

<http://www.ftsm.ukm.my/apjitm>

Asia-Pacific Journal of Information Technology and Multimedia

Jurnal Teknologi Maklumat dan Multimedia Asia-Pasifik

Vol. 8 No. 1, June 2019: 49 – 62

e-ISSN: 2289-2192

THE USE OF ADDIE MODEL FOR DESIGNING BLENDED LEARNING APPLICATION AT VOCATIONAL COLLEGES IN MALAYSIA.

MUHAMAD AZHAR STAPA

NAZERI MOHAMMAD

ABSTRACT

Teaching is a highly complex occupation, which needs to adapt to a great deal of variety in context, subject matter and learners. It does not lend itself to broad generalization. However, academic knowledge is not the only kind of knowledge that is important in today's society, and as teachers we have to be aware of other forms of knowledge and their potential importance to our students, and make sure that we are providing the full range of contents and skills needed for students in a digital age. E-learning strategies are still not explored extensively in the system of vocational education for the learning process in Malaysia. Nevertheless it is possible to provide guidelines or principles based on best practices, theory and research, which must then be adapted or modified to local conditions. This study discusses the instructional design and development of e-Learning prototype called Vocational Learning (Voc-Learning) by using ADDIE model and implemented via blended learning method. ADDIE model is one of the instructional design models used by many researchers to develop software or applications related to the field of education. The design of application development based on the ADDIE is explained as Analysis, Design, Development, Implementation and Evaluation. The strength of concerned is according to the variables have been divided into several items such as; teaching design, content, user controls and technical. Implementation phase involves formative evaluation of a prototype developed and make adjustments and improvements where necessary. The percentage of expert approval percentage becomes a benchmark in comparison. This study highlights the development of blended Voc-Learning model based on the relevant theories of teaching and learning.

Keywords: Voc-Learning, blended learning, ADDIE model, vocational colleges.

INTRODUCTION

Technical and Vocational Education Training (TVET) is a practice-oriented approach to education and emphasises on what to do in the workplace as a result of either learning to meet the requirements of the job or improving students' performance on the skill level to be possessed (Ismail et al., 2019). However, academic knowledge is not the only kind of knowledge that is important in today's society, and as teachers we have to be aware of other forms of knowledge and their potential importance to our students, and make sure that we are providing the full range of contents and skills needed for students in a digital age. The role of the TVET should be considered as a medium that can be combined with elements of e-learning in educational technology and gives a better impression on the students, vocational colleges (VC), and also in terms of careers (Muhamad Azhar, Mohamad & Amri, 2014b). The phenomenon at work today is different from the past. As more academic content becomes openly and freely available, students will look increasingly to their local institutions for support with their learning, rather than for the delivery of content. This puts a greater focus on teaching skills and less on subject expertise. The issue is not so much the nature of knowledge, but how students or learners come to acquire that knowledge and learn how it can be used. It is

characterised by global competition, cultural diversity, new technology, and new management processes that require employees to have problem solving and critical communication skills and high level of workmanship according to the study done by Jamaliah, Rohana, and Aede Hatib (2012).

In line with this development, the government has taken a step forward and in line with Vision 2020, which aims to develop Malaysia into a developed nation by 2020. Therefore, the development of human capital that can generate new sources of wealth in technology and knowledge-intensive sectors such as ICT (Information Computer & Technology) and skills-based services have been given priority (Kementerian Pendidikan Malaysia, 2013b). The rapid growing changes in the industries have brought a lot of competitions and challenges in the world today especially in the technology sector. Therefore, graduates in these areas are expected to be highly competent in terms of 'hand-on skills' and 'soft generic skills' for them to serve and remain in the industry.

The current student generation has been exposed to the technology of the Internet and smart phones since early teenage years as stated by Gialamas, Nikolopoulou, and Koutromanos, (2013) that most of the students have experience using the Internet before they enter the educational institution (Gialamas et al., 2013). A study by Sandars and Murray (2009) showed that students prefer to use technologies that they are familiar with such as mobile network, social media, and blogs to interact and get information. Valtonen, Hacklin, Dillon, Vesisenaho, Kukkonen and Hietanen (2012) suggested if teachers have their own environment to negotiate the learning needs of students and how it is supposed to connect with students and in what form should the communication between students and the learning environment that teachers need to take, then teachers need to maximise of existing facilities. A method for more effective communicative learning should be sought and practiced in VC so it is more relevant to the needs of the students and teachers present (Muhamad Azhar, Mohamad, & Amri, 2014a).

This study aims to design and develop the application e-learning using web technology based applications in terms of T&L effective among vocational students and teachers in VC under the management of the Ministry of Education (MOE). The training program for vocational students has been greatly changed by the passage of time in the curriculum and teaching methods in the classroom (Ahmad, Syed, Mohd & Mohammad, 2012). Career excellence vocational education will be achieved through work-based learning oriented training programs (Battistelli et al., 2019). Work-based learning (WBL) allows content knowledge and skills available to students and constantly being adjusted to conform to the new requirements in the industry, business and society (Kementerian Pelajaran Malaysia, 2011).

