SindhUniv. Res. Jour. (Sci. Ser.) Vol. 53 (01) 105-114 (2021)
http://doi.org/10.26692/sujo/2021.03.16
SINDHUNIVERSITYRESEARCHJOURNAL(SCIENCE SERIES)

Successful Adoption of Blended Learning Model for Programming Language Courses by Determining Effective Pedagogy and Influencing Learning Factors

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Received 13th October 2020 and Revised 24th January 2021

Abstract: This study deliver the effective and helpful educational exercise to facilitate students and learners of blended education with keys of influencing factors on students' positive view about the use of the Successful adoption of blended learning model for programming language courses in teaching and learning. The main objectives of this research is to explore students' acceptance and use of Moodle and influencing factors using Technology Acceptance Model (TAM), TAM also for evaluating the Moodle platform trendy the design of a course in programming language also utilizes Unified theory of acceptance and use of technology (UTAUT) to validate the model more effectively and to improve its sympathy with adoption and further understand the influencing factors of the model. Collected data from 45 university students' questionnaire analysis, through Likert scale exposed that 45% user satisfaction of performance expectancy, effort expectancy, and social influence is the main key influencing factors of model to evaluate the acceptance of Moodle. Behavioral intention went about as a mediator to urge understudies to include in the utilization of Moodle.

Keywords: Blended Learning, Technology acceptance model, Moodle.

1. INTRODUCTION

Blended learning is a technique of educating which aim is to connect the features of one-on-one education including the features of virtual education to produce a finest education outcome. Learning can be achieve by different ways, like face-to-face class room based learning, space or virtual learning, computer mediated learning, online learning, mobile learning or it can be in achieve in the blend of these ways. Blended learning model focused around the learning hypothesis and pedagogical methods, which incorporate online e-learning exercises and face-to-face learning exercises hip our educating. That enhances the impact of instructing, as well as improves the centre rivalry to understudies, so they can suit to the essential of social for programming building strength, usage, and its suggestions for the learning of programming designing educational module Robust learning wants students and teachers to joint into a self-motivated firm where they share the obligation for education (Karamustafaoglu, 2009). The face-to-face stage can be used to study the substantial at a profounder near and association the satisfied to wider topics (Collopy, and Arnold, 2009).

Blended Learning methodology have real pedagogy, it is the fusion of online learning and face-to-face learning methodologies which have gotten to be prominent in higher education in light of the fact that they are viable for decreasing costs, disseminating quality,

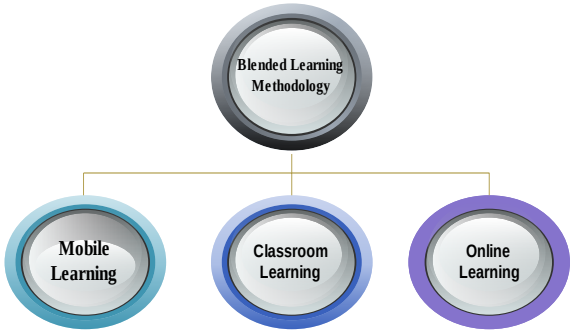

Fig. 1: Blended learning Methodology

education and tackling separation issue. The goal of blended methodology is to join top features of equally face to face and virtual teaching. Classroom interval be able to used involve academics in progressive collaborating knowledge's. Meanwhile, virtual serving of course can offer learners with multimedia rich contented at any period of day, anyplace the scholar has internet access. This permits for a rise in planning flexibility for students and blended learning method permits educators to association the essence of the feature of pedagogical applies with the cumulative convenience of existing Material and Communication Technology and right technological hardware within the teaching space. (Allen and Seaman, 2007).

