The Advanced Dietetics Module Development in Improving the Nutrition Diploma III Students' Learning Outcomes of Kendari Health Polytechnic of the Ministry of Health

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Abstract. A successful learning process at schools must be supported by adequate facilities and infrastructure, including up-to-date learning resources and teaching materials that can support the learning process. The appropriate method in development research is a mixed method, which ensures that all research procedures are collected. Data analysis at the stage of the advanced dietetics module development process used analytical techniques in the forms of reviewing suggestions and corrections to the module content, presentation, language, and graphics. These processes were further conducted through a qualitative descriptive analysis. Material validation questionnaire sheets, linguists, and media were analyzed descriptively and quantitatively. In this case, calculation of the Likert Scale score was used to calculate this percentage. In addition, quantitative and descriptive analysis was carried out on student response questionnaires. The effectiveness of the advanced Dietetics module was evaluated quantitatively through quasi-experimental and non-equivalent control group research design. The expert team's assessment on the aspects of cover, content feasibility, presentation, module layout, graphics, and language aspects showed that all aspects were categorized as very feasible. Furthermore, in terms of appearance, presentation of material, and benefits, the results of the student's assessment on the module were categorized as very understandable. This study showed that the group of students who were given the dietetics module advanced had a higher average score. The researchers suggest that advanced dietetic modules need further development with regard to the media used to support teaching materials, for example interactive computer-based modules and multimedia products in digital formats (e-learning).

Keywords: Modules, Advanced Dietetics, Study Outcomes, Diploma III Nutrition Student

1 Introduction

Improvement on the quality of education has been carried out including by ensuring the use of teaching resources [1]; [2]. A successful learning process at schools must be supported by adequate facilities and infrastructure, including up-to-date learning resources and teaching materials that can support the learning process [3].

Module is a learning book that encourages students to study on their own within a set time. In this case, it is possible to design modules as a complete independent unit containing a series of activity units in order to clearly support students to achieve a number of objectives [4]. Learning outcomes can be measured and assessed by students independently. In addition, it can also develop the students' skills to interact directly with the learning environment and develop their motivation or enthusiasm for learning through modules [5].

Previous research [6] stated that printed teaching materials in the form of modules are teaching materials with the most complete components compared to worksheets and handouts. The reason is that module contains all essential teaching materials, including titles, study guides, knowledge development, supporting data, exercises, tasks or work steps, and assessments. In addition, module is equipped with activity sheet answer keys, worksheet answer keys, and assessment sheet answer keys so that students can assess their own abilities and learn at their own pace.

In the structure of the Diploma III in Nutrition curriculum, advanced dietetics courses are part of the Work Behavior (MPB) course group in the fifth semester. The competency standard for this course is that students can use the Standardized Nutrition Care Process (PAGT) to treat patients with nutritional problems.

Standard Nutrition Care Process (PAGT) is a methodical approach to solve nutrition problems and to provide safe, efficient and high quality nutrition care. The use of a consistent structure and framework for nutrition care can ensures that every patient with a nutritional problem receives the four steps of the nutrition care process, those are assessment of nutritional status, diagnosis, treatment, monitoring and evaluation [7].

Based on the data obtained from the academic sub-unit on the advanced dietetics course grade of the odd semester in the 2015/2016 academic year, among 56 students who enrolled in the course, only 1 student (1.79%) received an A grade, 19 students (33.93%) received a B grade, 34 students (60.71%) received a C grade, and 2 students (3.57%) received an E grade. This result is quite concerning because the course is a prerequisite course for attending clinical practice in the following semester (semester six).

In the new integrated curriculum, well-designed study guides can become a more useful learning tool for students [8]. Until now, learning materials for Advanced Dietetics courses are still scattered in various reference books, scientific journals, bulletins, research proceedings, and health magazines. Even though all of these sources complement each other, it is difficult for students to own or obtain these learning materials. The negative impact of this phenomenon causes the students to become dependent on lecturers, so the learning process in the class becomes stagnant. In this case, since the main source of obtaining information on course material is the lecturers, students tend to only listen to them. Lecturers spend a lot of time to explain the lecture material, so the time to guide students in other learning processes is reduced. Hence, these materials need to be compiled to become a teaching material, so that students can use them as textbooks that can be studied on their own, while other sources can be used for enrichment. It was stated that one of the uses of teaching modules is to make it easier for teachers to convey material, giving teachers more time to help and guide students with their studies [9].

