

## Flipped Learning and Smartphones: Their Impact on Students' Achievement and Performance

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### ABSTRACT

The study aimed at figuring out the impact of corporate implication of flipped and mobile learning supported by smartphones on undergraduate class students' performance. It focused on three lower cognitive achievement levels in Bloom's taxonomy that include remembering, understanding and comprehension, and application that target undergraduate class teachers in the Faculty of Educational Science and Arts (FESA) in Amman, Jordan. Additionally, the study aims at investigating the undergraduate class teacher students' perceptions of learning and teaching experiences that they gain from this implication. The sample of the study includes students involved in two classes of the course of design and production of instructional aid, one of the classes was randomly selected as an experimental group (n=31) student and the other as a control group (n=29) students. The experimental group was taught based on the flipped-smartphones mediated learning while the control group was taught based on the conventional methods of teaching. A test was employed to measure both classes' achievement in remembering and understanding while a rubric was used to evaluate the quality of their projects and measure their ability in applying the knowledge they have gained. The results revealed a significant impact of the flipped-smartphones mediated learning on the undergraduate class students' achievement in remembering and applying the knowledge while there was no significant impact on the undergraduate class teacher student's achievement regarding the understanding level. Interviewing the targeted sample revealed that they consider this strategy a better experience than the conventional method.

**Keywords:** Flipped Learning, Students' Achievements, Smartphones.

### Introduction

Information Communications Technology (ICT) has affected almost all aspects of our life. Education is one of those fields that utilized the developments of ICT. It could represent reality through different mediums such as text, images, audio, video, and animations (Joliffe, Ritter, & Stevens, 2000). Moreover, ICT could provide virtual learning experiences that could excel those in reality (Granlund, Berglund, & Eriksson, 2000), and simplify complicated situations (Jarmon, Traphagan, Mayrath, & Trivedi, 2009). In addition Mobile technology enables learners to learn anytime and anywhere through wireless Internet in ubiquitous and flexible manner (Mtebe & Raisamo, 2014), unlike the PC's physical limitations that constrain learners' access to learning materials limiting them within rigid spatial choices (Jairak, Praneetpolgrang, & Mekhabunchakij, 2009).

Mobile devices such as smartphones and tablets enable personalized, tactile, and collaborative learning practices (Vázquez-Cano, 2014). Moreover, they have the potential to be effective learning tools in higher education with powerful affordances since their personal and mobile nature enable 'learning that is integrated with everyday life' and create opportunities of contextualized and personalized learning tasks (Schuck, Aubusson, Kearney, & Burden, 2013). Through mobile technology, learners in different places and times can interact with each other, share information, contact their tutors, and collaborate from their places on their projects when applying authentically what they have already learnt (Ally & Prieto-Blázquez, 2014).

Moreover, mobile technology enhances learning experience (Teri et al., 2014) as well as performance by facilitating

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extendable learning contexts and fostering adaptive collaborative learning outside the classroom (Alnabhan & Aljaraideh, 2014).

Mobile learning or m-learning enabled by mobile technology fosters, a high level of collaboration by making connections amongst learners and resources causing a high networking level and creating shared and socially interactive environments where learners communicate and share information with other peers, tutors, and experts (Kearney, Schuck, Burden, & Aubusson, 2012). Learning experiences supported by mobile technologies occur in physical and virtual settings that are situated in the context where learning occurs. Moreover, mobile technologies enable different informal learning experiences attained in a 'semi-formal places' such as museums and libraries, and/or 'self-regulated' learning experiences within the learner's generated context (Luckin, 2010) cited in (Kearney et al., 2012).

Because of the capabilities provided by ICT, flipped learning notion has recently emerged (Bergmann & Sams, 2014). Through flipped learning, students are introduced to the learning content before attending the class through presentation to readings and videos to make them utilize the class time in hands-on and cognitive processing activities (Green, 2015). Class activities are done collaboratively by learners (Barber, 2015).

Introducing learners to pre-class learning content or using videos in learning is not new, however, the new is utilizing the capabilities of technology in a way that was impossible before, such as, making a video and making it available for students at home without a need for complicated requirements (Bergmann & Sams, 2014). Accordingly, students require an adequate internet access to watch the online educative videos outside the classroom (Ullman, 2013).

