Impact of Blended Learning on Teaching and Learning of Physics: Teachers' and Students' Perception at Secondary Level

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Abstract

The purpose of this research paper was to ascertain the Teachers' and students' perception of using Blended Learning (BL) in physics subject at secondary level. This objective was split into four sub research questions in order to gain the results of the study precisely. For this purpose an experimental study was conducted at public sector High School No.1 (Boys) Tordher of District Swabi Khyber Pakhtunkhwa (KPK). A short BL training was arranged for teachers and students of grade 9 (science group). Altogether 4 teachers and 120 students participated in this experimental study. Four groups i.e. Group A, B, C and D of students were formed and assigned one teacher to each group. After completion of the course, the teachers' and students' perception of BL was assessed through two different questionnaires and interviews. The statistical tools, mean and standard deviation were used to analyze the quantitative data. These results were then validated by the data achieved from interviews. Mostly, teachers' and students' perception was found positive except some technological issues and problems that were faced during application of BL.

Key words: Blended Learning (BL), Blended Learning Models, Impact of Blended Learning, Teachers' Practices, Students' Learning Experiences.

Introduction

The opportunities of gaining learning experiences anytime and anywhere became possible through online instructions (Temizel, 2018). In the views of researchers (Graham, 2006; Hannafin, 1984) BL approach integrates the experience of online and face-to-face instruction. Both modes of education possess the influential aspects of students' academic performance. For instance, personality traits (Noftle & Robins, 2007; O'Connor & Paunonen, 2007) and motivation (Brackney & Karabenick, 1995; Credé & Phillips, 2011) have a momentous function for students' academic achievements. Alongside this, training materials, pedagogies

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and students' learning approaches are the other noteworthy predictors of educational concert (Akkoyunlu & Soylu, 2008; Kim, 2013).

The authors like Bauger et al., (2003); Biktimirov & Klassen, (2008); and Wilson, 2003) suggested that higher accessibility to instructional notes increases students' course grades (Temizel, 2018). That is the reason that BL enhances learning by expanding access to online materials uploaded by a number of teaching experts from any part of the world, anywhere, anytime, and to those resources which remain normally out of the access. It reduces costs paid for instructional activities, making curricula standardize manually and mixing the rigid traditional classroom activities with the online interactive contents. There are number of examples exist in the previous research papers that BL is being used successfully in developed countries and is now gripping in developing countries across the globe (Isman, 2008). This study will investigate the impact of BL on teaching and learning of Physics, as perceived by teachers and students, at secondary level. Keeping in view the characteristics and usefulness of BL, this study will make contribution in enhancing teachers' teaching skills and students' learning capabilities in physics at secondary school level education. For this purpose, the following four research questions were framed.

Research Questions

i. What is the impact of BL training on teachers' experiences of teaching?
ii. What is Teachers' perception of BL?
iii. What is the impact of BL training on students' learning of physics?
iv. How do students' perceive BL?

Statement of the Problem

In order to build a practical framework for using BL at secondary level education, the Education Ministry of KPK started projects to train the Elementary and Secondary School teachers using BL approach through intensive induction program (Ameen, 2018). This provided a gape to researcher to research to find out the impact of BL on teaching and learning of Physics in the light of the perception of secondary school's teachers and students, so that it may be applied for successful schooling.

Review of Literature

BL Concept

The researchers concluded that designing of flexible courses were necessary (Delfino & Persico, 2007) for the incorporation of f2f and online techniques. The previous research studies indicated the instructive characteristics of f2f and online classes when evaluated through students' perception (Wuensch et al., 2008). These researchers concluded that online

classes were far superior to that of mere f2f classes. The reasons deduced were superiority, convenience and allowance of self-pacing to prove the inferiority of f2f learning. These two formats possess their own potencies and flaws (Alonso & Blázquez, 2009). The main purpose of finding the potencies of each format is to reduce the weaknesses of either of the two formats and using these strengths for effective education. This concept leaded towards the mix of both f2f and online instructional approaches and affirmed the declaration of the expression "Blended Learning". In the same vein Berger et al., (2008) also discussed that despite of dissimilar role of traditional and online approaches these two formats are corresponding to one another. Chew (2008) also considered BL as a grounding area to develop a mixed method for effective teaching. In contrast, the findings of the study of Jackson and Helms (2008) revealed that the mix of online and f2f format does not diminish the weak points of each other.

