Quality Assessment of Blended Learning in the Technical Vocational Education and Training (TVET) Course Software System Development in the Polytechnic University of the Philippines

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Abstract- In the Philippines, Blended Learning (BL) implementation in distance education was proven effective in the teaching-learning process. Thus, the research study focused on the assessment of BL in Technical Vocational Education and Training (TVET) particularly in the Polytechnic University of the Philippines (PUP) Institute of Technology (ITech).

Anchoring the Context, Input, Process, and Product (CIPP) Model of Daniel Stufflebeam, the implementation of innovation in the Software System Development (SSD), an Information Communication Technology (ICT) major course in PUP ITech, was assessed.

The study used both quantitative and qualitative research approaches and descriptive method was the design used. The respondents were 130 ICT students, who were given the survey to gather quantitative data. On the other hand, qualitative data were generated from the interview conducted for the course specialist.

Research found BL appropriate in the context of SSD. Majority of learners had resources needed in the implementation of BL. In learning facility, opening files uploaded by the course specialist and understanding online lectures were both easy. Other than that, tasks were done on time though difficulty was experienced in taking quizzes and assignments. Finally, the knowledge and skills on competencies was effectively acquired by the learners.

I. INTRODUCTION

According to the Long Term Higher Education Development Plan of the Commission on Higher Education (CHED), the commissioning body of higher education in the Philippines, Information Communication Technologies (ICTs) has reshaped the educational landscape by transforming the content and modes of delivery and acquisition of learning as well as how the educational institutions operate (CHED, 2001). With that, teaching and learning processes is transformed, and one of the changes brought by ICTs in the field of education is the implementation of BL.

Blended Learning (BL) is prescribed and used as mode of delivery to facilitate instruction in distance education. Librero (2007) explains that common features of distance education includes the separation of teachers and learners in terms of time and space, and the use of technical media in the presentation of concepts and processes. Thus, BL through ICTs breaks the problem between students and facilitators. In fact, 37.50% of the Higher Education Institutions in the Philippines offering distance education uses BL (Gapasin, 2011).

However, Technical Vocational Education and Training (TVET) is an aspect of the educational process involving the study of technologies and related sciences with the acquisition of practical skills, attitudes, understanding and knowledge relating to occupants in various sectors of economic and social life (UNESCO, 2001). Since this primarily involves the use of technology, faculty members as well as administrators must be innovative in delivery for the convenience of both learners and teachers.

In the 3rd World Congress on TVET, Richardson (2012) discusses the flexibility of BL. Therefore, BL mode of delivery is possible in facilitating learning for TVET.

Since this is an education reform or innovation, it is important to see its effectiveness to the learners and to identify the appropriate blending in the teaching process.

II. BACKGROUND OF THE STUDY

The Polytechnic University of the Philippines (PUP), the largest university in Asia in terms population, has a vision of clearing the paths while laying new foundations to transform the university into an epistemic community. This kind of community is composed of networks of professionals who have recognized skills and specializations that are contributory in building the nation.

The Institute of Technology (ITech) is the TVET system of PUP. It envisions to be a leading institution that provides globalized skilled workforce in a technologically-driven culture. ITech exists to provide globally competitive graduates in the field of technology. In addition to that, one of the goals of the institute is to
ensure teaching-and-learning efficiency and effectiveness by means of highly qualified and committed faculty members. With that, to ensure such competencies, evaluation must be conducted. This will serve as the basis for another innovation in teaching and learning in TVET specifically in PUP ItTech.

Information Communication Technology or ICT is one among six TVET programs in PUP ItTech which aims to prepare students to design, implement, and manage a variety of computer-based information systems through its specialized curriculum. To attain the objectives of ICT program, Software System Development (SSD) as one of the major ICT courses is included in the curriculum designed to build up students’ understanding in developing software system. It also includes advancement in the process and fundamental principles of system development with object oriented technology using Unified Modeling Language (UML). The course initiates students to different software process models, project management, and software requirements engineering process, system analysis and design as a problem solving activity, key elements for analysis and design.

