

## A Comparative Study of Blended Learning versus Traditional Teaching in Middle School Science

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### Abstract

*The rapid growth in the use of technology particularly the use of web based technologies and communications have provided an opportunity to educators around the world to investigate the most suitable learning environments that would cater students' diverse learning styles. The purpose of this study was to compare the use of blended learning in middle school science with traditional teaching. This study was conducted with one hundred and fifty grade eight science students studying at local private schools of Lahore. A mixed method research approach was used which included pre – test and post – test design along with non-participant observations and interviews. The t- test analysis on independent samples revealed statistically significant differences in students' performance based on the results of pre-test and post-test of two groups (control and experimental). Based on the findings, blended learning model appears to be an alternative teaching strategy that should be embraced by science teachers in order to help students learn better.*

### 1. Introduction

For a long time, science teaching has been using out of date curriculum, based on irrelevant experiments, cramming, with no understanding of concepts. In Pakistan, the majority of science teachers just walk into classrooms holding their yellow note books, which they have inherited from the preceding “teachers”. Their lectures are just a kind of readymade recipe book for teaching scientific concepts.

The prevalent use of computers and technology in our daily lives has brought about cultural changes in society. Innovations such as smart phones, cloud computing, iPad and laptops were science fiction stories, some years ago. But, students in our classrooms today are surrounded with technology and we are preparing them for the jobs that have not yet been created. We expect them to be multitasking so they can survive in the 21<sup>st</sup> century. We expect them to be good problem solvers, for instance let's talk about the environmental issues. They haven't created all these environmental problems, it's the fault of this and the previous generations. Yet, we expect these students to solve these issues. The question that arises here is –whether we are we preparing these students to be problem solvers.

We have the future of Pakistan sitting in our classrooms today. What are we doing for them? It's now or never. We must take some serious steps to bridge the gap and schools can best prepare the students for their future careers by adopting blended learning model to help students develop the essential 21<sup>st</sup> century skills.

### 2. Blended Learning

What is blended learning? If you think about the traditional classroom environment on one end of the spectrum and on the other end of the spectrum is the student learning at a computer at home. Blended learning is somewhere in the middle. (See Figure 1.1) The literature review suggests that there is no one definition on blended learning. However (Connection 2013) defines it as a computer-mediated instructional strategy that leverages technology and focuses on the student-teacher relationship to enhance independence, engagement, and achievement.

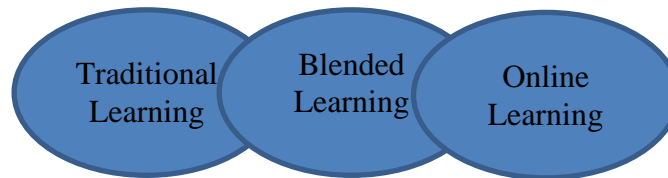


Figure 1.1 Blended Learning

Moreover, in blended learning; blending not only includes technology but real life experiences too. As the word indicates it is a blend of Teacher Led Instructions by face to face interactive session, Web Based Assessments through feedback, reflection, outcomes, Computer Mediated Instruction i.e. digital, Visual, e-learning and Printed Instructions using traditional study material. See figure 1.2

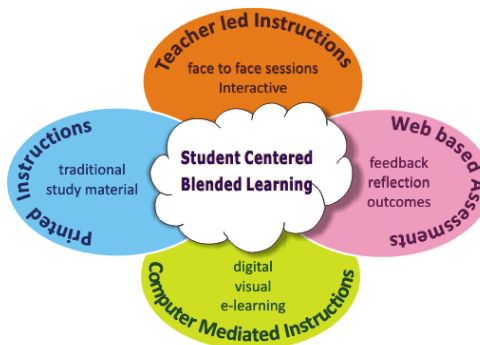


Figure 1.2 Blended Learning Web (Taken from Google images)

### 3. Research Design

A mixed method approach was used in this study. This method was used to provide more depth in the research by implementing more than one research methods such as pretest and posttest research design (quantitative) along with, interviews and non- participant observations (qualitative).

#### 3.1 Participants

Local private schools from Lahore were selected. These private schools were selected because they had well equipped computer labs and other resources such as multimedia and media rooms. The permission to conduct research was acquired from the administration of these local private middle schools, grade 6-8, based in Lahore. Each school had 9 sections of grade eight. A total of 150 students participated in the study.

#### 3.2 Sampling Procedure and Data Collection Sources

The experimental and control group each comprised of 75 students, making a total sample size of 150 students. Teaching methodology is the (independent variable) X, while students' learning is (dependent variable) Y. Students' demographics were same. Each group had equal number of boys and girls. Sampling was random, because there is likelihood to find representatives of each kind in the sample. After conducting the post-tests, the researcher collected the answered sheets, and compared their scores with pre-tests scores. This comparison allowed him to compare the conventional methods (lecture and face to face teaching only) with blended model (face to face, along with simulation, games, email, blogs, Facebook, twitter, Edmodo and any blend according to the need). Further, detailed statistical analysis was conducted for data analysis.

