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Development of a QR Code-based Woodworking Practice Jobsheet

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ABSTRACT

This research was motivated by the need for the development of jobsheets to support the learning process in the Wood Working Practices course at the Department of Civil Engineering, Faculty of Engineering, Padang State University. The purpose of this research is to produce a QR code-based jobsheet that is valid and practical to use as a learning support medium in the Wood Working Practices course. The research method used is Research and Development (R&D) with the DDD-E development model, which consists of Decide, Design, Develop, and Evaluate stages. The instrument used in this research is a questionnaire to test the validity and practicality of the product. The research subjects consisted of three lecturers or experts of the Wood Working Practices course who acted as assessors in the product validity level test, and 16 students of the Building Engineering Education study program who took the Wood Working Practices course in the July–December 2023 semester who played a role in the product practicality level test stage. The results of the validation test of the QR Code-assisted Wood Working Practice job sheet showed a high level of validity, with a rating of 94% for Media Expert 1, 92% for Media Expert 2, and 99% for Media Expert 3. As for the student usability test of the QR Code-assisted Wood Work Practice jobsheet, a score of 93% was achieved in the highly usable category. Based on the results of this study, it can be concluded that the QR Code-assisted Wood Work Practice jobsheet can be said to be valid and practical for use in the learning process of the Wood Work Practice course at the Department of Civil Engineering, Faculty of Engineering, Padang State University.

Keywords: *Jobsheet Woodworking Practice, QR Code, Development, DDDE.*

INTRODUCTION

Education is an investment for a country, especially for developing countries like Indonesia. The demand for quality human resources shows that education has a very important strategic role in the progress of a nation's civilization. So education indirectly affects the quality of a country.

Padang State University is one of the universities in West Sumatra responsible for supporting government programs in the field of education. The Faculty of Engineering is one of the faculties at UNP that consists of several departments, one of which is the Department of Civil Engineering. This department manages three undergraduate programs, namely S1 Civil Engineering Education, S1 Non-Educational Civil Engineering, and D III Civil Engineering. The Civil Engineering Education program applies learning that combines theory and practice in each course. One of the compulsory courses that students must complete is the Woodworking Practices course, which has a total of 4 credits, all of which are practical. The practical activities are carried out in the Woodworking Workshop of the Civil Engineering Department. This

workshop is quite complete and adequate and is equipped with a work area, theory room, workshop manager and technician work area, and material warehouse. This workshop has a practicum capacity of 16 students.

Based on the observations made by researchers in the learning process of woodwork practice for the semester July–December 2022 at the Department of Civil Engineering, Faculty of Engineering, Padang State University, In the learning process, lecturers apply learning methods using presentations and sketches on the blackboard. In addition, the lecturer also demonstrates the use of tools and materials and the work to be done. During the practicum, some students seemed confused about the work to be done because the demonstration given by the instructor was only one-time. During the observation, the researchers also did not see the use of job sheets during the practicum, and the students only relied on the instructor's instructions. This, coupled with the students' lack of knowledge about the use of the practicum tools and materials, resulted in many students asking back to the instructor or technician, so the learning process was less effective, especially for practicum learning.

Hands-on activities are designed to improve student understanding by practicing specific skills. The use of learning tools is something that must be fulfilled in the implementation of practicum. Arsyad suggests that there are several types of learning tools that can be used in learning: information sheets, operation sheets, worksheets, workshop handouts, and modules [1]. In the context of practicum, it is important that students are given learning tools in the form of visual aids such as worksheets or job sheets. Abdillah argues that a jobsheet, also called a worksheet, is a practice guide sheet that will guide the steps in operating and practicing something [2].

On September 28, 2022, researchers conducted interviews with three lecturers who taught the Woodworking Practice course at the Faculty of Civil Engineering, Padang State University. The results of this interview revealed that the use of job sheets as a learning tool is currently not used in the learning process due to the fact that the existing job sheets and their application in the workshop are very different because for the final project contained in the old job sheet, students are directed to make connections and wood relationships and assemble them into a ventilation cozen, wicket door cozen, and panel door leaf, while in its application in the workshop, the final project of students is directed to make connections and wood relationships and assemble them into a piece of furniture planned by students and approved by the lecturer.