LITERATURE REVIEW

In the system of vocational education, e-learning strategy is still not thoroughly exploited to enhance the teaching and learning process. An effort should be made to develop recommendations to explore new technologies that are accepted and used in learning systems at VC. There is a decline in the number of students enrolled in secondary vocational schools due to the decreasing number of students who apply for admission to the school, from 62,200 in 2008 to 51,500 in 2011. The Figure decrease from 2.7% to 2.2% in the overall secondary enrolment (Kementerian Pendidikan Malaysia, 2013a). However, the demands of industry for graduates of vocational students are high and will continue to increase each year. By the year 2020, of the 3.3 million jobs created under the National Key Economic Areas (NKEA), at least 46% require vocational qualification certificate or diploma, compared to 22% who require a degree university (Kementerian Pendidikan Malaysia, 2013a). To address the problem, MOE has provided Vocational Transformation Plan to strengthen training for skilled students. The

implementation process of education transformation requires new approaches and strategies that the students are able to own and master the skills needed in the 21st century. Therefore, this study is an ideal platform to be exposed the vocational students in VC on T&L new uses Vocational Learning applications (Voc-Learning) based on blended learning model.

ADVANTAGES OF BLENDED LEARNING

The research for this study is based on the model that has proven as blended learning. Köse (2010) did a research on blended learning model supported by popular Web 2.0 technologies and used it in a Mathematics course at a high school in Afyonkarahisar (Köse, 2010). The students' academic achievement improved with blended learning and this activity was good for the students. Figure 1 shows the model of blended learning, which is the combination two types of learning, face to face learning and e-learning. In this paper, e-learning can be a web based and face to face will as a classroom or workshop. Ginns and Ellis (2007) studied the relationship between online and face-to-face teaching and learning. They found that student learning outcomes were better when there is student interactions, a favourable workload, a quality of online teaching and resources. They also found that students' learning outcome are more favourable when instructors clarify the value of student postings and interactions as well as seeking to understand their students' perceptions in the online part of a blended learning course (Ginns & Ellis, 2007). For a blended learning course to be successful, the students must be motivated to engage in online activities as well as made to understand that they are acknowledged and heard (Feiz, Hooman, & Kooshki, 2013; Shivetts, 2011).

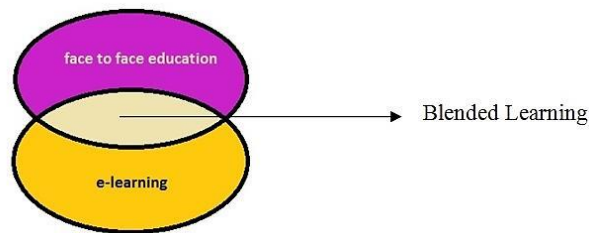


FIGURE 1. Blended learning

Blended learning is an educational approach that mixes online and offline learning and teaching. This Teaching Topic gives us a step by step guide, experiences and best practices to show how to blend our course. Blended learning is also an alternative way of education that depends on the use of information technology in the form of online active learning strategies that improve T&L strategy based (Lothridge, Fox, & Fynan, 2013). In general, blended learning has several features of face to face learning and e-learning which makes it a new approach for creating educational programs that can take into account the individual differences between students and bring different learning methods (Ho, Nakamori, Ho, & Lim, 2014).

Studies carried out by Kazu and Demirkol (2014) found students who have gone through the learning process in a suitable environment according to blended learning were more successful after study compared to the learning techniques practised earlier. Looking at this situation, it can be said that learning adapted to the environmental conditions and technology has become more effective than traditional learning throughout the research process as shown in Table 1.

TABLE 1. Differences in traditional and blended learning method

	Traditional	Blended learning
Classroom	Face to face	Face to face / Online
Practical	Face to face	Face to face / Online
Assignments	Individual	Individual
	Group	Group
Workshop	College	College
		Online
Learning	Teacher	Teacher
Materials		Group of teacher
Online support	None	Conversations
		Talks
		Submitting assignments online
		Decision assignments online

The issue of costs should be taken into account for each particular technology when integrating information technology into teaching and learning (Sife, Lwoga, & Sanga, 2007). Blended learning has the potential to revolutionize the educational system of quality and cost (Dankbaar, Storm, Teeuwen, & Schuit, 2014; Hollands et al., 2013; Taplin, Kerr, & Brown, 2013). Using blended learning model gives teachers more time to focus on learning activities that engage students and improve their own skills (Hamilton & Tee, 2013). A study by Mckenzie, Perini, Rohlf, Toukhsati, Conduit, and Sanson, (2013) showed a reduction in time-to-face classes which gave impact on the organisation to improve time efficiency of the learning session. Perceptions of students from the class will be presented with an open comment on the web learning. Teachers and students can enhance the experience in the classroom in person to address the inconsistency between teachers and teachers' approaches to the different learning content and synchronise content between class sessions and online learning (Mckenzie et al., 2013).

ADDIE MODEL

ADDIE model design is an instructional model that serves as a guide to the construction of software and learning materials based on needs (Wang & Hsu, 2009). This model is the models of teaching that often form the basis of models of other instructional design. ADDIE is the generic process to be modified before it can be used. Figure 2 shows the purpose of this model is designed to produce lesson plans and learning materials so that the presentation of the teaching will be more effective and efficient. ADDIE Instructional Model covers the phases of analysis, design, development, implementation and evaluation. ADDIE model is one model design (instructional design) application used by many researchers to develop software or applications related to the field of education.

