

Design Considerations for Implementing a Virtual Learning Environment in Sultan Kudarat State University

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Abstract—This study examined the current status of three interrelated areas in designing and implementing a virtual learning environment: (a) university's technical capability, (b) students' technological readiness, and (c) the instructors' technological, pedagogical, and content knowledge (TPACK) used to provide practical recommendations for effective and convenient deployment of online education in Sultan Kudarat State University (SKSU). The study is conducted by means of a survey and is participated by one ICT dean, 194 students and 10 instructors. The result of the survey on the university's e-learning capability proved that the respondents are satisfactorily ready to engage in the VLE in spite of problems related to the university's technical capability. However, it is viewed that the VLE is a new technology in the context of SKSU that needs to address issues related to awareness on the implementation. Moreover, it is observed that the current ICT infrastructure needs to be revisited in order to meet the minimum necessary requirements for the integration of the VLE in the university.

Interestingly, it was found out that 79% of students show willingness to adopt a VLE in SKSU. However, it was also observed that some of the students responded that they need enough access to the Internet or sufficient library resources in order to be affirmative to VLE implementation in the university. Some students do not know how to manipulate a computer because of limited access and experience in using such device too. Some of which lacks the basic computer manipulation skill belong to the ethnic minority groups Manobo, T'boli, and Teduray, who came from remote isolated areas of the province and were just compulsory mandated to study in the expense of the provincial government of Sultan Kudarat. The general findings is that students of SKSU need to be committed and resilient in adopting new technology and be willing to change their learning style.

The results show that when instructors develop intermediate forms of technology pedagogy knowledge (TPK) and technology content knowledge (TCK), these contribute to their confidence for constructivist-oriented technology integration. The results also show specific challenges faced by experienced instructors. The need for support for the ongoing professional development and continuous improvement in e-learning topped the list.

Overall, it seemed that VLE implementation in SKSU might be demonstrated as being effective through the capability of the three interrelated areas on addressing its design considerations.

Index Terms— Technical Capability, Technology, Pedagogy, Content, Knowledge, Virtual Learning Environment, Constructivist-oriented Technology, e-learning.

1 INTRODUCTION

In today's globalization and rapid technological advancements, dramatic changes have been happening in higher education, (e.g. the dearth of resources). For classroom based instruction, the development of the open and distance learning philosophy, the need to service, the needs of adult learners and many other factors are among the challenges of the Philippines educational system today [1].

At some point, some colleges and universities in the Philippines offers distance learning that allows student to study online. These universities are using virtual learning environment (VLE) to minimize time effort, cost and promote sustainable and effective technological and pedagogical learning environment for students and instructors. In the Philippines, out of 112 only 18 State Universities and Colleges (SUC) are offering distance learning and that roughly translated to only 16.07%. Unfortunately, Sultan Kudarat State University is not included on the list [2].

In SKSU, out of all 92 programs offered in 10 different SKSU campuses, ICT courses, totaled 10 in all, came in second place and dominated in terms of subject offered in almost all programs available. These 10 courses seek to educate individuals and engage them to become knowledgeable about com-

puters and the Internet.

Lamentably, although internet-based instruction is the one of the best practices the faculty and students can use to research on topics related to subject matter that they are specializing in and to upload and download learning materials from the different web servers, currently, SKSU has not implemented yet its own VLE. Because of this, it has not utilized the full potential of the Internet and internet-based teaching and learning. In this day and age of technological advancements, face-to-face learning is still the practice in SKSU. In addition, there are large numbers of older instructors who do not have enough experience in incorporating technology in their teaching [3]. This results to the slow progress of the learning methods in SKSU that would other come as result of improvement in teaching and learning.

E-learning as Konrad [4] recognized is effective and convenient. This project studies the effectiveness and convenience of three interrelated areas: institutional capability, students' perceived readiness, and instructors' perceived knowledge in terms of technology, pedagogy and content knowledge (TPACK) areas for the deployment of e-learning in SKSU. The areas are interrelated institutional capability that placed em-

phasis on the construction and development of ICT infrastructures which affects the students' technological readiness and academic performance, such technological readiness and academic performance being feed backed into instructors' effective pedagogical practice in a technology enhanced learning environment.

STATEMENT OF THE PROBLEM

This project study aims to deploy a virtual learning environment at Sultan Kudarat State University Academic Program. Specifically, it seeks to answer the following:

- (1) What is the status of the University's e-learning capability?
- (2) What is the perceived readiness of students to engage in virtual learning?
- (3) What is the perceived knowledge of instructors in utilizing (or about) a VLE in terms of technology, pedagogy, and content knowledge areas?