Blended learning can be executed in different kind of ways, ranging from a model in which syllabus

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completely computer mediated or online with face-to-face interaction to a model in which computer mediated or online learning can be integrated to support face-to-face classroom instruction. In this rapid pace, Technology Enhanced Learning (TEL) proved as for fruitful instructional transformation, further it catalyst as progressing pedagogics in which teachers' role is not only limited to the teaching but it might be facilitator, monitor, and may provide different instructions for individual student at a single time. It increased the versatility and personalization of learning environments for students, and strategic use of technology as schools tap the learning management systems' capabilities to support a broader variety of educational programs (Eduviews, 2009).

When designing a Blended Learning Model we must be careful about the proper designing and implementation of overall instructional designs like operational pedagogy, learning styles, learning environment, learning preferences and learning strategies, the poorly designed or implemented technologies can create new barriers to participation for students with diverse learning needs. (Cook *et al.,* 2010). Conversely, designing a blended learning model on the basis of the effective pedagogy and influencing learning factors can result to not only empower students to participate as equals but the successful and sustainable adoption of the system.

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The blended model indicates learning engagement closer to the real world; effective use of learners' communication tools, important attention is paid to content design; teachers feel drawn to engage in the experience; strengthened tutoring programmes and student assistance; increased capacity to provide a broader variety of services and thus didactic responses that are additional app responses (Picciano, 2006) (Khine and Lourdusamy 2003) found that educator candidates were fulfilled by the blended approach, in light of the fact that online modules spared them time from needing to meet face-to-face and likewise furnished them with chances to enhance their insight without anyone else present. These three studies demonstrated that these blended courses enhanced instructor candidates' uplifting state of mind toward the approach and improved their insight and abilities from utilizing online modules.

Blended learning can be more successful if the system is designed on the basis successful factors and course management strategies. Since it was first published, the TAM has been consistently validated by many scholars in various settings and has thus been widely used in IT adoption research over the past ten years (Adams *et al.,* 1992 and Deng *et al.,* 2005), the Technology Acceptance Model (TAM) has been coordinated into a model for analysing the conduct of adoption of individual information technology (IT). The obvious qualities of growth (Nan, *et al.,* 2008).

Moodle is an open source and a standout amongst the most prominent learning management systems (LMS) at present. Engineers can alter usefulness and modules for teaching reason. At the point when incorporating with different systems, engineers need to manage the boundary that originates from Moodle servers with diverse variant or other human resource framework. (Ching, *et al.,* 2010).

In this research, knowledge of blended learning was used. Blended education systems was designed by integrated Moodle as online- computer mediated learning management system with face-to face. The Systems was designed on the basis of identified pedagogical practices and most influencing factors on the learners, especially on the students of the computer programming language courses.

In this paper, our contribution is:

1. To investigate existing work pertaining to Blended learning and its adoption.
2. To identify pedagogical patterns and influencing factors for the learners of computer programming languages.
3. To propose a model for successful adoption of the Blended Learning systems on the basis of identified findings.

The organization of this manuscript is as follows; Background realities on such situations is discussed in these Section 1.To explore present work relating to Blended learning and its adoption 3.To identify pedagogical patterns and influencing factors for the learners of computer programming languages4.in this section to explore the propose a model for effective adoption of the Blended Learning systems on the origin of identified results work .

2. REVIEW OF LITERATURE

In this part, we discussed the background realities regarding to the Blended learning. Blended learning is reliable with the estimations of conventional higher education institutions and has the demonstrated potential to upgrade the adequacy and effectiveness of compelling learning encounters. Blended learning, its potential to help profound and serious learning, its transformative potential is examined. (Garrison and Kanuka 2004). BL frameworks and impart a few trends and problems that are profoundly significant to the individuals who are actualizing such frameworks. Blended learning" is, no doubt utilized with expanded recurrence within both scholarly and corporate rounds.