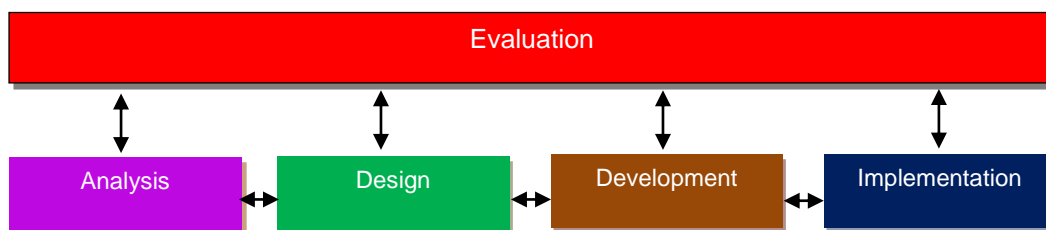


FIGURE 2. ADDIE Model

METHODOLOGY VOC-LEARNING

Voc-Learning applications designed based Voc-Learning Development Model as seen in Figure 3 Model is developed based on ADDIE. The model consists of three layers namely: the first layer (L1); the second layer (L2) and third layer (L3). L1 is the first inner layer which is the main basis for the development of application Voc-Learning Comprehensive Assessment. L1 layer is to emphasize the characteristics of assessment which includes cognitive, psychomotor and affective. L2 layer is the inner layer, which involves the use of constructivism as an approach in determining teaching strategies in Voc-Learning applications. This model was first introduced in the 1970s and experienced a number of changes to date. Maimun Aqsha et al., (2013) argue that the ADDIE model fits in the design and development of educational software Smart Prayer. Theories can be applied in the design and development of software in an effective and meet user requirements (Maimun Aqsha et al., 2013). This reflects very positively to the researcher to use the ADDIE model.

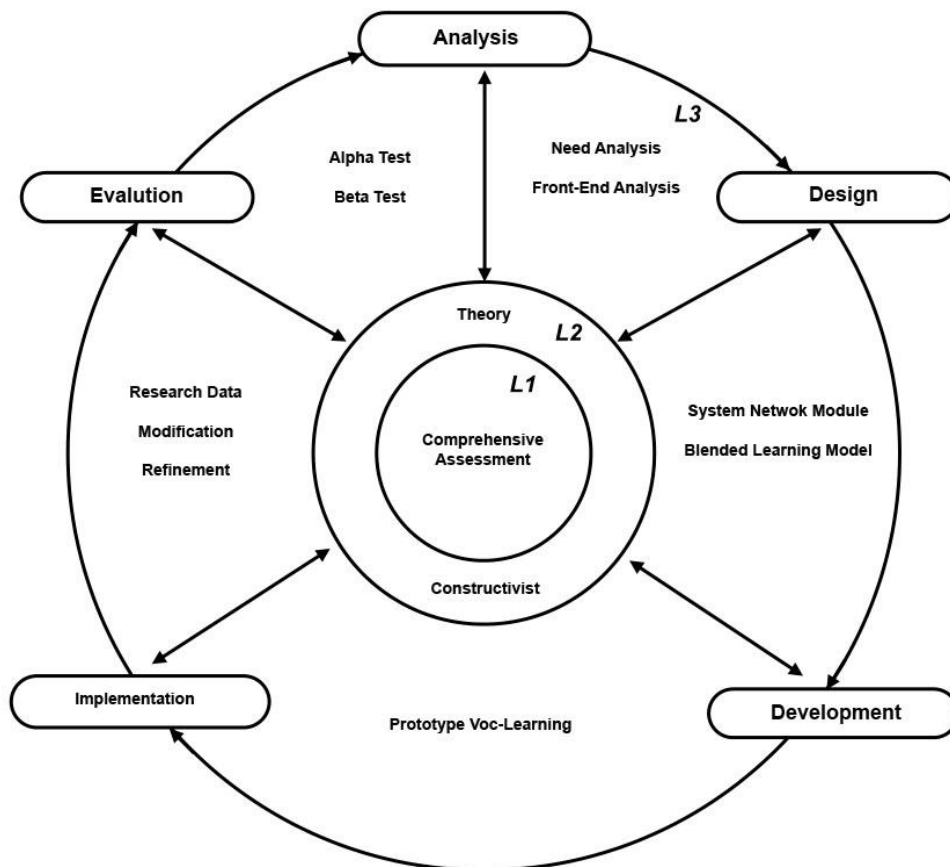


FIGURE 3. Voc-Learning development model

Through the work flow of the above model, the following is a framework that needs to be followed during the development of applications such Voc-Learning;

1. The process of designing and analyzing purposes application courses, namely coaching application concepts and related data collection subject. Included in this category is the provision of a computer system needs and software-related application.
2. They process the application form Voc-Learning, ie. Determine how implementation, T&L strategy, the overall structure and produces a storyboard.

3. Development process, namely coaching ratings application courses based on the overall structure and storyboard (storyboard).
4. Implementation process, ie. Test runs Voc-Learning applications that outcome and assess fluency to conform to the specifications as multimedia applications is based on the web.
5. The process of assessing the application, that is, test and assess the application based on the web through summative assessment to target users.

An analysis phase involves objectives related to the educational process and to identify the characteristics of students, the scope of the proposal, among other elements. Design phase shift in the definition of learning, study education strategy to be adopted, feedback mechanisms and interactive, interface usability aspects, and so on. Development phase aims to implement the proposed building is structured based on the specification in the previous two steps. The implementation phase is a step in which the elements are placed in a learning platform available, as well as tests performed. Finally, the assessment phase aims to analyze the evolutionary process involved, ie. seeks to work and structuring tool for measuring the effectiveness of the plans are developed and implemented. With it is possible to make adjustments and analyze how the procedures work cycles occur to achieve the objectives of a project (Rossi & Mustaro, 2013).