Based on this background, the aim of this study was to develop an advanced dietetic module of Standardized Nutrition Care Process (PAGT) as a learning support for Diploma III Nutrition Students at Kendari Health Polytechnic of the Ministry of Health.

2 Method
2.1 Type of research

The research design used is Research and Development by building and testing a particular product to see how well it performs. The four stages of research and development were referred to the development model according toThiagarajan et.al., (1974) in dalam [10] referred to as the 4D model. This model has 4 stages, where the first stage is to provide a definition or formula (define), the second stage is design or arrangement (design), the third stage is to develop or build a design (develop), and the fourth stage is dissemination or distribution of product (disseminate).

The appropriate method in development research is a mixed method (mixed method), which ensures that all research procedures are collected. In addition, sequential exploratory design method is another name for this method which is a combination of qualitative and quantitative research methods used sequentially. Qualitative and quantitative approaches were used in the first and second research stages. In the process of making the advanced dietetics module and the results of the assessment from the expert team and student responses to the module, qualitative methods were used, while the effectiveness of the product (module) was evaluated using quantitative methods. This research has received approval of ethical feasibility (Ethical clearance) from the Health Research Ethics Commission of Yogyakarta Health Polytechnic of the Ministry of Health, No. LB.01.01/KE/XLI/386/2016.

2.1.1 Time and Place of Research

This research was conducted in May - November 2016, at the campus of the Nutrition Department of Kendari Health Polytechnic of the Ministry of Health.

2.1.2 Research Population and Sample

The research subjects involved in this case are 60 students of the fifth semester of DIII Nutrition Study Program of Kendari Health Polytechnic of the Ministry of Health in 2016/2017 academic year who enrolled to the Advanced Dietetics course. In addition, two substance or material experts and one language and graphic design expert were also involved.

Among the population, 60 students were employed to test the effectiveness of the modules developed in large groups. Thirty fifth semester students in class A served as the control group, and the other thirty students in class B served as the experimental group.

2.1.3 Development Procedure

According to Borg and Gall (1989) [11], research and development included four main characteristics, namely: 1) Examining research findings related to the product to be developed (potentials and issues); 2) Creating products based on results; 3) Field trials; and 4) Revision to address deficiencies found during the field test phase.

The specifications and descriptions of the research flow carried out were described below:
1. Defining (*define*)

Defining stage (*define*), according to [12], requires preliminary analysis with the aim of gathering relevant information on issues related to learning. In this case, student analysis was carried out aiming to determine the nature and characteristics of students. In addition, task analysis was also done to identify the main learning goals for students. In teaching materials, the material to be developed was selected through concept analysis, where the learning objectives were made by identifying indicators of learning success.

According to the previous study [11], such preliminary study was carried out to determine the requirements that must be met and problems that must be resolved in research and development. Needs can result from a variety of problems faced by individuals, groups of students, and educational institutions.

Another study [13] stated that the defining stage includes the analysis of the components needed to develop learning modules to determine learning requirements. Meanwhile, curriculum analysis, student analysis, task analysis, concept analysis, and objective analysis are the five steps that make up this stage.

Through observations and interviews with students in the fifth semester of the 2015/2016 academic year who have passed the Advanced Dietetics course, as well as the lecturers of the course, the researchers in this study looked for supporting resources or the existing potential, and tried to find the causes of learning difficulties in students. The findings were then developed into teaching material products in the form of modules. The potential for this study includes all learning tools, teaching materials, media, and approaches, as well as advanced Dietetics courses learning. This potential can be developed according to the needs and development of students. However, it can also become an obstacle if the functions implementation are failed and its goals are not achieved.

Based on the fact that most of the students' final grades for this course (60.71%) received a C score (adequate), the problem revealed by this research is that the fifth semester students still have limited understanding of the advanced dietetics course material.