Blended learning contains the insertion of online materials into appropriate techniques and means of face-to-face (f2f) classroom method of teaching/learning a subject (Gomes, 2014). Apart, the students' distinctiveness, online materials and instructor's expertise are considered the key factors for a productive BL environment (Larson, 2012). Herb (2013) also stressed upon the amalgamation of digital applications (online discussion forum, electronic mail, web environment, social media, conversational applications) for offering the course partially instead of delivering course in a group. He mentioned few obstacles in online instruction such as inadequate interaction of teacher-student or peer-peer and hence leads to lack of communication and poor bonding sense between the teacher and students. This impediment is overcome through "Hybrid" or "Blended Learning" concept which included of both information and communication technologies (ICT) and f2f (Shantakumari and sajith, 2015).

The above views, both in supportive and in oppose, about potencies and flaws of the two formats, it can be concluded that BL combines the strengths of f2f and online approach and convert the weaknesses of one format with the strength of other. Majorities of the studies distinguished the online from traditional approach of study but fall short to scrutinize the distinguishing features analytically. Melisa et al., (2015) isolated their studies mostly in support of pedagogical technologies on the basis of the following three attributes.

(i) A flexible approach for students' learning.

(ii) An instantaneous and up to the mark source of feedback.

(iii) Use of instructional matter for ever-increasing of students' contribution and commitment.

These researchers examined that students learnt twice in BL environment consuming the same period of time and devoid of escalating the load of work, to the quantity of contents learnt in traditional approach only. The researcher further stated that BL had combined the advantages of both f2f and online pedagogical approaches.

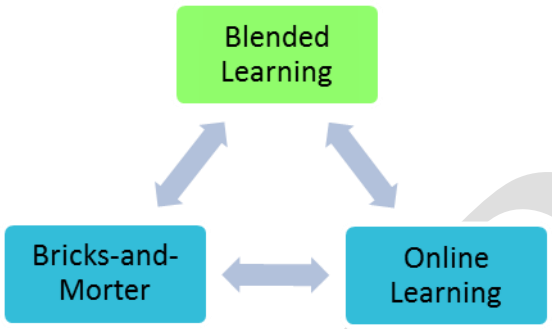

Figure 1: Sketch of BL

For more precise use of BL approach the researchers develop different kind of blended learning models which are discusses in the following section.

BL Models

Three BL models have been developed (Valiathan, 2013). These are namely (i) Skill-driven learning; (ii) Attitude-driven learning; and (iii) Competency-driven learning. Similarly Graham et al., (2014) delineated few important BL models. He categorized these models as (A) Model higher education, (B) Model of K-12 education, and (C) Model of corporate trainings. Hui (2016) enlisted the following six profiles of emerging BL models (Staker & Horn, 2012) in her research work and were commenced at secondary level education. Briefly, these models are:

i. Traditional (f2f) Model: Teacher remains in interaction with each student inside the classroom, whereas using online instruction for correction or reinforcement.
ii. Model Rotation: In rotation model students rotate between the online and classroom environment.
iii. The Flex Model: Primarily, this model delivers course contents through online approach and instructor scaffolds by using face-to-face approach.
iv. Online Laboratory Model: This model is used for delivering the contents using online approach in f2f classroom whereas the activities are arranged in computer laboratory.
v. Self-blend Model: This model allows students for deciding and selecting the learning contents, supplementary to the course work offered by their school, on their own.

vi. The Online Driver Model: This model allows keeping the online activities as a primary source for course delivery while physical facilities remain secondary for mere extra-curricular activities, check-ins, or assimilated purposes.

As long as the use of BL models concerns, the Rotational, Flex, A La Carte, and Enriched Virtual Model have been considered useful at secondary education. The Rotational Model further split into four associate models namely Station Rotation, Lab Rotation, Flipped Class Room and Individual Rotation model (Gomes, 2014).