According to the domains of learning, these objectives are set. In the cognitive domain, the course aims to develop an understanding of project management, software process models and the ability to select the suitable model in using software development, to develop an understanding of requirements in information process and to determine the different types of requirements. However, its affective domain focuses and empowers the presentation, and teamwork management skills. Finally, the psychomotor domain should develop students’ ability to analyze, design, and develop the system models using object oriented methodology for software development; ability to prepare the software requirements specification documentation for a software project; demonstrate the ability to research a particular topic; and develop it for a specific audience and purpose. At the end of the semester, learners are expected to develop computerized information system.

In teaching methodology, teachers have an option to deviate and innovate the mode of delivery. To maximize the use of ICT, they have used BL as one of the strategies. To see the effectiveness of this mode of delivery, this must be evaluated by the learners to assure its quality. However, the research study only focused on the evaluation of online aspect of BL implementation.

Research Problem
The study assessed the Blended Learning mode of delivery of Software System Development in Information Communication Technology program in the Polytechnic University of the Philippines Institute of Technology.

Specifically, the study aimed to answer the following questions:
1. What is the level of appropriateness of BL as mode of delivery to the objectives of the course Software System Development?
2. What is the capability of learners in the implementation of BL in terms of resources?
3. What is the respondents’ evaluation in the implementation of BL in teaching-learning process?
4. What is the effectiveness of BL in the knowledge and skill acquisition of the students according to the course competencies?

III. STUDY FRAMEWORK

Daniel L. Stufflebeam’s Context, Input, Process, and Product (CIPP) Model is a decision-focused approach in evaluating and emphasizing the systematic provision of information for program management and operation. In the approach, information is valuable in helping program managers to make better decisions. Data collection and reporting are then undertaken in order to promote more effective program management. Since programs change as they are implemented, decision-makers need to adapt with these changes to ensure continuous focus on appropriateness and efficiency of the development and performance over time.

In the model, the four aspects of evaluation were emphasized. Context evaluation involves collecting and analyzing needs assessment data to determine goals, priorities and objectives. In the study, the context evaluation is the appropriateness of BL to the cognitive, affective and psychomotor objectives of the course SSD.

This is followed by Input evaluation which involves the steps and resources needed to meet the new goals and objectives and includes identifying successful external programs and materials as well as gathering information. With that, the researcher knew the capability of learners in the implementation of BL in terms of resources namely internet connection and gadgets.

In the Process evaluation, decision-makers provide information about how well the program is being implemented. To assess the implementation of BL in teaching-learning process of the said course, it includes evaluation of the learners’ capabilities in using files, difficulties in taking quizzes and assignments, finishing the given tasks with the assigned time frame, and understanding lectures online.

Finally, Product evaluation measures the actual outcomes and comparing them to the anticipated outcomes. Decision-makers shall be able to decide if the program should be continued, modified, or dropped altogether. In the study, the researcher measured the effectiveness of learning and skills acquisition in SSD.
These are the Development Methodologies; Requirement Analysis and Design Method; Programming Language; Programming Techniques; Test and Review Methods; Development Environments; Development Management; and Software Packages.

![Fig. 1: CIPP Model as Applied in the Study](image)

**IV. RESEARCH METHODOLOGY**

In this portion, the methods of research, sampling techniques, research instrumentation and the statistics used were explained.

**A. Method of Research**

The study used the descriptive method. Shuttleworth (2006) defines it as a scientific method which involves observing and describing the behavior of a subject without influencing it in any way. In the study, the researcher defined the assessment on BL mode of delivery in the course SSD specifically in the appropriateness of the course objectives, availability of the learners’ resources, the BL implementation process and effectiveness of knowledge and skills to the learners according to the course competencies.

The research, a quantitative research approach, involves variable needs to be measured for the purpose of quantitative analysis through a survey (Hohmann, 2005). In addition to that, the researcher also utilized the qualitative research approach to generate more information.

**B. Instrumentation**

The instrument used was a researcher-made survey questionnaire composed of five parts: (1) the profile of the respondents; (2) the context evaluation which is applied through assessment of the respondents on the level of appropriateness of BL in the stated objectives of the course SSD; (3) the input evaluation which is applied in the evaluation of the resources in the implementation of BL; (4) the process evaluation which is about the implementation process in the said course through BL; and (5) the product evaluation which is on the effectiveness of the competencies in the course.

Aside from the survey questionnaire for the respondents, Interview Guide was used to generate qualitative data for the instructor of the subject.