MATERIALS AND METHODS

Assessment on the University's e-learning capability

The questionnaire adapted the five (5) sustainability issues that have been used by Atwell [5] to addresses the problems in relation to the capability to implement e-learning in the university (Figure 2). In addition, some key challenges are included to determine how really supportive the university on its ICT instructors in the use of VLE in the campus like: responding to increasing technical support demands from instructors, responding to increasing pedagogical support demands for instructors, maintaining current technical infrastructure, securing adequate funding to handle demand, maintaining a standard network/user platform, creating offering easy-to-use tools to decrease support requirements, providing 24 / 7 support, and upgrading classroom to technology use.

Survey evaluation on students' perceived readiness to engage virtual learning

The survey was administered using a questionnaire, which was constructed from the Technology Acceptance Model (TAM) that was developed and empirically tested by Davis. TAM uses multiple item scales to operationalize Behavioral Intension (Motivation), Perceived Usefulness (Online Skills and Relationship), and Perceived Ease of Use (Technology Access).

The study participants were 194 students enrolled in SKSU-Isulan campus who are attending their second year as an ICT student. These students were randomly selected by their instructors for the conduct of the survey on the adoption of the VLE in the campus.

The selection criteria given to students were: technology access, online skills and relationships and motivation wherein readiness, perception of the usefulness, and challenges of implementing VLE in SKSU.

Survey evaluation on instructors' perceived knowledge in terms of technology, pedagogy, and content domain areas (TPACK).

An evaluation have be conducted to assess the domain knowledge level of the 10 ICT instructors, which is necessary in the use of the VLE as a teaching tool. The technology pedagogy and content knowledge (TPACK) questionnaire have been used. The instrument measures two areas namely: (1) technological pedagogical knowledge (TPK), and (2) technological content knowledge (TCK). *The Teaching With ICT Audit Survey (TWictAS)* (Albion & Jameson, 2010) contains items that measure teachers' interest in, and attitude toward, using ICT; access to ICT and the Internet; competency with ICT applications; digital technology knowledge (TK); and TPACK Vocational Self-efficacy.

Population/Sampling Techniques

The respondents of this study were composed of 1 department head 10 instructors and 194 students of Sultan Kudarat State University-Isulan Campus. The researchers used a simple random sampling technique. It is the form of probability sampling. Each member of the population has an equal and known chance of being selected. As all members of the population have an equal chance of becoming a research participant, this is said to be the most efficient sampling procedure.

Data Gathering and Procedure

The researcher conducted a personal visit to the Sultan Kudarat State University-Isulan Campus to ask permission for the survey to be addressed. The researcher chose the ICT Department as the focus for conducting surveys to ensure that the participants had enough experience in online courses and adequate knowledge to share through their responses to the researcher. The researcher received the approval of SKSU President thru the office of Vice-President for Academic Affairs' to conduct the study at their university. Likewise, all the participants (instructors and students) from Sultan Kudarat State University received approval to take survey from the College of Computer Studies (CCS) Dean to participate in this study. The surveys took approximately 15 minutes to complete.

Data Analysis

Data from instructors' TPACK and students' readiness survey were analyzed using a statistical package for social science (SPSS) software to run descriptive analysis. Mean

scores were calculated to measure instructors' TPACK components while percentage scores were recorded to measure students' readiness. The variables of data analysis are: (a) instructors' TPK and TCK levels and (b) students' readiness

Statistical Tools

Statistics is one way of getting the information organized. To have a general view of the whole scenario of the study, a statistical tool is used. This also includes the scaling system, which was used by the researchers as a technique to monitor the respondent's interpretation of facts. The Likert scale was used to interpret items in the questionnaire. These responses were based on the respondents. The range and interpretation of the five point scale are shown in table 1.

Table 1 The Five-point Likert Scale

Scale	Range	Interpretation
5	4.6 - 5.0	Completely Agree
4	3.7 - 4.5	Strongly Agree
3	2.8 - 3.6	Not Sure
2	1.9 - 2.7	Strongly Disagree
1	1.0 - 1.8	Completely Disagree

Weighted mean was used to measure the general response of the survey samples, to determine the student and instructors' knowledge in using online courses.

