Development of a Final Project Assessment Instrument to Enhance Students' Metacognition

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Abstract. The final project is a requirement that students must complete to graduate from vocational higher education. The evaluation process for the final project follows the guidelines set forth. However, the current evaluation instruments have not yet produced objective results. The main issue lies in the differing interpretations among examiners, which leads to inconsistent grading standards. Therefore, this research was conducted as part of a self-assessment initiative to enhance students' metacognitive abilities. This study employs descriptive analysis to construct a more objective evaluation guide. Data were collected through participant observation, interviews, and literature review. The findings indicate that using a structured final project evaluation instrument with pre-determined answer choices provides a more objective assessment. As a result, students also develop the ability to analyze during self-assessment, thereby improving their metacognitive skills.

Keywords: Final Project Assessment; Metacognition; Self-Assessment; Assessment Instrument; Vocational Higher

1 Introduction

The final project testing in vocational study programs has become an interesting focus in the assessment process. The assessment is not only based on the final project report but also on the work created by the final-year students. For this reason, the assessment process not only tests academic abilities but also the hard skills possessed by the students. This assessment process is part of the evaluation of the learning process during college studies. Educational evaluation is an assessment of the growth and progress of students towards the goals or values that have been established in the curriculum [1]. Therefore, the evaluation in the form of a final exam plays a central role in determining whether the student passes or not.

This formulation will be presented in this research. Thus, the process requires the appropriate assessment techniques for evaluation. The assessment conducted is a portfolio assessment, which is a comprehensive evaluation approach that encompasses cognitive, affective, and psychomotor domains. Portfolio assessment in learning can be used for various purposes [2]. The process of implementing this portfolio assessment is carried out as a form of self-evaluation of the works that have been created. The work not only showcases technical skills. The assignment represents how students implement the learning they have undergone during their studies.

In this final project, which is the subject of this research, the work is carried out in groups or as a team-based project. The execution of this final project is done collaboratively, with each member fulfilling their respective roles. Thus, in the assessment process, we should not only consider individual abilities but also the collaboration involved. This collaboration requires

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students to have the ability to engage in metacognition in order to achieve optimal results. Good metacognitive skills will make the learning process for students more meaningful by selecting strategies to improve cognitive abilities in the future [3].

Metacognition helps problem solvers to recognize the existence of a problem that needs to be addressed, to distinguish what the problem actually is, and to understand how to achieve the goals or solutions to the problem [4]. Thus, metacognition can be understood as one of the activities and abilities that students must possess. The problems that arise become part of explaining them better. Students use metacognition to control and monitor their cognitive abilities to the extent that they can understand a problem [5].

To develop that metacognition, an assessment instrument for final tasks is needed that can be carried out through self-assessment. Therefore, the development of this task value is expected to provide facilities and critical potential regarding one's own results. This research was conducted to obtain a standardized formulation for the assessment process of final projects, particularly those based on team-based projects, and to serve as a rhetorical document in policy determination at vocational higher education institutions.

2 Literature

2.1 Assessment Instruments

In conducting the evaluation of students' learning outcomes, a assessment instrument is needed [6]. This assessment instrument serves as a measuring tool that will be used to evaluate learning results. Therefore, this measuring tool requires appropriate validity and consistency in order to produce objective scores. Assessment instruments are the most important part of the learning process, aimed at determining the quality of student learning outcomes and measuring students' skills in relation to specific material [7]. These instruments are crucial as they serve as essential tools for measuring the achievement of learning objectives, providing feedback to students, offering evidence of learning progress, enhancing accountability, and strengthening students' motivation to learn.

This assessment instrument requires precise criteria so that it is not only beneficial for students but also from the perspective of instructors or lecturers. For this reason, instruments are needed to evaluate the effectiveness of learning and identify areas that need improvement. In addition, assessment instruments should be able to provide appropriate feedback so that students are aware of their strengths and weaknesses. Therefore, the assessment instrument needs to be analyzed before and after use in order to produce a valid assessment tool [8].

a. Self-Assessment

The step to evaluate metacognition is to ask students to conduct a self-assessment. In this assessment, students are asked to reflect on their learning process, identify what they understand, areas that need improvement, and the strategies used to complete the tasks. This assessment is necessary to evaluate learning outcomes in order to improve the quality of student learning [9]. In this case, assessment becomes an activity that must be carried out by the students themselves. Self-assessment is the term used to evaluate what has been done.