The next step is observation and interviews with the lecturers and the fifth semester students who have successfully completed the Advanced Dietetics course for the 2015/2016 academic year to collect information about students' difficulties in understanding the material. This stage was carried out to obtain information about the needs of lecturers and students for advanced dietetics learning modules as learning aids, as well as information about student learning outcomes. After that, the Dietetics module was further developed using the data as a basis for research and development.

2. Level of planning (*design*)

According to the previous research [14], the first step in preparing the module is to find various references needed, including a needs analysis. After that, the framework (or outline) of the module is designed and a nice cover is given. The theory used is included in the module framework.

The outputs or products developed through development and research were expected to be able to increase the productivity of education in the education sector so as to produce quality graduates who meet their needs. The developed module was during the design stage. This stage has two main steps, those are choosing the format or form of the teaching materials and making an initial plan for the teaching materials.

3. Development stage (*develop*)

Modules revision was conducted at this stage following the expert suggestions. Activities carried out at this stage included expert review, module revision, expert validation, and limited trials.

According to previous study [12], development stage consists of expert studies followed by revisions based on study findings to improve teaching materials. Then, validation of instructional content is carried out, where the validity score will indicate whether the teaching material is properly utilized or not. The next step is testing the teaching materials to students, analyzing the data, and determining whether the teaching materials are appropriate or not. The module is the final product of this research, which contains advanced dietetic material as a support in the process of studying advanced dietetics course.

1. Product design validation

According to previous study [14], the validation procedure involves filling out a prepared validation questionnaire. In this case, the aspects validated are graphic feasibility, presentation feasibility, content feasibility, and linguistic feasibility.

Design validation is a process to determine whether a product design, in this case a new teaching material, will be rationally superior to the previous one. Presenting a number of experienced experts to evaluate newly

designed products is one method for product validation. Each expert was required to evaluate the product to further identify the strengths and weaknesses of the design.

Furthermore, it was also stated that during the validation stage, the experts in their respective fields examined the module. After reading the module that has been made, the validator completes the product validity questionnaire that has been prepared [14].

Two clinical nutrition experts and a lecturer with experience in writing textbooks were involved as the product validators for the Advanced Dietetics module. After requesting an evaluation of the module design from each expert, deficiencies and weaknesses of the product design were identified. This stage was carried out by distributing assessment sheets to the experts for module design validation purposes.

2. Design Improvements

After validating the module design through discussions with experts, weaknesses will be identified and the next design will be improved by the researchers. Based on the checklist sheet as well as the expert evaluation sheet given at the previous assessment stage, the weaknesses or deficiencies of the module were identified and the module design was improved so that the module design became more perfect in all aspects.

3. Product Trials

The design of products in the education department can be tested right after verification of modifications. Initial trials were carried out through the use of dummy modules. After the simulation, testing can be carried out on a limited group with the intention of knowing whether the new output (module) is more efficient and effective than the previous product or other output.

Product testing or inspection can adopt the experimental method by comparing the conditions before the use of the product and after the use of the product on both experimental group and a control group. The module trial is a comparison of advanced Dietetics learning before and after the use of supporting modules, while an indicator of the effectiveness of using the module is the student's ability to answer advanced Dietetics practice questions as an achievement of student understanding the course.

4. Level of spread (*disseminate*)

In this study, advanced dietetic module products were not distributed due to cost and time constraints.

2.2 Data Collection Techniques

In this study, structured interviews were used as a data collection technique, while the tools used were questionnaires or expert validation forms (material validation and linguistic validation) and student response surveys. This study used an instrument in the form of an open questionnaire consisting of expert statements and a closed questionnaire in the form of an expert or expert team validation sheet.

2.3 Data analysis

Data analysis at the stage of the advanced dietetics module development process used analytical techniques in the forms of reviewing suggestions and corrections to the module content, presentation, language, and graphics. These processes were further conducted through a qualitative descriptive analysis.

Material validation questionnaire sheets, linguists, and media were analyzed descriptively and quantitatively. In this case, calculation of the Likert Scale score was used to calculate this percentage. In addition, quantitative and descriptive analysis was carried out on student response questionnaires.