Constructivism theory and comprehensive assessment are integrated in the development of learning material Voc -Learning to produce a material that meets the requirements of vocational students. The design and development of an application is a very important element in creating effective learning materials. All learning material will be produced if effective theoretical foundations of learning are taken into account while designing such materials. Entity during the analysis phase are teaching and learning objectives using Voc-Learning applications; learning outcomes to be achieved; the characteristics of the target users and the content of education. Entity during the design phase is a blended learning model and design of the course module and sub module network system.

ANALYSIS PHASE

In the design and application development Voc-Learning based on ADDIE model, it begins with the analysis phase. In this phase (see Figure 4) researchers need to make an analysis of what actually needs or things you want to achieve in the development of this application. The analysis needs to be done to get the real problems and needs in the next process. Needs analysis and front-end analysis is performed to see all the things that can affect the study.

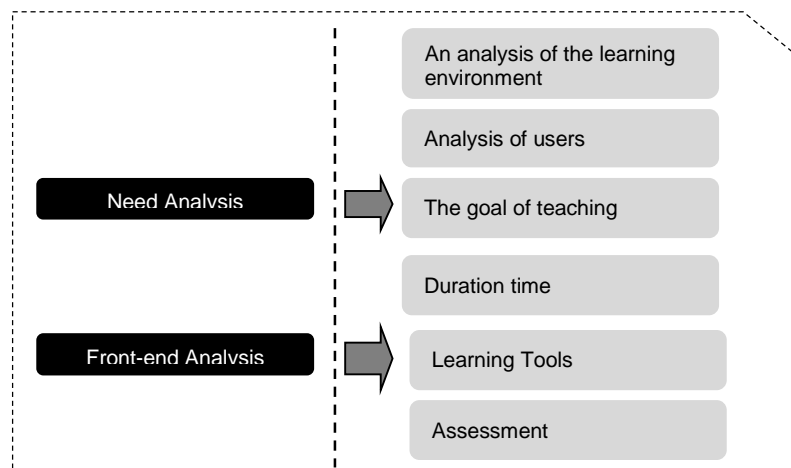


FIGURE 4. Analysis phase

This phase determines the objectives related to the educational process and to identify the characteristics of students and the scope of the proposal, among other elements. At this stage it involves a number of decisions and identifies problems to be resolved. Once a problem is identified the process of analysis is performed to find the cause or a factor related or presenting problem. The analysis process involves many aspects including;

ANALYSIS OF THE LEARNING ENVIRONMENT

Learning environment refers to the diverse physical locations, contexts, and cultures in which students learn. VC learning sessions starting from 8.00 am to 5.00 pm. Since students may learn in a wide variety of settings, such as an outside-of-school locations and outdoor environments, the term is often used as a more accurate or preferred alternative to the classroom, which has more limited and traditional connotations a room with rows of desks and a chalkboard, for example. The term also encompasses the culture of a college or class its presiding ethos and characteristics, including how individuals interact with and treat one another as well as the ways in which teachers may organize an educational setting to facilitate learning example, by conducting classes in relevant natural ecosystems, grouping desks in specific ways, decorating the walls with learning materials, or utilizing audio, visual, and digital technologies. Educators may also argue that learning environments have both a direct and indirect influence on student learning, including their engagement in what is being taught, their motivation to learn, and their sense of well-being, belonging, and personal safety. For example, learning environments filled with sunlight and stimulating educational materials would likely be considered more conducive to learning than drab spaces without windows or decoration, as would schools with fewer incidences of misbehavior, disorder, bullying, and illegal activity. How adults interact with students and how students interact with one another may also be considered aspects of a learning environment, and phrases such as “positive learning environment” or “negative learning environment” are commonly used in reference to the social and emotional dimensions of a college or class.

ANALYSIS OF THE STUDENT

The number of students enrolled in colleges and courses network system. Average number of students in each college from 15 to 20 per class. The number of students who are not too many give an advantage to the use of blended learning model.

IDENTIFY INSTRUCTIONAL GOALS

At this stage some of the analysis will be done as a learning environment analysis, user analysis and determine instructional goals. There are some questions that can be asked during the analysis process; (a). Who are the users and what are their properties? (b). In determining the new attitude that will be exhibited? (c). What types of learning barriers that exist? (d). The choice of delivery system? (e). What is the length of time required to complete the project? This involves the study of techniques such as requirements analysis; need analysis and front-end analysis (refer Fig. 4). The output of this phase includes instructional objectives and a list of tasks that need to be taught. All output will be the input for the design phase.

LEARNING TOOLS

Equipment used by VC in the T&L also be considered in determining the effectiveness of the study. They have computer laboratories dedicated and not shared with other vocational students. Complete ICT equipment in VC helps students and teachers to the T&L. The equipment is like; computers, printers, scanners, servers and network equipment.

ASSESSMENT

Assessment is divided into two forms of theoretical and practical. While the assessment will take place in two ways, namely continuous assessment and final assessment.

DESIGN PHASE

Design phase shifts to the definition of learning, the study of educational strategies to be adopted, feedback mechanisms and interactivity, usability aspects of the interface, and so on. This stage is carried out after the completion of the needs analysis process. It describes the overview of the shape, structure, theory, types of media and technology to be used. Among others it also involves the process; (a) the formation of specific objectives for teaching, (b) construction of the items for testing (c) selection of teaching strategies. This phase is important for planning strategies in developing teaching and outline ways to achieve the goal of teaching. Among the elements in the design phase, including writing that the targeted, lead learning analysis, writing objectives and test items, selecting and arranging the delivery system of teaching.