In the self-assessment process, an evaluation is conducted using questionnaires or rubrics designed to explore metacognitive aspects, such as how they plan their learning, monitor their understanding, and evaluate their results. The instrument is part of the evaluation process so that

students can assess their own abilities. This process will also guide students to continue thinking actively and critically on their own..

2.3 Metacognitive

Metacognition refers to a person's ability to be aware of, understand, and control their own thinking processes. In the context of learning, metacognition is an important element that helps students become more effective, independent, and critical learners. Mastery of the material by students is key to the development of metacognitive skills. Mastery of the material is one of the indicators of the success of the learning process. Insufficient mastery of the material indicates a less successful learning process [10].

Metacognition is the ability to be aware of and regulate one's thinking processes, which includes awareness of what is known, how to know, and how to monitor and control the learning process. In self-directed learning, students need metacognitive skills to manage their learning processes, determine effective strategies, and evaluate their learning outcomes. It is important for students to identify areas that need improvement, as well as to plan steps to achieve their learning goals.

3 Method

This research was conducted using a qualitative approach with a constructivist analysis. Constructivist analysis is a principle that views learning as a process of constructing knowledge based on experience [11]. us, this research process will develop a research instrument that will be used in the assessment of students' final projects. This research employs three data collection techniques: participant observation, interviews, and literature review. The study conducts direct observation of the final project assessment process. The measuring instrument was developed in collaboration with the program study team to achieve an objective measurement formulation. An interview was conducted with the management of the department and study program in accordance with the objectives of the final project assessment. Interviews will be conducted both orally and in writing to obtain accurate data. To confirm the research process, a literature review was also conducted on books, journals, or proceedings that could support the research findings. Qualitative data analysis is carried out in five stages, namely: organizing the data, reading the data, coding the data, creating descriptive analysis, and representing the description [12].

4 Result

Currently, it is still not possible to accurately measure the scores for a final project exam. Moreover, if this final project is of a social humanities nature, then a subjective perspective will always arise in the assignment of a grade. In the assessment process, examiners are always required to be objective. Especially for examiners from the industry, the established standards may vary. Thus, the process of evaluating the final project often results in significant differences among examiners. In the assessment process, it should be conducted in a harmonious manner even though there are different educational backgrounds and experiences.

Another problem arises when this assessment process is deemed not transparent. Students as exam participants cannot assess the quality of the reports and final projects they have created. Therefore, an assessment instrument that can be understood by students is necessary for self-assessment to take place. The evaluations conducted by students on their reports and final projects can be done independently. This process encourages students to improve in order to achieve the maximum expected grades. Thus, an assessment instrument that can be accurately understood by the exam participants is required. In the process of developing the assessment instrument for the final project, it is important to consider the students' ability to conduct self-assessment. If the process of developing this assessment instrument can have an impact on improving students' metacognitive abilities.

The instrument is now available to us in the accreditation process of study programs or higher education institutions, including the accreditation process of scientific journals. Self-assessment is conducted at the main stage to obtain an overview of the performance that has been carried out so far. This process will shape how critical thinking is carried out independently to achieve the desired results. Thus, the learning process will automatically be undertaken with the ambition of obtaining the best grades. Consequently, this process will encourage the ability to engage in metacognition, which can solve problems more effectively.

Based on the findings of this research, there are two main aspects, namely related to the construction of assessment instruments and metacognitive abilities. These two aspects will be discussed to achieve an integration between the assessment instruments and the development of students' metacognition. This effort aims to encourage the creativity, critical thinking, and innovation possessed by the students themselves. So that the learning process promoted in the Merdeka Campus program can be implemented more optimally.

4.1 Construction of Assessment Instruments

Based on the 2024 Final Project Guidelines, the assessment instruments for this final project are divided into two evaluation schemes, namely the score from the supervisor and the score from the examiner. The final project supervisor consists of two people. The examiners for the final project consist of three people, but one of them is a supervisor who acts as the moderator. So, the total assessment comes from those four people.