(Graham 2004). The convenience of an e-learning setting is openly connected to its educational value; ease of use evaluation of educational significance is a piece of establishing quality. An extended vision of ease of use essential exist on the effective blend of knowledge models and convenience values, (Zaharias 2004). The blended course delivery method can reduce expenses, improve student academic performance, and improve teacher success in meeting course learning objectives when compared to face-to-face guideline. (Lyman *et al.*, 2006). Authorization free programming stage is Moodle, included in the matter of e-learning additionally call it as a Learning Management System (LMS), Moodle and could be utilized by the instructors to assess students exercises and recognize online practices and communication design in the arranged nature's turf. (Nagi and Suesawaluk 2008). Blended-learning in advanced education, a key part is the selection of Open Space Technology (OST), the utilization of blended-OST has helped the formation of a superior learning setting. The understudies' notions, gathered after the course, additionally help this perspective (Pereira and Figueiredo 2010). blended learning (BL) environment has been produced with the motivation behind overhauling the essential programming courses. Set Goals, their advancement and execution (structure outline, the improvement of teaching materials, situation usage, and assessment), and the aftereffects of the execution and assessment of these courses (Djenic *et al.*, 2011). Student satisfaction in blended learning is significant because it can influence motivation and, learner achievement and achievement rates and Measurement of satisfaction is similarly can be used to evaluate programs and courses and, to a certain point, to predict Student attrition rates analysis of information from survey methods, (Naaj, *et al.*, 2012). Improved favorable techniques of teaching and learning when using new online tools. Which indicate to increased cognitive learning outcome (Rosenbaum 2012). The blended learning is a critical educational instrument that gives adaptability to understudies to ace abilities without the obligations of time and region, and the significance of up close and personal communications to help the understudies' online learning. (Chaudhry and Gallant 2013). Blended learning as the joining of online and face-to-face guideline. (Graham 2013).BL approach that effect on students' achievement, inspiration, joint effort and correspondence as perceived by students. Also analyses difficulties tackled by learners is utilizing Moodle within blended education, to increase courses using Moodle current education and examining new knowledge, data flexibility of Moodle learning environment and their goals. Thabit Al-Ani (2013) Technology Acceptance Model (TAM) utilized and created a qualitative exploratory examination plan. (Tshabalala *et al.*, 2014). Blended learning turned into the most prominent instructive model that colleges and universities apply for learning and education (Bauk *et al.*, 2014).

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3. RESEARCH METHDOLOGY

In this section, we are going to specify some effective technological perspectives and traits.In the first phase the design and evaluation of the blended learning systems using the effective pedagogical patterns for learning the programming languages will be carried out. In evaluation of this phases the different influencing factors on the learners of Blended learning systems will be identified.

The second phase is about to accommodate the identified Influencing factors for the sustainable adoption of the Blended Learning System.

3.1 Design Based Research Methodology (DBRM)

DBRM can be used as it provides the most suitable approaches for designing and evaluating blended learning system. It is the process of continuous refinements of the steps through consecutive iterations. Design Based Research expresses precise hypothetical entitlements about the pedagogy. Design Based Research is ideal for blended learning, which needs to evolve rapidly in order to ensure the learning process is important, acceptable, and efficient. In computer programming as applied to blended learning, Design based research is conducted in four phases: analysis, design, implementation, and evaluation. As shown in **(Fig. 3.1)**

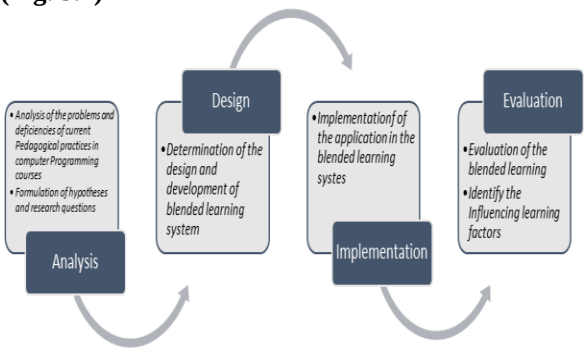


Fig. 3.1 Design Based Research for the Blended Learning System
Course Development Based on ADIE Model

In this research study get a collection of one semester’s programming language course data. Which include on lectures, presentations etc. It was downloaded from moodle.org website and it is necessary that user have account on moodle.org without user account can’t get a programming course

data was downloaded. Follow this URL: https://moodle.org/.

