

Development of a Digital Portal as a Learning Resource Computer Numerical Control (CNC) Machining Engineering Course

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Abstract: This journal reviews the mindset of educators in Indonesia. Times have changed, technological developments have become more sophisticated, information flows so fast, but the mindset of educators has not changed much. Educators in the revolutionary era 3.0 are educators who act as facilitators. This means that educators cannot dominate the learning process. Students actively learn and educators facilitate the learning process. Meanwhile, educators in the revolutionary era 4.0 are students as teachers. In this era students can act as educators. Students become content creators, become producers, and become conductors. So what is the position of educators in the 4.0 revolution, educators must be able to activate, curate and develop learning resources with various digital channels. According to AECT (Association for Education and Communication Technology) learning resources are one of the keys to success in achieving learning goals. Based on these problems, this research is still very much needed.

The type of research used is research and development (Research and Development). This study only looks at the feasibility and practicality of digital portals as learning resources for computer numerical control (CNC) machining techniques courses. The development of this learning product is arranged programmatically with a systematic sequence covering six stages, namely: literature study, development planning or design, product development, expert validation, trials, revisions, final product. The test subjects consisted of three material experts for the CNC machining engineering course, three learning design experts, three learning media experts, and a practicality test consisting of thirty students from the mechanical engineering education study program. Data about the quality of this development product is collected by questionnaire. The collected data were analyzed using qualitative descriptive analysis techniques.

The research results show; (1) the expert test for the subject matter for the CNC machining engineering course is in the Valid qualification (91.67%); (2) the learning design expert test is in the Valid qualification (94.20%); (3) the media expert test is in the Valid qualification (94.52%); (4) test the practicality of digital portals as learning resources computer numerical control (CNC) machining techniques courses by student responses showed a level of practicality with a percentage of 95.8% in the very practical category.

The results of this research study concluded that the digital portal as a learning resource for CNC machining engineering courses is feasible and practical to use in achieving student learning goals in the CNC machining engineering course in the Mechanical Engineering Education Department, Faculty of Engineering, Medan State University.

Keywords: Learning Resources; CNC Machining Techniques; Digital

1. INTRODUCTION

The development of education to date has progressed very rapidly and has become a major contribution to people's lives. Factors that influence the journey of education include curriculum, facilities and infrastructure, technology used and available learning resources. All the factors that support this will certainly bring about better changes than before [1]. One factor, for example the learning resources available on campus and off campus, is a necessity that must be met to provide students with comfort in learning. The existence of a complete learning resource will influence the progress of ways of thinking in solving problems in each subject matter. Therefore learning resources are one of the solutions and a must in answering educational problems [2].

According to Syawal Gultom, the main problem for educators in Indonesia is mindset. The times have changed, technological developments have become more sophisticated, the flow of information is so fast, but the mindset of educators has not changed much. Educators in the Revolution 3.0 era are educators who act as facilitators. This means that educators

cannot dominate the learning process. Students actively learn and educators facilitate the learning process. While educators at 4.0 are students as teachers. In this era students can act as educators. Students become content creators, producers, and conductors. So what is the position of educators in the 4.0 revolution, educators must be able to activate, curate and develop learning resources. Learning resources are one of the keys to success in achieving learning objectives. Based on these problems, this research is still very much needed [3]. Available learning resources can be harmed in various types such as people, tools, materials, teaching activities, environment. All of these learning resources can be maximized if they can be combined and fulfilled as a whole. However, several learning resources are currently not being utilized properly because they require the development of learning resources that go through a long process, such as digital website-based learning resource portals [4][5][6][7].

Based on observations made at the Department of Mechanical Engineering Education, Faculty of Engineering, Medan State University, researchers found several obstacles experienced

by lecturers in the learning process of CNC machining engineering courses, one of which was the problem of fulfilling learning resources. First, until now learning resources have not been developed that can be used for independent and group learning needs digitally by supporting lecturers based on not yet mastering the development of website-based digital learning resources, especially on CNC material. Second, there are gaps in the teaching process, including the professional skills of lecturers who are unsatisfactory, positions, roles, and functional relationships with other fields of study are neglected, factual information relies more on textbooks that are out of date. Third, the lecturers have made no effort to develop materials, the minimal use of digital technology/channels that can be used as a means of curating materials needed by students, and the lack of utilization of other sources, and the lack of attention to student needs. Fourth, students do not have experience because they have never used a website-based learning resource portal but already have devices to access website-based digital learning resource portals.