Based on the guidelines, the assessment sheet for the final project consists of six aspects, namely attitude, problem identification, literature review, implementation methods, results and discussion, as well as the work itself. Each assessment aspect has its own maximum value. The assessment form for the final project supervisor can be seen in **Fig. 1**.

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Lampiran 6. Form TA-06 Penilaian Pembimbingan Tugas Akhir

	KEMENTERIAN PENDIDIKAN, KEBUDAYAAN, RISET, DAN TEKNOLOGI POLITEKNIK NEGERI MEDIA KREATIF JURUSAN	Form TA-06
PENILAIAN PEMBIMBINGAN TUGAS AKHIR		

Nama : .....
NIM : .....
Program Studi : .....

No	Aspek	Nilai Maksimal	Nilai
1.	**Keaktifan dan Sikap/Perilaku selama Pembimbingan** - Ketepatan waktu dan kuantitas pembimbingan (minimal 8 pertemuan) dan menunjukkan perkembangan pembuatan TA secara bertahap, berdasarkan masukan Pembimbing. - Sikap dan Perilakumahasiswa selama pembimbingan	20	
2.	**Identifikasi Masalah** Mahasiswa mampu mengidentifikasi masalah (latar belakang/ide/alasan pembuatan karya)	10	
3.	**Pemahaman Tinjauan Pustaka** Mahasiswa memahami pustaka/teori yang dibutuhkan untuk menjawab rumusan masalah	10	
4.	**Metode Pelaksanaan** Mahasiswa mampu memilih metode pelaksanaan yang tepat.	10	
5.	**Hasil dan Pembahasan** Mahasiswa mampu menerapkan metode dan teori yang telah dipilih untuk mengatasi masalah yang ada (kemampuan mengeksekusi)	30	
6.	**Penilaian Ide dan Karyaatau Kontribusinya saat Magang Industri** - Original dan tidak ada unsur plagiarisme - Aspek Fisik/Tampilan Karya (nilai penyajian, visual, estetika) - Aspek Fungsional (kegunaan, ketercapaian tujuan) - Aspek Kualitas (mutu, kompleksitas, harmoni, kebaruan, kedalaman)	20	
	JUMLAH	**100**	

Pembimbing I/II

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Tambahan: *Penilaian pembimbingan Tugas Akhir dapat dilakukan melalui Sistem Akademik dengan petunjuk yang diatur dalam pedoman terpisah.*

Fig. 1. Assessment Form for Final Project Supervision

Meanwhile, on the final project examiner's assessment sheet, there are only three main aspects: presentation, report, and final project work. Each of these three assessment aspects also has its own maximum value. The assessment form for the final project can be seen in **Fig. 2.**

Lampiran 9. Form TA-09 Penilaian Ketua dan Anggota Penguji TA

Media Kreatif	**KEMENTERIAN PENDIDIKAN, KEBUDAYAAN, RISET, DAN TEKNOLOGI POLITEKNIK NEGERI MEDIA KREATIF JURUSAN .....**	Form TA-09
PENILAIAN KETUA DAN ANGGOTA PENGUJI TUGAS AKHIR		

Nama : .....
NIM : .....
Program Studi : .....

No	Aspek Penilaian	Nilai Maksimal	Nilai
I	**Presentasi Tugas Akhir**		
	1. Sikap dan Etika Penyajian (penampilan rapi sesuai ketentuan, penggunaan bahasa yang baik, slide presentasi yang jelas, berdiri saat presentasi dengan percaya diri, dan tepat waktu)	10	
	2. Kemampuan mahasiswa mempresentasikan hasil laporan TA-nya, menanggapi pertanyaan penguji, dan mempertahankan pendapatnya.	10	
II	**Naskah Laporan Tugas Akhir**		
	1. Kelengkapan sistematika penulisan laporan TA sesuai dengan Pedoman Tugas Akhir.	10	
	2. Kesesuaian rumusan masalah, tujuan penulisan, teori yang digunakan, pembahasan, dan simpulan dengan tema tugas akhir yang diangkat.	30	
III	**Karya TA atau Kontribusi Pemecahan Masalah saat Magang Industri**		
	1. Aspek Fisik/Tampilan Karya (nilai penyajian, visual, estetika)	10	
	2. Aspek Fungsional (kegunaan, ketercapaian tujuan)	10	
	3. Aspek Kualitas (mutu, kompleksitas, harmoni, kebaruan, kedalaman)	20	
Nilai Akhir		**100**	

...../.....
Ketua Penguji/Anggota 1

.....

