Does blended learning* techniques using WhatsApp result in better performance by V th semester MBBS students in pathology as compared with lecture classes** alone?

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Abstract
Mobile learning (M learning) is gaining much importance in the field of medical education nowadays. Whats App messenger has become an interesting tool to be incorporated into teaching learning programs. We conducted this study to find out whether blended learning techniques combining lecture class and WhatsApp result in better performance by Vth semester MBBS students in Pathology as compared lecture classes alone and to understand the differences in attitude of students towards M learning. Study design was that of Randomized Controlled Trial. Entire batch divided into control & experimental group and a Whats App group created for those in experimental group. Single topic selected and lecture class given to all followed by 1 hr discussion in Whats app for those in study group and face to face discussion for other. Post test conducted to assess cognitive performance and questionnaire given to assess the attitude of students. Results analyzed using SPSS software. Findings of the study show that student find learning through WhatsApp very interesting eventhough there is no significant difference in cognitive performance. The attitude of the students toward WhatsApp- M learning was favorable.

Keywords: E-Learning, M-Learning, Whats App.

Introduction
Since long time many of the medical colleges in India are following the didactic lecture method alone for teaching process where students have a passive role only. The only application of technology is limited to the use OHP & LCD projectors. It provides no space for learner independent thinking and may lead to boredom. It offers limited opportunities for assessment and feedback also.

Technology is unavoidable in today's world and makes everything easier. Electronically mediated teaching method [E-learning] is a concept which has been gaining much acceptance in the field of medical education for last few years.[1] Modern information technologies are gradually replacing the usual 'chalk & black board' concept. With an increasing number of smartphones, tablets, and laptops medical students currently have access to wide variety of E-learning resources as required. Of these, Mobile technology has a major role. Most of the online educational portals have their own mobile applications. It helps the online learners to access and share knowledge whenever and wherever required. Every day newer, highly efficient, technically advanced mobile phones are released in the market. It has become an essential, yet cosy device to every student which they prefer over laptops and PCs for ease of carriage.

Preston and his colleagues found that nearly 70% of students state that they learn just as well in online learning communities such as WhatsApp groups, Facebook communities, Twitter chats and Google+ communities, as they do in lectures that are held in the classroom in the presence of other students.[2] WhatsApp Messenger is a messaging app for smart phones which uses the internet to send text messages, documents, images, videos and audio messages to other users using standard cellular mobile numbers. WhatsApp was founded in 2009 by Brian Acton and Jan Koum, both former employees of Yahoo. Today WhatsApp is one of the leading applications in the market.

According to Barhoumi et al, advantages of WhatsApp are as follows.[3]
a. WhatsApp is a free application that is easy to use and superior to SMS when cost is considered.
b. Information and knowledge are easily constructed and shared through WhatsApp instant messaging especially in groups.
c. Information can be shared in the form of PPTs, PDFs & images very easily.
d. WhatsApp provides students with the ability to create a class publication and thereby publish their work in the group.

The research conducted by Aicha Blehch Amry (2014) demonstrated the effectiveness of WhatsApp social networking in comparison with face-to- face learning in the classroom.[4]

This study aims to find out the effectiveness of mobile technologies (WhatsApp) in the achievement of learning activities compared to didactic lectures in our set up.

[*Blended learning is a formal education program that involves combining Internet and digital media with traditional classroom methods that require the physical presence of both a teacher and students, with some

element of student control over time, place, path, or pace.]

Study objectives & Research hypotheses

This study seeks to explore the impact of using blended learning techniques combining lecture class and WhatsApp social learning activities on the achievements and attitudes of students in studying Pathology and to compare them with face-to-face learning in the classroom.

Primary objective: To find out whether blended learning techniques combining lecture class and WhatsApp result in better performance by Vth semester MBBS students in Pathology as compared with lecture classes alone.

Secondary objective: To understand the differences in attitude of students towards blended learning techniques incorporating WhatsApp media.

Hypothesis 1: There is no difference in the arithmetical means of the study group using blended techniques and the control groups using face- to-face learning (at the 0.05 alpha level) in the achievement tests of Pathology students following the experimental period.

Hypothesis 2: There is no difference in the arithmetical means of the study and control groups (at the 0.05 alpha level) in their respective attitudes toward WhatsApp mobile learning and face-to-face learning in the classroom.

Study Design & Subject Selection

Study design was that of Randomized Controlled Trial which was approved by Institutional Ethics Committee. The total duration of study was 1month including time for analysis. The study was targeted to V[th] semester students who was studying paramedical subjects including Pathology at that time. Entire batch was divided into study & control group after randomization including a number of 53 and 52 in each group respectively.