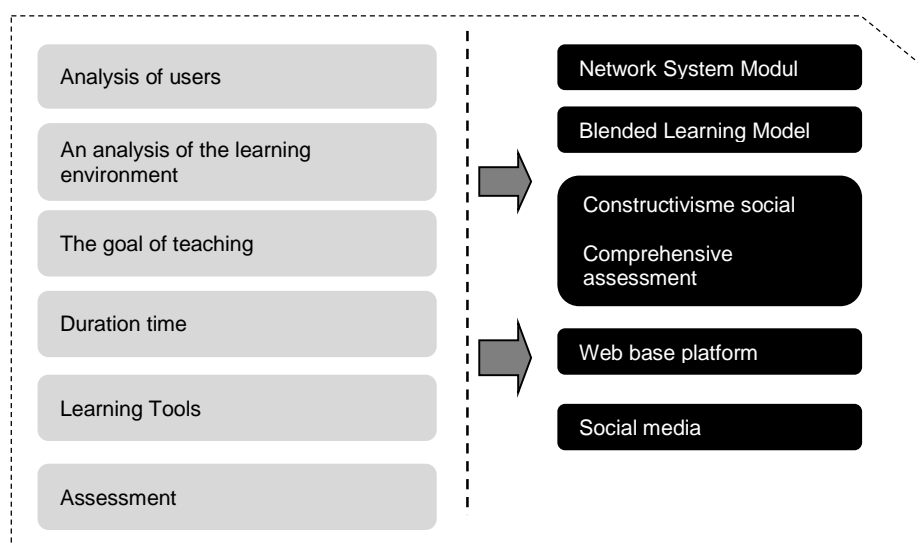


FIGURE 5. Design phase.

DEVELOPMENT PHASE

The development phase is intended to implement the proposed structured building based on the specifications in the two previous steps. This stage involves the actual system build using all elements of the media and technology chosen based on need. Built on the analysis and design phase. The purpose of this phase is to produce a plan of teaching and learning materials. During this phase of development, the teaching and the media that will be used in teaching and other required documents. Work on the development of multimedia projects will be carried out in accordance with an agreed specification requirement. Each building will be tested so that it can operate consistently and effectively.

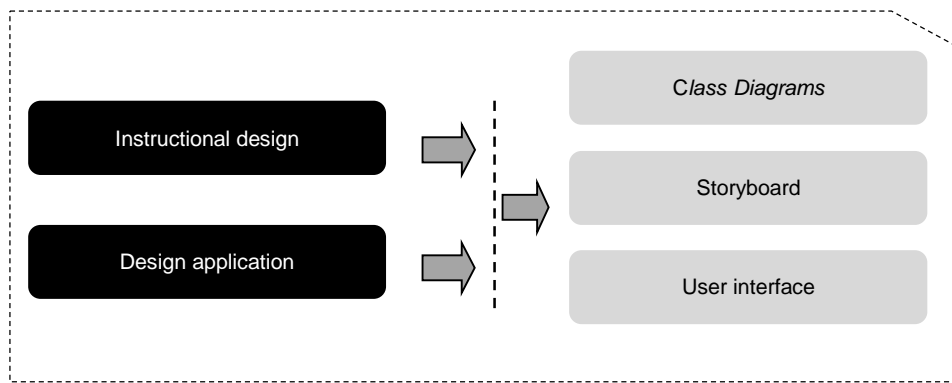


FIGURE 6. Development phase.

IMPLEMENTATION PHASE

Implementation phase at this stage, instructional materials have been provided to be used or implemented in practice. Projects that have been completed will be tested on real users to identify errors in the process of project development occurs. If things go wrong, the repair will be done before it is left entirely to the target consumer to use. The four parts of the ADDIE model (see figure 7) are doing an evaluation of Voc-Learning systems that have been developed.

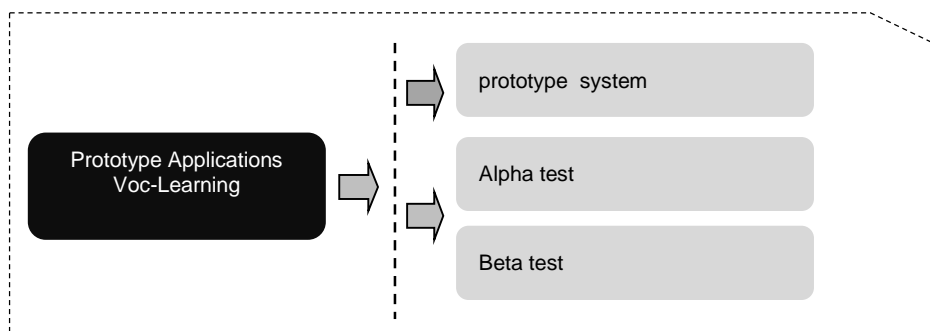


FIGURE 7. Implementation phase

Two types of tests will be performed alpha and beta testing for its impact on the look of views of experts;

1. Alpha testing is simulated operational testing by potential users or an independent test team appointed by the developer of the application. Alpha testing is often used to test the application in-house, before the application goes into beta testing. Alpha testing is done by involving content experts and web application experts. Content expert evaluation is related to the content aspects of the application that has been produced.
2. Beta testing is a pilot study to find out the applicability and usefulness of the software that has been produced. Beta testing sessions are usually tested at the highest level of real user needs (Keengwe & Georgina, 2011). Use is related to the use of applications in support of learning. Meanwhile, usability is relevant to the application operation that covers the interface and interaction. Beta testing is done by involving the users who have the same background with the target user. With the planned move of the ADDIE model it can make room for adjustment and analyze cyclical nature of work for a project (Rossi & Mustaro, 2013).

