Digitalization of Comprehensive Higher Order Thinking Skills (HOTS) Test Assessment Instruments Based on Learning Management System (LMS)

[1]Vita Pujawanti Dhana*, [2] Habibah Hanim Lubis, [3]Wisri Ardhita Mandaputri, [4]Irmiah Nurul Rangkuti, [5]Astrid Sitompul

[1, 2,3,4,5] *Universitas Negeri Medan*
vitapwd@gmail.com

Abstract. The aim of this research is to develop an assessment instrument for the comprehensive examination of students in the Cosmetology Education Study Program, Faculty of Engineering, UNIMED, which is Higher Order Thinking Skills (HOTS) and is implemented through the SIPDA UNIMED Learning Management System (LMS). Students of the Cosmetology Education Study Program who currently have to take a written comprehensive exam/paper test, are expected to be able to take the comprehensive exam more effectively through digitizing the test. The research method used in this research is Research and Development using the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) development model. Data collection was carried out through testing the validity of the question items and the reliability of the questions. Next, trials were carried out on respondents, namely students of the cosmetology education study program and study program managers. Then proceed with a feasibility test of the CBT instrument by experts (expert review). The results of this research show that the instrument that has been developed is valid, practical, and can be used to measure the competency of final year students of the cosmetology education study program.

Keywords: Cosmetology Education, Comprehensive Examination, Learning Management System.

1. Introduction

Cosmetology education can be pursued at undergraduate level at Medan State University. Through the learning process in the Cosmetology Education Study Program, students will learn the ins and outs of the world of beauty education and vocation. Profiles of graduates of the Cosmetology Education Study Program include; beauty teacher, beauty instructor, beauty entrepreneur, event organizer, and others. To be able to create a profile of graduates who are superior, qualified and able to compete in the world of work, the services and facilities managed by universities must be improved on an ongoing basis.

Digitalization of education is a very developing issue for the world of education today. The use of information and computer technology (ICT) in education will make educational institutions, especially universities, increasingly superior and of higher quality. Creating digital assessment tools is one way to implement educational digitalization in a university study program. Digital assessment instruments used to measure student competency can be applied with the help of e-learning in the form of a Learning Management System (LMS). This change in the exam implementation system will really help increase the effectiveness of the work of education administrators and students.

In the learning process in higher education, learning components starting from learning objectives, learning activities, and learning evaluation must be implemented as closely as possible. Assessment is an important learning component at the evaluation stage.

Assessments must be able to provide comprehensive data that helps teachers improve their teaching

abilities and help students achieve optimal academic development. (Wahyuningsih et al., 2016). Students of the Cosmetology Education Study Program, in completing their studies, must go through an assessment stage in the form of a comprehensive exam which must be taken in the final semester. So far, comprehensive exams have been carried out in written form/paper tests. Apart from being outdated, carrying out exams using paper also often experiences problems or obstacles in their implementation. Several technical obstacles during the paper test include (Suwarna, 2017): 1) The low level of honesty of the examinees; 2) Students find it easier to find answers by working together; 3) Ineffective time allocation; 4) The level of correctness of the test results will be affected by the condition of the corrector/person checking the test paper; 5) Exam results are not well documented.

It is hoped that the digitization of assessment instruments can be a solution to the problems encountered by the Cosmetology Education Study Program in implementing comprehensive exams. Digitalization of assessment instruments can take the form of a Computer Based Test (CBT) which is integrated with the LMS. Computer Based Tests are computer-assisted evaluation systems that help teachers and exam organizers carry out assessments, such as scoring and tests, effectively and efficiently (Murniati, 2017). Computer-based tests have benefits, including: more time effective, reduced costs, more attractive question packaging, more environmentally friendly because they don't use paper, and faster test results.

Through this research, researchers are trying to develop a comprehensive exam assessment instrument that is designed to be used with computer assistance or CBT which can be implemented through UNIMED's LMS SIPDA (Online Learning System). This instrument was developed with HOTS capabilities, namely cognitive domains C4-C6 including analyzing, evaluating and creating. The instruments will also be prepared in accordance with a curriculum that has relevance to the industrial world, so that students will be recruited which will hopefully lead to the emergence of a superior generation in the field of cosmetology who are able to compete in the world of work.

The aim of this research is to produce a digital assessment instrument that is applied through the UNIMED SIPDA LMS in comprehensive exams that will overcome current problems. The expected benefit of this research and development for students is as a form of improving the quality of service when completing their studies in the Cosmetology Education Study Program. Meanwhile, the benefit of this research for lecturers is the availability of a comprehensive computer-based exam system which makes it easier and reduces lecturers' time and energy in carrying out exams and correcting exam results.