BL Rotational Model (BLRM)

The previous studies suggested that BLRM had been the best-fit for using at secondary level education (Staker & Horn, 2014). It consists of the following four types of sub models:

i. Station Rotation: In this type of model, students are rotated according to a fixed timetable, during teaching or learning of course modules, depended on teacher's prudence but at least one of the learning modalities need to be offered online. The other modalities consist of traditional learning activities such as full class or group instruction, project completion method, individual tutoring, and writing assignments on paper etc. The station rotation can take place between a single classroom and more than one classroom.

ii. Lab Rotation: Lab Rotational model is a bit different from Station Rotation. The only exception is the students' rotation to a computer laboratory for online learning.

iii. Flipped Classroom: This type of model allows the students to participate off-site while learning on-line instead of conventional homework and go to school for f2f teacher-guided activities and assignments. Actually the contents are delivered online which distinguishes the Flipped Classroom from that when students merely do homework practice online.

iv. Individual Rotation: A course or subject, in which each student has an individualized playlist, does not necessarily rotate to each available station or modality. An algorithm or teacher(s) sets individual student schedules.

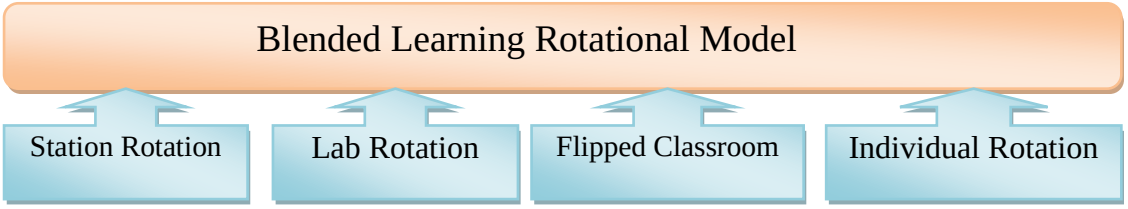

Figure 2: Best-fit Blended Learning Rotational Model at Secondary Level

Methodology

This experimental study was conducted by adopting concurrent embedded technique for data collection following explanatory sequential approach of mixed method design (Creswell, 2014) to ascertain the required results. Altogether, there were 120 science students in grade 9 and 4 science teachers at Government High School (GHS) No.1 (Boys) Tordher district Swabi of KPK. All were selected for participating in this experimental study. Sampling technique and group formation was as under.

Sampling Technique and Data Collection Tools

Purposive sampling and Convenient sampling techniques of Non-probability sampling were adopted for this experimental study. The sampled school GHS No.1 Tordher was selected on purpose because of easy access, facilitated with Information and Technology (IT) lab, and enough science teachers and students for participating in the study. All, 120 students and 4 science teachers were selected to participate in the study for ascertaining enriched information about the use BL approach. No control group of students was formed because the same students were already studying in traditional classroom setting. All the participants have gone through the traditional method but BL environment was an innovated approach for them. Two separate questionnaires, contained modified items of WEBLEI (Web-Based Learning Environment Instrument) questionnaire of Larsen (2012), were used for collecting data about teachers' and students' perception where as five students from each group were interviewed randomly, for collecting qualitative data. Two semi-structured interview lists were developed separately for Teachers' and students' interview. The participants were divided into four groups as following.

Table 3.1

Group Formation of Participants of the Study

S.NO	Teachers' Name	Students Per Group	Interview Students
1.	Teacher-A	30 (GROUP A)	5
2.	Teacher-B	30 (GROUP B)	5
3.	Teacher-C	30 (GROUP C)	5
4.	Teacher-D	30 (GROUP D)	5
Total	4 Teachers	120(4 Groups)	20

Reliability and Consistency of the Date Collection Tools

i. External

The original questionnaires WEBLEI of Larsen's (2012) were altered with the consultation of research experts in the department of education Abdul Wali Khan University Mardan. According to their suggestions items were reworded or rephrased with the help of the appropriate synonyms, without affecting the actual aim of the statement.

ii. Internal

The internal reliability and consistency of questionnaires were find out by using cronbach alpha, which shows α=.88 for teachers' and α=.70 for students' questionnaire, indicating that the items of the questionnaires were reliable and consistence internally as well.