The researchers also conducted online interviews with 10 students in the 2021 Building Engineering Education program who had completed the Wood Work Practice course in the July–December 2022 semester. The results of the interview indicated that during the Woodworking Practices lecture, from the first session to the last session, students did not use job sheets. Students do not even know that there are job sheets in the Woodworking Practices course. In practicum activities, the reason for using jobsheets is to make it easier for students to do the practicum. The use of jobsheets will reduce the verbality of the material presented and may increase the active role of students in learning, which in turn is expected to improve learning outcomes. In addition, jobsheets also function to minimize the role of the instructor and activate students, make it easier for students to understand the material provided and their skill competencies, summarize and include elements of student skill training, and facilitate the implementation of practical teaching [3].

Based on the researcher's observations of the Woodworking Practice job sheet at the Faculty of Civil Engineering, Padang State University, several deficiencies were found, such as the mismatch between the final project included in the job sheet and the final project carried out in

the workshop, the absence of a description of course learning outcomes and subcourse learning outcomes for each job topic in the job sheet, no theoretical basis or supporting theory for each job topic in the job sheet, unclear work drawings, and no exercises or tasks that can check each job performed. Widarto argues that the completeness of the job sheet includes at least the title, basic competencies to be achieved, equipment or materials needed to complete the task, brief information (supporting theory), work safety, work steps, tasks to be done, and reports to be done [4].

Based on the problems found, it is necessary to develop job sheets to support the learning process in the woodworking practice course of the S1 Building Engineering Education study program. The job sheet to be developed will be more complete with job adjustments that will be adapted to the conditions and available practicum facilities, provide an explanation of the course learning outcomes and sub-course learning outcomes for each topic on the job sheet, provide a theoretical basis or supporting theory for each work topic on the job sheet, provide additional pictures of tools and materials used and update better work drawings, and finally add exercises or tasks that can review each work done.

Technology should be used properly in the learning process. Especially at this time, the world of education is expected to be able to innovate with the development of rapidly growing technology by utilizing it. One form of technology utilization is the use of QR codes as a learning medium. The use of QR code-based learning media in the learning process is still relatively rare. However, the use of QR codes as a learning medium will be of particular interest to students. In addition, QR Code has several advantages that have been described by Setyorini. One of the advantages of QR Code is that it can be read from different directions and can still be read by the system even if parts of it are damaged [5]. The use of QR codes in educational media also brings ease of access. The data is stored in the form of a two-dimensional matrix code, which allows quick access on the majority of smartphone devices.

Based on the description of the problems above, in order to modernize the job sheet in the Woodworking Practice course, which is still in the form of printed or conventional media, the use of QR codes can turn the job sheet into media with the help of practical technology that can be accessed online. This allows for greater accessibility and flexibility in the learning process.

METHOD

This type of research is developmental research. This research was conducted using the research and development, or R&D, method. According to Sugiyono, the research and development method is a research method with a direction to obtain or produce a certain product; one of the products is educational media [6]. In addition to producing a product, the R&D method can also be used in testing and evaluating the feasibility level of a product that has been produced. This research uses the DDD-E development model. The details of the stages carried out by the researchers can be seen in the following figure:

