Developing Computer Based Test Of Higher Order Thinking Skills Instrument In Cosmetology Comprehensive Examination

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ABSTRACT

The purpose of this study was to develop the High Order Thinking Skills (HOTS) instrument for the comprehensive examination of students of the Cosmetology Education Study Program, Faculty of Engineering, Medan State University, which was applied through a Computer Based Test (CBT). Students of the Cosmetology Education Study Program who currently have to go through a comprehensive written test / paper test, will later be able to take a comprehensive exam more effectively through digitalization of the test. The comprehensive exam being developed requires a computer device and will be integrated with the SIPDA UNIMED Learning Management System (LMS). With the CBT comprehensive exam and the quality of the items adjusted to the High Order Thinking Skills (HOTS), it is hoped that it will have a good impact in producing quality graduates of the Cosmetology Education Study Program. Research and development using the ADDIE development model (Analysis, Design, Development, Implementation, and Evaluation) is the methodology used in this study. Data was collected by testing the validity of the items and the dependability of the questions. Furthermore, trials were carried out on respondents, namely 30 students of cosmetology education study programs and 3 study program managers. Then proceed with the feasibility test of the CBT instrument by experts. The results showed that the computer-based comprehensive examination instrument developed was valid, practical, and could be used to measure the competence of students of the Cosmetology Education Study Program.

Keywords: *Cosmetology Education, Computer Based Test, Higher Order Thinking Skills.*

1. INTRODUCTION

Cosmetology education can be pursued through the undergraduate level at Medan State University. Through the learning process at the Cosmetology Education Study Program, students will learn about the world of beauty education and vocational. The profiles of graduates of the Cosmetology Education Study Program include; beauty teachers, beauty instructors, beauty entrepreneurs, event organizers, and others. To produce quality graduates who are able to compete in the world of work, the quality of services and facilities provided by universities must be developed in a sustainable manner [1]. One way to improve services is by digitalizing education.

Digitalization of education is a very developing issue for the world of education today. The use of Information and Communication Technology (ICT) in the scope of education makes an educational institution, especially at the tertiary level, more advanced and of higher quality [2]. One form of digitalization of education that can be applied at the tertiary level is to make an assessment instrument in digital form. Digital assessment instruments are used to measure student competency with the help of a computer or Computer Based Test (CBT).

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This innovation in the academic field will greatly help increase the effectiveness of the work of educational institutions [3]. However, the use of CBT in cosmetology education study programs is still minimal.

Students of the Cosmetology Education Study Program Universitas Negeri Medan, in completing their studies, must pass a comprehensive exam that must be taken in the final semester. So far, comprehensive exams have been conducted in writing/paper tests. But often there are problems or obstacles in its implementation. Some of the technical obstacles during the paper test exam [13], include: 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 who checks the paper test; 5) Exam results are not well documented.

The Computer Based Test is expected to be a solution to the problems encountered by the Cosmetology Education Study Program in implementing comprehensive exams. Computer Based Test is a computer-assisted evaluation or assessment system that has the goal of assisting test administrators in carrying out exams, starting from preparing instruments, administering tests, scoring, distributing test results, to documenting test results [4]. Computer-based tests have benefits including: more effective time, reduced costs, more attractive question packaging, more environmentally friendly because they do not use paper, and faster exam results [5].

Through this research, researchers are trying to develop a comprehensive exam instrument that is designed to be used with the help of a computer or CBT. The instrument will be developed with HOTS abilities, namely the C4-C6 cognitive domain, including analyzing, evaluating, and creating. In order to attract later students who are anticipated to contribute to the formation of a superior generation in the field of cosmetology capable of competing in the workplace, instruments will also be prepared in accordance with an industrially relevant curriculum.

1.1. Objective

The aim of this study is to produce an instrument through CBT on a comprehensive examination that will address current issues. The expected benefits of this research and development for students are to help improve the quality of services provided to students when completing studies in the Cosmetology Education Study Program. Meanwhile, the benefit of this research for lecturers is the availability of comprehensive CBT exams that facilitate and reduce the time and staff of lecturers in administering exams and correcting exam results.

