A Study on the Student Experiences in Blended Learning Environments

R.K. Kavitha, W. Jaisingh

Abstract- In recent times, teaching and learning methods have a direct impact on students' learning experiences. Blended learning is a combination of face-to-face and online delivery methods which influences students' perceptions on the learning environments to a great extent. Learning analytics is a growing trend at all levels of education. The objective of the paper is to examine the student's experiences in blended learning environments. Relevant data has been collected from undergraduate and postgraduate students who are exposed to a blended learning environment while learning programming subjects. Learning analytics has been applied on the collected data. It can be inferred from the results that the blended learning approach is more beneficial for students who are skilled in using certain computer programs and applications. The study results also provide new insights into the student preferences for learning in such knowledge sharing collaborative environments.

Keywords - Blended learning, Learning analytics, Collaboration, Knowledge sharing.

I. INTRODUCTION

The fame of the Internet have formed terms like online learning, e-learning, blended learning etc. in the field of education. Several research studies have been conducted throughout the world to study the impact of these techniques on learning outcomes of student community. Blended learning has gained popularity nowadays and is used in many Indian universities and educational institutions. Blended learning combines the traditional classroom learning where a teacher teaches the student face-to-face and the self contained online learning. Blended learning is achieved by the combining different delivery modes, teaching models and learning styles effectively. Success of blended learning depends on various aspects like quality of the course materials, mindset and ability of the students to learn in such interactive environments, ease of the tools and learning environment. Blended learning is influenced to a large extent by student's attitude to the work on a given task. This paper aims to review the student perception of blended learning in a computer programming course.

II. REVIEW OF LITERATURE

Many experiments have been conducted in various schools and universities so far to analyze the efficiency of blended learning environments.

Various metrics like enhanced learning, use of technology, awareness of technologies were considered [11][8][9][13]. The study outcome reveals that students who used blended learning strategies benefited from the information and communication technologies [12][10].

Chen and Jones studied the students' evaluation of course effectiveness and overall satisfaction of both traditional and blended courses [2]. Research results specify that students learning in a traditional setting were happier and fulfilled with the lucidity of instruction. Whereas, students learning in blended environments appreciated and benefited more in analytical skill development. Akkoyunlu and Soylu examined the students' views on blended learning with respect to their learning styles [3]. The students' views were found to be positive.

Chandra and Fisher measured the high school students' perceptions of a blended web-based learning environment [4]. The findings exposed that web-based learning environment was more suitable, reachable, promoted independence of learning and positive interactions. Donnely conducted a study on the communication among the university students in a blended problem-based learning atmosphere [5]. The study revealed that technology driven exchanges yielded positive results. It was observed by López-Pérez et. al that blended learning reduced failure rates among students [6]. Another study indicated that blended learning's ease and flexibility is ideal among the students that helped them to plan their learning (Smyth et. al., 2012). Kintu and Zhu studied the possibility of blended learning in a Ugandan University and examined whether student characteristics and background were significant factors in learner outcomes [1]. Yeh, Y. C., Huang explains the areas where blended learning is suitable, and the challenge faced by this technique like technological and organizational challenges and instructional design challenges [7].

A. Research gaps
- Few studies in Indian educational context have been reported so far in blended learning environments.
- Studies of students who work in blended environments were not conducted systematically.

Blended learning is gaining popularity nowadays. If the study confirms that the adoption of blended learning environments improves the work quality, reduces time taken to access a learning resource and increases the knowledge and programming skill, the technique can be used as pedagogy in the educational environments. Blended learning will be suitable for students in an increasingly technical and culturally diverse society.

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III. PROPOSED STUDY

The significance of blended learning was realized when students faced difficulty in accessing the study resources and to collaborate with their course instructor and other peer learners. Generally, contact hours of the students and instructor are three to four hours in a week. When they want to interact, discuss and share materials and they are not collocated, a blended learning environment comes handy for them. In order to address this particular problem, this paper attempts to study the outcomes of experiential learning from using blended learning strategies in computer programming course.

A. Study Objectives

1. To study the student's experiences in blended learning environments.
2. To assess how technology can enhance peer interaction and facilitate knowledge sharing among the students in blended learning environments.
3. To examine the effectiveness of blended learning environments in Indian educational setting.

