Research Article

Assessment of eLearning Tools Utilized by IT Faculty of Programming Course in the New Normal

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Abstract: Students' knowledge relies on the hand of their teacher. The use of different learning modalities like utilization of hand-outs, visual aids using paper or presentation, and the internet helps to impart knowledge to the learners. Learning process is not limited in school alone, rather it continues even at home. With the current setting where face-to-face classes are prohibited due to pandemic, teachers need to be more innovative which helps not to disrupt the continuous learning of the students. This study will present discussions on the assessment of eLearning teaching tools utilized by IT faculty of programming course. The researcher conducted a descriptive research and used survey questionnaire for data collection. Teachers used different eLearning tools in instruction delivery. The technological factors greatly help on the success of eLearning tool implementation in the new normal. The learning management system tools used in distance learning has valuable effect on students when interacting with the instructor. Faculty members of programming course used Microsoft Teams as the Learning Management System with Google Classroom, Schoology, Facebook Page, or Messenger as the secondary medium for interaction. The assessment results showed that majority of the students are highly satisfied with the features, functions, and support provided by the tools. Further studies must be conducted to address the performance of the students and teachers during the implementation of these eLearning tools in the new normal.

Index Terms: Assessment, eLearning tools, programming course, tools utilized

1. Introduction

Education in new normal is really a challenge not only to the education institution and its faculty members but to the learners as well. In times where residential learning were not permitted, all instructors must be innovative and find ways to cope up with the needs of the students and the challenges on how these set of learnings be imparted to them. Technology plays a vital role in learning delivery to the students. The used of Learning Management System may not be enough to address the gap and challenges of the instructors and students.

Blended learning is an approach to education that combines online education materials and opportunities for interaction online with traditional place-based classrooms methods [1]. Place-based classroom methods in today's education setting were now replaced by webinars, online conference, and/or video recording of discussions.

Programming course is a challenging subject for teaching and learning. Introductory programming courses at the universities are very important since they are responsible for students' acquiring of basic programming skills and knowledge. Learning programming course at university level is the challenge for both students and teachers, especially for students without previous exposure to programming [2]. Thus, innovative and effective learning tools must be available to support the teaching and learning needs of both teachers and students.

In the traditional classroom setting, programming course requires the need to introduce programming concepts through face-to-face lectures and discussions. Actual application of these concepts are done with the aid of software tools in computer laboratories provided by the university. These software tools may vary according to the availability of the computing devices needed for a specific programming subject.

Mobile devices are also used nowadays in education. Applications such as Google Classroom and Microsoft Teams are some of learning management systems that can be installed in mobile devices. As mobile technology advances and its use continues to proliferate, the boundaries are beginning to blur between learning and those emerging through electronic and mobile learning [3]. Faculty and students are starting to adopt and use mobile devices and apps to support education and training in practice [4].

With the current setting where face-to-face classes are prohibited due to COVID-19 pandemic, teachers need to be more innovative which helps not to disrupt the continuous learning of the students [5]. E-Learning is one way to provide accessibility to more students and to overcome distance barriers which may prevent some students from perusing a university qualification [6].

This study focused on the assessment of eLearning tools utilized by IT faculty of programming course in the

new normal. Moreover, this study profiled the faculty in a programming subject, identified the tools utilized by the faculty and students, and determined the students' satisfaction level in utilizing those eLearning tools.

2. Methodology

This study employed descriptive research to determine the satisfaction level on the eLearning tools utilized by the IT faculty members of Pangasinan State University teaching programming course in lieu of the new normal in education.

Descriptive research aims to accurately and systematically describe a population, situation or phenomenon. It is an appropriate choice when the research aim is to identify characteristics, frequencies, trends, and categories. It is useful when not much is known yet about the topic or problem [7]. Moreover, this methodology focuses more on the "what" of the research subject than the "why" of the research subject [8].

A survey questionnaire was formulated by the researcher based on a sample survey questionnaire adapted from www.questionpro.com and validated by a staff of the Statistics Center Unit and an active researcher of the institution. The questionnaire was used to gather data on the profile of faculty members teaching programming courses; the eLearning tools used by faculty and students for personal computer and mobile devices; and the satisfaction level of the respondents on the different tools being utilized.

Online survey was conducted, and responses were collected from three hundred forty-one (341) out of two thousand nine hundred seventy-six (2976) students among the six campuses offering Bachelor of Science in Information Technology program. Using the computed sample size of 11.46%, the distribution of respondents per campus is illustrated in Table I below.