Flipped learning is a step towards a learning-centered where students are deeply engaged in interactive learning exercises (Bergmann & Sams, 2014). Before the class time, students are exposed to the primary concepts. Inside the class, students are engaged in active problem-based and practical learning activities. It helps students to prepare for lessons in a way fits to their own time and affordances (Kim, Kim, Khera, & Getman, 2014). However, there have to be an alignment between online learning content and class activities to ensure students engagement in learning activities. Moreover, clear guidance, enough time, learning community encouragement, supportive in-class feedback, and familiar and easy to access technologies are required to have a successful flipped learning session (ibid). Moreover, formative assessments are encouraged to be adopted in flipped learning sessions to ensure learners presentation to the pre-class learning material and preparation before the class (Kim, Kim, Khera, & Getman, 2014).

Performance includes action and work; it is given an applied characteristic. Moreover, according to the accomplishment results because of the action, it is named as (attainment). Accordingly, the (Performance) notion itself includes the achievement of a certain task and doing an applied action as well.

Performance assessment includes logical issues that couldn't be treated by the achievement test such as efficiency and accuracy. The tool used for such an assessment is built by passing through a series of steps that begins with task analysis, which includes defining characteristics of performance, the subject of assessment. Then, characteristics are organized in a list forming a (Rating Scale) that refers to levels of quality. Later, learner's performance is measured and notes are taken by the examiner.

### **Literature Review**

Schuck et al. (2013) explored the introduction of mobile technologies into practice within a community of university educators. The study aims to investigate the impact of the adopted technology on the community's practice. Moreover, it investigates the best practices of using this technology. Moreover, Kearney et al. (2012) studied two mobile learning projects located in teacher education communities by proposing a pedagogical framework based on a socio-cultural perspective characterizing three basic features of m-learning which are authenticity, collaboration, and personalization which is tested empirically through the two projects. The study reveals the framework's ability to assess mobile activities and their pedagogical approaches.

Other recent studies targeted the role of mobile devices from learners' perspectives. Vázquez-Cano (2014) assessed the pedagogic use and capability of smartphones and an app used in learning at the Spanish National University of Distance

Education. The study revealed that students highly valued the role of targeted mobile technology in enhancing learning practice, connecting learners with their subjects, and evoking collaborative work among students and their instructors as well. Mtebe and Raisamo (2014) explored the students behavior intention in adopting and using mobile technology in higher education in East Africa. It stated that students have a strong belief of the usefulness and ease of mobile learning, moreover, they think of its capability to improve their learning and grades. Jabbour (2014) explored the impact of mobile technology in Lebanese higher education classrooms. The study targets students' attitudes, achievements, and educational process. The study stated that students conceived learning via mobile with 3G technology as pleasant, and positive experience. Moreover, mobile technology enhances learning outcomes and interaction among students and among students and instructors.

Wong, Ip, Lopes, and Rajagopalan (2014) conducted an action research targeting a group of first year pharmacy students who experienced the flipped learning. The study explored students' academic performance and perceptions compared with a control group that learnt by the traditional method. The study revealed a better achievement and higher satisfaction in the intervention group.

Love, Hodge, Grandgenett, and Swift (2014) conducted an action research examines college students' content understanding and perceptions in algebra course. An exam and a survey were employed for measurement and data collection. The flipped learning group showed a significant increase in scores compared with the traditional learning group in the formative assessments; however, they achieved the same in the final exam. The experimental group reflected positive attitudes regard the learning experience especially the collaboration and video experiences. Barber (2015) studied a developed flipped collaborative learning environments in four undergraduate courses relying on a blended mode and using video podcasts and Adobe Connect sessions. Through qualitative analysis, the study asserts students ability to develop meaningful learning relationships despite the variation in their backgrounds.

(Prashar, 2015) conducted a that study revealed higher scores in students involvement, task orientation, and innovation in a flipped course in a management module compared with a conventional learning, and shows flipped learning effectiveness in supporting collaborative learning.

Students' achievement is generally measured by scores students get in tests prepared for this purpose (Caspersen, Smeby, & Olaf Aamodt, 2017). Wong et al. (2014) used the mean examination scores to compare students achievement between a control and an experimental group.

### **Research Problem**

Despite the tremendous focus on the design of mobile devices and their capabilities, the pedagogical design of learning enabled by these devices does not attain the required attention in some sectors (Kearney et al., 2012).