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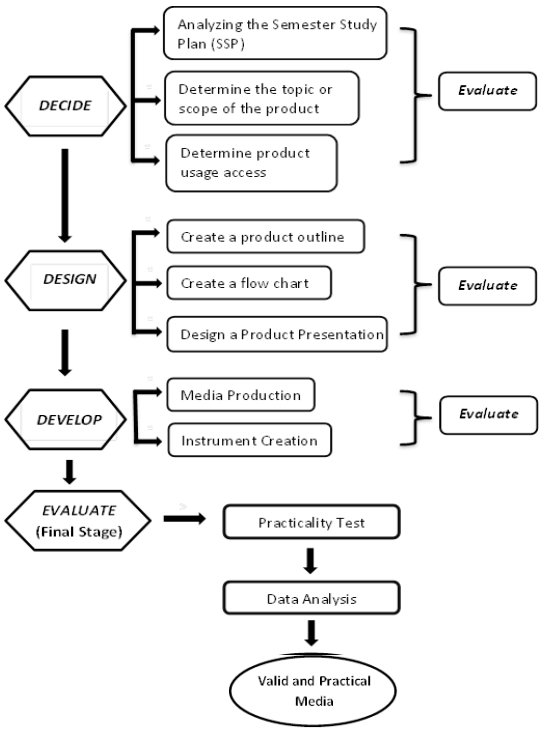

Figure 1. Flow Chart Of The Research Process

This research was conducted at the Department of Civil Engineering, Faculty of Engineering, Padang State University in the semester of July–December 2023. The research instrument or data collection technique used in this research is a questionnaire. The questionnaire used in this study includes two types of questionnaires. The first questionnaire was used for product validation by experts, while the second questionnaire was used by students from the Building Engineering Education study program who took the Wood Working Practice course in the July–December 2023 semester to measure product practicality. The data analysis technique used is as follows:

a. Data Analysis of Validation Results

The data obtained in the form of a checklist will be converted into quantitative data using a rating scale from a Likert scale. After converting the checklist data into a rating scale, the rating scale data in each aspect of expert validation will first be subjected to descriptive statistical analysis with the aim of providing a clear description of the data collected. In addition, the validation data are processed using the formula proposed by Aiken as follows [7]:

$$V = \frac{\sum s}{n(c-1)} \times 100\% \quad (1)$$

Description:

V = Rater agreement index
S = Each rater's score minus the lowest score in the category used (s = r - Io).
r = rater's preferred category score
Io = lowest score in the rater's preferred category
n = number of raters
c = number of categories selected by the scorer

After processing the score data, the processed data results are categorized according to the level of validity, which can be seen in Table 1 [8].

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Table 1. Validity Assessment Percentage

Performance Standard (%)	Category
76 ≤ V ≤ 100	Very valid
51 ≤ V ≤ 75	Valid
26 ≤ V ≤ 50	Less valid
0 ≤ V ≤ 25	Not valid

b. Data Analysis of Practicability Scores

The data obtained in the form of a checklist are converted into quantitative data using a rating scale from a Likert scale. After converting the checklist data into a rating scale, The data from the questionnaire will then be analyzed using descriptive statistics with the aim of providing a clear description or explanation of the collected data. Furthermore, the practicality data will be processed using the formula proposed by Riduwan and Sunarto as follows [9]:

$$Score = \frac{Total\ score\ obtained}{Total\ maximum\ score} \times 100\%$$

After processing the score data, the processed data results are categorized according to the level of practicality, which can be seen in Table 2 [9].

Table 2. Practicality Assessment Percentage

Rating Level	Category
81-100	Very Practical
61-80	Practical
41-60	Moderately Practical
21-40	Not Practical
0-20	Not Very Practical

RESULTS AND DISCUSSION

The development of this QR Code-based Wood Working Practice Job Sheet uses the DDD-E development model, which consists of four stages: decide, design, develop, and evaluate. These stages are explained below.

a. Decide stage

In this stage, researchers first conducted a thorough exploration of the topics and job titles in the Woodworking Practices course job sheet, which would be aligned with the Course Learning Outcomes (CLOs) listed in the Woodworking Practices course RPS. In addition, the researchers determine the topic or scope of the product to be used in learning. In this study, the product created is the development of a QR code-based job sheet that falls under the category of visual media by combining elements of traditional media and cutting-edge technology. The researcher then determines access to product use and conducts formative evaluation. The formative evaluation was conducted to assess the suitability of the semester learning plan (SSP) with topics and job titles in the created jobsheet.