Inclusion criteria: Only those who gave consent were included in the study. For study group, only those students having Whats App messenger in their phone incorporated.

Exclusion Criteria: Those who are not attending the post-test & questionnaire section after enrolled in study excluded from further analysis.

Materials and Methods

For the study group, the learning process consisted of face-to-face learning and WhatsApp messaging to achieve learning activities and discussions. The Researcher along with a student representative formed a WhatsApp group first and acted as group administrators. Strict guidelines put forward for experimental groups while using Whats App (like do not post things that are unrelated to the study, should be connected to the group at the appropriate time etc.).

Topic selected was glomerulonephritis. Both groups were given lecture class of 1hr duration. Study group was instructed to be in WhatsApp for 1hr. after the class on same day for discussion. They were also provided with PPT related to class, 1 day before through Whats App medium. All conversations in the study group in WhatsApp were taken place in the presence of the administrator. The students were asked to respect all rules as well as to set start and end times of the mobile discussion.

For the control group, no discussion was available through Whats App medium. They were given 1 hr time to go through text books and to have face to face discussions.

Data Gathering Tools

A post-test consisting of 20 MCQs were conducted after classes & discussion to assess the cognitive performance of students. The results of the test were used to test hypothesis 1. A simple t test was done using SPSS Software to analyze the data.

Additionally, questionnaire was administered to explore the students' attitudes toward the adoption of the WhatsApp learning and toward face-to-face learning activities in the classroom. Separate questionnaires were used for each groups. First questionnaire was distributed in person to the experimental group to evaluate their attitudes toward blended techniques. Other questionnaire, was given to control group to measure those student's attitudes towards face to face learning in class rooms. A five-point Likert scale (strongly agree, agree, neutral, disagree, and strongly disagree) was used for the questionnaire distributed to the both group. Hypothesis 2 was tested based on this method. In present study, the dependent variables are score of students & attitude and independent variables are blended learning techniques incorporating Whats App medium & the Lecture class alone.

Results

Table 1 represents the means and standard deviations of student scores in the experimental group using the mobile learning process and the control group, which used face-to-face learning activities only in the classroom.

Table 1: Group Statistics

Groups	Number	Mean	SD	SE
Control	51	15.88	3.16	0.44
Experimental	52	15.23	2.79	0.38

It clearly shows there is not much difference in the means of results of the test between control and experimental groups. But this has to be verified with t-test of equality of means.

Table 2:

Group Statistics						
Groups	**t**	**df**	**Sig. 2 tailed**	**Mean Difference**	**95% CI of the difference**	
					Lower	**Upper**
Equal variance assumed	1.108	99	0.270	0.65158	-.51447	1.817

Validation or rejection of the first hypothesis based on the results of the achievement test

Hypothesis 1: There is no difference in the arithmetical means of the study group using blended techniques and the control groups using face- to-face learning (at the 0.05 alpha level) in the achievement tests of Pathology students following the experimental period.

The mean of the control group is 15.88, while the mean of the experimental group is 15.23 (Table 1). The t-test value of equality of means is used to interpret the difference between the means of the control and the experimental groups. The value of the t-statistic in the test of equality of means of the experimental and control groups is 0.270 (Table 2), while the critical value of the table is 0.05. The value of calculated t-statistic is higher than the t- value of the table. Thus, hypothesis 1 is accepted and concluded that there is no difference in the arithmetical mean of the experimental group and the control group.

Attitudes of students in the experimental and control groups:

Annexure 1 describes the questionnaire administered to students in the control group

Annexure 2 describes the questionnaire administered to students in the control group

The difference between the two means of the experimental and control groups was analyzed with the t-test.

Table 3

The Mean of Group Statistics				
	Number	**Mean**	**SD**	**SE**
Control	51	42.45	4.80	.6723
Experimental	52	44.36	4.66	.6475

Table 4 shows the values of t-statistics to interpret the difference between the means of the experimental and control groups.

Table 4

Group Statistics						
Groups	**T**	**df**	**Sig. 2 tailed**	**Mean Difference**	**95% CI of the difference**	
					Lower	**Upper**
Equal variance assumed	-2.051	101	.043	-1.914	-3.765	-.0631

Validation or rejection of the second hypothesis

Hypothesis 2: There is no difference in the arithmetical means of the experimental and control groups (at the 0.05 alpha level) in their respective attitudes toward WhatsApp mobile learning activities and face-to- face learning activities in the classroom.