Table I. Number of Respondents per Campus

Campus	Population	Sample Size
Alaminos	174	20
Asingan	197	23
Bayambang	602	69
Lingayen	752	86
San Carlos	694	80
Urdaneta	557	64
Total	**2976**	**341**

Faculty teaching programming course were also included in the study. eLearning tools utilized by the faculty members in their subject were identified in the survey questionnaire. This includes the software used in their personal computer. In addition, mobile applications used in programming by students who do not have personal computer were also included in the survey questionnaire. All items were measured on the following scale illustrated in Table II below.

Table II. Scale of Measurement used in the Study

Rating	Descriptive Interpretation
5	Very Highly Satisfied (81-100% of the expectations were met)
4	Highly Satisfied (61-80% of the expectations were met)
3	Moderately satisfied (41-60% of the expectations were met)
2	Least satisfied (21-40% of the expectations were met)
1	Unsatisfied (0-20% of the expectations were met)

3.Results And Discussion

If you are Based on the conducted survey from the six (6) campuses offering BSIT program, there were ten (10) faculty members participated in the study: two (2) from Alaminos, one (1) each from Asingan, Bayambang, San Carlos and Urdaneta; and four (4) from Lingayen.

Most of the instructor were handling more than two programming subjects: five (5) were handling at most two (2) subjects, and five (5) were handling at most four (4) subjects. Nine (9) of the faculty members have been in teaching programming for more than six years while only one from the respondents was in less than five years in teaching programming course. This signifies that the faculty members have already used different eLearning tools on handling the subject.

In terms of the delivery of instructions using Learning Management System, 100% of the respondents were using MS Teams. Further, to support other means of communication and delivery of instruction, 20% of the respondents used Schoology and 10% Google Classroom. Moreover, Facebook Page and Messenger were also utilized by the 10% of the respondents.

A. eLearning Tools Utilized by the Faculty Members Teaching Programming Course

On the utilization of eLearning tools for programming course, the study found out from 341 respondents, 236 or 69.2% have personal computer, and 105 or 30.8% do not have. Students were instructed to install application to their smart phones which provides same functionality of an Integrated Development Environment (IDE) where they can use in programming. Table III shows the application software and Table IV shows the mobile application most frequently used by the students.

Table III. For Personal Computer Used in Programming

Application Software	F	Rank
Dev-C++	76	1
Code::Blocks	72	2
Microsoft Visual Studio	38	3
Android Studio	36	4
DrJava	27	5
NetBeans	25	6
Eclipse	16	7
JCreator	11	8
OnlineGDB	10	9
BlueJ	8	10
IntelliJ	7	11

Table IV. Mobile Application Used in Programming

Application Software	F	Rank
CppDroid	72	1
JVdroid	64	2
Cxxdroid	39	3
CPP N-IDE	22	4
Java N-IDE	19	5
Dcoder	15	6
C4droid	8	7
Coding C++	8	8
JStudio	5	9

B. Assessment of eLearning Tools Utilized by the IT Faculty Teaching Programming Course

OnlineGDB with a computed overall mean of 3.17 which interprets as students were moderately satisfied using this tool. For C-based language, with an overall weighted mean of 3.84 for Code::Blocks, 3.68 for Dev-C++ and 3.51 for Microsoft Visual Studio, students are highly satisfied with these tools. It means 60 to 80% of the functionality of the applications are met.

With a computed overall mean of 3.88 for BlueJ, 3.72 for DrJava, 3.66 for IntelliJ, 3.73 for JCreator and 3.67 for NetBeans, all eLearning tools used by the students for java-based language were interpreted as highly satisfied using these tools. Even though some tools identified are freeware, it provides features needed in writing and running the programming codes.

Students using Android Studio and Eclipse for mobile programming development were interpreted as highly satisfied in using these tools with a computed overall mean of 3.43 and 3.77 respectively. More so, Eclipse provides uncomplicated features and functionality to the users. Table V shows the computed overall mean with descriptive interpretation on the different eLearning tools used for personal computer.

Table V. Computed Overall Weighted Mean of eLearning Tools for Personal Computer

Application	OWM	DI
Android Studio	3.43	HS
BlueJ	3.88	HS
Code::Blocks	3.84	HS
Dev-C++	3.68	HS
DrJava	3.72	HS
Eclipse	3.77	HS
IntelliJ	3.66	HS
JCreator	3.73	HS
Microsoft Visual Studio	3.51	HS
NetBeans	3.67	HS
OnlineGDB	3.17	MS

On the utilization of eLearning tools used by students using their mobile device, students who are using Java N-IDE with an overall mean of 3.05 and JStudio with an overall mean of 3.2, which interprets as students are moderately satisfied in using with these tools for java-based language. In comparison to Jvdroid with computed overall mean of 3.42, students are highly satisfied in using this tool. Jvdroid certainly provides features needed by the students in writing java language using mobile device.