b. Design stage

In this stage, the researcher makes a product outline, flow chart, product display design, and formative evaluation. The product outline is made as a writing plan that contains an outline of the product to be made. A flowchart contains a diagram or flow of the

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woodworking practices job sheet. Product display design includes several aspects, including jobsheet cover design, jobsheet sheet background design, jobsheet content display, and jobsheet QR code background design. The formative evaluation is designed to assess the product outline, flowchart, and product display design that will be used to create the QR Code-enabled Wood Working Practices jobsheet.

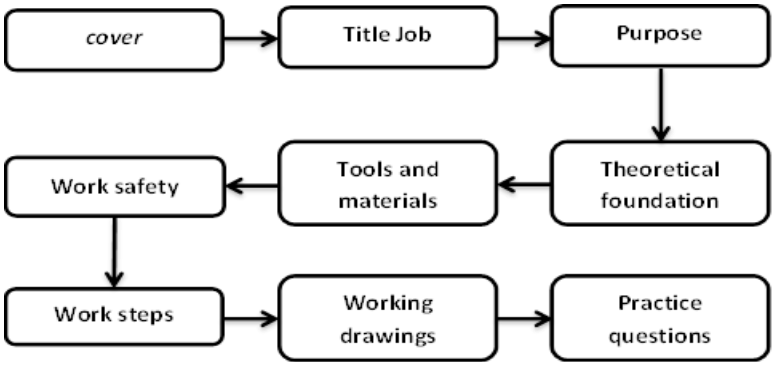

Figure 2. Flowchart

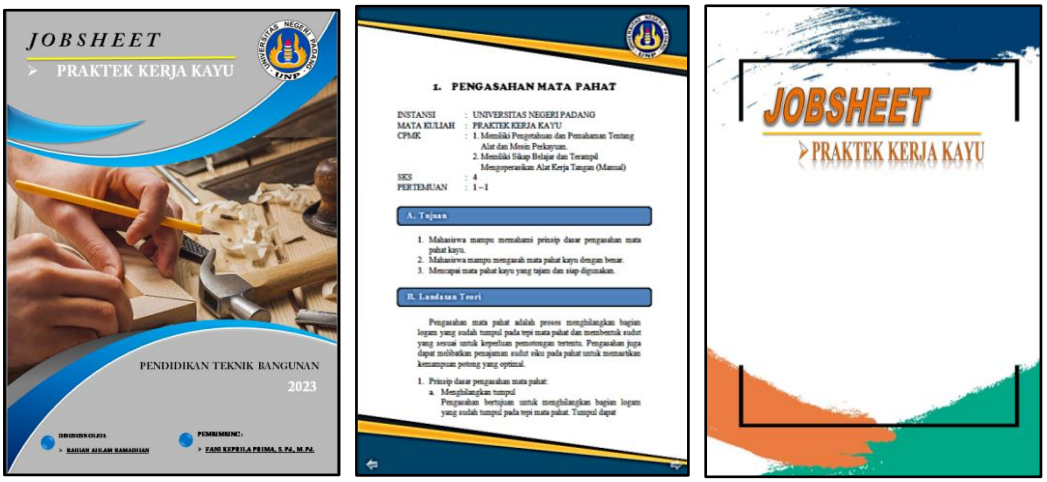

Figure 3. Product Display Design

c. Development stage

At this stage, researchers begin the process of producing products and creating research tools. The production of the product starts with arranging the topic and job title on the job sheet. In addition, the content of the job sheet is designed, the writing format is selected, the job sheet script is written, and a QR code for the job sheet is created. After the production of the product was completed, the production of instruments continued, which included the preparation of two types of questionnaires, namely questionnaires for product validation and questionnaires for product practicality. Finally, a formative evaluation was conducted, which included a validation test of the instrument conducted by Dr. Ari Syaiful Rahman Arifin, ST., MT., and a validation test of the QR Code-based Wood Working Practice jobsheet conducted by Mr. Syaiful Haq, S.Pd., M.Pd.T., and Dr. Juniman Silalahi, M.Pd. and Mr. Faisal Ashar, Ph.D. The results of the descriptive statistical analysis and summary of the product validation test results are presented in the following table.