Table 3.2

CronbachAlpha

Questionnaire No	Cronbach Alpha Based (α)	Cronbtach Alpha on Standardized Items
Teachers' Questionnaire	.886	.882
Students' Questionnaire	.706	.726

Experimental Procedure

The website "Sabaq Foundation" was selected for online teaching and learning by using BLRM. The main focus remained to integrate technology in traditional approach for teaching and learning physics in BL.

Data Analysis

Two types of five points-based likert scales were selected to measure the data, such that (i) Strongly disagreed (ii) Disagreed (iii) Undecided (iv) Agreed (v) Strongly Agreed, was used to measure the data about impact of BL, students' perception whereas and (i) Very Difficult (ii) Difficult (iii) Not Difficult/Easy (iv) Easy (v) very easy was used the data regarding teachers' perception of BL; allowing the author to apply descriptive statistics, mean and standard deviation, for analyzing the measured data. These results were then validated through interviews of the participants following general inductive approach (Thomas, 2006) for analyzing the qualitative data gained through interviews. This approach helped in deriving the codes from the data and arranging these codes on the basis of resemblance to develop the ultimate themes for data interpretation where ever necessary.

Results

RQ 1: What is the impact of BL training on teachers' experiences of teaching?

The results of items 1,2,3,4,6,7, and 8 of table 4.1 revealed that BL course had positive impact on teachers' experiences as mean ratings of the items are about 4 on five-point likert scale, indicating that the participants are agreed with the statements. The only exceptional case found was the low mean rating of item 5, this course encouraged me to use BL in teaching of other subjects (M=3.25, SD=0.67) indicating that teachers are uncertain about the statement.

Table 4.1

Impact of Blended Learning on Teachers' Experiences

S.N0	Statements	N	M	SD
1.	I felt pedagogically prepared to teach the course contents in BL	4	4.75	0.50
2.	BL pedagogical support was quite helpful throughout the course	4	4.00	0.00
3.	BL environment technically felt me prepared for teaching of Physics	4	3.75	0.95
4.	Technical support was provided during the BL course	4	3.50	1.73
5.	This course encouraged me to use BL in teaching of other subjects	4	3.25	0.67
6.	MY teaching style matches well with blended BL	4	4.50	0.57
7.	The online activities worked well	4	4.75	0.50
8.	The classroom activities worked well	4	4.50	0.57

RQ 2: What is teachers' perception of BL?

Items 1, 2 and 3 of table 4.2 received mean ratings about 4 on 5-points scale, indicating that getting technical support, online activities, and classroom management activities were easy for teachers. The only exception in this case is item 4 having mean about 2, meaning integration of online and classroom activities were difficult for them (M=2.25, SD=0.50).

Table 4.2

Teachers' Perception of BL

S.No	Statements	N	M	SD
1.	Getting technical support was…….	4	3.50	1.73
2.	The Online management activities in BL environment were….	4	3.50	1.73
3.	The management of classroom activities in BL environment were.	4	4.25	1.50
4.	Integration of online and classroom activities were...	4	2.25	0.50

The questions posed for conducting teachers' interview, are given in the following table.

Table 4.3

Interview Questions asked from Teachers

S.No	Questions
1.	What is your opinion about teaching in BL?
2.	What activities have found you found difficult during this BL course?
3.	What are the technical problems that one can face during teaching in BL?
4.	What are the advantages and disadvantages of BL course?

When teachers were interviewed in connection of statements, stated in table 4.1 and 4.2, they mostly commented positively, sharing that BL approach was supportive in teaching of Physics. When teachers were asked, what are their opinions about teaching in BL environment? Teacher-D stated,

"I found BL supportive in enhancing my teaching skills by facilitating me to exhibit the practical experiments in science lab through online materials.

These statements affirm the high mean rating of item 1 and 2 (table 4.1) stating I felt pedagogically prepared to teach the course contents in BL (M=4.75, SD= 0.50), and that BL pedagogical support was quite helpful throughout the course (M= 4.00, SD= 0.00). Teacher's these comments also explain the reason of high mean rating (M=4.25, SD=0.50) of item 3 (table 4.2) stating the classroom management activities.