**C. Sampling Techniques**

Purposive sampling technique was utilized in choosing respondents whom undergone the subject. There were 196 PUP Itech ICT students for the Academic Year 2013-2014 completed the said course. Using Sloven formula, 130 samples were computed as shown in Table 1.

**TABLE 1** Distribution of Respondents Per Section

<table>
<thead>
<tr>
<th>Section</th>
<th>Number of Students Enrolled</th>
<th>Percentage</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICT III-1</td>
<td>47</td>
<td>24.35%</td>
<td>32</td>
</tr>
<tr>
<td>ICT III-2</td>
<td>49</td>
<td>25.39%</td>
<td>33</td>
</tr>
<tr>
<td>ICT III-3</td>
<td>34</td>
<td>17.62%</td>
<td>23</td>
</tr>
<tr>
<td>ICT III-4</td>
<td>29</td>
<td>15.03%</td>
<td>20</td>
</tr>
<tr>
<td>ICT III-5</td>
<td>34</td>
<td>17.62%</td>
<td>23</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>193</strong></td>
<td><strong>100.00%</strong></td>
<td><strong>130</strong></td>
</tr>
</tbody>
</table>

The researcher assigned target respondents in five sections. Portion of each section was computed to see the number of samples per section. The table below shows the number of students enrolled per section and the number of respondents.

From the total number of enrolled students, percentage was computed to get the portion of every section. There were 130 respondents consisted of the following: 32 ICT III-1 students, 33 ICT III-2 students, 23 ICT III-3 students, 20 ICT III-4 students, and 23 ICT III-5 students.

As far as the qualitative research approach is concern, the researcher also purposively selected the course specialist.

**D. Statistical Treatment**

In the data analysis and interpretation, the researcher used the percentage and weighted mean.

Percentage was used to see the portion of the total respondents. This was already used in computing the portion of the respondents per section in Table 1. In addition to that, this formula was used in treating the data of the input and process evaluation.

Other than that, the researcher also treated the data using Weighted Mean or WM. This used in order to determine the average responses of the different options in the aspects of evaluation. In this study, weighted mean used to know the assessment of the respondents in the quality of SSD through BL particularly in the context and product evaluation.
V. RESULTS AND DISCUSSIONS

A. Context Evaluation

Table 2 shows the appropriateness level of BL in the course objectives of SSD. In the cognitive domain of the objectives of the course, the computed weighted mean is 3.09, which BL is appropriate.

On the other hand, the course specialist reveals that online discussion is easier than face to face discussion in terms of understanding. This is because learners found it difficult to absorb what the course specialist was talking about without trying the hands-on experience in SSD.

Other than that, it also reveals that online sources and coding are vital elements in developing system and software, and impossible to be discussed by the professor in the classroom. However, if the professor forced students to explain these competencies in the class, the learners have difficulty in understanding.

This finding can link to the result of the study of Akyol and Garrison (2011) which indicates that students in both online and blended courses are able to reach high levels of cognitive presence and learning outcomes. However, Akyol and Garrison’s focuses on the context of the graduate study in British. Data show that respondents and the justification of the informants are in favor of the appropriateness of BL as teaching mode of delivery to facilitate learning.

In the affective domain of learning, the weighted mean is 3.32, very appropriate in enhancing learners’ motivation, attitudes and values. Course specialist says, “Students are engaged to study because online class provided them freewill that can lessen the pressure to complete a task.” In addition to that, pressure-free learning experience encouraged them to explore more applications and techniques in studying not only in the said course but also to other related-programming courses.

Improving students’ engagement and motivation are two of the 10 drivers of BL enumerated by Classroom Aid (2013). These addresses the affective domain of learners in this mode of delivery. Accordingly, data and literature say that BL as mode of delivery in facilitating learning is very appropriate in addressing the affective domain of learning.

Finally, in the psychomotor aspect, the weighted mean of 3.24 says that BL is appropriate in acquiring the needed skills in developing information systems.

Since it is mentioned that students are motivated and engaged in BL for the course SSD that lead them to better understanding, the application is also easier. As stated by the course specialist, students already produced acceptable and high-quality systems.

