confirm that hybrid learning can enhance students' understanding through education that integrates technology and teaching tools through modern educational media such as computers and mobile phones (Thomas et al., 2022). The results of the current study have potential applications in science education in general. One limitation of this study is the relatively small sample size, which limits the generalizability of the results. The hypothesis was put forward that the use of hybrid learning improves mathematics learning, and the results confirmed this through a statistically significant increase in achievement, which confirms that the results are consistent with and support the hypothesis.One limitation of this study is the relatively small sample size, which limits the generaliza bility of the results. The hypothesis was put forward that the use of hybrid learning improves mathematics learning, and the results confirmed this through a statistically significant increase in achievement, which confirms that the results are consistent with and support the hypothesis.

5. CONCLUSION

The proposed blended teaching strategy via the mobile applications in education has effectively and significantly improved the achievement of college students in mathematics. Developing their ability to think, relate, compose, and interpret what they learn and their ability to give the right decision to evaluate the situations and problems they face.

The development of the strategies used in modern teaching and their response to the changes of the era, away from the primitive methods that time has eroded and drank, which made them a burden on the student who has no specific one, is essential and pivotal. Permanent work must be done to achieve and through increased attention and intensively to train teachers, old and new, according to a comprehensive plan that considers the recruitment process Technology and education are properly based on a scientific method that takes into account the requirements of the times.

The results of this study indicate that the implementation of mobile applications indicates the need for professional development activities for teachers, students, and educational administrations in an adequate and thoughtful manner, and to provide all teachers with many opportunities to experience the implementation of mobile applications. In addition to saving time for student activities during the implementation of mobile applications, in addition to Support the involvement of all participating students and teachers in schools and evaluate the success of these applications to achieve the desired educational changes.

Based on the results, I suggest the following recommendations:

1. Use the hybrid learning method in teaching at all educational levels.
2. Train teachers on how to use hybrid learning in teaching.

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