When it was asked, what activities have you found difficult during this BL course? Two teachers A and B, pointed out some difficulties they had faced during application of BL such as low quality internet services, poor access to internet, technologically non-equipped class rooms, lesson planning to create a BL environment, maintaining students' interest in BL. These comments explain that why item 2 (table 4.2), management of online activities in BL environment was…….. (M=3.50, SD=1.73), were rated with moderate mean scoring above 3. Teachers' these statements also confirm the low mean rating of item 4 (table 4.2), integration of online and classroom activities were…. (M=2.25, SD=0.50).

Different statements were recorded in terms of difficulties faced by the teachers during teaching in BL environment, such as Teacher-C said that planning for mixing of traditional classroom and online learning was harder in a balanced way. Similarly Teacher-A commented,

"The thing harder for me is to figure out the connectivity of lab and classroom activities."

But Teacher-B said that regular practice enabled him to overcome this difficulty. That is the reason that the mean of item 3 and 5 (table 4.1), BL environment technically felt me prepared for teaching of physics (M=3.75, SD=0.95) and this course encouraged me to teach my other subjects in BL environment (M=3.25, SD=1.09), received the low scoring rate.

Teachers also put light on the advantages and disadvantages of this BL course. When it was asked from Teacher-C, why would you like to teach in BL environment? He said,

"When I studied the contents of each topic in the book by traditional way, went online, watched videos on them, and then did a short practice, it really worked and felt me like it was my normal way of teaching.

These expressions explain informatively the causes of high mean ratings of items 8, 7, and 6 (table 4.1) stating, the classroom activities worked well (M=4.50, SD=0.57), the online activities worked well (M=4.75, SD=.50), and that my teaching style matches well with BL (M=4.50, SD=0.57). The reasons outlined behind disadvantages of using BL were mostly technological issues such as non availability of enough computers, non-accessibility or poor accessibility to internet, electricity short fall, and slow working technological devices. These concerns of teachers confirm the moderate mean rating of item 4 (table 4.1) and item 1 (table 4.2), Technical support was provided during BL Course (M=3.50, SD=1.73) and, getting technical support was…… (M=3.50, SD=1.73). Teachers of Group A and D also pointed out distraction in BL environment by easy access to irrelevant websites.

RQ 3: What is the impact of BL training on students' learning of physics?

It was found from results of table 4.4 that items 1-8 received mean ratings above 4 on 5-point likert scale, showing most respondents were agreed with the statements.

Table 4.4

Impact of BL on students' learning

S.No	Statements	N	M	SD
1.	Learning in computer laboratory was fruitful	120	4.33	0.61
2.	This course improved my learning skill	120	4.26	0.95
3.	The course improved my practical skill	120	4.13	0.93
4.	Integration of online and classroom activities worked well.	120	4.57	0.81
5.	BL has met my learning objectives	120	4.66	0.78
6.	The Online activities helped in learning	120	4.62	0.59
7.	I liked to learn my science subjects in BL	120	4.60	0.84
8.	Learning in BL environment felt me sense of contentment	120	4.47	0.96

RQ 4: How do students' perceive BL?

The results of table 4.4 reveals that items 1-7 received mean ratings about 4 on 5-poin, revealing most of students are agreed with the statements. The only exception in this pattern is item 8 scoring mean ratings about 2, meaning most of the participants are disagreed with the statement that, I felt bored during BL course (M=2.47, SD=1.46).

Table 4.5

Students' Perception of BL

S.N o	Statements	N	M	SD
1.	The on-line activities were motivating	120	4.72	0.59
2.	The class room activities were motivating	120	4.42	0.96
3.	Online activities were accessible at time convenient to me	120	4.09	1.12
4.	The online materials were existing at appropriate location	120	4.53	0.91
5.	I had the opportunities to work at my own speed	120	4.39	0.96
6.	I felt bored during BL course	120	2.47	1.46

Following table 4.6, contains the questions posed for interviewing the students based.