There is a certain need to integrate m-learning into the educational design especially that there is little effort has been done regard enhancing learning enabled by mobile technology and based on active and experiential design (Dyson, Litchfield, Lawrence, Raban, & Leijdekkers, 2009). Moreover, there is a need to focus on teacher educators to raise their awareness of the affordances of mobile devices as learning tools, their ability to evaluate learning activities attained by these tools, and their ability to visualize models for effective learning enabled by these devices to their students (Schuck et al., 2013).

At the same time, flipped learning is not utilized or explored sufficiently in higher education context(Chen, Wang, Kinshuk, & Chen, 2014).Accordingly, the research problem would be stated as: what is the impact of the corporate implication of flipped and mobile learning supported by smartphones on students' achievement and performance in the three lower cognitive achievement levels in Bloom's Taxonomy?

### **The Significance of the study:**

The current study is a precursor in the following scopes:

1. It examines the impact of integrating flipped learning and smartphones capabilities on learning at higher education

level. The available literature reflects bareness of research that study the integration of flipped learning and Smartphones.

2. It focuses on the pedagogical design of learning enabled by mobile devices, which is not targeted satisfactorily by the available research literature (Kearney et al., 2012).

3. It is a more elaborate attempt to measure achievement, exceeding the raw outcome to focus on the three lower cognitive levels in Bloom's Taxonomy where previous attempts focused on the raw outcome of students' achievement.

4. As a primary attempt targets the local educational context, it handled the topic inclusively by following the action research with interviews targeted the study subjects aiming to provide holistic, intensive and detailed information about the studied case (Merriam & Simpson, 1995) and to enable a deeper understanding of it (Burton & Bartlett, 2005)

### **Study Target**

The study target is to encompass all preceding issues which raising the awareness of pre-service undergraduate classroom teachers about mobile learning by practicing it authentically, and examining the efficiency of a proposed pedagogical design that is based on flipped learning facilitated by mobile technology in authentic settings.

### **Research Questions**

The study tends to answer the following questions:

1. Is there statistically significant difference at significance level ( $\alpha \leq 0.05$ ) between mean scores of the experimental group (taught by flipped-mobile learning), and control group (taught conventionally) due to the achievement in remembering knowledge?
2. Is there statistically significant difference at significance level ( $\alpha \leq 0.05$ ) between mean scores of the experimental group, and control group due to the achievement in Comprehending on the achievement test?
3. Is there statistically significant difference at significance level ( $\alpha \leq 0.05$ ) between mean scores of the experimental group, and control group due to the achievement in applying gained knowledge in products they make?
4. How do students conceive their learning experience within this mode of learning in terms of obstacles and merits compared with what they are familiar with?

### **Action Research Statistical Hypothesis**

1. There is no statistically significant difference at significance level ( $\alpha \leq 0.05$ ) between mean scores of the experimental group (taught by flipped-mobile learning), and control group (taught conventionally) due to the achievement in remembering knowledge on the achievement test.

2. There is no statistically significant difference at significance level ( $\alpha \leq 0.05$ ) between mean scores of the experimental group, and control group due to the achievement in Comprehending on the achievement test.

3. There is no statistically significant difference at significance level ( $\alpha \leq 0.05$ ) between mean scores of the experimental group, and control group due to the achievement in applying gained knowledge in products they make.

### **Operational Definitions:**

**Flipped Learning:** Learning by which learners are introduced to learning material online five days before the class-time which is devoted for learners to apply gained knowledge, find answers for questions and inquiries they have, and have solutions for application problems they face.

**Smartphones:** Is the portable devices used to mediate flipped learning as exclusive medium to enable the delivery of the prior learning content, communication amongst students before the learning session, and referral to learning content within the running session.

**Students' Performance:** It is students measured ability of gaining knowledge, comprehension, and application where gaining knowledge and comprehension is measured by an achievement test designed for this purpose, and application is measured through a rubric used to evaluate products, the lighting boards, students are assigned to make.

**FESA:** Faculty of Educational Sciences and Arts / UNRWA, a university college is awarded to students enrolled in the bachelor's degree, a subsidiary of International Relief Agency for Relief and Works Agency for Palestine Refugees in Jordan.