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Table 3. Descriptive Statistics of Validation Test Stage Data

	N	Min	Max	Sum	Mean	Std. Deviation
Content Feasibility	3	25	28	80	26.67	1.528
Language	3	13	16	45	15.00	1.732
Presentation	3	16	20	56	18.67	2.309
Display	3	19	20	59	19.67	0.577
Format	3	19	20	58	19.33	0.577
Ease of use	3	16	16	48	16.00	0
Valid N (listwise)	3					

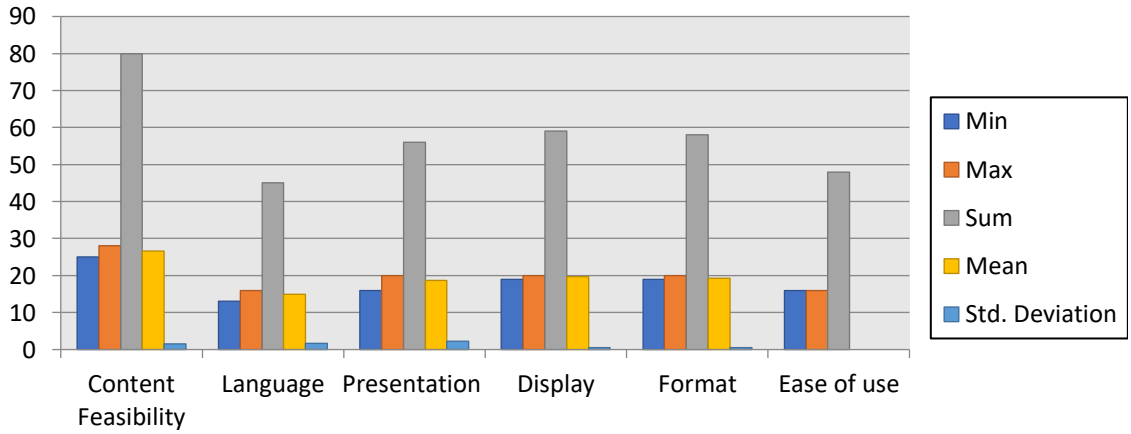

Figure 4. Graph of Descriptive Statistics of Validation Test Stage Data

Table 4. Recapitulation of Validation Test Results

No	Assessment Aspect	Validation Value (%)	Category
Material			
1	Content Feasibility	94	Very valid
2	Language	92	Very valid
3	Presentation	91	Very valid
Media			
4	Display	98	Very valid
5	Format	96	Very valid
6	Ease of use	100	Very valid
Overall Total		95	Very valid