According to El-Sayed and El-Sayed (2012), psychomotor abilities not only facilitate the learner’s practices but also motivate the learner to try different alternatives. A median level of mastery in the psychomotor domain skills can lead to a lower level of frustration, a higher level of motivation, and ultimately a higher desire and ability to innovate and create. Since the concepts of innovation and creativity are synonymous in developing information system or software, appropriate teaching strategy particularly BL as mode of delivery tends to increase motivation in learning while decreasing the level of frustration.

Generally, the overall mean on the level of appropriateness of BL to the course objectives of SSD is 3.22, appropriate. Commission on Higher Education and Technical Education and Skills Development Authority (2013) considered BL as input for K to 12 Basic Education Program to increase access to quality TVET programs in the Philippines.

<table>
<thead>
<tr>
<th>Course Objectives of SSD</th>
<th>WM Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive Domain</td>
<td>3.09 Appropriate</td>
</tr>
<tr>
<td>Affective Domain</td>
<td>3.32 Very Appropriate</td>
</tr>
<tr>
<td>Psychomotor Domain</td>
<td>3.24 Appropriate</td>
</tr>
<tr>
<td>Overall Mean</td>
<td>3.22 Appropriate</td>
</tr>
</tbody>
</table>

B. Input Evaluation

The input evaluation on the implementation of BL in the course SSD or the resources of the learners to participate in BL is revealed in Table 3. There are 101 or 77.69% of the respondents that have Internet connection at home while a small percentage of 22.31%, 29 students, don’t have the Internet connection at home. As far as the Internet connection is concern, majority is capable to participate in BL.

Meanwhile, 100 or 76.92% of the respondents have gadgets to be used in BL while 30 or 23.08% of them don’t have tools. In the aspect of gadgets, majority of the respondents were capable in participating BL in the course SSD.

It is mentioned in the study of Al-Hunaiyyan, Al-Huwail and Al-Sharlan (2008) that BL plays an important role with access to technology in which instructors can facilitate, provide, and control the provision and access to technology for learners. Hence, the TVET in the PUP is capable in the implementation of BL.

<table>
<thead>
<tr>
<th>Resources in the Implementation of BL</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>Do you have Internet connection at home?</td>
<td>101</td>
<td>77.69%</td>
</tr>
<tr>
<td>Do you have gadgets that can be used in learning purposes?</td>
<td>100</td>
<td>76.92%</td>
</tr>
</tbody>
</table>

C. Process Evaluation

The evaluation of the respondents on the implementation process of BL for the course SSD is
disclosed in Table 4. It is revealed that there are 105 or 80.77% of the respondents who easily open files uploaded by the professor online while only 25 or 19.23% of the learners find it difficult. In the statements of the student informants in the facilitated focused group discussion, online system where the conducted online class is users-friendly.

However, 101 or 77.69% of the respondents experience difficulties in taking quizzes and assignments online while there are 29 or 22.31% who don’t experience difficulties. In the qualitative inquiry, it is acknowledged that there are students who took online quizzes while entertaining people in a social networking site at a time. On the other hand, it is explained by the course specialist that in answering online quizzes and assignments, students are also forced to do online research which is essential in the development of their higher-order thinking skills.

There are 88 or 67.79% of the respondents who finish the given online tasks on time while 42 or 32.31% of them fail to do the given online tasks. According to the student informants, time management is also important element in this course.

Lastly, there is a big percentage of respondents who easily understand the lectures online. This is composed of 94 or 72.31% of the respondents who answer “Yes” and 36 or 27.69% respond the “No” item. In connection with the statements of the students in the appropriateness of the cognitive domain of learning in the objectives of the said course, it is easier to understand lectures because of the actual learning opportunities provided through BL.

<table>
<thead>
<tr>
<th>BL Implementation Process</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can you easily open files uploaded by the professor online?</td>
<td>105</td>
<td>25</td>
</tr>
<tr>
<td>Did you experience difficulties in taking quiz and assignments online?</td>
<td>101</td>
<td>29</td>
</tr>
<tr>
<td>Can you finish the given tasks online with the assigned time frame?</td>
<td>88</td>
<td>42</td>
</tr>
<tr>
<td>Can you easily understand lectures online?</td>
<td>94</td>
<td>36</td>
</tr>
</tbody>
</table>

D. Product Evaluation

Table 5 presents the effectiveness of BL to the transfer of knowledge and skills to the students according to the course competencies of system software development. Overall mean of 3.14 indicates that the acquisition of learning of the respondents is effective through BL.