Table 4.6

Interview Questions Asked from Students

S.No	Interview Questions
1.	What are the advantages and disadvantages of using BL in Physics?
2.	Where did you like to work more actively in the class room or in the computer lab? Why?
3.	Why have you been studying in BL environment?

When students were asked, what are the advantages of using BL in physics? Three students of group B, and two each of group C and D deemed that the main advantage of BL was, accessing to learning materials which comparatively consumed less time, and lessened their load of course books that was supposed to be carried on daily basis. Similarly three students of group C shared their views that learning through computer assisted them in preparation for evaluation and assessment. Another student of group A commented,

"When you read the contents in your experiment note book and then watch them practically in the computer lab, it is not only productive in demonstrating the experiments but also enhance the learning skill . I would like to be taught my other science subjects in BL environment."

Students' these views supported the mean ratings (table 4.4) of item 1, learning in computer was fruitful (M=4.33, SD=0.61); item 2, this course improved my learning skill (M=4.26, SD=0.95); item 3, this course improved my practical skill (M=4.13, SD=0.93); item 4, integration of online and classroom activities worked well M=4.57, SD=0.81); item 5, BL has met my learning objective (M=4.66, SD=0.87); item 6, the online activities helped me in learning (M=4.62, SD=0.59); item 7, I liked to learn my science subjects in BL environment (M=4.60, SD=0.84); and item 8 that learning of physics in BL environment felt me sense of contentment (M=4.47, SD=0.96).

But alongside the positive aspects, students also mentioned some disadvantages of using BL. For example two students from group A, three from C, and two from D described that some time effortless deviation from the course contents to amusement webs unfocused them from their learning goals.

When the students were asked, where did you like to work more actively: in the classroom or in computer laboratory?" Three students of group A, three of group B, two of group C, and one of group D liked both the computer lab and classroom activities because, the online approach enabled them to find out the most recent contents related to their course while classroom environment provided the opportunity of f2f discussion. These comments explain the cause of high mean ratings of items 1, and 2 (table 4.5), the online activities worked were motivating (M=4.72, SD=0.59), and that the classroom activities worked were motivating (M=4.42, SD=0.96)

Students shared their views in term of studying in BL environment stating that they were able to work on their own pace and well. They had the opportunity to access the relevant materials at appropriate time and location. For instance a student of group C described,

"Working online is more convenient, you can work on your own pace and speed, and it's a sort of more individual work because you don't have to wait for others."

These findings explained that why item 3, 4 and 5 (table 4.5) achieved the mean score above 4 describing, online activities were accessible at time convenient to me (M=4.09 SD=1.12), the online materials were existing at appropriate locations (M=4.53, SD=0.91) and that I had the opportunity to work at my own speed (M=4.39, SD=0.93). Most students commented that BL was helpful and maintained their interest in learning of physics which explains the cause of low mean rating of item 8 (table 4.5) indicating that I felt bored during BL course.

Discussion

Impact of Blended Learning on Teachers' Experiences

The result section of this research paper indicates that blended learning had positive impact on teachers' practices and experiences. They found BL supportive in the enhancement of their teaching skill and facilitated them in demonstrating the practical experimental work. They pedagogically prepare (M=4.75, SD= 0.50) and found it quit helpful throughout the course (M=4.25, SD=0.50). Teachers felt technically prepared to teach physics (M=3.75, SD=0.95) in BL environment and determined to use BL in other science subjects (M=3.25, SD=1.09). They revealed that studying each top in the book in traditional classroom environment, and then watching online stuff related to their course contents, really worked. More interestingly, they found it matching with their own teaching style (M=4.50, SD=0.57). The results further showed that both the classroom activities (M=4.50, SD=0.57) and online activities (M=4.75, SD=.50) worked well in BL environment.

Apart from the positive aspects, teachers also indicated few technological issues faced during BL course for instance, easy access to entertainment applications and websites diverted their attention from actual cause of learning. In this regard there was lack of technical support during BL course (M=3.50, SD=1.73).