The value of t in the t-test is used to reject or validate the second hypothesis: There is a statistically significant difference between the experimental group and the control group at the 0.05 alpha level regarding students' attitudes after the experimental period. This difference is in favor of the experimental group; the attitudes of students in the experimental group are more positive and oriented toward the use of the blended learning process compared with the attitudes of the students in the control group towards in-class learning.

Discussion

The study was done using the results of the achievement test to assess the cognitive performance of the students and with a questionnaire to explore students' attitudes towards the experimental learning process. It shows that experimental group is more oriented and motivated to use the blended course compared with the control group. But cognitive performance is almost equal in both groups. This is quite different from previous studies done by Barhoumi et al and Amry. In both of these studies, experimental group had better score in achievement tests. In our study, the control group made

full use of 1 hour post class for individual study. Moreover the study was based on a single theory class. If the research was applied to long term duration, there may be more positive outcome. The benefits of the blended course for the students in the experimental group are clear from the results of the study. The attitudes of students toward the use of WhatsApp mobile learning activities show that the learning process facilitates learning, helps students find solutions to learning difficulties and easily construct and share knowledge, and supports research into useful information for learning for a majority of students in experimental sample, compared with the control group.

Following are the positive comments from students in the experimental group:

"Promotes faster learning, more enjoyable, easy to understand the concepts".

"Made them interested to read text books.""Study of gross and microscopy easy."

"Doubts can be cleared easily."

"PDF notes helps in exam preparation correctly."

"Easy to carry and read from anywhere"

"Study material available easily."

"Promotes faster sharing of knowledge"

"Freedom to ask anything"

But few opined that:

"Decreased the interest to read text book."

"Presence of teacher in the class make them to concentrate, in his absence we feel lazy to read."

"Internet may not be available all the time, costlier, not practical if there is no net connection, downloading becomes problems."

"Live interaction is more effective."

"Useful only after reading class."

"Online discussion difficult to come same time for discussion."

According to some in control group long duration lecture classes make them bore and reduces their enthusiasm especially afternoon classes. They can't listen for a long time. There are only few chances of group discussions. Few reported that better understanding of subject is possible as concept is explained by the teacher. They become more attentive when under the control of teacher.

Most of the students are using smartphones for entertainment. Only few uses it for learning purposes. Study by Yeboah and Ewur in Ghana clearly show that WhatsApp can affect students negatively- it takes much of the student's studies time, leads to lack of concentration during lectures and difficulty in balancing online activities and academic preparation. [5] As a doctor, one should indulge in lifelong long learning. If they are motivated to use these electronic gadgets in a wise manner, it will benefit them for long term learning in a more easy and enjoyable way. Though M learning cannot replace the conventional teaching methods, definitely it act as an adjunct to it in any scenario. Especially in a subject like pathology where much

importance is given to gross and microscopic figures, this media becomes helpful. Assignments and small tests can also be given through this medium WhatsApp increases idea contribution among students and provides faster and easier communication also.

Even though availability of smart phones is not an issue in study set up like ours, ie a private medical college, the availability of data services posing a big issue. Availability of appropriate technology and training of faculty is required to facilitate M- learning. For this good administrative support is required. Provision of digital libraries and free WIFI can address these problems to an extent.

The main shortcoming of this study is that the class was of short duration ie less than 2 hr and only a single topic was selected. If it extended over few classes or weeks that may be reflected in their attitude and score. Multiple studies using a bigger sample size in different population of students is also required to provide a clear picture.

Conclusion

Though our students show no significant difference in cognitive performance using blended learning techniques using WhatsApp media, they find it as an enjoyable and comfort mode of leaning and shows a positive attitude towards it. So its better to include WhatsApp as an teaching aid to facilitate enjoyable learning along with the usual modes of teaching.

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Annexure 1

Questionnaire- Study Group

1. **Age**
2. **Sex**
3. **Net connection you use most frequently**
4. **What is the total number of hours per day you spend (use application) on your phone?**
   a)   <1 hrs. b) 1-2 hrs. c) 2-3hrs. d) 3-4 hrs. e) 4-5 hrs.
5. **Of these hours how many are used in academic activities**
   a)   <1 hrs. b) 1-2 hrs. c) 2-3hrs. d) 3-4 hrs. e) 4-5 hrs.
6. **What is the most common activity when using your phone?**
   a)   Gaming b) Research for medical study materials c) Voice call d) Social networking e) Watching cinemas
7. **How many hours you allocate for social networking like Facebook, twitter, LinkedIn, Instagrametc?**
   a)   <1 hrs. b) 1-2 hrs. c) 2-3hrs. d) 3-4 hrs. e) 4-5 hrs.
8. **How many hours you allocate WhatsApp activities?**
   a)   <1 hrs. b) 1-2 hrs. c) 2-3hrs. d) 3-4 hrs. e) 4-5 hrs.
9. **Reasons for using WhatsApp:**
   a)   Academic work b) General information c) Chatting d) Family

