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MANAGEMENT MODEL DEVELOPMENT OF INSTRUCTIONAL MATERIALS FOR PROFESSIONAL COMPETENCE IMPROVEMENT OF TEACHERS IN INDONESIA

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ABSTRACT

This study is aimed at developing a management model of web-based instructional materials that can be used by teachers to obtain teaching materials, knowledge sharing and discussions in order to improve their professional competence. This research used Borg and Gall's theory, 4-D Model and Development Model Prototyping. The results revealed that based on the judgement of expert of educational technology, expert of web design, and expert of information systems, the model fits to be applied. The results from individual evaluation, small group test, and field test showed that 84, 00% of the web-based module can be used well. Furthermore, the results of the expert evaluation and field test indicate that the web-based module can be used by Indonesian teachers either individually or in groups and it is very helpful for learning activities.

KEYWORDS Modules, Instructional Systems Design, Web-Based, Instructional Materials

INTRODUCTION

The review of the research and development that discusses the process of developing teaching material models for teachers in improving competence is the concern of this paper. This web-based development model is utilizing information and

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communication technology and various online learning resources. The purpose of this study is to provide a means that can be used maximally for teachers to interact each other in order to share learning materials and knowledge so that it can be used as a reference and model for teachers, principals, supervisors, and education practitioners. (Probst, Raub, & Romhardt, 2000) reveals that it is very important that knowledge must be shared and distributed within the organization so that all members of the organization can make use of it.

The background of this research is that teachers have a very important and strategic role in guiding students towards maturity, independence, and creativity. All teacher's personal integrity and abilities are needed to be carried out his professional assignments since they are formulated in the form of teachers' competence.

(Code, 2012) says that professionalism is the commitment of members of aprofession to improve their professional abilities and continuously develop strategies that are used in doing work in accordance with their profession. Professionalism also refers to the attitude of the members towards their profession and the degree of knowledge and skills they have in order to do their work. Professional teachers are teachers who have the ability to plan good and correct learning plans. Teachers who do not prepare lesson plans should be questioned for their professionalism. According to Permendiknas No. 16 of 2007 that professional competence is a mastery of the material being taught, the ability to develop the material being supported, as well as the ability to develop professionalism in a sustainable manner by taking reflective actions using information technology.

The data on the results of teachers' Initial Competency Test (UKA) which held by the Ministry of Education and Culture in 2015 showed an average result of 42.25 with the highest score of 97.0 and the lowest score of 1.0. The UKA average results include all participants (teachers) from kindergarten to high school (Marazyan, 2009) Competence is defined as knowledge, skills, and attitudes of values that manifest the habit of thinking and acting. A teacher is considered competent if he is consistently able to display / show specific abilities, which are very observable, and measured. Like the ability of teachers in designing learning plans, Lesson Plan (RPP and Syllabus) is one of the indicators and forms of teachers' professionalism.

The facts on the ground show that the improvement of teachers' competence is absolutely immediate (Willingham, 2021). In order to be able to produce quality of Indonesian human resources, the education sector must work seriously. In order to improve the quality of education in Indonesia, it is important to improve the quality and competence of teachers as one of the pillars of educational success. Then the question which is needed to be considered is "What efforts need to be made to improve the quality of teachers' competency?". In addition, other obstacles which are also faced by teachers are unwell managed online instructional materials that can be used as a source of learning for teachers in improving their competence. Various learning media have been developed to provide convenience for teachers and students in the learning process. However, the utilization has not been maximized, because it is not well distributed to the teachers. This is unfortunate for considering the large amount of research that has been done through the development of instructional media for teachers. In addition, learning materials from various sources are currently not integrated in a forum that compiles these learning materials properly. Teaching material is seen as it is much theoretical, less contextual. The learning method is monotonous, lacking optimal use of various media and technology. The use of technology, media, and learning aids by lecturers is more determined by the availability of these aids, not by their compatibility with learning objectives (Budiman, 2018.). The number of learning resources found in cyberspace today seems to be scattered about, although complete but not well managed according to the type of learning material and whose users

are in need of it. Educational practitioners, researchers and teachers contribute to each other in a variety of knowledge in the field of education, one of which is by posting / uploading learning material online in cyberspace.