1.2. Reasearch Contributions

The results of this study are the contribution of researchers to students and universities in an effort to improve the quality of graduates and increase the number of scientific works within the Cosmetology Education Study Program, Faculty of Engineering, Medan State University.

2. METHOD

The research approach employed is R&D (Research and Development) of the ADDIE development design model. The ADDIE development research models may be used to create a variety of learning products such as models, learning techniques, learning methods, media and teaching materials, and assessment tools [12]. The ADDIE model's development stage is divided into five steps or phases: analysis, design, development or production, implementation, and evaluations [6].

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

2.1. Analysis

The first stage of this research was to carry out a preliminary study in the form of, 1) Analysis of the topics of the material being studied by students, 2) Analysis of the level of difficulty of HOTS, 3) Analysis of the needs for a comprehensive exam of the CBT system. This stage aims to obtain complete information about the comprehensive examination instruments that have been implemented and which will be developed in this study. The analysis was carried out by means of field surveys and literature studies. Field surveys are to see how far the need for comprehensive CBT-based instruments is needed, while a literature study is needed to obtain information about the forms of tests that can be used in comprehensive exams covering the aspects of ability to be measured.

2.2. Design

The design stage is the second stage in this study. At this stage, the researcher designed the instrument by making questions based on the analysis phase that had been carried out previously by means of; 1) Compile a table of specifications based on HOTS, 2) Compose item questions.

2.3. Development or Production

Validation of the items or validation of the contents of the instrument is carried out through logical validation

by examining the representativeness of the indicators and items on the instrument comprehensive test through expert judgment. The validators involved in this process were 3 learning experts in the field of cosmetology. The decision-making technique at this stage used Aiken V validity analysis. The validity value is in the range of 0 to 1, the V value which is categorized as a high validity value is the V value close to 1, and vice versa [8].

Table 1. Aiken Category

Aiken Index (V)	Validity
>0,8	High
0,4-0,8	Medium
<0,4	Low

Reliability tests are also carried out to measure the reliability of the instrument. An instrument is said to be reliable or reliable if the answer to the instrument is consistent over time. The reliability test uses the Kuder Richardson formula (KR-20).

Table 2. KR-20 Category

KR-20 Index	Reliability
< 0,20	Very Low
0,20 – 0,40	Low
0,40 – 0,70	Medium
0,70 – 0,90	High
0,90 – 1.00	Very High

2.4. Implementation

At the implementation stage, trials were carried out on instruments that had been assembled on a computer. Trials are carried out by 30 students and 3 study program managers.

2.5. Evaluation

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

The assessment criteria guidelines for interpreting the test results at the implementation and evaluation stages use the response percentage criteria according to Sudijono, 2009. Seen in table 1.

Table 3. Scoring Criteria Guidelines

Presentation	Criteria
81% ≤×≤ 100%	Very feasibility
61% ≤×≤ 80%	Feasibility
41% ≤×≤ 60%	Feasibility Enough
21% ≤×≤ 40%	Not Feasibility
0% ≤×≤ 20%	Very Not Feasibility

3. RESULT AND DISCUSSION

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

In the analysis phase, through interviews with study program managers, qualitative data were obtained regarding the comprehensive test paper test instruments used so far. Through a review of the comprehensive exam paper test instrument documents that have been used so far, the quality data of the question levels is obtained as follows.

Table 4. Aspek of Ability Measured on The Comprehensive Examination Instrument on The Previous Paper Test

Exam Material	Cognitive Aspects	%
Hair and Skin Beauty	C1 (Remember)	30
	C2 (Understand)	42
	C3 (Apply)	24
	C4 (Analyze)	2
	C5 (Evaluate)	2
	C6 (Create)	0

Table 4 showed that the aspects of ability measured on the instrument so far measure more on the lower order thinking skills aspects, namely: remembering, understanding, and applying. This means that the questions on the previous cosmetology education comprehensive examination instrument have not been able to measure the level of understanding of students in the Higher Order Thinking Skill. This is in accordance with Bloom's Taxonomy [9], which states that the Remembering, Understanding, and Applying aspects are included in the LOTS (Lower Order Thinking Skills) category. While the aspects of Analyzing, Evaluating, and Creating, are included in the HOTS (Higher Order Thinking Skills) category.