**Achievement:** The marks obtained by students on the achievement test.

#### **Research Limitations:**

- The research targets undergraduate classroom teachers undertaking a module about Instructional Aids' design and production at Faculty of Educational Sciences and Arts (FESA) in the first semester of the academic year 2015/2016 in Jordan.

- The research is confined to the topic of Designing and employing Lighting Board in Instruction which is designed and conducted by one of the researchers.

-The research uses a performance test and a rubric designed exclusively to conduct this research, accordingly, interpretation of results depends on the used instruments' validity and reliability.

- The design of the online web-based manual.

#### **Research Methodology**

##### **Research Community and Individuals:**

The community of the study is the undergraduate classroom teachers in (FESA) in the first semester of academic year 2015/2016, while the individuals of the study are those undergraduate classroom teachers who are undertaking a module about Instructional Aids' design and production. The module is taught in two sections; accordingly, students in the two sections were assigned randomly as an experimental group (31) students and a control group (29) students. The experimental group is taught by the flipped-smartphones mediated Learning, while the control group is taught by the conventional method.

##### **Research Variables:**

The variables of the study are:

-Independent Variables: Smartphones, Flipped-mobile.

-Dependent Variable: Learners' performance in the achievement test and in producing a light board.

#### **Research Instruments**

##### **- The Achievement Test**

The achievement test was designed to measure learners' performance in remembering and comprehension based on Bloom's Taxonomy. The total score for the test is twenty; the remembering questions' score is sixteen, while the comprehension questions score is four. The questions are consisted of two types which are multiple choice and gap filling.

##### **- The rubric**

The rubric measures learners' performance in the application level through gauging the quality of learners' final product which is lighting boards. The rubric is consisted of seventeen items; ten items targets the content design, and seven targets the board design. Each item has three levels of achievement scores: 0, 1, and 3.

The rubric is reviewed by two professors who have experience in the domain of designing lighting boards. Later, some items are modified according to the gained advices.

##### **- The Online Manual:**

It is a Web-based manual that can be accessed online through smartphones. The manual introduces learners in the experimental group to the required information, and learning material. It provides them with detailed information and explanation, through texts, images, and videos as needed, of steps of how to accomplish the in-class task which is making a lighting board. It includes the rubric that is used for evaluating the final product.

### **- The Interviews**

Opinion questions are developed to explore students' perceptions regard their learning experience in the experimental group. The first question inquires about strengths and weaknesses of using smartphones in receiving learning content. The Second question is about strengths and weaknesses of posting the learning material online before the class time and devoting the class time to apply gained knowledge and skills with Instructor's support compared with the conventional method of learning. The third question is about suggestions that make this learning experience better.

### **Validity and reliability**

1. Rubric: To evaluate student performance tool has been set up by the researcher consisted of (17) items, corresponding to a binary scale (yes, no) has been checked and certified the stability of the tool in the following ways: - internal consistency: used Kuder–Richardson Formula 20 (KR-20) in the calculation of internal consistency reliability coefficient of grades in terms of paragraph statistics (paragraph variation) has been found that the internal consistency coefficient = 0.83 which is an acceptable value for the purposes of this study. B. Concurrent Validity: Checked the validity of the test by calculating the Pearson correlation coefficient between students' marks on the rubric, and the students' cumulative grades. The number of students in the sample was (32) students, and correlation coefficient found that in terms of test reliability coefficient = 0.75 which is an acceptable value for the purposes of this research.

2. Achievement Test: The achievement test was made to measure the information acquired by the students in lighting board in terms of the cognitive levels of Bloom's taxonomy in the level of knowledge and understanding and comprehension, final form of the test consisted of (20) items, (16) items in the level of knowledge, and four items in the level of understanding and comprehension. The construction of the test steps are the following:

1. content analysis, and then determine the behavioral objectives of the unit, and prepare a table of specification.
2. Formulation (25) items for testing in the initial form.
3. The initial form of the test and the specification table are given to experienced group to give their observations, and thus was to verify the validity of the content of this test.

4. -internal consistency: used Kuder–Richardson Formula 20 (KR-20) in the calculation of internal consistency reliability coefficient of grades in terms of paragraph statistics (paragraph variation) has been found that the internal consistency coefficient = 0.81 which is an acceptable value for the purposes of this study.

