
DEVELOPMENT AND MESSAGE DESIGN OF COURSE IN E-LEARNING BASED PROBLEM SOLVING FOR EDUCATIONAL MATHEMATICS

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Abstrak: Jenis pembelajaran ini telah berkembang ke arah kursus online dengan memanfaatkan berbagai sumber belajar, media dan teknologi. Perkembangan ini dinilai belum mampu memfasilitasi konsep pembelajaran matematika. Desain mata kuliah yang sistematis dan terstruktur diperlukan agar pembelajaran matematika dapat tersaji dalam suatu desain mata kuliah dengan mengikuti langkah-langkah pembelajaran yang ada. Salah satu langkah pembelajaran yang dapat digunakan untuk mengarahkan pembelajaran kontekstual matematika adalah model pembelajaran berbasis masalah. Untuk membuat mata kuliah yang berjenis problem solving, perlu dilakukan penataan pesan dengan memanfaatkan sumber daya yang tersedia. Model mata kuliah ini dikembangkan dengan model penelitian pengembangan ADDIE untuk menghasilkan produk yang layak. Berdasarkan evaluasi tampilan mata kuliah diketahui bahwa penyajian mata kuliah rata-rata 75%, penggunaan media dan teknologi rata-rata 80%, dan pemanfaatan sumber belajar rata-rata 80%. Dari hasil tersebut dinyatakan bahwa course based problem solving dapat digunakan untuk menyajikan konsep matematika kontekstual.

Kata kunci : *Desain Pesan, Course, E-learning, Pemecahan Masalah, Matematika* (Italic, 3-5 words)

Abstract: This type of learning has developed towards an online course by utilizing a variety of learning resources, media and technology. This development is considered not to be able to facilitate the concept of learning mathematics. A systematic and structured course design is needed so that mathematics learning can be presented in a course design by following the existing learning steps. One of the learning steps that can be used to direct the contextual learning of mathematics is the problem based learning model. To create a course with the type of problem solving, it is necessary to organize messages by utilizing available resources. This course model was developed with the ADDIE development research model to produce a feasible product. Based on the evaluation of the course display, it was found that the presentation of the course averaged 75%, the use of media and technology averaged 80%, and the utilization of learning esources averaged 80%. From these results it is stated that course based problem solving can be used to present contextual mathematical concepts

Keywords: *Message Design, Course, E-learning, Problem Solving, Mathematics*

INTRODUCTION

The rapid development of the digital world is marked by the use of technology as a daily necessity. It can be seen that there is a gap between theory and practice from a contextual perspective. Technology allows someone to create something concrete with abstract codes. Technology is now inseparable from everyday human life. Technology is currently used for various purposes ranging from education, training, the general public and so on. Some of the available facilities make it possible to create a technology-based learning.

Technology offers ease as well as speed and accuracy for its users in accessing. Technology users in various sectors include the world of education, entertainment and so on as needed. The use of technology often considers needs analysis so that it can be used in bulk. The use and utilization of technology needs to pay attention to who the users are, their roles and functions, flexibility, and output or outcome. outcome can be seen or measured by increasing insight.

In the world of technology education, it is still limited to the functions of use and utilization. usage functions such as introducing concepts and theories, presenting facts or events, and explaining examples. on the function of using technology to make it easier to stimulate students, explain data, explain the theoretical basis, and concretize events. The use and utilization of technology cannot be separated from organizing messages from experts. designers are required to be active and creative in designing a message to be conveyed.

Various tools and media have been used in the world of education, including e-learning. e-learning is used for various purposes, namely presenting material, directing instructional and learning objectives. The use of e-learning takes into account student characteristics, namely learning independence. In the digital era, students generally have independent learning to use technology, starting from accessing information and determining the purpose of obtaining information. articles or writings generally direct the reader to examine every word, sentence and story in it. Through it students have consciously learned information independently.

The level of understanding of each reader is based on how to see words, save words or sentences into their brain memory. As innovation develops, the course in e-learning should present articles that can direct readers. The use of technology in learning today, starting with media, learning resources, teaching materials and learning systems. Technological development on the system begins with the selection of platforms, databases and available plugins. This development is in order to achieve or produce a quality course.