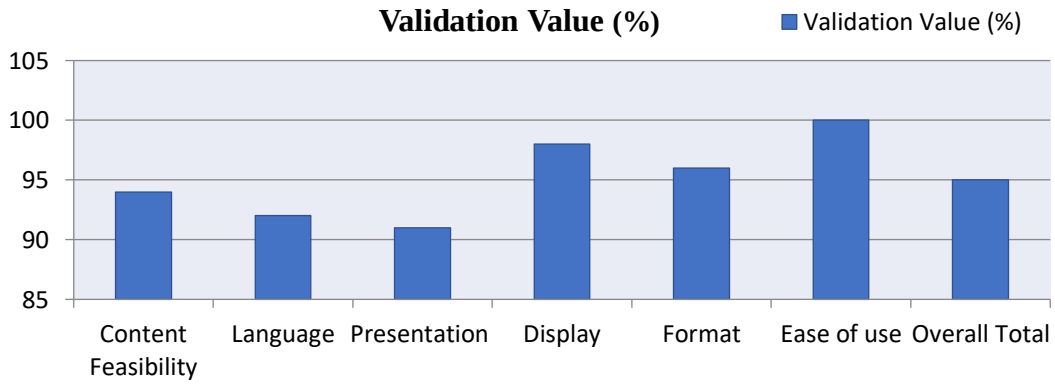

Figure 5: Graph of Validation Test Results

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d. Evaluate Stage

The next stage is the evaluation stage, or the final stage of evaluation, which consists of testing the practicality of the product. The practicality test was carried out by giving a questionnaire to 16 students of the Building Engineering Education study program who attended Wood Work Practice courses in the July–December 2023 semester. The results of the descriptive statistical analysis and the results of the product practicality test are presented in the following table.

Table 5.Descriptive Statistics of Practicality Test Stage Data

	N	Min	Max	Sum	Mean	Std. Deviation
Ease of Use	16	8	12	178	11.13	1.310
Time Efficiency	16	8	12	182	11.38	1.204
Readability	16	8	12	173	10.81	1.377
Flexibility	16	7	12	171	10.69	1.662
Cost Appropriateness	16	9	12	180	11.25	1.238
Valid N (listwise)	16					

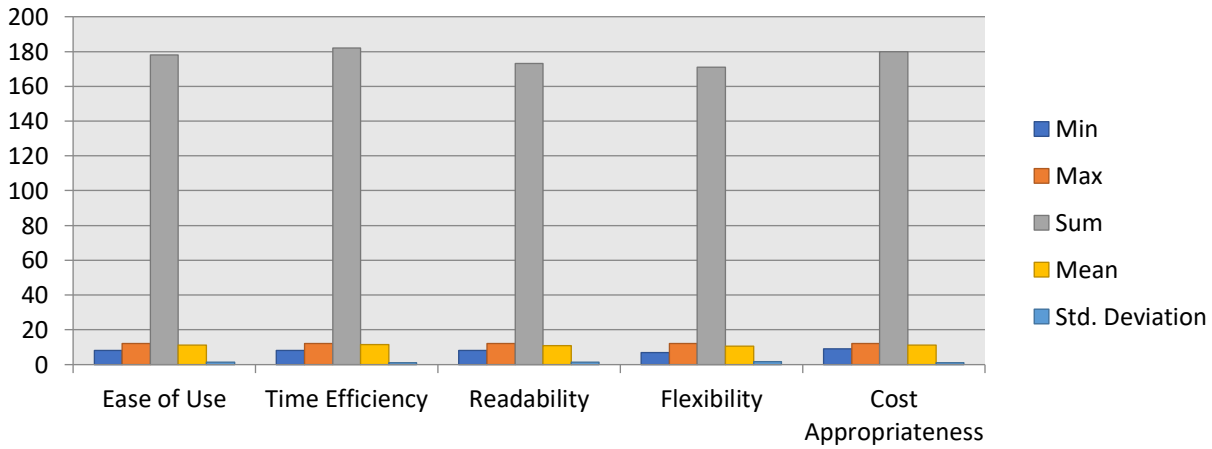

Figure 6. Graph of Descriptive Statistics of Practicality Test Stage Data

Table 6. Results of Practicality Test Assessment Analysis

No	Assessment	Aspect Practicality %	Description
1	Ease of Use	93	Very Practical
2	Time Efficiency	95	Very Practical
3	Readability	90	Very Practical
4	Flexibility	89	Very Practical
5	Cost Appropriateness	96	Very Practical
Overall average		93	Very Practical