3. Interviews: The interview questions were arbitrated by experts and academics in the field of education and Information Communications Technology. The questions were modified as needed according to the gained feedback. In addition, six students were interviewed, after that the students were interviewed again after three weeks. The students' responses in both interviews demonstrated constancy and noticeable cognition.

### **Research Procedures**

The designed achievement test was conducted on the two groups, the experimental and control groups, at the beginning of the academic semester; a month before the research intervention. In the intervention period, the two groups undergo two different instructional designs as the following:

#### **- The Conventional Teaching Method (Control Group's Approach):**

The instructor introduces the lighting board for students, demonstrating how it is used, its design, its features and its components. Students here, are watching, listening, and asking questions. Next, the instructor demonstrates the steps, materials, and tools needed to make the lighting board through making an example, step by step. Later, students are divided into groups; each one is consisted of five students and assigned to make a lighting board. After that, needed materials and tools are distributed to the groups and the students' work begins. Here, Instructor begins rounds amongst the groups discussing their task, checking their understanding, and responding to their inquiries, and helping them if face difficulties.

#### **- The Interventional Learning Method (Experimental Group's Approach):**

Students are referred to the prior learning content via an online web-based manual to be accessed by smartphones five days before the class time. Students are encouraged to study the online learning content before attending the class. In the class time, students are divided into groups; each one is consisted of five students and assigned to make a lighting board. The needed materials and tools are distributed by the instructor to the groups. Instructor's role is to provide students with help and advice as needed. While working, students are encouraged to refer to the web-based manual using their smartphones as well as the instructor.

## Results

- Results concerned with the equivalence of the experimental group and the control group before applying the flipped and mobile learning supported by smartphones:

The equivalence of the experimental group and the control group was tested by applying the t-test for the significance of differences between the two groups scores' means before applying the flipped and mobile learning supported by smartphones on students. Table (1) introduces the results of t-test:

**Table 1: The Results of t-test for the equivalence of the experimental and control group before applying the flipped learning**

Dependent variable	group	N	MEAN	Std. Deviation	t-value	Sig(2-tail)
Remembering	experimental	31	6.48	2.17	1.07	.29
	control	29	5.9	2.08		
Understanding	experimental	31	1.45	.89	0.01	0.99
	control	29	1.45	0.91		
Total Score	experimental	31	7.94	2.58	1.09	0.28
	control	29	7.24	2.36		

The results show that there is no statistically significant difference at significance level ( $\alpha \leq 0.05$ ) between mean scores of the experimental group ( taught by flipped-mobile learning ), and control group ( taught conventionally ) due to the achievement in remembering knowledge on the achievement test before applying the flipped learning . Moreover, there is no statistically significant difference at significance level ( $\alpha \leq 0.05$ ) between mean scores of the experimental group, and control group due to the achievement in Comprehending on the achievement test. Also, there is no statistically significant difference at significance level ( $\alpha \leq 0.05$ ) between mean scores of the experimental group, and control group due to the total score on the achievement test. These results confirm the equivalence of the two groups before applying the flipped learning.

### - Results concern the questions: 1,2,3

1. Is there statistically significant difference at significance level ( $\alpha \leq 0.05$ ) between mean scores of the experimental group ( taught by flipped-mobile learning ), and control group ( taught conventionally ) due to the achievement in remembering knowledge?

2. Is there statistically significant difference at significance level ( $\alpha \leq 0.05$ ) between mean scores of the experimental group, and control group due to the achievement in Comprehending on the achievement test?

3. Is there statistically significant difference at significance level ( $\alpha \leq 0.05$ ) between mean scores of the experimental group, and control group due to the achievement in applying gained knowledge in products they make?