Catatan Penguji:

Fig. 2. Examiner Final Project Assessment Form

When comparing the two assessment sheets, significant differences can be seen in the evaluation processes of the supervisor and the examiner. However, the scores given by the supervisor and the examiner carry the same weight in the final grade, as they are averaged. In this case, it is necessary to integrate the assessment aspects between the supervisor and the examiner, including the maximum scores.

To combine the assessment sheets of the supervisor and the examiner, a simplification of the assessment aspects on the supervisor's assessment sheet has been formulated, which includes three aspects similar to those on the examiner's assessment sheet. The maximum score given must also be appropriate to achieve a more objective evaluation.

In this integration process, the assessment aspects on the supervisor's evaluation sheet, which initially had six aspects, have been consolidated into three aspects. There has also been a change in the maximum score; previously, the maximum score for the work assessment was 20, which has now been changed to a maximum of 40. This is to ensure that the assessment process remains consistent and aligned with the examiner's evaluation sheet. The examiner's evaluation sheet has three similar aspects but with different aspect titles. The maximum score has not changed either,

as it is already in accordance with the assessment integration. The results of the integration can be seen in **Table 1.**

Table 1. Integration of the Assessment Sheets for Supervisors and Examiners

Assessment Form for Final Project Supervision	Examiner Final Project Assessment Form	Integration of Assessment	Maximal Score
1. Activity and Attitude/Behavior during Supervision	1. Final Project Presentation	1. Attitude and Presentation	20
2. Identify the Problem 3. Understanding the Literature Review 4. Implementation Method 5. Results and Discussion	2. Final Project Report	2. Final Project Report	40
6. Evaluation of Ideas and Works or Contributions during Industrial Internship	3. Final Project or Contributions to Problem Solving During Industrial Internship	3. Final Project	40

In the assessment process, it is depicted that there are three separate aspects involved. This is not in line with the objectives of implementing integration in the assessment instruments. Thus, a slice is made on these three aspects. This intersection ultimately produces four aspects of assessment, namely three aspects of intersection with two variables and one aspect of intersection with three variables. The aspects of intersection with two variables are the intersection between attitude and presentation with the final project report, attitude and presentation with the final project work, and the final project report with the final project work. Meanwhile, the aspect of intersection with three variables is the intersection of attitude and presentation with both the final project report and the final project work.

The overlap has an impact on the maximum value, especially for the variables that intersect directly. The intersection of the three variables has a maximum value of 2. The intersection of attitude and presentation with the final report has a maximum value of 4. The intersection of attitude and presentation with the final project has a maximum value of 4. The intersection of the final report with the final project has a maximum value of 12. Thus, the maximum values for the three aspects without intersections are: attitude and presentation have a maximum value of 10, the final report has a maximum value of 22, and the final project has a maximum value of 22. For questions from non-overlapping aspects, the multiplier value is only 1. For aspects with an intersection of two variables, the value will be multiplied by 2. For aspects with an intersection of three variables, the value will be multiplied by 3. When summed up, it will yield a maximum result of 100, as illustrated in Fig. 3.