2. Method

The research method used is research and development (Research and Development) ADDIE development design model. In product development steps, the ADDIE research and development model is considered more rational and more complete. This model can be used for various forms of product development in learning activities such as models, learning strategies, learning methods, media and teaching materials as well as assessment instruments. The ADDIE model development stage consists of five steps/development phases including Analysis, Design, Development or Production, Implementation, and Evaluations.

The instrument development stage using the ADDIE model is carried out in the following stages:

2.1. Analysis

The first stage of this research was to conduct a preliminary study in the form of, 1) Topic analysis of the material studied by students, 2) Analysis of the level of difficulty of HOTS, 3) Analysis of needs for a comprehensive exam based on the SIPDA LMS. This stage aims to obtain complete information regarding the comprehensive examination instruments that have been implemented and which will be developed in this research. Analysis was carried out by means of field surveys and literature studies. A survey in the field to see the extent of the need for a comprehensive instrument based on the SIPDA LMS is needed, while a literature study is needed to obtain information about the forms of tests that can be used in comprehensive exams covering aspects of the abilities to be measured.

2.2. Desain

The design stage is the second stage in this research. At this stage, the researcher designs the instrument by creating questions based on the analysis stage that has been carried out previously by; 1) Arrange a question grid (specification table) based on HOTS, 2) Arrange the question items.

2.3. Development or Production

Question item validation or instrument content validation is carried out through logical validation by examining the representation of the grid and question items on the instrument through expert judgment. The validators involved in this process are 3 learning experts in the field of cosmetology. The decision making technique at this stage uses Aiken V validity analysis. Question items will be categorized as valid if they have an Aiken validity value of more than 0.7.

2.4. Implementation

At the implementation stage, trials were carried out on the instruments that had been assembled on the computer. Vocational testing is carried out by students and study program managers.

2.5. Evaluation

At this final stage, a review by an expert is needed to obtain information regarding the quality of the instrument developed through an expert perspective. What will be done at this stage is: 1) Expert review, and 2) Revision stage if necessary.

3. Result and Discussion

The test instrument developed in this research is a comprehensive examination instrument that includes representatives of all the competencies studied by students in the cosmetology education study program. The form of test developed is an objective test in the form of multiple choices.

At the analysis stage, through interviews with study program managers, qualitative data was obtained regarding the comprehensive test paper test instruments used so far. Through reviewing the comprehensive exam paper test instrument documents used so far, the following question level quality data was obtained.

Table 1. Aspects of ability measured in the previous Comprehensive Paper Test Instrument

Exam Materials	Aspect	%
Skin and Hair Makeup	C1	30
	C2	42
	C3	24
	C4	2
	C5	2
	C6	0

Based on the data above, it can be seen that the ability aspect measured in the instrument so far measures the Lower Order Thinking Skills (LOTS) aspect, namely: remembering, understanding and applying. Through a needs analysis questionnaire given to 20 students/graduates who had carried out a comprehensive test-based examination, the following data was obtained:

Table 2. Results of the Student Needs Analysis Questionnaire

No.	Statement	Yes %	no %
1	Soal ujian komprehensif mudah dijawab	70	30
2	Soal ujian komprehensif sudah mewakili keseluruhan kompetensi yang dipelajari mahasiswa Prodi Pendidikan Tata Rias	25	85
3	Sistem ujian komprehensif Prodi Pendidikan Tata Rias membuat mahasiswa tidak dapat mencontek satu sama lain	60	40
4	Kualitas gambar pada soal baik	40	60
5	Durasi waktu yang diberikan untuk ujian komprehensif sudah sesuai	65	35
6	Jadwal ujian komprehensif sudah efektif	70	30

At the design stage, a comprehensive test instrument grid is prepared as follows.

Table 3. Developed instrument grid

No.	Kompetensi	Aspek Kognitif						Jumlah
		C1	C2	C3	C4	C5	C6	
1	Kecantikan Kulit	1	1	3	1	5	4	15
2	Kecantikan Rambut	0	0	2	3	6	4	15
3	Tata Rias Pengantin Indonesia	0	1	2	2	5	5	15
4	Tata Rias Pengantin Internasional	0	0	0	0	2	3	5
	Total							50