The impact of employing flipped learning supported by smartphones on students' performance in the three lower cognitive achievement levels in Bloom's Taxonomy. Table (2) shows the results:

**Table 2: The Results of t-test for the impact of employing flipped learning on students' performance in the three lower cognitive achievement levels in Bloom's Taxonomy**

Dependent variable	Max .Score	group	N	MEAN	Std. Deviation	t-value	Sig(2-tail)
Remembering		experimental	31	10.48	2.35	5.88	0.00
		control	29	7.14	2.03		
Understanding		experimental	31	3.55	0.62	0.42	0.67
		control	29	3.48	0.57		
Applying gained knowledge		experimental	31	31	2.03	9.84	0.000
		control	29	23.76	3.44		

Table (2) displays the results of t-test for the difference at significance level ( $\alpha \leq 0.05$ ) between mean scores of the experimental group, and control group due to the achievement in remembering, comprehending on the achievement test and in applying gained knowledge. The results show that there is no statistically significant difference at significance level ( $\alpha \leq 0.05$ ) between mean scores of the experimental group (taught by flipped-mobile learning), and control group (taught conventionally) due to the achievement in understanding on the achievement test. However, there is statistically significant difference at significance level ( $\alpha \leq 0.05$ ) between mean scores of the experimental group, and control group due to the achievement in remembering. And the results shows that there is statistically significant difference at significance level ( $\alpha \leq 0.05$ ) between mean scores of the experimental group, and control group on applying gained knowledge.

**- Results concern question 4: How do students conceive their learning experience within this mode of learning in terms of obstacles and merits compared with what they are familiar with?**

Fifteen students of the experimental group were interviewed. The dominant impression of the interviewees was the recognition of the flipped- mobile mediated learning as a better learning method compared with the conventional method. Moreover, they welcome using smartphones with some concerns. Table (3) displays students' thoughts in detail.

**Table (3): Interviews Results**

		Students' Comments
1 <sup>st</sup> Q.	Smartphones Strengths.	<ul style="list-style-type: none"> <li>- "It is easy to access in any place".</li> <li>- "The availability of videos makes learning better and more enjoyable".</li> <li>- "The availability of learning content at any time".</li> <li>- "It is easier and faster to use it (compared with computers)".</li> <li>- "It is always available".</li> <li>- "It is easy and fast to access information through it".</li> <li>- "It saves learner's time and effort".</li> <li>- "It is portable".</li> <li>- "Low cost learning".</li> <li>- "Its use is interesting, easy and enjoyable".</li> <li>- "The availability of images and videos ease learning".</li> </ul>
	Smartphones Weaknesses.	<ul style="list-style-type: none"> <li>- "It requires membership to internet service".</li> <li>- "I do not have access to the internet".</li> <li>- "Its screen is small (compared with computers)".</li> <li>- "It shuts down quickly because of the consumption of battery charge".</li> <li>- "The battery needs frequent charge".</li> <li>- "Some students do not have smartphones".</li> </ul>

2d Q.	Flipped Learning Strengths	<ul style="list-style-type: none"> <li>- "I make an idea about what I am going to learn".</li> <li>- "It increases learners' interaction as they know and understand what they are going to do. That eases the application in the class".</li> <li>- "It gives more knowledge and experience".</li> <li>- "It makes me memorize information".</li> <li>- "Helps us to be prepared, eases action in the class, and minimizes obstacles".</li> <li>- "It is better than the boring cuing and causes a better understanding and staying of information".</li> <li>- "It saves time and effort and provide engaging and active learning".</li> <li>- "It gives more chance to inquire about misunderstood issues".</li> </ul>
	Flipped Learning Weaknesses:	<ul style="list-style-type: none"> <li>- "This method of learning does not suit all topics".</li> </ul>
3d Q.	Suggestions:	<ul style="list-style-type: none"> <li>- "Including Images and videos for all the steps".</li> <li>- "Using the computer lab instead of students' smartphones".</li> <li>- "Giving more time for the in-class learning".</li> </ul>

**Discussion**

The action research proves the ability of the corporate implication of flipped and mobile learning supported by smartphones to improve students' achievement in remembering on the achievement test and applying their gained knowledge. These results, complies with Wong et al. (2014) and Mason, Shuman, and Cook (2013) and contradicts with Findlay-Thompson and Mombourquette (2014). However, the study compiles with Love et al. (2014) in terms of the similarity in comprehension results between the experimental and control groups.

The enhancement of students achievement in applying their gained knowledge in the experimental group could be according to the enhancement of collaborative learning (Prashar, 2015), students' preparation (Kim et al., 2014), and giving the opportunity for situated learning because of using smartphones while working on their projects (Ally & Prieto-Blázquez, 2014).