It is specifically shown that through BL mode of delivery, the following lectures in SSD are effectively acquired by the students because of weighted mean computations: 3.12, Development Methodologies; 3.16, Requirement Analysis and Design Method; 3.16, Programming Language; 3.17, Programming Techniques; 3.17, Test and Review Methods; 2.95, Development Environments; 3.23, Development Management; and 3.13, Software Packages.

The results say that BL is an effective mode of delivery in the TVET system of PUP. The learning innovation is recommended for other institutions offering TVET programs.

<table>
<thead>
<tr>
<th>SSD Competencies</th>
<th>Weighted Mean</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development Methodologies</td>
<td>3.12</td>
<td>Effective</td>
</tr>
<tr>
<td>Requirement Analysis &amp; Design Method</td>
<td>3.16</td>
<td>Effective</td>
</tr>
<tr>
<td>Programming Language</td>
<td>3.16</td>
<td>Effective</td>
</tr>
<tr>
<td>Programming Techniques</td>
<td>3.17</td>
<td>Effective</td>
</tr>
<tr>
<td>Test and Review Methods</td>
<td>3.17</td>
<td>Effective</td>
</tr>
<tr>
<td>Development Environments</td>
<td>2.95</td>
<td>Effective</td>
</tr>
<tr>
<td>Development Management</td>
<td>3.23</td>
<td>Effective</td>
</tr>
<tr>
<td>Software Packages</td>
<td>3.13</td>
<td>Effective</td>
</tr>
<tr>
<td>Overall Mean</td>
<td>3.14</td>
<td>Effective</td>
</tr>
</tbody>
</table>

VI. SUMMARY OF FINDINGS

Based on the data presented, the following are the findings:

1. The context, the objectives of SSD, which includes cognitive, affective, and psychomotor domain of learning, was generally appropriate in the implementation of BL in PUP ITech.
2. The input, the ICT students, was capable in the participation of BL in the course SSD.
3. Majority of the students easily opened the files uploaded by the professor, finished tasks on time and easily understood lectures online. However, majority of the students also experienced difficulties in taking quizzes and examinations online.
4. Finally, the product evaluation, competencies in the course SSD, was effectively acquired by the learners through BL.

VII. CONCLUSION

Based on the results, PUP ITech students assessed the quality of BL in TVET for the course SSD.

Specifically:

1. The evaluation on the level of appropriateness of BL to the learning domains – cognitive, affective and psychomotor – of the students varies.
2. In terms of input evaluation, students who are the respondents have materials needed in the implementation of BL.
3. Since BL implementation was an initiation, some learners found it easier while some found it difficult for the course SSD.
4. Learners can evaluate the effectiveness of the transfer of knowledge and skills based on the SSD course competencies.
VIII. RECOMMENDATIONS

Based on the conclusions, the following are the recommendations:

1. For PUP, it is important to conceptualize innovations in teaching-learning process that will improve the quality of education through activities, programs and strategies aligned in the context of the university with the vision in the transformation towards epistemic community. Aside from that, these innovations in education must always undergo evaluation to see its effectiveness, capability and appropriateness to the learners.

2. Through the collaboration with the Research and Development sector, a task-force that will monitor and evaluate the implementation of the innovation must be created. This is to see the effectiveness of the innovations to the teacher-learning process.

3. For ITech, BL and other educational reforms should be conceptualized based on the needs of the learners not only for their major courses, but also in their general education courses. This is to respond with one of its goal of producing user’s friendly instructional materials appropriate for the learners.

4. For the ITech Faculty members, active participation on workshop and trainings on educational reforms in Technical Vocational Education and Training must regularly done. This is followed by proposing programs and projects that will respond to both needs of the learners and the needs to achieve the university goal.

5. For the other TVET institutions administrators, other researches that will assure the quality of TVET in the country are recommended.

6. For both Commission on Higher Education and TESDA, a policy, standards and guidelines must be created to assure the quality of Technical Vocational Education and Training in the Philippines.

7. For education researchers, it is recommended to explore innovations in the teaching-learning process in the TVET context.

REFERENCES