After compiling the grid, the next step is to compose the question items. A total of 50 questions were successfully prepared and then validated by 3 experts. The results of validating the questions using Aiken validity analysis are shown in the following table:
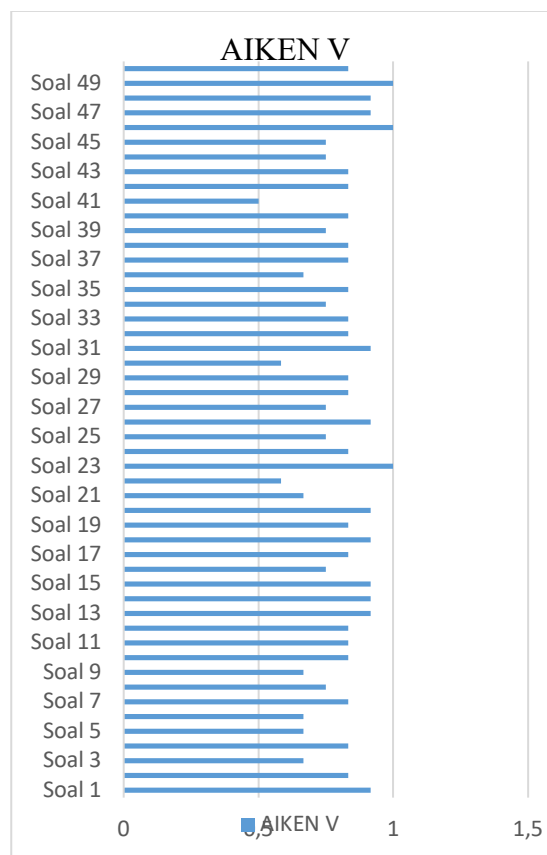

Fig 1. Hasil Analisis Aiken

Based on the results of the content validity analysis above, it can be seen that there are no questions that have a validity value of less than 0.4. This means that these values fall into the medium and high validity categories. Therefore, it can be concluded that all the questions on the comprehensive examination instrument for cosmetology education are valid for use.

Next, the test is given to students to carry out a test reliability test to see the reliability figures for the comprehensive examination instrument using the KR20 formula. Based on test reliability calculations, the

r11 value is 0.925. because r11 > 0.75 the instrument can be said to be reliable in the very high category. Thus, the CBT-based HOTS comprehensive test instrument can be used for field trials.

At the implementation stage, a practicality test was carried out on the instrument. The practicality test was carried out by giving questionnaires to 30 students who attempted a comprehensive computer-based test. Based on the practicality test, it is known that the practicality level of the computer-based comprehensive examination instrument for cosmetology education is 4.58 or 91% in the very high category. Practicality test data can be seen in the following picture:
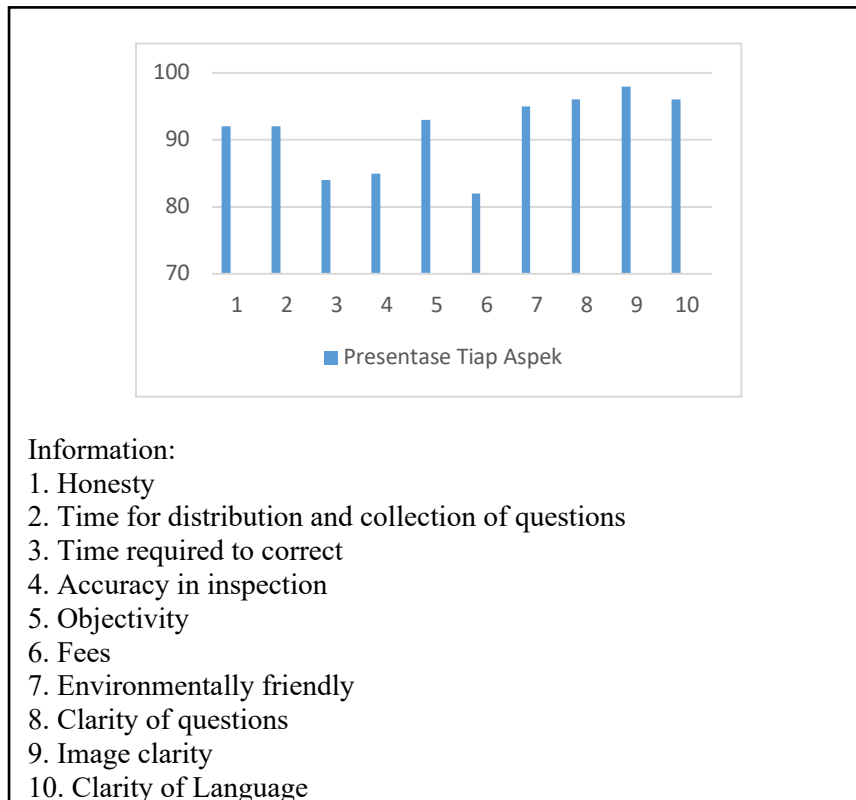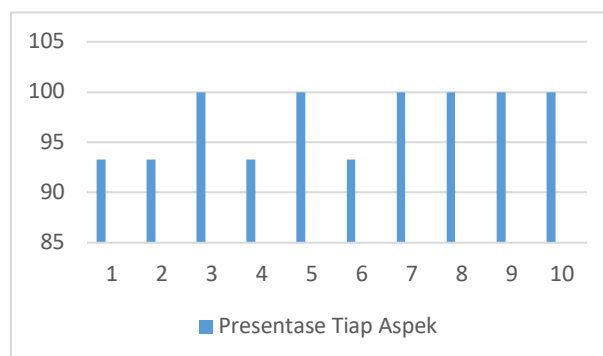