3.2 Phase 1:

3.2.1 Design and evaluation

Patterns are designed to release finest training in a specific domain. So Blended learning has developed a key to address these requirements and has been adopted. Blended learning blends various event created activities, which hold the method of innovative information technologies in the education also to evaluate the effect on policies of performance, and Lerner satisfaction. so we use blended learning.

Collaboration diagram of use case UML-01 course is design for administrative/Teacher to register students of blended learning and also add, remove etc., programming courses and also from student site how to registered for computer programming courses to learning management system (LMS) Moodle and chose the computer courses.

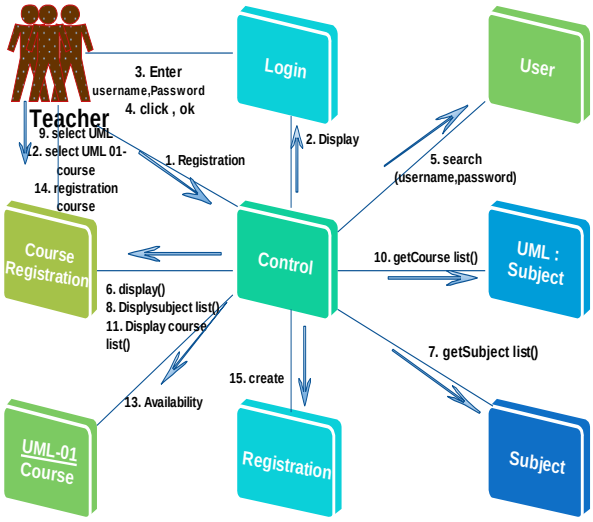


Fig. 3.2. Collaboration diagram of use case UML-01 course registration

3.2Data analysis:

The data analysis from Moodle. Moodle (Modular Object-Oriented Dynamic Learning Environment) is an open source Learning Management System (LMS) that consist of many features that develop pedagogical quality in blended learning environment. Moodle and further virtual education platforms take sustained the capacity and inspiration of academies to maintenance remoteness learning (Sanchez and Hueros, 2010). Moodle is create a course of computer programming and making and managing online UML courses. We develop programming course in instruction to meet the learning and teaching requirements.

Five important influencing elements in blended learning: Logged off and online Learning, Self Stepped and Live, Designed Blending and Amorphous Learning, Combined Learning, Tradition Content with Ordinary Content and Blending Learning, Training, and Performance Sustenance. (Carman, 2005).

3.2.2 Blending Offline and Online Learning:

A blended learning expertise joins disconnected from the net and online frameworks of learning anyplace the web learning implies over the Internet and logged off learning is traditional classroom site. The disconnected from the net learning serves to over saw over a web learning framework.

3.2.3 Blending Self Stepped and Live, Combined Learning:

Self stepped learning involves private, going on mandate learning by a phase that remains reached or organised through students/learner. Combined learning, suggests an extra active communication between many learners that gets knowledge from distribution.

3.2.4 Blending Structured and Unstructured Learning:

Formal or Designed education platform by structured satisfied with particular system like parts in a paradigmatic. A combined platform scheme can gaze to dynamically release dialogs and booklets as of amorphous learning procedures into information sources accessible on request, associate the method facts staffs work together and determination.

3.2.5 Blending Tradition Content with Standard Content:

Standard content exists common oblivious of a system single framework and requirements. But, generic contented is much less costly to purchase and frequently has advanced production values than custom content. Generic self-paced content can be modified nowadays through a blend of quick involvements (classroom or online) or with content customization more and more flexible blending of off-the-shelf and custom content, educating the user knowledge though reducing cost.

3.2.6 Blending Learning, Practice, and Performance Support:

Blended learning is to enhancement learning controlled to an innovative task by impartial in period performance maintenance implements that support suitable performance of errands. Efficiency tackles deliver cubicle environments that platform organized the computer based effort, performance maintenance tools and collaboration.