EVALUATION PHASE

Evaluation Phase is divided into two parts: formative and summative evaluation (see Figure 8). Formative assessment covers every phase of the ADDIE process. Formative assessment should be done on all levels to ensure their effectiveness. Summative assessment only involved the design of a specific test that requires user feedback such as content, strategy and multimedia elements by means of interviews, questionnaires, monitoring and testing. Summative evaluation usually occurs at the end of a project completed production of teaching materials.

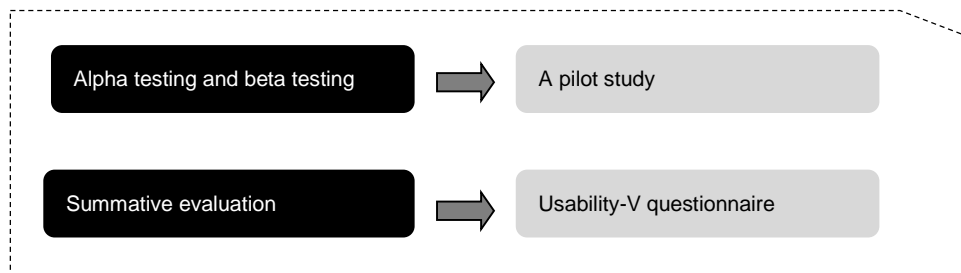


FIGURE 8. Evaluation phase

INTERFACE DESIGN

Voc-Learning has integrated constructivism theory and evaluation theory into the content development and learning material to produce a material that meets the requirements of vocational students. Design and development of an application is a very important element in creating effective learning materials. All effective learning materials will be produced if the fundamental of learning theory is taken into account during the design of these materials. Web 2.0 has gradually become a must-have necessity in teaching and learning due to its ability in sharing, interaction and collaboration among students in their daily lives. With the right content, this technology can be a suitable choice for enhancing the skills and a motivation tool for improving class attendance and participation vocational students. Figure 9 shows the interface of Voc-Learning applications and developing using Web 2.0 technologies. Social media refers to the means of interfaces among people in which they create, share and exchange information and ideas in a virtual environment and networks (Danciu & Grosseck, 2011).



FIGURE 9. Main page Voc-learning

Social media constitute an increasingly important context where individuals utilize them regularly in their everyday lives. Therefore, this poses a potential benefit in assessments, curriculum, and teaching practices in the vocational school today. Figure x shows the main page of a prototype system that is easily accessible to students, in which the screen display is designed based on the preliminary design phase of the design of the interface and the main template which has been discussed as each phase of the design and development phase. This application can be accessed at the address <http://www.voc-learning.net>. Menu contained in this web site are logged in, sign up, home and contact us.

RESULT

The findings of expert analysis are descriptively shown in Table 2. The percentage of expert approval percentage becomes a benchmark in comparison. The strength of consent is according to the variables that have been divided into several items such as; design, content, consumer and technical controls.

TABLE 2. Analyze the results of a content rating expert

Item	Expert					Total	%	M %
	1	2	3	4	5*			
Teaching design								
The teaching method is in line with the student's level	0	1	1	1	1	4	80	85.7
The teaching strategy is in line with the content	1	1	1	1	1	5	100	
The language used is in line with the student's level	0	1	1	1	1	4	80	
The use of graphics helps learning	1	1	1	1	1	5	100	
The interactive level is sufficient	1	0	1	1	0	3	60	
Student feedback is sufficient	1	0	1	1	1	4	80	
Presentation of learning materials is in order	1	1	1	1	1	5	100	
Content								
No spelling mistake	0	1	1	1	0	3	60	90.0
Content is accurate	1	1	1	1	1	5	100	
No gender or race bias	1	1	1	1	1	5	100	
Content is in accordance with the learning objectives	1	1	1	1	1	5	100	
User Controls								
Users can control learning speed	0	0	1	1	0	2	40	80.0
Interesting app interface	1	1	1	1	1	5	100	
The menu user is appropriate	1	1	1	1	1	5	100	
Technical								
Applications can be used without problems technical to computer system	1	0	1	1	1	4	80	86.7
This application is free of error program that can affect its use	1	1	1	1	1	5	100	
The quality of the media (text, graphics, video and animation) used in this app is satisfactory	1	0	1	1	1	4	80	

CONCLUSION

Education has become one of the clearest indicators of life outcomes such as employment, income and social status, and is a strong predictor of attitudes and wellbeing. Education can equip learners with the agency, the competencies and the sense of purpose to shape their own lives and contribute to the lives of others. What matters is whether classroom design meets the changing needs of a digital age. However, just adding technology to the mix, or delivering the same design online, does not automatically result in meeting changing needs. It is important then to look at the design that makes the most of the educational affordances of new

technologies, because unless the design changes significantly to take full advantage of the potential of the technology, the outcome is likely to be inferior to that of the physical classroom model which it is attempting to imitate. The study of e-learning typically focuses on the factors of achievement, attitude, knowledge base, socioeconomic status and learning strategy. This study is important to be implemented in developing application, because these factors are important factors associated with the achievement of vocational students in a particular field of study skills to be acceptable as the practice of their craft.