Students in the experimental group who experience flipped- mobile mediated learning demonstrate positive attitudes towards their learning experience underpinning their views with reasons why they prefer this type of learning compared with the conventional method as shown in table (4). These findings complies with the findings of Love et al. (2014) and (Wong et al., 2014). However, students reveal some concerns about using smartphones such as the small screen, the consumption of battery charge, and the need for internet access. Although, learners suffer from the lack of reliable internet access, they rely on screenshots of the manual to review and exchange when and where internet access is unavailable.

Above all, the instructor who implemented the two methods, spent less effort in explaining, and answering students' questions in the flipped-mobile learning method compared with the conventional method.

**Conclusion and Recommendations**

The intervention apparently demonstrated the ability of flipped-smart phone mediated learning to enhance learners' achievement in remembering and applying knowledge. Moreover, it left a positive impact on learners and the educator as well. Learners showed a high level of motivation and enthusiasm while experiencing this mode of learning. They even strived to find solutions for problems they face while learning such as making screen shots for to capture the online learning content to be used later when they are offline. The teacher declared the importance of this mode of learning in providing learners with focused, well organized learning activities

According to the research results as well as experience gained because of conducting the study, the scholars recommend the following:

1. It is recommended for higher education institutes to increase the online learning content that would be used in flipped learning and to make it available free online as this saves effort and time, and benefit learning through the exchange of shared efforts.

2. Educators are encouraged to employ the flipped-mobile learning method as flipped learning makes the class time available for students to practice what they learnt, inquire, and discuss what they learn instead of receiving information passively, on the other hand, smartphones give more flexibility for learning utilizing the wide spread and popularity of them amongst students.

3. Educators are encouraged to develop their knowledge and skills that help in transforming learning content into the digital mode.

4. Educators are encouraged to start their own initiatives that suit their learners' conditions

5. It is noticed that students do not give enough attention for optional activities before or after the class time, accordingly, it is recommended to make the reading the prior learning content mandatory.

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## تأثير اتباع استراتيجيتي التعلم المعكوس والتعلم النقال المدعوم بالهواتف الذكية على أداء الطلبة

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### ملخص

تهدف الدراسة إلى تحديد أثر التطبيق المشترك لاستراتيجيتي التعلم المعكوس والتعلم النقال المدعوم بالهواتف الذكية على أداء الطلبة في المستويات الثلاثة الدنيا للتحصيل المعرفي وفق هرم بلوم متمثلة بـ التذكر، والفهم والاستيعاب، والتطبيق مستهدفة طلبة مرحلة البكالوريوس لتخصص معلم الصف في كلية العلوم التربوية والآداب. بالإضافة لذلك فقد سعت الدراسة لتقصي انطباعات الطلبة بشأن الخبرة التعليمية التعلمية الجديدة التي تعرضوا لها. وقد تكونت عينة الدراسة من الطلبة الملتحقين بمساق تصميم وإنتاج الوسائل التعليمية التعليمية. وتم تدريس المساق بواقع شعبتين عشوائيتين لتكون إحداهما المجموعة التجريبية (3) طالبًا وطالبة والأخرى مجموعة ضابطة (29) طالبًا وطالبة. ودرست المجموعة التجريبية بالدمج بين استراتيجيتي التعلم المعكوس والتعلم النقال المدعوم بالهواتف الذكية، أما المجموعة الضابطة فتم تدريسها بالطريقة التقليدية. ثم طبق اختبار لقياس تحصيل الطلبة في مستويي التذكر والفهم، بينما تم استخدام أداة شطب لتقييم المشاريع التي أنجزها الطلبة لقياس قدرتهم على تطبيق المعرفة التي تعلموها. أظهرت نتائج الدراسة أنزادات دلالة إحصائية للدمج بين استراتيجيتي التعلم المعكوس والنقال باستخدام الهواتف الذكية على تحصيل الطلبة في مستويي التذكر وتطبيق المعرفة، كما أظهرت عدم وجود أثر دال إحصائياً على تحصيل الطلبة في مستوى الفهم. كما أظهرت مقابلات الطلبة تقديرهم وتفضيلهم لتجربتهم التعليمية بواسطة الدمج بين استراتيجيتي التعلم المعكوس والنقال باستخدام الهواتف الذكية مقارنة بالطريقة التقليدية.

الكلمات الدالة: التعلم المعكوس، الهواتف الذكية.

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