Through a needs analysis questionnaire given to 20 students who had carried out a test-based comprehensive exam, the following data was obtained:

Table 5. Results of the Student Needs Analysis Questionnaire

No.	Statement	Yes %	No. %
1	Comprehensive exam questions are easy to answer	70	30
2	Comprehensive exam questions already represent all the competencies studied by students of the Cosmetology Education Study Program	25	75
3	The comprehensive examination system for the Cosmetology Education Study Program makes students unable to copy one another	60	40
4	The image quality is good	55	45
5	The length of time allotted for the comprehensive exam is appropriate	35	65
6	Comprehensive examination schedule is effective	30	70

Based on table 5, it is clear that a comprehensive examination instrument and system is needed that is updated and adjusted so that the examination takes place more effectively for students and also for exam administrators.

Furthermore, at the design stage, the comprehensive examination instrument indicators are prepared as follows.

Table 6. Developed instrument specification table

No.	Competence	Cognitive Aspect						Tota l
		C1	C2	C3	C4	C5	C6	
1	Skin Beauty	1	1	3	1	5	4	15
2	Hair Beauty	0	0	2	3	6	4	15
3	Indonesian Bridal Makeup	0	1	2	2	5	5	15
4	Internasional Bridal Makeup	0	0	0	0	2	3	5
Total Questions								

After compiling the specification table, the next step is compiling the item questions. A total of 50 items were successfully compiled and then validated by 3 experts. The results of validating the items using Aiken's validity analysis are shown in the following table:

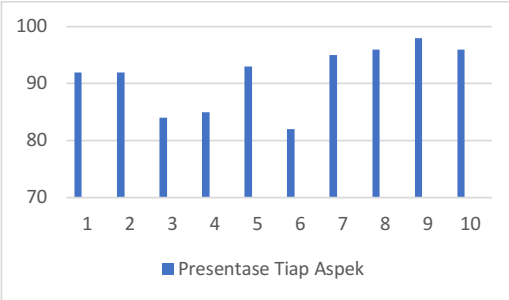
Table 7. Results of Aiken Analysis

Question Number	V Aiken	Validity Category
1	0,916	High
2	0,833	High
3	0,666	Medium
4	0,833	High
5	0,666	Medium
6	0,666	Medium
7	0,833	High
8	0,75	Medium
9	0,666	Medium
10	0,833	High
11	0,833	High
12	0,833	High
13	0,916	High
14	0,916	High
15	0,916	High
16	0,75	Medium
17	0,833	High
18	0,916	High
19	0,833	High
20	0,916	High
21	0,666	Medium
22	0,583	Medium
23	1	High
24	0,833	High
25	0,75	Medium
26	0,916	High
27	0,75	Medium
28	0,833	High
29	0,833	High
30	0,583	Medium
31	0,916667	High
32	0,833333	High
33	0,833333	High
34	0,75	Medium
35	0,833333	High
36	0,666667	Medium
37	0,833333	High
38	0,833333	High
39	0,75	Medium
40	0,833333	High
41	0,5	Medium
42	0,833333	High
43	0,833333	High
44	0,75	Medium
45	0,75	Medium
46	1	High
47	0,916	High
48	0,916	High
49	1	High
50	0,833	High

Based on table 7, it appears that there are no questions that have a validity value of less than 0.4. That is, the value is included in the category of medium and high validity. Therefore, it can be concluded that all items on the cosmetology education comprehensive exam instrument are valid to use.

Next, the test is given to students to carry out a test reliability test to see the reliability score of the comprehensive exam instrument using the KR20 formula. Based on the calculation of the reliability of the test, the value of r11 is 0.925. because r11 > 0.75 the instrument can be said to be reliable with a very high category. Thus the CBT-based HOTS comprehensive exam instrument can be used for field trials.