Overall, this paper has proposed a new innovation in teaching and learning process that involves the transfer of knowledge from teacher to the student; it is not only theoretical but also the practical form of training based or hands-on. What matters is whether classroom design meets the changing needs of a digital age. The use of technology and support can encourage or impede student engagement in online activities. Many supporting studies such as Carter, Cooper, Adcock dan Branh, (2013); Conde et al. (2012;); Haghparast, Nasaruddin dan Abdullah (2014); Taneja, Vitrano dan Gengo (2014) found that the usability of application facilities greatly influenced the student's decision to engage in online activities. In addition, studies by Malawski and Kuzniar (2013); Mohamed Amin (2011) and Muhamad Azhar et al. (2014a) demonstrating the technical support, support of classmates and encouraging adequate teachers is essential in enhancing students' motivation to use online applications. This paper is part of an on-going study that finally aims to enhance the evaluation, implementation and applications of Voc-Learning in vocational education.

ACKNOWLEDGEMENTS

Sincere appreciation and thank you are extended to the Ministry of education Malaysia (MOE) the opportunity and space to pursue this research.

REFERENCES

- Ahmad, S., Syed, H., Mohd, K., & Mohammad, S. 2012. Methods to Study Enhancement of Problem Solving Skills in Engineering Students through Cooperative Problem-Based Learning. *Procedia - Social and Behavioral Sciences*, 56, 737–746. <http://doi.org/10.1016/j.sbspro.2012.09.711>
- Battistelli, A., Odoardi, C., Vandenberghe, C., Di Napoli, G., & Piccione, L. 2019. Information sharing and innovative work behavior: The role of work- based learning, challenging tasks, and organizational commitment. *Human Resource Development Quarterly*.
- Carter, S., Cooper, M., Adcock, J., & Branham, S. 2013. Tools to support expository video capture and access. *Education and Information Technologies*, (106). <http://doi.org/10.1007/s10639-013-9276-6>
- Conde, M. Á., García-peñalvo, F. J., María, J., Alier, M., Casany, M. J., & Piguillem, J. 2012. An evolving Learning Management System for new educational environments using 2 . 0 tools. *Interactive Learning Environments*, (August 2014), 37–41. <http://doi.org/10.1080/10494820.2012.745433>
- Danciu, E., & Grosseck, G. 2011. Social aspects of web 2.0 technologies: Teaching or teachers' challenges? *Procedia - Social and Behavioral Sciences*, 15, 3768–3773. <http://doi.org/10.1016/j.sbspro.2011.04.371>
- Dankbaar, M. E. W., Storm, D. J., Teeuwen, I. C., & Schuit, S. C. E. 2014. results , less training costs compared with a traditional, 289–299. <http://doi.org/10.1007/s40037-014-0109-0>
- Feiz, P., Hooman, H. A., & Kooshki, S. 2013. Assessing the Motivated Strategies for Learning Questionnaire (MSLQ) in Iranian Students: Construct Validity and Reliability. *Procedia - Social and Behavioral Sciences*, 84(4), 1820–1825.
- Gialamas, V., Nikolopoulou, K., & Koutromanos, G. 2013. Student Teachers' Perceptions About the Impact of Internet Usage on Their Learning and Jobs. *Computers & Education*, 62, 1–7. <http://doi.org/10.1016/j.compedu.2012.10.012>
- Ginns, P., & Ellis, R. 2007. Quality in blended learning: Exploring the relationships between on-line and face-to-face teaching and learning. *The Internet and Higher Education*, 10(1), 53–64. <http://doi.org/10.1016/j.iheduc.2006.10.003>