The formula in computing weighted mean is as follows:

Where:

\bar{x} – Mean

f – Weight given to each respondent

x – Number of respondents

n – Total number of respondents

Mean

$$\bar{x} = \sum fx / n$$

Percentage

$$P = \left(\frac{x}{n} \right) * 100$$

RESULTS AND DISCUSSIONS

Three questionnaires were developed based on literature related to the e-learning context. The questionnaires targeted the ICT Head, 10 Instructors and 194 students actively attending the ICT courses in SKSU-Isulan Campus. E-learning survey questionnaire [6] on ICT Head was used to determine the university's e-learning capability. Technology Assessment Model was used on students' readiness to engage VLE in SKSU and *The Teaching With ICT Audit Survey (TWictAS)* [7] contains items that measure teachers' interest in, and attitude toward, using ICT; access to ICT and the Internet; competency with ICT applications; digital technology knowledge (TK); and TPACK Vocational Self-efficacy.

In the last section, participants were also asked to comment on the questionnaire in their native language. Based on the findings, the researcher found out that result of the usability evaluation confirmed that 175 out of 194 or 90% of the student preferred to learn using VLE and face-to-face learning or blended learning.

Assessment of University's e-learning Capability

The researcher designed a matrix of problems and recommended solutions to determine and address the current e-learning status of the university. Table 1 gives an indication on the present status to determine and address the current e-learning status of the university. Issues related to university's technical capability.

Table 1. e-learning capability in the university

e-Learning Capability Issues/problems	Present status of the University	Recommended Solutions
1. Technical Capability a) Does the college have a computer server? b) Does the college have Internet connection? c) What is the campus' current Internet speed? d) Can you sustain the internet need of the campus? e) Do you have a Wi-Fi in the campus? f) Does all ICT student have access to computer?	<ul style="list-style-type: none"> There are available computer hardware and ICT infrastructure and internet connection. In 2014, the University acquired ICT infrastructures. However focus is on interconnectivity of the SKSU-system (10 campuses); acquisition of instructional program is still being planned. The current speed of the university's internet connectivity is perhaps which can sustain 50 units of computer in the campus The university has limited wifi and only in the hotspot areas of the campus 100 computer units are available for the population of approximately 2,500 	<ul style="list-style-type: none"> Determine existing ICT facilities, number of computer, computer laboratories, computer specifications, WIFI hotspots, internet line and bandwidth and other facilities used for teaching Identify computer servers, server specifications, different hardware and software infrastructure, budget/cost, and projects related to the automation of the university
2. Workload a) What is the average workload of your faculty?	<ul style="list-style-type: none"> 18 units per instructors' workload were given to address the technological and pedagogical demand to sustain the quality of education, yet traditional method of instruction is extensively used in the classroom because of the lack of skills experience in engaging online technology. 	<ul style="list-style-type: none"> Determine the average workload of the faculty to provide additional time to manage e-learning program Seek approval to the university's academic affairs to provide training for technology advancement of instructors to enhance their capability to deliver engaging online technology on their students.
3. Rewards and Remunerations a) How does your institution encourage instructors to integrate technologies into instruction?	<ul style="list-style-type: none"> The Institution are encouraging its instructors to integrate technologies into instruction through special considerations for promotions and tenure. 	<ul style="list-style-type: none"> Determine the university's standing by considering ICT faculty to integrate e-learning technology into education Involve IT experts and content specialist in promoting VLE implementation in the university.
4. Policy a) Why institution encourages instructors to incorporate technology to instruction. 5. Support a) institutional spending for supporting ICT instructor's and instructional needs for e-learning courses	<ul style="list-style-type: none"> The university is willing to spend and support ICT instructors to conduct training for the acceptability and implementation of the VLE. 	<ul style="list-style-type: none"> Conduct training and seminars to students and instructors who will manage and deploy the VLE system Prepare cost analysis to initially determine the development, implementation and evaluation costs of the VLE.

CONCLUSION

The main fact that can be concluded in this research was VLE is a new technology. The institution should focus and enhance the development of ICT infrastructures, appropriate professional training and development because it shows that the university has the capability to support ICT instructors to address the technological and pedagogical demand to sustain the quality of ICT education for the adaptability and implementation of the VLE in SKSU University. Resiliency and commitment toward students to provide range of resources, and activities by engaging online learning experience for they are hopeful that the VLE in SKSU University will be approved. Furthermore, by addressing the three inter-related areas, it seemed that VLE implementation in SKSU might be demonstrated as being effective

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