In line with elaboration theory as conveyed by (Christopher S. Reigeluth & Addis, 2021) which is a theory of learning design on the basis of the argument that lessons must be organized from simple material to complex expectations by developing understanding in a more meaningful context so that it develops into integrated ideas. It reveals that the management of learning materials that are well organized will be one of the keys to successful education, where educators will be able to deliver their teaching materials so that it can reaches students' purposes. The elaboration theory also allows the knowledge sharing between students, in this case, the teacher can contribute to conveying thoughts, ideas and experiences to complement each other's insights knowledge and problem-solving learning process.

(Elhefni, 2011) revealed that the way of learning is also known as cooperative and collaborative learning which seeks to use peers, and teachers as their learning resources. In a collaborative learning environment, knowledge is jointly conveyed between students to achieve learning objectives. For example, an understanding of problems and solutions to be known is needed. Students are no longer passive but are active in the process of gaining knowledge because they participate in discussions, seek information, and exchange opinions with their peers. Knowledge is created and shared among peers, not owned by one particular student. The learning process creates bonds between students as knowledge constructs, and they depend on their respective contributions to discussion. According to (Brindley, Blaschke, & Walti, 2009) that the collaborative learning process helps students to develop their thinking skills and achieve richer knowledge through shared goals, and exploring shared knowledge.

RESEARCH METHOD

This study used the development model by the Borg and Gall through adopting a 4-D model (Define, Design, Develop and Disseminate) proposed by Thiagarajan, Semmel and Semmel (Brindley et al., 2009). Borg and Gall model was chosen because this model covers all the complete stages of development, especially in the part of the test and revisions which are carried out repeatedly to make it possible to obtain the final product of learning as needed. The 4-D model was adopted in this development because the stages cover a very detail development process step by step. Because the final product of information system development is software, so the process of developing this model is equipped with a special method of developing information systems, namely; the prototyping method. (Grygoryev et al., 2021) The hallmark of the prototype method is that among system developers, clients, and users to see each other's processes so that the process can be well controlled by all parties. By using a prototype approach, consumers and the development teams can clarify their needs and interpretations. The prototype of the resulting software is then presented, and the user is given the opportunity to provide their input so that the later produced software is truly in accordance with the wishes and needs of the users (Code, 2012). The data collection procedures in this study began with the preliminary research, expert validation, and field test. The data collection instruments used were questionnaires, observation sheets, interview sheets, and photo and document documentation.

RESULT AND DISCUSSION

Based on preliminary research, it shows that 77% of the teachers were willing to improve their competency in order to achieve the standards competency set in the applicable laws and regulations. And 69% of teachers want that the facility can share knowledge through articles, scientific work, experiences and ideas to improve their competency. There are 75% of teachers expressed a desire to be able to interact to establish a communication forum among teachers, and as a network in order to discuss some problems and solutions within the learning process through learning concepts that are correctly and easily to be understood by students. In order to update teachers' competencies, it is needed to meet the needs within the development of science, technology and arts as 72% of them want to use information and communication technology (Pulungan, 2014).

Based on the needs analysis, some steps are done in order to develop the model, starting from the information system design stage, the front-end display design, the back end, the menu structure and proceeded with coding programming. The name of the developed system is shortened into 'SIPIMRu', which stands for Instructional Materials Management Information System for Improving Teachers' Professional Competence. The website's domain address is www.sipimru.net as presented in Figure 1.

Figure 1. Display of Instructional Materials Management Information System Website

There are some menus that can be utilized in viewing SIPIMRu profiles in the form of general explanations and operational technical instructions for using the website such as technical assistance, contact us, website links, reading articles, news, knowledge sharing, discussion forums, and downloading learning materials and references. General users can provide comments or opinions and respond to each other about the content of articles or other user contributed to the posts. However, to be able to contribute to sending articles, references and learning materials, it must be registered as a user who has an account in the form of a username and password.

In learning technology, descriptions of development research procedures and steps have been developed. state that the development research procedure basically consists of two main objectives, namely: (1) developing a product, and (2) testing the effectiveness of the product in order to achieve its objectives. The first objective is called the developer

function while the second objective is called validation. Thus, the concept of development research is more precisely interpreted as a development effort that is accompanied by validation efforts.The results of the further development were evaluated and validated by a team of experts, including: (1) educational technology experts; (2) expert of website design material; and (3) information system development experts. The results of the expert team's validation are illustrated in Figure 2.