- Haghparast, M., Nasaruddin, F. H., & Abdullah, N. 2014. Cultivating Critical Thinking Through E-learning Environment and Tools: A Review. *Procedia - Social and Behavioral Sciences*, 129, 527–535. <http://doi.org/10.1016/j.sbspro.2014.03.710>
- Hamilton, J., & Tee, S. 2013. Blended teaching and learning: a two-way systems approach. *Higher Education Research & Development*, 32(5), 748–764. <http://doi.org/10.1080/07294360.2012.711301>
- Ho, V.-T., Nakamori, Y., Ho, T.-B., & Lim, C. P. 2014. Blended learning model on hands-on approach for in-service secondary school teachers: Combination of E-learning and face-to-face discussion. *Education and Information Technologies*. <http://doi.org/10.1007/s10639-014-9315-y>
- Hollands, F., Bowden, a. B., Belfield, C., Levin, H. M., Cheng, H., Shand, R., ... Hanisch-Cerda, B. 2013. Cost-Effectiveness Analysis in Practice: Interventions to Improve High School Completion. *Educational Evaluation and Policy Analysis*, 36(3), 307–326. <http://doi.org/10.3102/0162373713511850>
- Ismail, A., Adnan, W. N., Masek, A., Hassan, R., Hashim, S., & Ismail, M. E. 2019. Effectiveness of Entrepreneurship Programmes in Developing Entrepreneurship Skills towards Quality TVET Graduates. *Journal of Technical Education and Training*, 11(1): 081-086.
- Jamaliah, M. J., Rohana, H., & Aede Hatib, M. 2012. The Role Of Technical And Vocational Education In Career Development. *Journal of Technical, Vocational & Engineering Education*, 5(March), 28–34.
- Kazu, Ibrahim Yasar; Demirkol, Mehmet 2014, Effect of Blended Learning Environment Model on High School Students' Academic Achievement, *Turkish Online Journal of Educational Technology - TOJET*, v13 n1 p78-87 Jan 2014.
- Keengwe, J., & Georgina, D. (2011). The digital course training workshop for online learning and teaching. *Education and Information Technologies*, 17(4), 365–379. <http://doi.org/10.1007/s10639-011-9164-x>
- Kementerian Pelajaran Malaysia. 2011. *Pelan Strategik Transformasi Pendidikan Vokasional*. Kementerian Pelajaran Malaysia. Putrajaya, Malaysia.
- Kementerian Pendidikan Malaysia. 2013a. *Malaysia Education Blueprint 2013 - 2025*. Kementerian Pendidikan Malaysia. Putrajaya, Malaysia: Kementerian Pelajaran Malaysia.
- Kementerian Pendidikan Malaysia. 2013b. *Pelan Pembangunan Pendidikan Malaysia 2013 - 2025*. Kementerian Pendidikan Malaysia. Putrajaya, Malaysia: Kementerian Pelajaran Malaysia.
- Köse, U. (2010). A Blended Learning Model Supported with Web 2.0 Technologies. *Procedia Social and Behavioral Sciences*, 2, 2794–2802. <http://doi.org/10.1016/j.sbspro.2010.03.417>
- Lothridge, K., Fox, J., & Fynan, E. 2013. Blended learning: efficient, timely and cost effective. *Australian Journal of Forensic Sciences*, 45(4), 407–416.
- Maimun Aqsha, L., Norazah, N., Muhamad Amin, E., Md. Yusoff, D., Rosseni, D., Aidah, K., & Fariah Muftah, A.-G. (2013). Development and evaluation of a multimedia software (smart solat) for j-QAF Program for Malaysia Primary Schools. *Research Journal of Applied Sciences*, 8(1), 5–8.
- Malawski, M., & Kuzniar, M. 2013. How to use Google App engine for free computing. *IEEE Computer Society*.
- Mckenzie, W. A., Perini, E., Rohlf, V., Toukhsati, S., Conduit, R., & Sanson, G. (2013). A Blended Learning Lecture Delivery Model for Large and Diverse Undergraduate Cohorts. *Computers & Education*, 64, 116–126. <http://doi.org/10.1016/j.compedu.2013.01.009>
- Mohamed Amin, E. 2011. *Aplikasi Web 2.0 dalam Pengajaran dan Pembelajaran*. Universiti Kebangsaan Malaysia (1st ed.). Bangi, Selangor: Universiti Kebangsaan Malaysia.
- Muhamad Azhar, S., Mohamad, I., & Amri, Y. 2014a. Engaging Vocational College Students Through Blended Learning : Improving Class Attendance and Participation. In *Conference proceedings of the 4th World Congress on TVET 2014* (pp. 238–246). Melaka, Malaysia: UTHM.
- Muhamad Azhar, S., Mohamad, I., & Amri, Y. 2014b. Pembangunan Model Blended Learning Menggunakan Teknologi Web 2.0 Dalam Pembelajaran Aliran Vokasional. In *The 9 th International Malaysian Studies Conference (MSC9)* (pp. 1–19). Terengganu: Malaysian Social Science Association.
- Rossi, R., & Mustaro, P. 2013. Quality evaluation of online courses through rubrics and ADDIE model. *International Conference on E-Learning and E-Technologies in Education (ICEEE)*, 234–238.

- Retrieved from http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=6644380
- Sandars, John;Murray, C. 2009. Reflective learning for the next generation. In I. L. C. Terry T. Kidd (Ed.), *Wired for Learning:an educator's guide to web 2.0* (1st ed., pp. 153–168).
- Shivetts, C. 2011. E-Learning and Blended Learning : The Importance of the Learner : A Research Literature Review. *International Jl. on E-Learning*, 10(3), 331–337.
- Sife, A. S., Lwoga, E. T., & Sanga, C. 2007. New Technologies for Teaching and Learning : Challenges for Higher Learning Institutions in Developing Countries. *International Journal of Education and Development Using Information and Communication Technology*, 3(2), 57–67.
- Taneja, A., Vitrano, J., & Gengo, N. J. 2014. Rationality-based beliefs affecting individual's attitude and intention to use privacy controls on Facebook: An empirical investigation. *Computers in Human Behavior*, 38, 159–173. <http://doi.org/10.1016/j.chb.2014.05.027>
- Taplin, R. H., Kerr, R., & Brown, A. M. 2013. Who pays for blended learning? A cost – benefit analysis. *The Internet and Higher Education*, 18, 61–68.
- Valtonen, T., Hacklin, S., Dillon, P., Vesisenaho, M., Kukkonen, J., & Hietanen, A. 2012. Perspectives on personal learning environments held by vocational students. *Computers & Education*, 58(2), 732–739. <http://doi.org/10.1016/j.compedu.2011.09.025>
- Wang, B. S., & Hsu, H. 2009. Using the ADDIE Model to Design Second Life Activities for Online Learners, 53(6): 76-81.

Muhamad Azhar Stapa
Fakulti Seni,Komputeran dan Industri Kreatif,
Universiti Pendidikan Sultan Idris,
muhamadazhar@iab.edu.my

Nazeri Mohammad
National Institute of Educational Management and Leadership
Institut Aminuddin Baki. Genting Highlands Branch,
nazeri@iab.edu.my

Received: 16 August 2018
Accepted: 11 April 2019
Published: 30 June 2019