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3 Development of an E-Learning instructional model for vocational training in Indonesia.

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Abstract

This research aims to produce an E-learning instructional model for vocational schools (VS) in Indonesia by implementing a system of E-learning instructional design that allows teachers to develop and teach their own e-learning lessons. This study reports a design-based research and development activity which was performed over three years, 2012-2014. In the first year, assessment and development of criteria for E-learning & instructional design in VS and its indicators were performed. The second year was used to develop a guide book of E-learning instructional design in VSs, based on the results of the first year of the study when a focus group discussion (FGD) was held to discuss, test, and revise the draft guidebook. In the third year the dissemination of E-learning instructional design was executed, involving 22 teachers from around Yogyakarta Province. Quantitative analysis of the E-learning instructional model in VS led to different values of adoption for the specific components, such as guidebooks, learning modules, and DVD based training. The final results showed that the model of E-learning instruction in VS is suitable to support and motivate the teachers in dissemination and for developing their teaching material by using the E-learning instructional model guidebook.

1 E-learning models in TVET: the situation of Indonesia

The development of science, technology, and information affects all aspects of society, culture, economics, politics, as well as developments in the world of education, either directly or indirectly (Lievrouw et al. 2000). New discoveries in the field of technology allow for the adoption of those new technologies in education, which would provide opportunities for educational institutions to enhance the quality of education and quality of human resources through the improvement of the learning process (Köhler et al., 2008). The application of the instructional model with E-learning at vocational schools (VS) is appropriate because the nature of teaching materials in VS is closely related to the application of technology. The complexity of the system and the use of equipment in the world of work, in line with technological developments, led to changes in the concept of skill included within knowledge work (BMBF, 2013:

78). These changes are in accordance with the concept of the use of computers in a variety of production process, thus requiring programming skills or intellectual skills more than just physical or motoric skills. These changes reflect the new condition of the existing system in the world of work, i.e. one that is changing from manual to automatic, detection to scheduling, and from work steps to programming. Some of the changes are related to IT. The pace of technological development has a direct impact on the importance given to vocational school students gaining experience by implementing multi-source instructional materials. By employing multi-source instructional methods, the material is very easily obtained and maintained through E-learning, so the teacher as a facilitator must be prepared and skilled at using and updating the content of E-learning. Major challenges to the implementation of E-learning in Technical and Vocational Education and Training (TVET) lie within technological development, human resources development, infrastructure development, economic issues, and managerial and policy making issues (Bappa-Aliyu, 2012, pg. 56). One of the obstacles in the use of E-learning in Indonesian VS is that teachers lack the understanding of how to properly use E-learning. They assume that learning with E-learning would complicate the interaction between teachers and students, which hinders the performance of teachers having to learn to run the E-learning programme. On the other hand, the geographical condition of Indonesia creates a need for instructional material that can be used by VSs from various regions at the same time and language skills similar to the vocational fields. The number of VSs throughout Indonesia is approximately 11,000 schools scattered among more than 17,000 big and small islands with an area that covers almost 2 million km² of land and over 3 million km² of sea. More than 230 million inhabitants who interact by using more than 200 different language types and sets of more than 300 ethnic groups. Under these conditions, there is an urgent need to create E-learning modules for VSs, along with a guidebook (that describes its usage in relation to the topics of the subject area) which allows teachers to manage and use the E-learning package that is suitable for vocational subjects. The learning model presented here has been realised through three years of research. Further in this article a discussion and results of the 3-year study are provided.

2 Research design: model development and research method

In terms of methodology, this paper adopts the approach of design-based research (Richey et al., 2003). Since in the study possibilities for new learning and teaching arrangements are explored, and evidence for such a design is collected, the methodology of design-based research (DBR), which arose in the context of learning and teaching research, is almost ideal for modelling. With this approach the limits of a purely experimental approach can be overcome and can incorporate the project-oriented character already found in the research design. Subsequently, in the first year

of the project, an assessment and criteria development model of E-learning in VS was implemented. Focus Group Discussion (FGD) aimed to discuss the results of the draft criteria for the E-learning design, find indicators for every aspect, and test and revise the draft criteria. Therefore, the second year aimed to develop a model to guide E-learning in VSs based on indicators for each aspect. A FGD was held to discuss, test, and revise the draft guidebook. Lastly, the objective of the project's third year was the dissemination of the E-learning draft model in VSs and testing its implementation in schools. Different materials (handbook, Modules, and DVD) were suggested in this research since they can complete the useful learning tools for students, and with those varied tools they can be more attracted in the learning materials.

This study uses three different clusters of subjects each year. FGD respondents involved in the first year were 5 experts of instructional media from universities and 5 experts from the information technology and communications practitioners. The respondents for the trial in the second year were VS students and VS teachers. In the third year, the respondents consisted of 22 teachers and their VS students picked from a typical vocational school in Yogyakarta Province.