Among the applications identified for C-based programming, CPPDroid got the highest computed overall mean of 3.82, followed by C4droid with overall mean of 3.68, Dcoder with overall weighted mean of 3.54, Coding C++ with overall mean of 3.51, Cxxdroid with overall mean of 3.49 and CPP N-IDE with overall 3.47. Students using these tools are highly satisfied, which means most of the features and functionality in programming are available. Table 6 shows the computed overall mean with descriptive interpretation on the different eLearning tools used for mobile device.

Table VI. Computed Overall Weighted Mean of eLearning Tools for Mobile Device

Application	OWM	DI
C4droid	3.68	HS
Coding C++	3.51	HS
CPP N-IDE	3.47	HS
CppDroid	3.82	HS
Cxxdroid	3.49	HS
Dcoder	3.54	HS
Java N-IDE	3.05	MS
JStudio	3.2	MS
Jvdroid	3.42	HS

The identified eLearning tools for personal computer and mobile, were assessed on fifteen (15) indicators. Detailed computed weighted mean for the eLearning tools used for personal computer is shown in Table VII and for mobile device is shown in Table VIII.

Table VII. Computed Average Weighted Mean of eLearning Tools for Personal Computer

	Code::Blocks		Dev-C++		Visual Studio		DrJava		BlueJ		IntelliJ		Jcreator		NetBeans		OnlineGDB		Android Studio		Eclipse	
	Mean	DI	Mean	DI	Mean	DI	Mean	DI	Mean	DI	Mean	DI	Mean	DI	Mean	DI	Mean	DI	Mean	DI	Mean	DI
1. Ease of installation	3.82	HS	3.68	HS	3.53	HS	3.81	HS	3.88	HS	3.86	HS	3.91	HS	3.8	HS	3.3	MS	3.44	HS	3.88	HS
2. Ease of use	3.83	HS	3.76	HS	3.5	HS	3.7	HS	3.75	HS	3.57	HS	3.91	HS	3.92	HS	3.4	MS	3.31	MS	3.81	HS
3. Hardware compatibility	3.69	HS	3.66	HS	3.16	MS	3.67	HS	3.63	HS	3.57	HS	3.45	HS	3.52	HS	3.2	MS	3.17	MS	3.88	HS
4. Operating system compatibility	3.81	HS	3.68	HS	3.37	MS	3.7	HS	4	HS	3.57	HS	3.91	HS	3.64	HS	3.1	MS	3.33	MS	4.06	HS
5. Security	3.78	HS	3.66	HS	3.68	HS	3.89	HS	3.75	HS	3.57	HS	3.73	HS	3.68	HS	3.1	MS	3.53	HS	3.81	HS
6. Ability to integrate with other apps	3.69	HS	3.45	HS	3.5	HS	3.59	HS	3.88	HS	3.71	HS	3.18	MS	3.48	HS	2.9	MS	3.42	HS	3.56	HS
7. Consistency with interface	3.86	HS	3.61	HS	3.58	HS	3.7	HS	4	HS	4	HS	3.55	HS	3.68	HS	3.2	MS	3.47	HS	3.69	HS
8. Application software compatibility	3.94	HS	3.76	HS	3.47	HS	3.59	HS	4	HS	3.71	HS	3.73	HS	3.64	HS	3	MS	3.44	HS	3.75	HS
9. Collaborate with team	3.71	HS	3.72	HS	3.5	HS	3.63	HS	3.63	HS	3.43	HS	3.45	HS	3.48	HS	3.1	MS	3.36	MS	3.56	HS
10. Documentation	3.86	HS	3.76	HS	3.53	HS	3.81	HS	3.75	HS	3.57	HS	3.82	HS	3.72	HS	3.1	MS	3.5	HS	3.81	HS
11. Clarity of documentation	3.78	HS	3.74	HS	3.53	HS	3.78	HS	3.88	HS	3.57	HS	3.73	HS	3.72	HS	3	MS	3.5	HS	3.69	HS
12. Accessibility of eLearning tool support	3.9	HS	3.68	HS	3.47	HS	3.63	HS	3.88	HS	3.43	HS	3.82	HS	3.68	HS	3.2	MS	3.39	MS	3.75	HS
13. Quality of eLearning tool support	3.86	HS	3.63	HS	3.53	HS	3.74	HS	4	HS	3.57	HS	3.73	HS	3.6	HS	3.3	MS	3.42	HS	3.75	HS
14. Overall reliability	3.97	HS	3.67	HS	3.58	HS	3.74	HS	4	HS	3.71	HS	4	HS	3.72	HS	3.3	MS	3.53	HS	3.81	HS
15. Overall performance	4.04	HS	3.76	HS	3.74	HS	3.78	HS	4.13	HS	4	HS	4	HS	3.72	HS	3.3	MS	3.61	HS	3.69	HS