B. Methodology of the study

Experimental research was carried out which enabled the researcher to test the hypothesis by examining the relationships between independent and dependent variables in programming laboratories. The following research hypothesis has been formulated for the study:

H0: There is no association between existing skill set of the student and the future support for blended learning environments

H0: There is no significant difference in the level of collaboration taking place among the students and faculty while using blended learning environment.

C. Study Variables

The independent variables represent the cause for the effect in any study. The effect in the research is learning efficiency and the cause is the blended learning methodology. Thus, the independent variable suggested for the research is learning methodology. A dependent variable is what we measure and what is affected during the study. The dependent variable responds to the independent variable. As per the hypothesis formulated, the dependent variables identified are level of collaboration, knowledge sharing, skill set and future support.

D. Sampling

Population is the totality of all the elements that have homogenous characteristics for the purpose of conducting a research study. Sample is a sub group of the definite target population that possesses the information for which inferences are to be made. The samples considered for the study includes both post graduate and undergraduate students who have enrolled for computer science courses. Samples were drawn from students who undergo computer science courses as a part of their curriculum. A sample of around two hundred students was considered for the study. The study has been conducted for the entire semester (i.e) a period of six months. The student-faculty contact hours were three hours per week. The faculty created a Google classroom for the course and the students were invited to join Google classroom. All sort of interactions among the students and faculty took place through this environment during non contact hours.

The technique used for the study was the questionnaire. The productivity improvement was assessed using various metrics like problem solving, knowledge sharing and communication skills. The data collected during the study was analyzed and visualized using analytical tools. Students will think critically and freely discuss and clarify their doubts while working in blended learning environments [8]. They can upload and download necessary materials and collaborate anytime anywhere. A blended learning environment helps the students to gain greater control of their work and also make them more responsible.

IV. RESULTS AND DISCUSSIONS

Appropriate statistical and data mining tools were used to analyze the collected data.

A. Correlation between variables:

The results of correlation using pearson method are exhibited in Table 1 and Fig.1. It can be observed that the highest correlation of 0.64 was found for the variables time saving and confidence and support. The next highest correlation of 0.53 was found between knowledge sharing and confidence and support and 0.52 between collaboration and confidence and support. It can be concluded from the results that blended learning environment saves the precious time of students and at the same time provides confidence and support, enables students to effectively collaborate among themselves. The lowest correlation of 0.11 was observed between the variables ICT preference and time saving. Thus just preferring to use ICT in classrooms is not going to save much time of the students.

TABLE I: CORRELATION BETWEEN VARIABLES

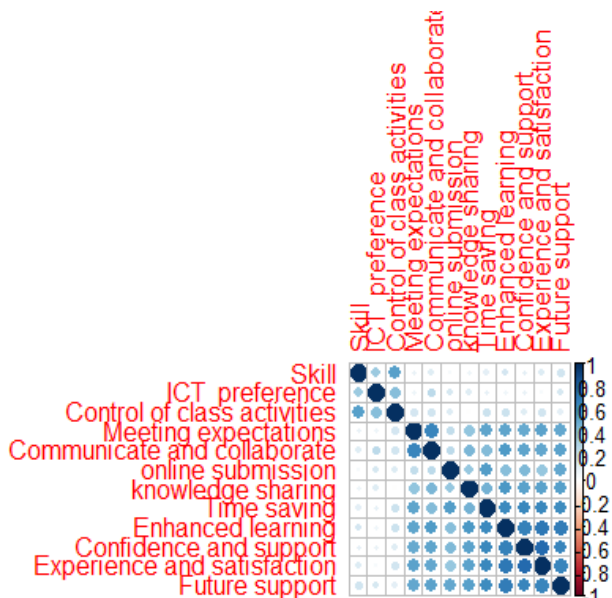|	ICT pref	collabo rate	k.shar ing	Time saving	Conf & supp
ICT pref	1.00	0.26	0.14	0.11	0.09
collabo rate	0.26	1.00	0.46	0.44	0.52
k.shari ng	0.14	0.46	1.00	0.48	0.53
Time saving	0.11	0.44	0.48	1.00	0.64
Conf& supp	0.09	0.52	0.53	0.64	1.00

Fig.1. Correlation between variables

B. Association between knowledge sharing and level of learning:

The association between skill level and future support was tested through Pearson correlation test. The test details and the results are given in Table 2. The hypothesis formulated is as follows:

H0 : There is no association between existing skill set of the student and the future support for blended learning environments

TABLE II. PEARSON'S CORRELATION BETWEEN SKILL SET AND FUTURE SUPPORT

```
Pearson's product-moment correlation

data: my_data$Skill and my_data$`Future support`
t = 2.2957, df = 134, p-value = 0.02325
alternative hypothesis: true correlation is not equal
to 0
95 percent confidence interval:
 0.02708425 0.35135762
sample estimates:
    cor
0.1945302
```

The test results of Pearson correlation tests indicates a positive correlation between skill set and future support for blended learning environment thereby eliminating the assumptions put forth by the null hypothesis. The result clearly indicates that the students possessing skills to learn in such environments will support using it in the near future.