2. RESEARCH METHODS

The research method used is research and development (Research and Development). The development of this learning product is arranged programmatically with a systematic sequence covering six stages, namely: literature study, development planning or design, product development, expert validation, trials, revisions, final product [8][9][10]. Subjects The trial consisted of three material experts for the CNC machining engineering course, three learning design experts, three learning media experts, and a practicality test consisting of thirty students from the mechanical engineering education study program. The population in this study were odd semester students of the Department of Mechanical Engineering, Faculty of Engineering, Medan State University, Academic Year 2022/2023, while the sample in this study was 30 students. Data on the quality of this development product were collected by means of a questionnaire (validation and practicality sheet).

1) Validity Analysis Techniques for Digital Learning Resources Portals

The collected data were analyzed using qualitative descriptive analysis techniques. Data validation results of digital learning resources portals in the form of content validation, presentation validation, and format validation were analyzed using the following steps: Syaifuddin Azwar (112-112: 2013) [11], one of the statistics showing the validity of the item content is as proposed by Aiken (1985). Aiken has formulated the Aiken V formula to calculate the content-validity coefficient which is based on the results of an assessment by a panel of experts of n people on an item in terms of the extent to which the item represents the construct being measured. In this case representing the construct being measured means the item in question is relevant to the behavioral indicator, because the behavioral indicator is the operational translation of the attribute being measured.

The assessment is carried out by giving a number between 1 (ie not very representative or very irrelevant) to 5 (ie very representative or very relevant). Aiken's V statistics are formulated as follows:

Table 1. Categories of Learning Resources digital portal validit

Number	Achievement Level	Kategori
1	$\geq 0,6$	Valid
2	$< 0,6$	Invalid

Modified by: Saifuddin Azwar (2013:112-113)

2) Practicality Analysis Techniques for Learning Resources digital portals

Practicality test data for digital portals of learning resources obtained from practicality data by students are analyzed using the following steps:

a. Give an answer score with the following criteria:

4 = very practical, 3 = practical, 2 = quite practical, 1 = not practical, 0 = impractical.

b. Add up the scores of each validator for all indicators.

c. Giving practicality percentage value.

d. To determine the level of practicality the criteria in table 2 below:

Table 2. Value Range and Practicality category

Number	Achievement Rate (%)	Category
1	90 – 100	Very Practical
2	80 – 89	Practical
3	65 – 79	Pretty Practical
4	55 – 64	Less Practical
5	0 - 54	Impractical

Source ngalim Purwanto (2009: 82)

3. HASIL DAN DISKUSI

A. Product Specifications

The specifications or learning features of the products produced are as follows:

1. Learning Materials / Content

For learning resources to be used optimally, the teaching materials included in the learning portal are material that contains text in the form of e-books, audio-visual in the form of CNC videos, and pictures related to presentations.

2. Online Assessment System

The assessment system used in this learning resource is online (google form). The advantage is that the lecturer can determine the time that can be arranged and adjusted to the meeting used for assessment. In this study, there were 2 assessments carried out, namely the pretest and posttest which contained the same multiple choice questions but differed in the order of number and optional location. This assessment also makes it easier for students to answer without having to use stationery and is more transparent in the description of right and wrong answers.

3. Chat facility

Chatting facilities are used by lecturers and students in interacting in cyberspace, making it easier to exchange information about the lecture material.

B. Product Validity and Practicality

Based on product validation through a series of trials and revisions that have been carried out, the digital portal as a learning resource for computer numerical control (CNC) machining techniques has a valid status. The trial was carried out in 3 stages, namely: (1) Material expert test, (2) Learning design expert test, (3) Learning media expert test.