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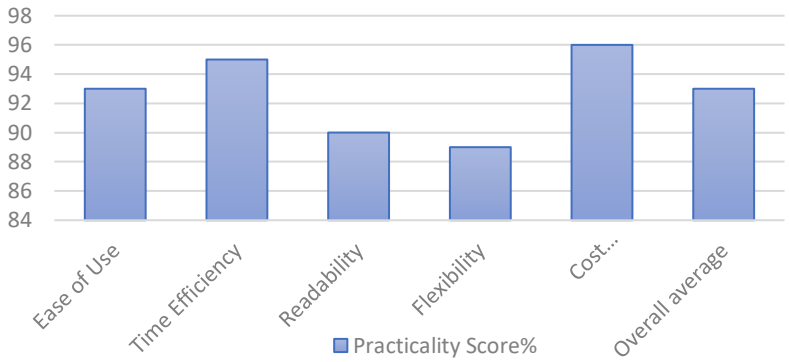

Figure 7. Graph of Practicality Test Results

Discussion

The product developed in this research is a QR Code-assisted jobsheet for the Wood Working Practices course at the Department of Civil Engineering, Faculty of Engineering, Padang State University. This research was conducted with the aim of developing a QR Code-assisted jobsheet that can support the learning process in the Wood Working Practices course, as well as to measure the level of validity and practicality of the developed jobsheet.

The first stage is the decide stage, which includes analyzing the semester learning plan, determining the theme or scope of the product, and determining access to use the product. After completing the decision stage, the next stage is the design stage. The design stage is a stage where the blueprint of the entire product is created in the form of a product outline, flowchart, and product display design. The next stage is the development stage, which consists of two processes: the product manufacturing process and the research instrument manufacturing process. After the production of products and research instruments is completed, the next step is the product validation test. The results of the validity test evaluation of the manufactured product show that the product validation value reaches 95%, which is a very valid category. This shows that the media and materials produced are of high quality and meet very good criteria..

The next step is the evaluation step, or the final evaluation step, which consists of the product usability test. After the QR Code-based Woodworking Practice job sheet passes the validation test stage and is declared valid by the validator, the next step is to conduct a product practicality test. Based on the results of the practicality test data processing, it is known that the product practicality test score reached 93% in the very practical category. This shows that the products produced are feasible and can be used to support learning activities in the Woodworking Practice course at the Department of Civil Engineering, Faculty of Engineering, Padang State University.

The results of this study are consistent with the results of the research on job sheet development conducted by Chairul Nazalul Anshar in 2021, entitled "Product-Based Job Sheet Development in the Electronics Circuit Practice Course of the Industrial Electrical Engineering Study Program, Faculty of Engineering, Padang State University". According to the results of this study, the validity of jobsheet-based products according to experts reached 92%, while the practicality of jobsheet-based products according to lecturers reached 76.67%, and the

effectiveness of jobsheet-based products according to students reached 83.87%. From this, it can be concluded that the product-based jobsheet is valid, practical, and effective for use in training Electrical Circuit Practice Electrical Engineering Study Program, Faculty of Engineering, Padang State University [10].

In addition, this research is also in line with the results of QR Code-based media development research conducted by Rahma Yani in 2022, entitled "Development of Mathematics Modules Based on Contextual Approach Accompanied by QR Code on Logarithm Material". The results showed that the average validation of material experts reached 86.43%, including the very valid category, and the validation of media experts reached 90%, including the very valid category. The module practicality test averaged 87.95%, with a very practical category. Based on these criteria, the mathematics module based on the contextual teaching and learning approach accompanied by a QR code on the class X logarithmic material is considered feasible and practical to use [11].

CONCLUSION

Based on the research data and discussion described, the following conclusions are reached:

a. The creation of the QR Code-assisted Wood Working Practice job sheet was carried out using the Research and Development (R&D) research method with the DDD-E development model, which consists of four stages, namely, decide, design, develop, and evaluate.
b. The evaluation of the QR Code-assisted Woodworking Practice jobsheet shows high validity by obtaining a validation score of 95%, which is included in the highly valid category.
c. The response of students in the Building Engineering Education program who are taking the Woodworking Practice course to the practicality test of the QR Code-assisted Woodworking Practice jobsheet is included in the very practical category with a score of 93%.

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