Teachers' Perception of BL

Mostly teachers perceived moderately but positively in respect of BL. The reasons behind this were mainly few technological issues such as non provision of enough computers in the lab, poor accessibility to internet electricity short fall, and slow working technological devices obstructed their activities during BL. That is the reason they gave careful, moderate but positive opinion BL stating that getting technical support (M=3.50, SD=1.73) was comparatively easy and as result were not quite sure about managing the online activities (M=3.50, SD=1.73 while management of classroom activities was (M=4.25, SD=1.50) easy for them. Another difficulty that they faced was the mix of classroom and online activities with that of the classroom activities and therefore they found difficult to integrate the online and classroom activities (M=2.25, SD=0.50). But it was found that regular practice had resolved this issue.

Impact of BL on Students' Learning in Physics

The results evidenced that BL had mostly positive impact on students learning. The causes of this positivity were mainly considered accessing to online learning materials comparatively in less time than that searching manually in the libraries. It was also noted that BL lessened the heavy load of the course books that was supposed to be carried on daily basis. Similarly

merging of learning through traditional classroom and online activities worked well (M=4.57, SD=0.81). Resultantly students ability of learning was improved (M=4.33, SD=0.61). The students believed that BL course had enhanced their practical skill (M=4.26, SD=0.95) of demonstrating the experiments whereas online activities helped them mere in learning (M=4.62, SD=0.59) the contents and that is why they felt a sense of contentment (M=4.47, SD=0.96). The results indicated that student became able to achieve their learning objectives (M=4.66, SD=0.87) through BL approach. These utilities of BL encouraged students to learn their other science subjects in BL environment (M=4.60, SD=0.84).

Students' Perception of BL

The results evidenced that most students had positive opinion regarding BL except some minor but controllable issues such as effortless deviation from the course contents to amusement webs unfocused them from their learning goals, and complaint in respect of not having enough proper access to internet. Students liked both activities inside traditional classroom environment (M=4.42, SD=0.96) and online (M=4.72, SD=0.59) as they believed that both were motivating. They explained that online approach enabled them to find out the most recent contents related to their course while classroom environment provided the opportunity of f2f discussion with teacher and other peers. The results ascertained that BL provided students the opportunity to work on their own pace (M=4.39, SD=0.93) and well (Larsen, 2012). Similarly they found that online activities were accessible at time convenient to them (M=4.09 SD=1.12) and the materials were existing at appropriate locations (M=4.53, SD=0.91). These results confirm the claim of Larsen (2012), Chang & Fisher (2003), Fisher & Chandra (2009), Sagarra and Zapata (2008), that BL felt students easy to approach the on-line course materials. It is also discovered from results that BL was helpful and maintained their interest in learning of physics. This description justifies the suggestions of Kaleta et al., (2007) that online and traditional classroom activities must be blended for creating interest in the students. This is the reason that most students disagreed with the statement that got bore during BL.

Conclusion and Recommendations

It is concluded that BL have positive impact on teachers' experiences and students' learning activities in the sense that it enhances teaching and learning skill at secondary level. Mainly, BL motivated both teachers and students in terms of classroom activities as well as online activities. It is also concluded that BL course had improved pedagogy, endowed with better access to additional relevant contents. These findings confirm the conclusions of prior research studies, carried out by Osguthorpe & Graham (2003), Dziuban et al. (2007),

Coryell & Chlup (2007), Kaleta et al. (2007), Hubbard (2008) , Fisher and Chandra (2009), and Gottlieb (2015). Teachers' and students' perception of BL were moderate due to some technical issues such as poor access to internet, electricity short fall, shortage of computers in the lab, and effortless diversity towards the entertainment websites obstructed their activities during BL. Apart, lesson planning in BL, integration of online and classroom activities, was difficult for the teacher.

For successful BL environment, good pedagogical and technical support is recommended both for teachers and students. It is suggested that teachers allow themselves enough time to practice and get mastery in preparing materials for BL activities. School administrators should make efforts for allocation of technological devices in the classrooms for employing BL approach. Students' supervision must be carried out during their lab activities to keep them on track and to make sure they were not distracted. The findings of this research study suggest that more studies should be conducted in future by increasing the number of teachers and students from different schools in order to achieve a better statistical data.

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