3.6 Phase 2:

3.6.1 **Technology Acceptance Model (TAM)**

TAM will be adapted on the basis of the Influencing factors on the learners of the Computer programming language courses using the Blended Learning system. so we have chosen to examine Moodle Influencing Factors, Moodle is course management system that is designed using sound pedagogical principles to help educators create effective online learning communities and determined by using the Likert Scale evaluation technique from the phase one. TAM attitude impacted of performance is usually considered as the significant theory it is also practically apply into various changed fields.

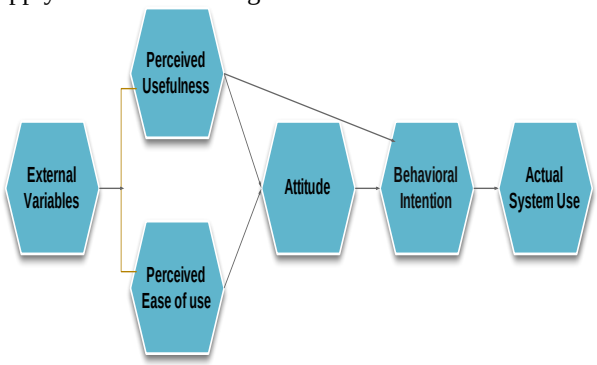


Fig. 3.3 Technology Acceptance Model (TAM)

This is hard blend and evaluation of acceptance models resulted in the design so Unified Theory of Acceptance and Use of Technology (UTAUT) model that combined almost every feature of information system (IS). UTAUT has the capability to describe modification, so UTAUT provides valuable tool for learners to measure the probability of achievement for the innovative technology introductions. Investigate user influences as regards acceptance of educational and mobile pedagogy.

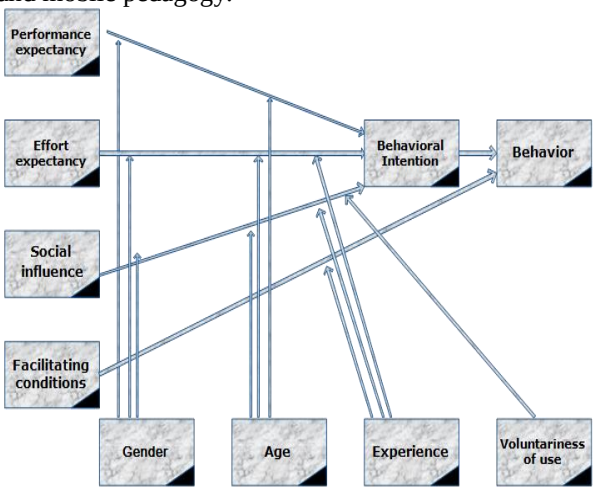


Fig. 3.4. Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT holds that four main influences factors 1) performance expectancy, 2) effort expectancy, 3) social influence, and 4) facilitating conditions, the initial three reality coordinate determinant factors of use target and behaviour and the fourth a prompt determinant segment of use conduct. Gender, experience, Age and voluntariness is middle person of Unified Theory of Acceptance and Use of Technology (UTAUT).

Applicants communicated major factors that influenced the adoption of Moodle in computer programming courses. These factors Expectation of success persisted, social impact, expectation of effort and conditions facilitated.

In this study different researcher's examined about model for successful adoption and influencing factors of computer programming factors. Outline based research at the same time seeks after the objectives of creating powerful learning situations and utilizing such situations as common labs to study learning and instructing. (Sandoval and Bell, 2002).

The TAM model takes an suitable analytical strength while measuring the procedure of innovative material and communication technologies (Geffen and Straub, 1997).Most of the fundamental relationships between the variables exist well sustained, and the study confirms the suitability of relating TAM to measure acceptance in blended learning schemes ,the outward variable, specialized backing, directly affects saw convenience (Ngai et al., 2007).