The availability of courses is evidence of technological developments towards a learning system. Learning designers are expected to be able to design courses by utilizing various media, learning

resources and learning materials. Some considerations that need to be considered in designing a course are the curriculum used, learning objectives, the model or method used, the assignments given and the outcomes. Along with that, a new profession emerged, namely course developer which has a function in designing and developing courses in learning. the profession according to the development of new knowledge and skills that make this field increasingly developed and insightful.

Mathematics education is generally abstract by studying various formulas and theorems. This development shows that contextual learning has not yet been created. According to Firmansah (2022: 3) explains that learning mathematics can be designed using contextual methods in animation on the determinants of the course matrix. It shows that learning media as a tool in displaying pilots can be used. it is necessary to do an analysis so that learning that is abstract in nature turns into contextual, namely through modeling or piloting mathematics. Through this pilot, mathematics can be seen its benefits and functions in everyday life.

Contextual thinking in mathematics learning is growing along with the development of technology. Humans experience the benefits of learning mathematics starting from arithmetic operations to learning geometry, while learning integral, differential, limit functions and as abstract is still considered. the use of formulas and examples of questions that are quite dominant results in early adulthood children being judged to be less motivated to learn. For this reason, pilots are needed which are the contextual results of the concepts presented in a problem. Educators assume that abstract concepts in mathematics cannot be explained in a course, for this reason a course designer is needed who makes abstract concepts explainable through a course.

The selection of courses in mathematics learning in e-learning pays attention to several things such as the application of mathematics in other disciplines, selecting examples or events, compiling concepts, completing pilots with formulas and connecting or creating new pilots using formulas. making a course in e-learning also pays attention to the learning interactions that are produced during the teaching and learning process and learning outcomes. Course systematics pays attention to the direction and development of concepts from mathematics. Through the designed course, students are expected to be able to learn mathematics independently. In this study the courses used in learning mathematics use videos or animations which are examples of real-world problems.

Videos and animations in mathematics courses are used as objects of observation regarding the phenomena in the concept to be explained. organizing messages including videos and animations following the syntax or problem based learning steps. through the use of these problems, students can understand concepts and analyze problems oriented to concepts and formulas. learning management

such as learning interactions pay attention to feedback when students observe and complete assignments. organizing messages and managing learning based on the selection of models in learning.

Course is one of the planned learning activities following a certain method. Through the course, learning is directed and regulated by utilizing existing learning resources and learning media. Learning achievements can be seen in the available courses including competency and outcome outcomes. The arrangement of available learning resources and features is used to provide knowledge in the form of facts, concepts, procedures and principles. The relevance of learning resources is important in organizing learning in courses, because through learning resources students can observe, research and understand theories and concepts.

Firmansah (2022: 1814) learning mathematics can be directed to solve everyday problems or learning is designed contextually. Learning arrangements include how to understand a formula and use the formula into a video or animation which is then presented in the course. The sequence of learning resources and articles in the course can be presented by presenting current phenomena or problems, then followed by other activities such as assignments, tests and so on.

The reason why the articles in the course follow the learning steps is that the course has a function in directing the reader to follow the theoretical concepts that will be presented or explained. Each course in certain subjects has different objectives and indicators depending on the types of concepts to be explained and the completeness of learning resources. The available courses not only contain basic theory but also contain phenomena that occur in life.

RESEARCH METHOD

This type of research is often used to develop various kinds and types of courses in e-learning. Development type research is used to meet needs in various fields of science. The type of this development research is by design by developing a new course in the world of education for learning purposes. Courses are developed following certain learning methods to direct learning. The design or development research model used in this research is ADDIE with the steps of Analysis, Design, Development, Implementation, Evaluation. These stages are used to obtain research results that can be utilized in the world of education.

At the analysis stage, the results show that a course design is still needed for the purposes of learning mathematics so that it can be formulated that learning mathematics has not utilized features in e-learning. The level of abstraction is one of the reasons for the underutilization of e-learning. Learning is still oriented to practice tasks and questions. The pilot still uses problems in textbooks. Information and communication technology is considered to be less flexible in explaining formulas. Learning is still

oriented to concepts, theories and formulas. The use of learning models and methods is only used to explain formulas.

Utilization of information and communication technology in learning has not utilized various kinds of media and learning resources. To attract students' motivation and interest in learning, it is necessary to use learning resources. Based on needs analysis, learning mathematics is inseparable from examples in life so it is necessary to organize messages so that the sequence of concepts leads to life. The use of problem based learning models basically directs learning from problems to concepts. For this reason, a survey of models, media and technology is still needed.