The research results show:

1. Material Expert

The assessment was carried out to obtain information that will be used to improve the quality of digital portal learning resources for CNC machining engineering courses for students majoring in odd-semester mechanical engineering education. The results of the validation in the form of an assessment score of the components of the digital portal of learning resources on the quality of learning materials can be seen in Table 3.

According to material experts on the quality of digital portals of learning resources, from the aspect of the quality of learning materials, the majority are in the Valid qualification (91.67%).

Table 3. Rating Scores of Digital Learning Resources Portals by Material Experts.

Number	Aspect	Average	Criteria
1	Material Quality	0.95	Valid
2	Strategies for Learning Basic CNC Machining Techniques	0.92	Valid
	Mean (average)	0.92	Valid

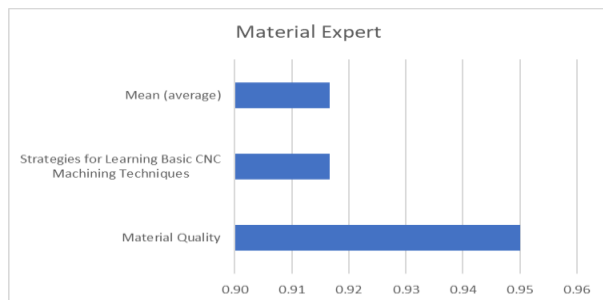


Figure 1. Diagram of the average value of the material expert test

2. Learning Design Expert

The assessment was carried out to obtain information that will be used to improve the quality of digital portal learning resources for CNC machining engineering courses for students majoring in odd-semester mechanical engineering education. The results of the validation in the form of an assessment score of the components of the digital learning resource portal on the quality of the learning design can be seen in Table 4. According to learning design experts, the quality of digital portals of learning resources, from the aspect

of the quality of learning materials, the majority are in the Valid qualification (94.20%).

Table 4. Rating Scores of Digital Learning Resources Portals by Learning Design Experts.

Number	Aspect	Average	Criteria
1	Component	0.92	Valid
2	Learning objectives	0.92	Valid
3	Learning materials	0.97	Valid
4	Learning strategies	0.96	Valid
5	Learning Evaluation	0.92	Valid
6	Learning Resource Strategy/Learning Portal	0.97	Valid
	Mean (average)	0.94	Valid

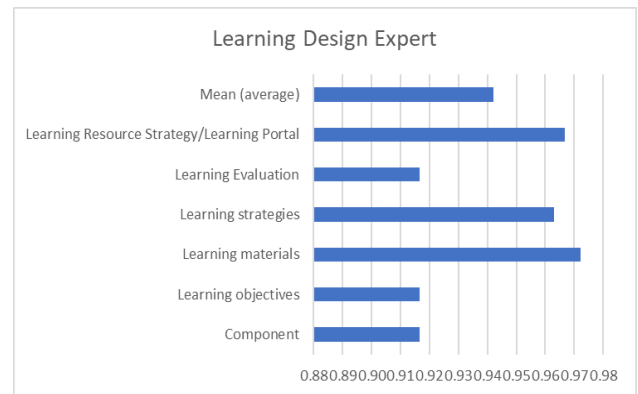


Figure 2. Diagram of the average learning value test

3. Learning Media Expert

This assessment is also carried out to obtain information that will be used to improve the quality of the digital portal of learning resources for CNC machining engineering courses for students majoring in odd semester mechanical engineering education. The results of the validation in the form of scores obtained in the form of assessment of the components of the digital portal of learning resources on the quality of learning media can be seen in Table 5.

According to learning media experts, the quality of digital portals of learning resources, from the quality aspect of learning media, the majority are in the Valid qualification (94.52%).

Table 5. Learning Resources Digital Portal Assessment Score by Learning Media Experts.