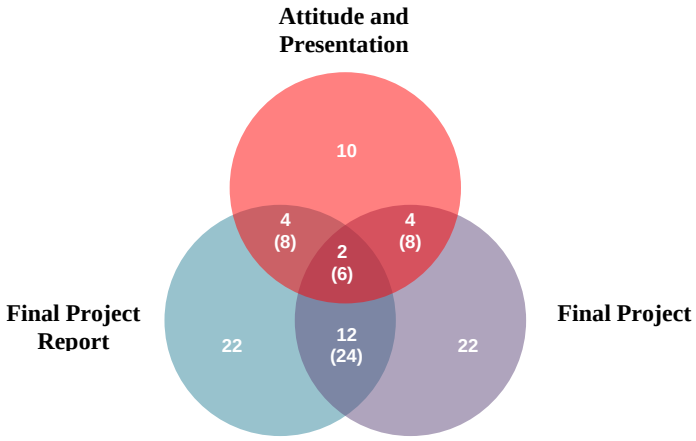

Fig. 3. Integration of Assessment Aspects and Maximum Score

After establishing the integration from the assessment aspect, questions will be created based on the maximum score that has been determined. If the question creation process has a maximum score of 2 for each question, there will be a total of 38 questions. From these 38 questions, they can be integrated to achieve a maximum score of 100. Therefore, in the creation of questions, it is also necessary to measure the depth and substance of each maximum score given.

In creating assessment questions, the examiner's responses are answered using a Likert scale. This scale is used so that each question has the same weight of evaluation. The answers are divided into five levels, namely scores from 1 to 5, which reflect grades A, A-, B+, B, and B-. According to the Final Project Guidelines, a final score of B- indicates that the exam participant has not passed the final project exam. Therefore, in the assessment process, if the average score is below or equal to 1, it is declared as not passing.

The use of this Likert scale will also provide an overview for exam participants to achieve maximum scores. This is because exam participants can see the assessment structure from the lowest score to the maximum score. This will motivate exam participants to conduct self-evaluation, thereby improving the quality of the three assessment aspects.

4.2 Development of Metacognition

Metacognition refers to a person's ability to be aware of, understand, and control their own thinking processes. In the context of learning, metacognition is an important element that helps students become more effective, independent, and critical learners. In the process of conducting this metacognition, it will refer to three main aspects: planning, monitoring, and evaluation.

Through the assessment instruments that have been previously constructed, the students participating in the final project exam will construct their attitudes, reports, and final project works with careful planning. The assessment scheme that already has definite answers will encourage independent learning, identifying it, and seeking solutions. Planning is done before working on the final project. They need to plan how they will complete the task. This includes setting goals, choosing appropriate strategies, and estimating the time required. During the process of completing their final project, students need to periodically monitor and evaluate whether they are on the right track to achieve the goals they have set. After completing the

assignment, they evaluated the process and results of the final task. They will understand and evaluate the strategies used to determine whether they are effective or not.

Therefore, in the development and strengthening of metacognitive competencies, a strong self-assessment process is needed. Constructive thinking in self-assessment is the ability of students to build new knowledge based on existing information, as well as to integrate that understanding with previously acquired knowledge. In this context, students not only perform tasks but also connect different concepts and create a deeper understanding.

In addition, this metacognitive approach will encourage students to be more critical of what they have learned and implemented in their final projects. Critical thinking is the ability to analyze, evaluate, and make decisions based on evidence and logical reasoning. In self-assessment, critical thinking is necessary when students need to evaluate the accuracy of information from various sources, solve complex problems, or make convincing arguments.

Thus, through this process, students will think more maturely and constructively. With good metacognitive skills, students can determine when to apply critical or constructive thinking. They can also assess whether the strategies they are using are effective or need improvement. Thus, other abilities will be stimulated in parallel. Like the problem-solving skills that can be developed from the habit of conducting self-assessments.

Based on this, the process of completing the final project will yield better results in all three assessment aspects. The concept of assessment also manifests how the interconnections between one another can form a correct logic. In terms of soft skills, this can indirectly foster independence and responsibility for what one has done. Thus, the process of creating reports and final projects, which was previously seen as a completion of coursework, has become a stepping stone for further progress. This improvement will impact graduates who are able to compete well..

5 Conclusion

The process of developing this final project assessment instrument provides an illustration of constructivism in building value for students. The objectivity of assessment is an important aspect that students need to achieve fair exam results. The assessment instruments are developed with consideration for the needs of higher education institutions to enhance the abilities of their students. The ability to plan and evaluate independently will foster the development of strong metacognitive skills. The learning process can be accelerated to produce graduates who excel in problem-solving, critical thinking, and creativity. Furthermore, this research can be conducted by implementing it in an integrated information system, allowing for the measurement of the validity and reliability of the scores given by the examiners. This instrument serves not only as an evaluator for the exam participants but also to assess the consistency and validity of the examiners in providing their evaluations.

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