Course is a type of organizing and managing learning resources, media and technology to achieve learning objectives. The basic concept should be conveyed in the course so that students can understand it. The types of practice questions can be delivered in the course as needed. The interactive design of the course depends on how educators use various media. The output and outcome of learning can be seen when they complete the course.

At the design stage, various kinds of media, learning resources, and technology are managed. It is necessary to plan a learning synopsis in the course with the aim that the course steps can be systematic and structured. The design synopsis is then used as a story' board to describe how the lesson is planned. Utilization of synopsis and storyboards to make it easier for learning designers to assess existing learning plans. At this stage an assessment of the strengths and weaknesses of the planned learning is also carried out. Assessment of course appearance is carried out at this stage by taking into account several aspects, namely ease of observation, completeness of learning resources, use of media and technology and presentation of information.

At the development stage, the course is synchronized with the database in the course. At this stage an assessment is made of the appearance of the course, the relevance of learning resources, media and technology. Evaluation of the display is based on being interactive, easy to observe, and easy to access. The sequence of learning resources, media and technology in the course will be validated and tested on small groups. At this stage an analysis of additional features is also carried out prior to the implementation stage. At this stage an implementation design process will be carried out using an experimental research design to produce effective use of the course

Table 1. Design of Eksperimen between Eksperimen and Control

Group	Pretest	Eksperimen	Posttest
G₁	T ₁	Course based Problem Solving	T ₂
G₁	T ₁	Traditional Teaching	T ₂
Group	Pretest	Eksperimen	Posttest

Group	Pretest	Eksperimen	Posttest
G ₁	T ₁	Course based Problem Solving	T ₂
G ₁	T ₁	Traditional Teaching	T ₂

The experimental class and control class are used to test whether the product design can be used in learning. The product was tested in the experimental class with the design that had been made, while the control class was used to determine real learning outcomes. The selection of the design is based on the eligibility level of the course made and takes into account the characteristics of the students

RESULTS AND DISCUSSION

The use of course based problem solving shows that the media can stimulate visual knowledge using a variety of media in learning mathematics. Mathematics learning is basically transformed into examples in the form of stories and phenomena that are then used as a learning resource in the course. In traditional mathematics learning, learning is only directed at understanding formulas and doing practice questions. There is a similarity between the two, namely understanding a mathematical concept. The t-test results show that course based problem solving can be used in learning mathematics. The course consists of various kinds such as blackboards, learning resources, media and technology. Courses are arranged in the order in which media and technology can be displayed alternately for observational purposes. The results showed that students preferred observation-based learning as in the course. The results of the t-test are presented in the following table

Table 2 T-test of Design Eksperimental

Group Statistics

	Kelompok	N	Mean	Std. Deviation	Std. Error Mean
Hasil Belajar	Kelas A	15	74.667	4.4186	1.1409
	Kelas B	15	80.667	4.1690	1.0764

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means					
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error	95% Confidence Interval of the Difference

								Difference	Lower	Upper
Hasil Belajar	Equal variances assumed	.821	.373	-3.825	28	.001	-6.0000	1.5685	-9.2130	-2.7870
	Equal variances not assumed			-3.825	27.906	.001	-6.0000	1.5685	-9.2135	-2.7865

Based on the data above, it shows that the experimental test in both experimental and control classes obtained a mean value of 74,667 in the control class and 80,667 in the experimental class. This explains that there is an increase in learning outcomes when using course based problem solving. Then a t-test was carried out to find out the difference between values and the results obtained $0.033 > 0.05$. This explains that from the experimental and control class tests there were differences in values. So it can be concluded that the use of online based problem solving courses can be used in learning mathematics to improve learning and provide experience. about contextual mathematical concepts

Learning is not limited to abstract concepts, but can be contextual due to several things, namely the availability of application and philosophy of formulas. Utilization of information and communication technology is considered unable to optimize mathematics learning. Based on the development of information and communication technology, there are currently various kinds of mathematics learning that are explained through blogs and websites. This explains that the level of abstraction can be solved by using phenomena or stories. These changes occur due to the addition of features that can be used for various purposes.