4. RESULTS AND DISCUSSION

In this section, we analyzed and stated certain Blended learning models. the results of proposed survey questionnaire was used to collect data regarding use of computer programming languages of LMS (MOODLE) with blended learning students of SAU. This thesis based questionnaire collected information from individual operators of computer programming languages using Moodle of blended learning system, a number of ideas in the research model. Earlier research by Venkatesh *et al.* (2003) had proved measures for each of the constructs, to discover infusing factor using UTAUT model by Venkatesh *et al.* (2003). To contain those endorses infusing factors in our questionnaire, used a Likert-type 5-point scale. 1 = strongly disagree, 2= disagree, 3= neutral, 4= agree and 5 = strongly agree and (SPSS) to draw conclusions and suggest appropriate recommendations. Through linker scale calculated UTAUT model infusing factors. The UTAUT model four types were identified performance expectancy, effort expectancy, social influence, and facilitating conditions consistent to the four constructs

of the UTAUT model. The UTAUT model also studies mediators influencing the four straight factors, gender, age, experience and voluntariness of use.

Table 4.1. Demographics of the respondents

Character		FREQUENCY	PERSENTAGE
GENDER	MALE	22	55%
	FEMALE	18	45%
AGE	20-30	30	75%
	31-40	10	25%
	1-2 Semester	15	37.5s%
Experience	More than 2 Semester	20	50%
FACULTY	ITC	35	87%
	VOLUNTARINEES OF USE	05	12.5%

Demographics table show the student respondents and how much % retrieve the UTAUT mediator involvement with the model. Some performance factors like user satisfaction and interaction with the model, completeness of the retrieved information, model understand ability overall performance were evaluated in **Fig. 4.1.**

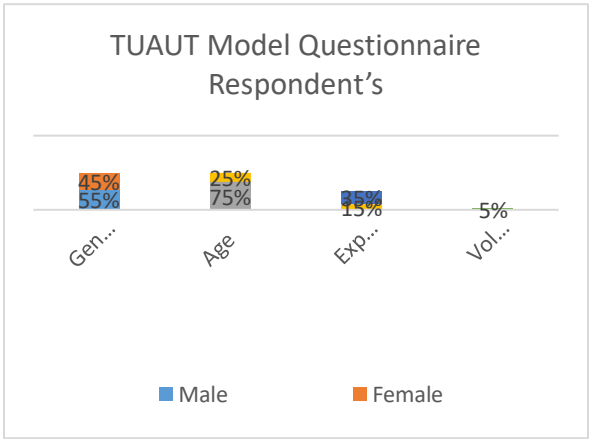


Fig. 4.1 Result of the Survey Questionnaire UTAUT Mediator's Response

4.2 Investigational Results

The following effects existing whether the influencing factors of the UTAUT model calculate student's acceptance of Moodle or Moodle for the perfect course and what the relationship among the factors in the model, the excepting the factors of facilitating situations, the other factors were significantly completely consistent.. Pre-tests and post-tests of user satisfaction. To collect data for evaluating Pre-tests and post-tests from blended learning programming courses were selected, and given a questionnaire (Appendix A)

The users ranked system's responses according to their correctness and significance. The results of the calculation are shown in tables and figures.

Table 4.2-1 Evaluation results of blended learning user A.