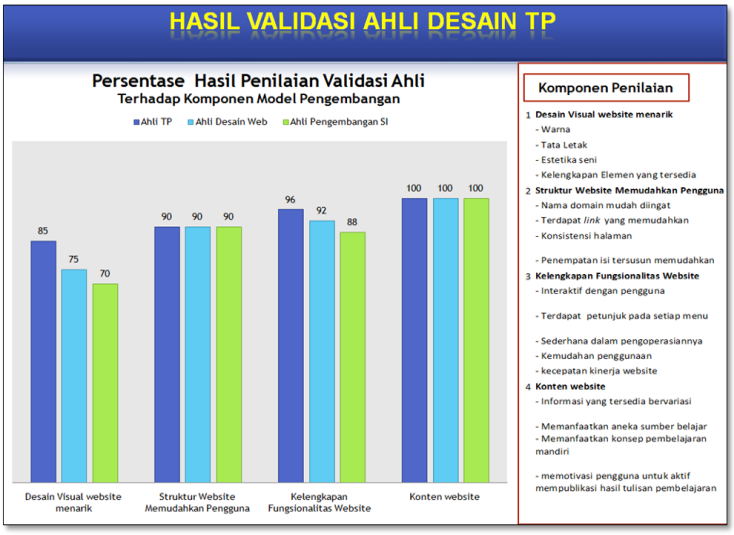

Figure 2. Graph of Expert Team Validation Results for Development Products.

Based on Figure 2 shows that the percentage of validation results quality which consisted of Educational Technology experts, Website Design Experts and Information Systems Development Experts stated that the model is very feasible to be tested to users. The expert team recommends that the product development can be continued and used for the field test process.

In this study, the criteria for evaluating how well the method works in achieving learning outcomes are effectiveness, efficiency, and attractiveness. Januszewski and (Rybakowski et al., 2013) say that effectiveness is an indicator that measures learning outcomes. Effectiveness is measured by the level of achievement of learners on the goals set. Effectiveness relates to the extent to which students achieve the stated learning objectives, namely schools, colleges, or training centers preparing students with the knowledge, skills and attitudes desired by stakeholders. Efficiency is the optimal use of resources, such as time and money, to get the desired results. Efficiency in the context of education and training can be seen as the design, development, and implementation of learning by using the fewest resources for the same or better results.

According to (Charles M. Reigeluth, 2013) that attraction is the extent to which students enjoy instruction, and it can be very effective in motivating students. Learning that has good attractiveness has the following characteristics, namely; a) provides challenges, raises high expectations; b) has relevance and authenticity in terms of students' past experiences and future needs; c) have an aspect of humor or a pleasant element; d) attract attention through things that are new; e) involves intellectual and emotional; f) connecting with the interests and goals of students; and g) using various forms of representation (for example, audio and visual).

Field test were conducted to see the effectiveness of the use of the developed product. The obtained result of field test found that development model gives an ease at finding out a lot of learning materials from a variety of learning sources.

Figure 3. Model Development Test Results

Figure 3 shows that learning materials originating from various sources can be uploaded by teachers and used together as a reference for improving teachers' professional competence. In this menu, the users can download learning materials in the form of teaching materials, including electronic books (e-books), educational media (print media, non-print media, and electronic resources), computer software, video cassettes, films, DVDs, and programs instructional television is a fundamental source for schools to improve instruction and advance knowledge. Some electronic documents can be utilized from this menu are such as power points, document files, pdf files, images, excel and video tables (MP4, MPEG) and others. Currently, there is a lot of diverse information in cyberspace, but it does not come from a group of teachers who have the appropriate instructional material needs. The uploaded instructional materials will continue to grow as a knowledge base and contributions from teachers that are expected to be used together.

Teachers can take advantage from developed models to obtain learning materials including learning material to download, research reports, journals, links to Internet learning resource sites, references in the form of government regulations that can be used as references, ideas or experiences posted by other users. In this development model, discussion forum facilities are also provided that provide an opportunity for users to submit problems, especially in an effort to improve teacher competency. This forum facility requires a competent resource in the discussion of problems so that they can find a solution. The use of technical assistance is helpful enough to help the users understand the steps in using the development model well. On the developed website, there is a Knowledge Sharing menu that provides knowledge sharing facilities in the form of user experiences, and ideas that can be shared with other users. In this menu the teacher can convey knowledge, and provide responses like in Figure 4.

Figure 4. Menu The Teacher Can Convey Knowledge, and Provide Responses

Learning is a system because it has component that must be organized. To achieve learning quality, lesson plan must be based on a systems approach. To develop a learning system design model, the concepts of system are generally characterized as systematic, systemic, responsive, interrelated, redundant, dynamic, cybernetic, synergy and creative. The development of information and communication technology can greatly influence learning activities. Information technology, including internet-based information systems, plays an important and increasingly widespread role in business.