C. Level of collaboration in blended learning environment:

One sample T-Test was used to test the level of collaboration between students and faculty in blended learning environments. The hypothesis formulated is as given below. The results of the t-test are shown in Table 3.

H0: There is no significant difference in the level of collaboration taking place among the students and faculty while using blended learning environment.

TABLE III. T-TEST RESULT

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One Sample t-test

data:  collaborate
t = 7.0367, df = 135, p-value = 4.495e-11
alternative hypothesis: true mean is
greater than 3
95 percent confidence interval:
 3.376693      Inf

sample estimates:
mean of x
 3.492647
```

The results of t-test indicate that a significant level of collaboration occurs between peer learners and the faculty handling the course in a blended learning environment.

C. ASSOCIATION RULES

Mining association rules seem to look for striking relationships among items in a given data set. It is planned to identify strong rules in databases using some measures that provides interest among users [14]. Association rules are generated by analyzing data for frequent if-then patterns and using the criteria support and confidence to identify the most vital relationships. Support is a sign of how frequently the items appear in the database. Confidence indicates the number of times the if-then statements have been found to be true. Association rules x=>y express that the occurrence of x has a positive impact on the occurrence of y. The association modeling not only helps to forecast those items that are likely to co-occur but also to envisage the intensity of relationship between them.

TABLE IV. ASSOCIATION RULES

S no	Rules
1.	Control of class activities =4 Communicate and collaborate =4 25 ==> skill level=Skilled 25 <conf:(1)> lift:(1.37) lev:(0.05) [6] conv:(6.8)
2.	skill level=Skilled Communicate and collaborate =3 Enhanced learning=3 23 ==> Meeting expectations=3 23 <conf:(1)> lift:(2.62) lev:(0.1) [14] conv:(14.21)
3.	knowledge sharing=3 Future support=3 22 ==> Enhanced learning=3 22 <conf:(1)> lift:(2.78) lev:(0.1) [14] conv:(14.07)
4.	Enhanced learning=5 Experience and satisfaction =5 22 ==> Future support=5 22 <conf:(1)> lift:(3.24) lev:(0.11) [15] conv:(15.21)
5.	online submission =5 Time saving=5 Experience and satisfaction =5 21 ==> Future support=5 21 <conf:(1)> lift:(3.24) lev:(0.11) [14] conv:(14.51)
6.	Timely announcements=5 Enhanced learning=5 Experience and satisfaction =5 20 ==> Future support=5 20 <conf:(1)> lift:(3.24) lev:(0.1) [13] conv:(13.82)
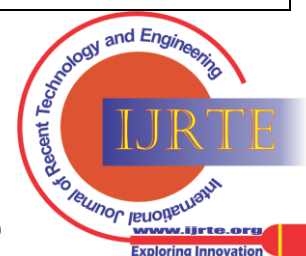
The association between the attributes knowledge sharing, control of class activities, online submission, meeting expectations, timely announcements, future support, enhanced learning, experience and satisfaction were explored by applying the apriori association mining algorithm, as exhibited in Table 4. The high level of confidence implies that the association rules have helped in arriving at certain decisions. It can be inferred from the rules that the aspects of knowledge sharing in blended learning environments and future support have a constructive influence on the enhanced learning, with a high level of confidence. Similarly the variables control of class activities, communicate and collaborate are strongly influenced by the high skill level of the student in handling the technology. Also, if blended learning environments provide support for timely announcements, enhanced learning, good experience and satisfaction for the student community, the future support for such environments will be high.

V. CONCLUSION

As the significance of blended learning has been accepted to a greater extent in current teaching and learning environments, knowledge sharing through collaborative blended environments are taken up for the study. The outcomes of the experiment conducted to employ blended learning as an instructive tool was also explored and discussed herewith. The study results has justified that blended learning environments provide possible space to develop collaborative skills for learning programming courses successfully.

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