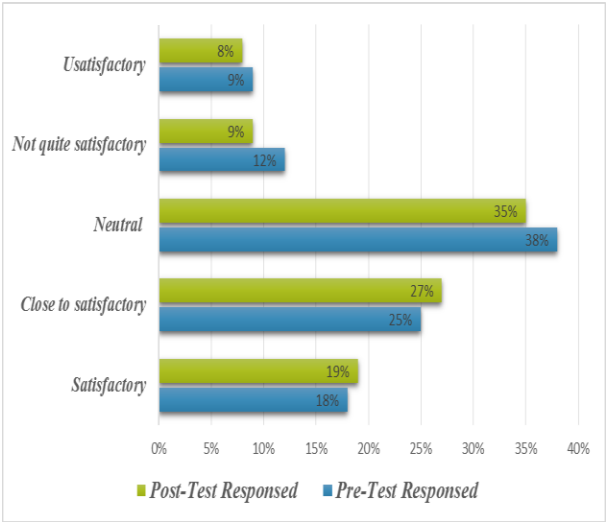
a. Pre-Test Respond

Terms	Ranks				
	Satisfactory	*Close to satisfactory*	*Neutral*	*Not quite satisfactory*	*Unsatisfactory*
The Responses retrieved from the systems are	0	0	0	✓	0
It is easy to know about the interaction with the system	0	✓	0	0	0
Did you get all the information you wanted using the system	0	0	✓	0	0
Do you think the system understood what you asked	✓	0	0	0	0
How was the complete performance of the system	0	0	✓	0	0
Overall valuation	1	1	2	1	0

b. Post Test Response

Terms	Ranks				
	Satisfactory	*Close to satisfactory*	*Neutral*	*Not quite satisfactory*	*Unsatisfactory*
The Responses retrieved from the systems are	0	0	0	✓	0
It is easy to know about the interaction with the system	0	✓	0	0	0
Did you get all the information you wanted using the system	0	✓	0	0	0
Do you think the system understood what you asked	0	0	0	0	0
How was the complete performance of the system	0	✓	1	1	0
Overall valuation	0	3	1	1	0

results of survey concerning with user satisfaction show the comparison evolution results of questionnaire which indicates the proposed blended learning factors pre-test is overall close to satisfactory 40% and post-test overall neutral 30%.



4.2 Survey results of the overall performance expectancy

Fig. 4.2 results of survey concerning with user satisfaction show the comparison evolution results of questionnaire which indicates the proposed blended learning factors pre-test is overall close to satisfactory 40% and post-test overall neutral 30%

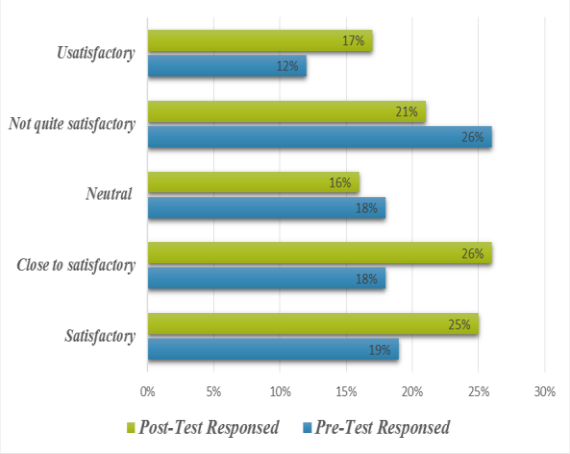


Fig. 4.3 Result of the survey regarding the Effort expectancy with the system

Fig. 4.3 results of survey regarding with user satisfaction show the comparison evolution results of questionnaire which indicates the proposed blended learning factors pre-test is overall satisfactory 20% and post-test overall Not quite satisfactory 15%.

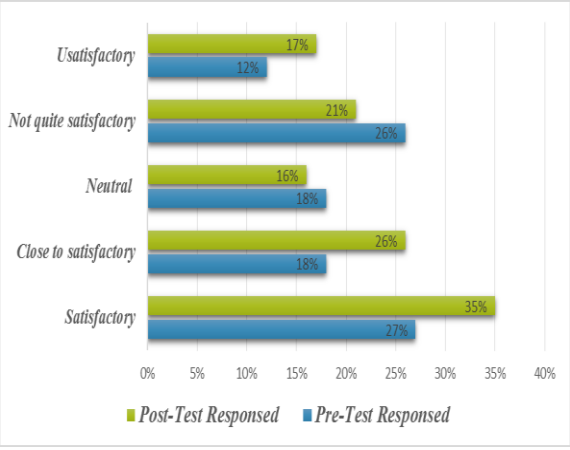


Fig. 4.4 Result of the survey regarding the social influence with the system

Fig. 4.4 Survey result of the Completeness of retrieved information show the evolution results of the questionnaire that indicates the proposed blended learning factors pre-test is overall satisfactory 20% and post-test overall Not quite satisfactory 20%.