Traditional learning is still used to fulfill the need for mastery of concepts and material. However, the limitations of use are still face to face with certain locations and places. Learning does not guarantee flexibility, that is, it does not utilize various kinds of learning resources, media and technology. For this reason, this course based problem solving design is available to create flexible, systematic and structured mathematics learning by utilizing learning resources as learning resources and references, media as tools and materials, and technology as a place for managing learning including place and time. Course based problem solving is a course that is designed using learning resources, media and technology with steps to present problem solving in each course.

The use is proven to be able to maximize learning of mathematics in theory and practice through observing and reading activities. Through reading and observing students can learn mathematical concepts and theories which are supported by the media as a means of demonstration. After students

understand the concept and its application in the real world, students will be motivated to learn concepts in mathematics. The level of abstraction can be changed to be contextual by using various kinds of media and technology. In addition to facilitating it can also attract the attention of students in learning. This reason makes learning mathematics more meaningful and scientific.

CONCLUSION AND SUGGESTIONS

The use of courses in the industrial era 4.0 is still considered as the management of learning resources consisting of various kinds of learning sources, media and technology. The use of courses is still considered to be less than optimal, for this reason, knowledge is needed that courses can be used as message organizers. Presentation of messages in the course can vary depending on learning needs. Utilization of this to fulfill the transfer of knowledge from the concept to an existing phenomenon of life. Some of the features that can be used are the videos in the course. Through video we can explain the material according to the needs and according to the characteristics of the material. Still needed further course development with certain uses. For this reason, further research is still needed regarding the use of course in e-learning on certain materials

REFERENCES

- Anderson, dkk (2001). A Taxonomy for Learning and Teaching and Assesing. New York : Pre Press Company Inc
- Ani cahyadi. (2018). Pengembangan Media Dan SumberBelajarTeoridanProsedur. Serang : PenerbitLaksita Indonesia
- Arsyad, Azhar. (2016). Media PembelajaranEdisiRevisi. Jakarta: PT RajagrafindoPersada.
- Baharuddin & Esa Nur Wahyuni. (2010). TeoriBelajardanpembelajaran. Yogyakarta: Ar –Ruzz Media.
- Burgos, D. & Specht, M. (2006). Adaptive e-Learning Methods and IMS Learning Design: An Integrated Approach Proc. Sixth Int Advanced Learning Technologies Conf, 2006.
- Budi, Brian Nurjayanti (2012). PengembanganMetodePembelajaran Online Berbasis E-Learning (StudiKasus Mata Kuliah Bahasa Pemrograman). JurnalSainsTerapanEdisi II Vol-2(1):103–113(2012). <https://repository.ipb.ac.id/handle/123456789/66435>
- Firmansah, MLH. (2022). Curriculum development and message design in E-learning based contextual using animation for Determinant Matrix Course: Curriculum development and design in E-learning. International Journal of Curriculum and Instruction 14 (3), 1813-1830, 2022
- Firmansah, MLH. (2022). Visualization and Message Design Concepts of Presenting Statistical Data Through Videos to Improve Understanding. International Journal of Multidisciplinary Sciences and Arts 1 (1), 1-6, 2022. 10.47709/ijmdsa.v1i1.1463

- Firmansah, MLH. (2022). Message Design Animation In Elearning To Stimulate Students To Design Messages Using Technology. *International Journal of Educational Research and Social Sciences (IJERSC)* volume 3 Number 2, 2022. <https://doi.org/10.51601/ijersc.v3i2.353>
- Firmansah, MLH. (2022). Desain Pembelajaran Kooperatif dalam E-learning pada Program Studi Pendidikan Guru Sekolah Dasar. *Jurnal Basicedu* Vol 6 No 1, 2022. <https://doi.org/10.31004/basicedu.v6i1.2052>
- Hendra Wicaksono, Mustaji, Retno Danu. (2019). Pengembangan Media elarning dengan Pemanfaatan Aplikasi Moodle Sebagai Bahan Ajar Siswa Kelas X SMK Kristen Petra Surabaya. *Jurnal Education and development Institut Pendidikan Tapanuli Selatan* Hal. 151-158. <https://journal.ipts.ac.id/index.php/ED/article/view/912/407>. <https://doi.org/10.37081/ed.v7i2.912>
- Supriadi (2015). Pemanfaatan Sumber Belajar dalam Proses Pembelajaran. *Lantanida Journal*, Vol. 3 No. 2 hal 128-138 , Fakultas Tarbiyah dan Keguruan UIN Ar-Raniry Banda Aceh. <http://dx.doi.org/10.22373/lj.v3i2.1654>