1	Blended techniques using WhatsApp learning activities and lectures makes learning easy	Strongly agree
		Agree
		Neutral
		Disagree
		Strongly disagree
2	Blended techniques using WhatsApp learning activities and lectures makes learning enjoyable	Strongly agree
		Agree
		Neutral
		Disagree
		Strongly disagree
3	Blended techniques using WhatsApp learning activities and lectures favors problem solving	Strongly agree
		Agree
		Neutral
		Disagree
		Strongly disagree
4	Blended techniques using WhatsApp learning activities and lectures favors the discovery of information useful for learning.	Strongly agree
		Agree
		Neutral
		Disagree
		Strongly disagree
5	Blended techniques using WhatsApp learning activities and lectures favors faster knowledge sharing.	Strongly agree
		Agree
		Neutral
		Disagree
		Strongly disagree
6	Blended techniques using WhatsApp learning activities and lectures make study of gross and microscopy in Pathology easier	Strongly agree
		Agree
		Neutral
		Disagree
		Strongly disagree
7	Blended techniques using WhatsApp learning activities and lectures make you interested to read textbooks	Strongly agree
		Agree
		Neutral
		Disagree
		Strongly disagree
8		Strongly agree

	Blended techniques using WhatsApp learning activities and lectures make interactions possible among.	Agree
		Neutral
		Disagree
		Strongly disagree
9	Blended techniques using WhatsApp learning activities and lectures makes it easier to understand the concepts in Pathology	Strongly agree
		Agree
		Neutral
		Disagree
		Strongly disagree
10	Blended techniques using WhatsApp learning activities and lectures makes you come prepared for next class	Strongly agree
		Agree
		Neutral
		Disagree
		Strongly disagree
11	Using WhatsApp, it helped me to pass any information discussed easily	Strongly agree
		Agree
		Neutral
		Disagree
		Strongly disagree

1. **What are the advantages of Whats App discussions according to you?**
2. **What are the demerits of Whats App discussions according to you?**

Annexure 2
Questionnaire- Control Group

1. **Age**
2. **Sex**

1	Lecture classes make learning easy	Strongly agree
		Agree
		Neutral
		Disagree
		Strongly disagree
2	Lecture classes favor learning enjoyable.	Strongly agree
		Agree
		Neutral
		Disagree
		Strongly disagree
3	Lecture classes favor problem solving	Strongly agree
		Agree
		Neutral
		Disagree
		Strongly disagree
4	Lecture classes favor the discovery of information useful for learning.	Strongly agree
		Agree
		Neutral
		Disagree
		Strongly disagree
5	Lecture classes favor faster knowledge sharing.	Strongly agree
		Agree
		Neutral
		Disagree
		Strongly disagree
6	Lecture classes make study of gross and microscopy in Pathology easier	Strongly agree
		Agree
		Neutral

		Disagree
		Strongly disagree
7	Lecture classes make you interested to read textbooks	Strongly agree
		Agree
		Neutral
		Disagree
		Strongly disagree
8	Lecture classes make interactions possible among.	Strongly agree
		Agree
		Neutral
		Disagree
		Strongly disagree
9	Lecture classes make it easier to understand the concepts in Pathology	Strongly agree
		Agree
		10Neutral
		Disagree
		Strongly disagree
10	Lecture classes make you come prepared for next class	Strongly agree
		Agree
		Neutral
		Disagree
		Strongly disagree
11	Lecture classes helped me to pass any information discussed easily	Strongly agree
		Agree
		Neutral
		Disagree
		Strongly disagree

1. **What are the advantages of Lecture classes according to you?**
2. **What are the demerits of Lecture classes according to you?**

Informed Consent Form-Students

I am ready to participate in the research titled " ***Comparative study between blended learning techniques using Whats App medium and lecture classes***" by **Dr. GEETHU G NAIR and Dr. SIMI S**, Assistant Professors in Department of Pathology of Malabar Medical College and Research Center, Calicut. I have been explained about the purpose of study. I know my participation is voluntary and I can withdraw my consent to be a part of study at any time. I will be provided with further clarification if needed. I know that there is no risk for me if I am a part of this study. I am convinced my identify and information given by me will be kept confidential and no-one but the researchers will be able to see it.

I consent voluntarily to participate in this research.

Date _____ (Day/month/year)

Name and Signature of Participants

S. No.	NAME	Roll. no	SIGNATURE
1			
2			
3			
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