Information:
1. Honesty
2. Time for distribution and collection of questions
3. Time required to correct
4. Accuracy in inspection
5. Objectivity
6. Fees
7. Environmentally friendly
8. Clarity of questions
9. Image clarity
10. Clarity of Language

Fig 2. Practicality Test Results of CBT Comprehensive Examination Instruments by Students

Based on trials carried out by the study program management, an average practicality value of 4.86 or 97.33% was obtained. This figure is included in the very high category. Practical test data by study program managers can be seen in the following picture:

Information:
1. Speed of distribution of questions and answer sheets
2. Speed of collecting answer sheets

Journal of Community Research and Service, 8(1) 2024

3. Speed in correcting answer sheets
4. Speed in informing exam results
5. Honesty of test takers
6. Cost savings for administering exams
7. Accuracy of checking answers
8. Objectivity in correcting answers
9. Environmentally friendly
10. Ease of documenting exam results

Fig 3. Practicality Test Results of the CBT Comprehensive Test Instrument by the Study Program Manager

Next, at the evaluation stage, a feasibility test is carried out by experts. The results of the feasibility test can be seen as follows.

Table 5. Feasibility Test Results by Experts

No.	Kriteria	Rata-Rata	Persentase
1	Materi		91,1
		4,55	
2	Konstruksi		81,6
		4,08	
3	Bahasa		86,6
		4,33	
	Rata Rata	4,28	86,48

Based on this data, a feasibility value of 4.28 or 86.48% was obtained, in other words it is included in the very feasible category.

4. Conclusion

The CBT comprehensive test instrument was produced through five stages, namely: 1) needs analysis for the LMS integrated HOTS comprehensive test instrument; 2) question design based on previous analysis; 3) development, namely validating the question items carried out by experts; 4) implementation by trial by students and study program managers; and 5) evaluation carried out by experts to assess whether the instrument is appropriate or not.

This development research has produced an instrument that is valid, practical, and can be used to measure the competency of students in the final stage of the Cosmetology Education Study Program as a whole. Through comprehensive LMS-based exams, cognitive competencies based on students' higher order thinking can be measured effectively, practically and accepted by all parties. The resulting data can provide accurate information about student competencies as a whole.

References

[1] Arikunto Suharsimi. (2004). Evaluasi Program Pendidikan Jakarta: PT. Bumi Aksara.
[2] Aiken, L.R. (1980). Content validity and reliability of single items or questionnaires. Educational and Psychological Measurement, 40(4), 955-959. https://doi.org/10.1177/001316448004000419
[3] Crisp Geoffrey (2011) Teacher's Handbook on e-Assessment: A handbook to support teachers in using e-assessment to improve and evidence student learning and outcomes. Transforming Assessment | www.transformingassessment.com
[4] Hamalik O. (2008). Belajar dan Teori Belajar. Jakarta: Bumi Aksara.
     Miarso, Yusufhadi. 2004. Menyemai Benih Teknologi Pendidikan, Jakarta: Prenada Media dan Pustekkon Diknas.
[5] Mundilarto (2010). Penilaian Hasil Belajar. Yogyakarta: UNY
[6] Murniati, E. (2017, April). Computer based test (CBT) sebagai alternatif instrumen evaluasi pembelajaran. In Prosiding Seminar Pendidikan Ekonomi Dan Bisnis (Vol. 3, No. 1).
[7] Prawiradilaga, D.S. 2015. Prinsip Desain Pembelajaran. Kencana: Jakarta.
[8] Purwanto. (2009). Evaluasi Hasil Belajar. Surakarta: Pustaka Belajar.

[9] Richey Rita C., James D.Klein, and Monica W.Tracey. 2011. The Instructional Design Knowledge Base Teori, Researh, and Practice, New York: Routledge.

[10] Sudjana N. (2010). Penilaian Hasil Belajar. Jakarta: Remaja Rosdakarya.

[11] Wahyuningsih, R., S. Wahyuni, dan A. D. Lesmono. 2016. Pengembangan Instrumen Self Assessment Berbasis Web untuk Menilai Sikap Ilmiah pada Pembelajaran Fisika di SMA. Jurnal Pembelajaran Fisika. Vol. 4(4):338-343.

[12] Sudijono, Anas. 2009. Pengantar Statistik Pendidikan, Jakarta: Raja Grafindo Persada.

[13] Suwarna, I. P. (2017). Mengembangkan instrumen ujian komprehensif pada program studi pendidikan fisika melalui computer based test (CBT).