Table VIII. Computed Average Weighted Mean of eLearning Tools for Mobile Device

	C4droid		Coding C++		CPP N-IDE		CPPDroid		Cxxdroid		Dcoder		Java N-IDE		JStudio		Jvdroid	
	Mean	DI	Mean	DI	Mean	DI	Mean	DI	Mean	DI	Mean	DI	Mean	DI	Mean	DI	Mean	DI
1. Ease of installation	3.22	MS	3.38	MS	3.45	HS	3.85	HS	3.51	HS	3.47	HS	3	MS	3.2	MS	3.42	HS
2. Ease of use	3.56	HS	3.63	HS	3.36	MS	3.82	HS	3.41	HS	3.53	HS	3.21	MS	3.2	MS	3.34	MS
3. Hardware compatibility	3.67	HS	3.5	HS	3.23	MS	3.74	HS	3.28	MS	3.33	MS	3	MS	2.6	LS	3.25	MS
4. Operating system compatibility	3.78	HS	3.5	HS	3.09	MS	3.76	HS	3.23	MS	3.4	MS	3.05	MS	3	MS	3.3	MS
5. Security	3.89	HS	3.5	HS	3.45	HS	3.86	HS	3.49	HS	3.6	HS	3.11	MS	3.2	MS	3.41	HS
6. Ability to integrate with other apps	3.56	HS	3.25	MS	3.18	MS	3.79	HS	3.41	HS	3.53	HS	3.05	MS	3	MS	3.34	MS
7. Consistency with interface	3.67	HS	3.38	MS	3.45	HS	3.78	HS	3.51	HS	3.33	MS	2.95	MS	2.8	MS	3.42	HS
8. Application software compatibility	3.78	HS	3.75	HS	3.5	HS	3.85	HS	3.49	HS	3.73	HS	3.11	MS	3.6	HS	3.48	HS
9. Collaborate with team	3.67	HS	3.75	HS	3.64	HS	3.83	HS	3.54	HS	3.6	HS	3.05	MS	3	MS	3.41	HS
10. Documentation	3.78	HS	3.25	MS	3.59	HS	3.82	HS	3.59	HS	3.53	HS	2.95	MS	3.4	MS	3.59	HS
11. Clarity of documentation	3.67	HS	3.25	MS	3.59	HS	3.86	HS	3.51	HS	3.47	HS	3.11	MS	3.6	HS	3.45	HS
12. Accessibility of eLearning tool support	3.67	HS	3.63	HS	3.55	HS	3.85	HS	3.44	HS	3.67	HS	3.05	MS	3.2	MS	3.38	MS
13. Quality of eLearning tool support	3.78	HS	3.63	HS	3.59	HS	3.79	HS	3.59	HS	3.6	HS	3.05	MS	3	MS	3.44	HS
14. Overall reliability	3.67	HS	3.75	HS	3.64	HS	3.78	HS	3.62	HS	3.53	HS	2.89	MS	3.6	HS	3.45	HS
15. Overall performance	3.89	HS	3.5	HS	3.73	HS	3.93	HS	3.67	HS	3.73	HS	3.16	MS	3.6	HS	3.58	HS

4. Conclusion And Recommendation

Analysis of survey data obtained in this study showed that most of the faculty members were handling more than two programming courses. Faculty members used Microsoft Teams as the Learning Management System with Google Classroom, Schoology, Facebook Page, or Messenger as the secondary medium for interaction. On the utilization of eLearning tools for programming course, results showed that most of the students are using Dev-C++, Code::Blocks, and Microsoft Visual Studio for personal computer and CppDroid, JVdroid, and Cxxdroid for mobile devices. The result for the assessment of eLearning tools showed that majority of the students are highly satisfied with the features, functions, and support provided by these tools.

Further, it is recommended that research studies must be conducted to assess the effectiveness of the different eLearning tools used in a programming course. Other research studies must also be conducted to address the performance of students and teachers during the implementation of these eLearning tools in the new normalUse either SI (MKS) or CGS as primary units.

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