#### 3.3 Data Analysis Techniques or Statistical Tests

In order to analyze data and calculate different statistics the most widely, commonly and comprehensive computer software in social sciences, SPSS has been used. In this comparative study the researcher has

specifically used mean, standard deviation, paired t- test for testing the assumptions, p value, correlations etc. Some graphical representations are also included like Histogram.

## **4. Results**

### **4.1 Control Group**

The participants in this group were taught selected science topics for three months by using traditional teaching or conventional methods (lecture and face to face teaching only). Before the start of the teaching, they were given a pretest based on 20 multiple choice questions and later were given a posttest to solve. The data was collected. The software generated the mean of the pretest of the control group as 8.31 with standard deviation of 2.80 indicating that from the sample of 75 students who participated and took the test most of the students scored 8 marks out of 20.

Similarly, the researcher got the results from the posttests of the same control group. The mean obtained based on the data, showed mean as 7.18 with standard deviation 2.88 indicating that the most of the students scored 7 marks out of 20.

### **4.2. Experimental Group**

This is the other half of the total number of students. The participants in this group were selected from the local private schools in Lahore. These students were selected for the treatment. Prior the treatment, these students were also given a pretest like the control group students. After the pretest the same 75 students were taught for three months by the trained blended learning teachers following the blended model (face to face, along with simulation, games, email, blogs, Facebook, twitter, Edmodo and any blend according to the need). The results of the experimental group pretest showed mean 8.16 and standard deviation as 2.033. Which means most of the students scored 8 marks out of 20 on the pretest.

Similarly, the researcher got the results from the posttests of the same experimental group. The mean obtained based on the data, showed mean as 7.50 with standard deviation 2.72 indicating that the most of the students scored 7 marks out of 20. The experimental group students are the ones who were given the treatment of blended instruction. The p-value of the correlation (0.006) also indicates that it is highly significant at 5% as compared to the control group value (0.845) which is non- significant at 5%.

### **4.3 Participation of Students**

When asked about the Blended teaching experience, all the four teachers said the students had a lot to say even a simple answer and question session would turn into a discussion as everyone had something to say. They were very excited because of the exposure to technology. One teacher said their exposure to technology is more than ours. At times the children don't wait for the teacher to involve them in a constructive discussion.

### **4.4 Enthusiasm**

Teachers gave their feedback. One teacher said, that it was difficult using the traditional method. No doubt the interest in the subject is there but they can't probably express it, because the teacher does not encourage questioning. Students from traditional classes only talk when asked to. Whereas in the blended class they are hard to stop from asking questions as they know that the teacher will listen to them. This makes the lesson much more interactive with the students actively participating. One teacher shared an example that in one of her classes, while discussing something a student asked a question, and the students instantly responded by suggesting to the teacher that they could search for the answer online. The teacher further said, this is what exposure of technology and blended environments can do to students' enthusiasm towards learning.

### **4.5 Attitude towards Using Blended Learning**

When teachers were asked whether they would continue using blended learning as a teaching mode there were mixed responses. Two teachers were very confident and said yes, out of personal interests. While others also showed determination but with some constraints. For instance, two teachers demanded a clear policy on blended learning, proper training and adequate technological resources. One teacher said he would happily implement it if institutional support is provided.

#### 4.6 Perceived Usefulness

When teachers were asked about how they perceive to be the benefits of using blended learning, they responded that it was time saving and especially beneficial for large classes as it helped reach a large group of students in a short time. A few teachers also indicated since access to electronic resources is flexible – accessibility of learning resources are available at all times. One teacher said it promotes student independence and also creates opportunities for networking.

#### 5. Conclusion

This research represents an initial attempt to compare the effectiveness of two different pedagogies, traditional and blended learning. Findings emanating from the study indicated that students who were taught with the blended learning model had better scores than those who attended traditional instruction. The test results are in agreement with (Dr. M. A. Omiola 2012, 42), who also argued that participants in the treatment group or blended learning environments showed more mean results and hence we can deduce that such blended environments have the potential to strengthen the core of teaching and learning, to provide the student with enough opportunities to learn in a fun way. This is a very important finding and the results also shows that students were not only enjoying the blended environments but it also lead to critical thinking. The classroom discussions and activities encouraged in the blended classes encouraged students to think critically and their higher order thinking questions reflected the interest developed towards the subject. The study finding is also consistent with other studies in the literature which indicated that student performance in blended courses was equivalent or slightly superior to traditional courses (Nikolaos Vernadakis 2012, 441), (Adem Uzun 2010, 202), (Ümit YAPICI 2012, 233) and (Ibrahim Yasar Kazua 2014, 184). The approach of blended learning as a teaching model is currently gaining more and more recognition and acceptance and thus appears as an alternative teaching approach that help students improve their performance. Overall, the findings reinforce the view that a blended learning environment promotes student-centered learning and critical thinking by giving the opportunity and providing a conducive environment where students take more responsibility for their learning and increase the involvement and participation necessary for such learning.

Based on the results, blended learning may be used as an effective way to deliver good quality instruction as it gives educationalists and students a technology based on ramp to student achievement and richer and more rewarding learning experiences in a fun way.

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