Number	Aspect	Average	Criteria
1	Access and navigation	0.90	Valid
2	Portal Interfaces	0.98	Valid
3	Learning Component	0.96	Valid
4	Appropriateness of the choice of learning resource portal components	0.90	Valid
5	The attractiveness of the portal of learning resources	1.00	Valid
	Mean (average)	0.95	Valid

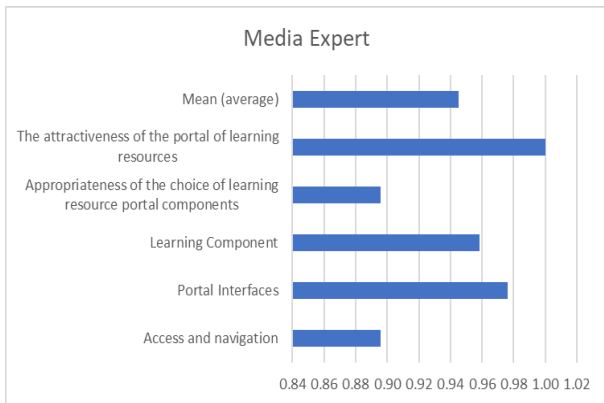


Figure 3. Diagram of the Average Test Value of Learning Media Experts

The following summarizes the results of the average percentage of assessment results on digital portals for learning resources for CNC machining engineering courses by material experts, instructional design experts, and learning media experts, which can be seen in table 6 below.

Table 6. Summary of digital portal assessment scores for learning resources for CNC machining techniques courses.

Number	Respondents	Average Percentage	Criteria
1	Material Expert	91.67%	Valid
2	Media Expert	94.52%	Valid
3	Learning design expert	94.20%	Valid
	Average	93.10%	Valid

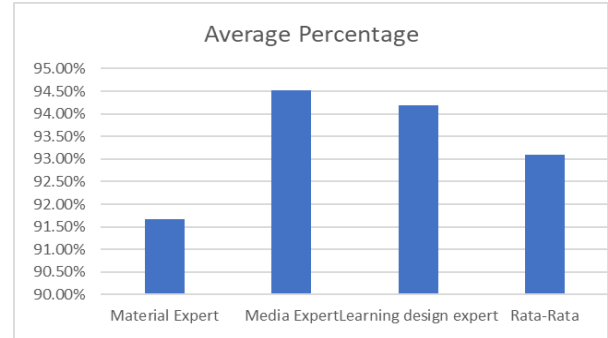


Figure 4. Summary diagram of the average assessment score of the digital portal learning resources for the CNC machining engineering course

4. Practicality Test

The results of the practicality test of the digital portal learning resources for the student CNC machining engineering course were carried out through a student response questionnaire showing the level of practicality with a percentage of 95.8% (entering the practical category). The digital portal for learning resources for CNC machining engineering courses is in the practical category, meaning that the digital portal for learning resources for CNC machining engineering courses makes it easier for students to understand the material for CNC machining engineering courses.

Table 6. Practicality test score for digital portal learning resources for CNC machining engineering courses

Number	Aspect convenience	Average (%)
1	convenience	96.6
2	time required	94.2
3	The Attraction of Portal-based Learning Resources	96.7

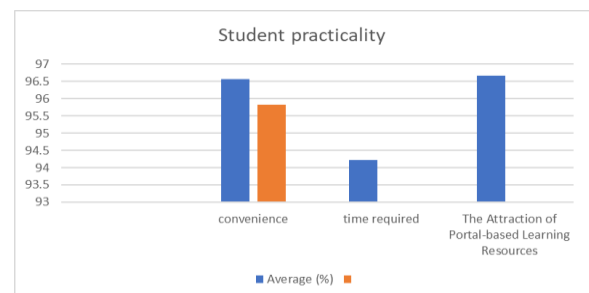


Figure 4. Diagram of Average Practicality Test Scores digital portal learning resources for CNC machining engineering courses student responses

4. CONCLUSION

Based on the results of the research and discussion, it can be concluded that the digital portal as a learning resource for CNC machining engineering courses is feasible and practical to use in achieving student learning goals in the CNC machining engineering course in the Mechanical Engineering Education Department, Faculty of Engineering, Medan State University.

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