Information technology can help all types of businesses to improve the efficiency and effectiveness of business processes, managerial decision making, and working group work, so as to strengthen the company's competitive position in a rapidly changing market. Information and communication technology have been able to provide convenience in the world of education in facilitating teaching and learning. One important element in learning is the learning material. The importance of learning resources in learning activities cannot be denied anymore. However, learning resources at school so far have generally not been managed and utilized to the full.

While information technology provides a variety of learning resources, provides a lot of learning material and knowledge, it is not well organized. Even though the learning resources will only be effective if they are managed and functioned optimally and in an organized manner, the utilization of advances internet technology, learning materials can be obtained from various learning sources. Teachers are no longer only depending on the source of their knowledge from books available at school but they can utilize some learning materials on the internet as learning materials. Thus, it is in line with the principle of learning from various sources reveals that the teacher who has extensive knowledge and insight can be able to convey their educational mission to students.

The development of a learning material management model is a way that provides facilities in obtaining organized learning materials. Some material available in this media comes from teachers through their contribution in the world of education form the research results and other written works, as well as other public works in the form of learning materials that has been uploaded on the internet. (Satyarini, Kasidi, & Setyaningsih, 2022) revealed that learning or instructional is an attempt to manage the environment intentionally so that someone can forms themselves positively in certain conditions. This opinion confirms that in the multimedia-assisted learning process in the form of a website, users are expected to explore their potential to gain knowledge, skills, and attitudes from what is learned through the presentation of multimedia in the form of a website. The teacher's role in utilizing this media is to make this media as a means of sharing learning material,

exchanging information, scientific work, ideas, knowledge and interacting with other teacher group members.

The test results show that this system can already be used by teachers as a medium for sharing their learning material, knowledge, information, experiences as well as references. Some sample posts in the form of articles, writings such as scientific work have been uploaded by the teachers. Information and Communication Technology (ICT) can create learning openly and provide a shift that learning is not centered on the teacher but on students. This is in line with the statement of Semenov (2005: 3) that teachers who were originally the main source of information and transmitters of knowledge turned into collaborators in which the role of students changed from one of the recipients of passive information to be actively involved in their own learning. In the current global era, of course we are no longer bound by the time and place to get information. Anywhere and anytime teachers can get answers to learning problems by sharing the thoughts of fellow users of the developed model. The advent of online learning and communication through computers has created major changes in how educators and students think about teaching and learning (Orey, 2010).

Currently education sector of e-learning system is an inseparable part of the development of modern educational institutions. This system does not intend to replace the role of the teacher or lecturer in the education process but rather on improving the services of learning and research facilities, for example the ease and availability of teaching materials, learning resources, references, practice questions, quizzes and examinations. Some important building components are learning management systems (LMS), learning content management systems (LCMS), and computer and internet networks. A number of supporting applications have been widely available, for example the open-source Moodle application that can be used to build LMS (Sutandi, 2016)

The Strength of Developed Model

1. The test results show that this system can already be used by teachers as a medium for sharing learning material, knowledge, information, experiences as well as references. Some sample posts were in the form of articles, writings such as scientific works have been uploaded by users easily.
2. This model uses the concept of collaborative and interactive learning by utilizing advances in information technology. The teachers can easily communicate an active contribution and mutually respond to the problems faced in the classroom as well as efforts to improve the professional competence of teachers. This development model also adopts the concept of learning from various sources, especially those from the internet.
3. The development model method is used in detail step by step which adopts three development models namely the 4-D Model, the Borg and Gall Model and the prototyping development Model.
4. By using this development product, learning materials are not bound by time and place. Discussions do not have to be face to face with a special room, but teachers can do it anytime they wish. Teachers also can independently learn from the knowledge and experience uploaded by other users through the website.

CONCLUSION

The development of instructional materials management model is a way that provides facilities to obtain organized learning materials. The provided material in this media comes from teachers through their contribution in the world of education in the form of research results and other written works, as well as other public works in the form of learning material that has been uploaded on the internet. The teachers' role in utilizing this media is to make it as a means of sharing learning material, exchanging information, scientific work, ideas, knowledge and interacting with other teacher group members. The existing facilities in this developed product utilize a form of collaboration among educators of learning management materials by utilizing information technology. Furthermore, the researcher has been able to provide effective forms of interaction to contribute to each other in learning materials management and mutual knowledge sharing among educators.

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