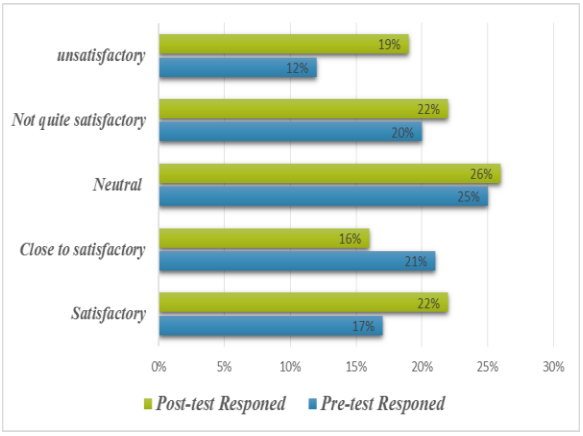


Fig. 4.5 Survey result about Facilitating conditions of the system

Fig. 4.5 Survey results of the System Comprehend talent show the evolution results of the questionnaire that indicates the proposed blended learning factors pre-testis 15% neutral & post-test responded 20% neutral.

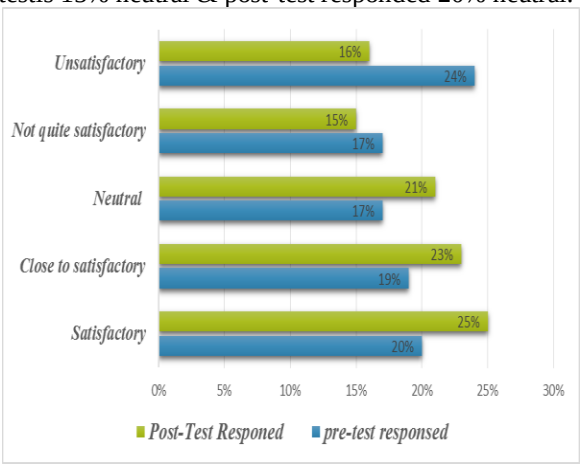


Fig. 4.6 Survey results of the System behavior

Fig. 4.6 Survey results of the overall performance show the evolution results of the questionnaire that indicates the proposed blended learning factors pre-testis 20% satisfactory & post-test responded 20% not quite satisfactory.

Through this way 45 university student's result collect and measure each and every factors of UTAUT model through linker sale.

5. CONCLUSION AND RECOMMENDATIONS

This article explained exactly how the Blended learning system can be the primary enabler for learning system the pedagogical of observation, BL (blended learning) to improve education it provide visions into exactly how computer facilitated environments can carry a level of validate to the traditional classroom

knowledge this research work deliver a blended/collaborative course environment for programming language anywhere learners will obtain and lectures, exercise, practice of the required programing course helps in the constructivist values of placed learning and helpful/blended learning.

Thesis cover tow phase design and evolution. Design base methodology (DBR) it is design for practice of learning environment, improvement methodology and understanding it. Moodle will be used as a computed and online mediated component for programming courses, the design phase improves exact learning points, assessment tools, trainings and content. These materials are provided to the student for pedagogy practice, knowledge and expertise and find the infusing factors (efficiency, performance, facilitating, practice of skill, quality of collaboration) which effect students.

In evaluation using technology acceptance model (TAM) to measure infusing factors of Effective Pedagogy and Unified Theory of Acceptance and Use of Technology (UTAUT) observing further relationships among the complete direct and moderating factors of technology acceptance to adoption of programming courses. As a result the 49% User Satisfaction were obtained using the designed prototype. The results also indicate that answers retrieved through designed model have a significant impact on performance of blended learning users.

Recommendations:

Future works on this system might be blended learning courses is design for other departments of Sindh agriculture university.

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