Methods of data collection for the three-year study were questionnaires and observation. Data collection was carried out immediately after training and dissemination of E-learning guidebooks for VS. Participants were asked to fill in instrument guidance reports regarding VS E-learning, VS E-learning module training, and VS E-learning DVD training. In the implementation of such dissemination, researchers observed the enthusiasm of the participants and assessed the extent of the teachers to develop instructional activities using the VS E-learning model. Following the dissemination, participants were encouraged to implement E-learning in their vocational training and were subsequently monitored by researchers.

For the assessment guidebook for VS E-learning, VS E-learning module training, and VS E-learning DVD training, respondents were asked to provide an assessment which included three indicators, namely: (1) material; (2) presentation; and (3) benefit, with each indicator then divided into sub-indicators.

Hypothesis testing is not performed in this study as once the data was collected, it was analysed descriptively in both a quantitative and qualitative way. Quantitative analysis is used to describe the assessment of respondents taking into account the aspects of material, presentation, and usefulness. Qualitative analysis is based on the results of dissemination in VSs and used to analyse the suggestions of the respondents regarding the usefulness of the VS E-learning guidebook and its implementation.

3 Results and discussion

In general appraisal, the instructional VS E-learning guidebook obtained a value of 4.60 from the range value 1-6 (with 6 being the best). The values obtained for the training module and the DVD training were 4.77 and 4.62. Respectively all these values were considered as more than sufficient. When rounded the acquisition value is 5.

From the preceding analysis, it can be seen that the VS E-learning draft model needs to be revised in terms of: 1) the material (guide book and DVD module) needs to contain more detailed instructions and explanations and 2) within the presentation it was found that: (a) some pictures in the guidebook and modules are not big enough, clear enough, or are even cut off, (b) there are some fonts that are less clear, and (c) some respondents asked for additional video tutorials and supporting software.

The guidebook for VS E-learning is considered capable of supporting and motivating teachers' to use E-learning in the subject matter in each VS. This is evident from the increased use of E-learning after the teachers had taken part in dissemination. Now the teachers are still developing their vocational subjects, as shown in Table 2 below (Source: <http://besmart.uny.ac.id/>). The expertise field is occupation in the field of work in Indonesia. The vocational subjects are all subjects offered in vocational schools, which are then separated into three subject groups: (1) Productive (skill subjects), (2) Adaptive (i.e. flexible topics), and (3) Normative subjects (supporting skill subjects).

Based on the results of the evaluation of dissemination and implementation of the 22 teachers from around Yogyakarta Province, the following was found: (1) an application for mathematics / physics (equations) does not exist, so the question regarding existing formulas did not match expectations; (2) there are several options that cannot be displayed for quizzes (multiple choices), for example the option that contains HTML tags had a flaw in the preview; (3) there is a need to be more detailed in all material; (4) the E-learning guidebook consists of teaching material for practical subjects (technical implementation).

4 Conclusions and recommendations

During the study, assessment of the criteria of the E-learning instructional model in VS was established to focus on the instructional system as a whole. The assessment was divided into initial, formative, and summative categories in which the initial assessment was focusing on the intervention to establish a baseline from which the respondents' skills were measured. The formative assessment was carried out throughout the teaching material, and the summative assessment was the last assessment in the end of the teaching material.

The results of the quantitative analysis for the model of E-learning generally focus on the assessment of the three components used in vocational schools: (a) the instructional guidebook for E-learning, (b) the training modules, and (c) the DVD based training. Overall those obtained a value of >4.0 , which is considered as 'sufficient'. This means that the model of VS E-learning is relevant, easy to be used, and accepted by vocational teachers. The results of the qualitative analysis of the model of VS E-learning based on the guidebook, the training module, and the DVD based training led to two more aspects which are worth considering:

- 1) There is a need to provide more detailed material.
- 2) Regarding the presentation aspect there are (a) still some pictures in the guidebook and module which are not large enough or where clarity is missing, (b) some fonts are less clear, and (c) the need for additional video tutorials and supporting software has been mentioned.

The results of the model developed suggest that the teachers considered the instructional model of VS E-learning as suitable for supporting and motivating their activity toward usage of E-learning in each vocational subject - i.e. for disseminating it. This is proven from the use of instructional E-learning through the domain <http://besmart.uny.ac.id/> recently. As recommendations toward improving the E-learning instructional model in VS or VS E-learning in general, the authors make the following conclusions:

- 1) Independent trainings/workshops for groups of adaptive, normative, or productive teachers should be created.
- 2) Implementation of a DSS (Decision Support System) for determining the characteristics of the continued/advanced workshops and the E-learning instructional model is recommended.

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