At the implementation stage, a practicality test of the instrument was carried out. In order to conduct the practicality test, a questionnaire was distributed to 30 students who took a computer-based comprehensive exam. Based on the practicality test by student, it is known that the practicality level of the computer-based cosmetology education comprehensive exam instrument is 4.58 with a very high category. This shows that the test takers responded very well to the CBT instrument developed. 91% of students agreed that the CBT instrument was able to increase the chances of student honesty in taking tests, distribution and collection of exam results were faster, time in correcting exam results was faster, accuracy in checking questions was more precise, assessment was more objective, reduced costs, more environmentally friendly, question questions were clearer, and the images displayed were also clearer. Practicality test data can be seen in the following figure:

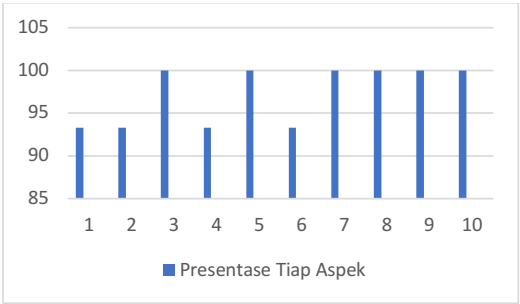


Information:
1. Honesty
2. Time of distribution and collection of questions
3. Time needed to correct
4. Accuracy in inspection
5. Objectivity
6. Fees
7. Environmentally friendly
8. Clarity of questions
9. Image clarity
10. Clarity of Language

Figure 1. CBT Comprehensive Exam Instrument Practical Test Results by Students

Based on trials conducted by study program managers, an average practicality score of 4.86 was obtained. . This shows that the response of study program managers is very high to the CBT instrument developed. 97.33% of study program managers agreed that the CBT instrument was able to increase the speed of question distribution, the speed of collecting exam results, the speed of time in correcting exam results, the speed in informing exam results, increasing the honesty of examinees, reducing costs, more precise and objective assessment accuracy, more environmentally friendly, and more effective documentation of exam results.

Practicality test data by study program managers can be seen in the following figure:



Information:
1. Speed of distribution of questions and answer sheets
2. Speed in collecting answer sheets
3. Speed in correcting the answer sheet
4. Speed in informing the results of the exam
5. Honesty of test takers
6. Savings in the cost of administering the test
7. Accuracy of checking answers
8. Objectivity of correcting answers
9. Environmentally friendly
10. Ease in documenting exam results

Figure 2. Results of the CBT Comprehensive Test Instrument Practicality Test by Study Program Managers

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

Table 8. Qualification Test Results by Experts

No.	Criteria	Average	Percentage
1	Material	4,55	91,1
2	Construction	4,08	81,6
3	Language	4,33	86,6
	Average	4,28	86,48

Based on table 8, a feasibility score of 4,28 or 86,48%, in other words, is included in the very feasible category. This means that the resulting instrument is suitable and acceptable to experts.

The CBT comprehensive examination is the first time it has been used in the Cosmetology Education Study Program, even so, students can accept and benefit from changes in this examination system. The CBT comprehensive exam is able to increase independence and honesty in accordance with the results of research by [5], [7], and [13]. The nature of the CBT exam requires students to work independently, reducing interaction between examinees because the questions are presented

randomly between examinees [11]. Not only are the questions presented randomly, but the answer options are also applied in random mode so that students really cannot cheat or ask each other.

The CBT system can present exam results quickly without the need to spend a lot of time and energy as in the paper test. This of course benefits the study program manager, and students as examinees. Examinees can immediately know the score of their exam results immediately after finishing the exam. Managers can immediately make an official announcement of exam results without the need to spend days. The study program also gets information about the quality of the questions, the level of difficulty, and the quality of the answer options made. This can facilitate effective evaluation of the implementation of comprehensive exams.

4. CONCLUSION

The CBT comprehensive exam instrument was produced through five stages, namely: 1) needs analysis of the HOTS CBT comprehensive exam instrument; 2) the design of the questions based on the analysis carried out previously; 3) development, namely validating the items made by experts; 4) implementation by way of trials by students and study program managers; and 5) evaluation by experts to assess whether or not the instrument is appropriate. This development research has produced an instrument that is valid, practical, and can be used to measure the competency of final stage students of the Cosmetology Education Study Program as a whole. Through a CBT-based comprehensive exam, cognitive competence based on students' higher order ways of thinking can be measured effectively, practically and accepted by all parties. The resulting data can provide accurate information about student competence as a whole.

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