2.4 Module Feasibility Validation Data Analysis

The descriptive analysis method was used to determine the expert's assessment of the advanced dietetic module. Each criterion related to the characteristics of the module were analyzed, including cover, content appropriateness, presentation, layout, graphics, and language. In this case, a Likert scale with four scales (1-4) was used to assess the data from validation test results, in which 4 means very good, 3 means good, 2 means sufficient, and 1 means poor.

The following formula was then used to analyze evaluation data or module validation by a team of experts:

$$\text{Percentage} = \frac{\textit{the total score of the validator results}}{\textit{Maximum score}} \times 100\%$$

In this case, when the expert team score sheet gives results with a percentage of $\geq 61\%$, the advanced dietetics module can be used. Table 1 shows the scores and criteria obtained from the experts team evaluation.

Table 1. Interpretation of Scores and Criteria

Average Score	Criteria
0 - 20%	Very inappropriate
21% - 40%	Inappropriate
41% - 60%	Fairly appropriate
61% - 80%	Worth it
81% - 100%	Very decent

Source: [15]

The Guttman scale was used to calculate the percentage of the student opinion questionnaire, with "yes" answers receiving a score of 1 and "no" answers receiving a score of 0. The formula used is Percentage $= \frac{Total\ score}{Max\ Score}$ x 100%

Table 2 shows how the criteria and student response scores are interpreted.

Table 2. Interpretation of student response scores and criteria

Score Rate-Rata	Criteria
0 - 20%	Strongly does not understand
21% - 40%	Do not understand
41% - 60%	Quite Understand
61% - 80%	Understand
81% - 100%	Strongly understand

Source: [15]

If all components of the student response questionnaire have an average percentage of more than 61%, then the teaching materials (modules) developed meet the criteria of understanding or strongly understand.

The effectiveness of the advanced Dietetics module was evaluated quantitatively through quasi-experimental and non-equivalent control group research design. The following Table 3 describes the research design.

Table 3. Non-equivalent control group design

Group	Pretest	Treatment	Posttest
Control	M_1	X	M_2
Experiment	M_3		M_4

Information:
M_1= Pre-test of group control
M_2= Post-test of group control
X= Treatment of the further use of dietetic modules
M_3= Pre-test of experimental group
M_4= Post-test of experimental group

The number of research subjects involved is 60 students of the fifth semester of DIII Nutrition Study Program who enrolled in the Advanced Dietetics course in the 2016/2017 academic year. They were further divided into two groups or groups, where 30 students from class A became the control group and 30 students from class B became the experimental group.

The experimental group received treatment using the Advanced Dietetics module, while the control group did not receive any treatment. Both the experimental group and the control group received *pre-test* questions. Furthermore, *post-test* questions were given to the control group and the experimental group after treatment was provided to determine student learning outcomes. The pre and post-test questions are objective tests which contain 10 (ten) multiple choice questions arranged according to the syllabus. There are 4 (four) answer choices for each question. The data obtained from this tests were further analyzed using SPSS program.

The unpaired T-test was used to determine the significance of the mean difference between the final test results of the experimental group and the control group if they meet the requirements of the parametric test (data are normally distributed and have homogeneous variances). The Mann-Whitney test (non-parametric test) was used as a substitute for the unpaired T-test in cases where the data is not normally distributed and has an inhomogeneous variance.

For large samples (n > 50), the Kolmogorov-Smirnov test or the Shapiro-Wilk test can be used to determine whether the data distribution is normally distributed. Meanwhile, for smaller samples (n ≤ 50), the Kolmogorov-Smirnov test can be used. The Kolmogorov-Smirnov test was used because this study used a sample of 60

students. If the Kolmogorov-Smirnov test results yield a p value of less than 0.05, it can be concluded that the data are not normally distributed. The data are considered normally distributed if the probability or p is more than the significance level (α) of 0.05.

In order to find out whether the sample data contains homogeneous variants or not, the F test was used. The population variance is considered homogeneous if Fcount < Ftable, while the population variance is considered inhomogeneous if Fcount > Ftable. Unpaired sample T-test is used to test the hypothesis if the results of the data distribution test are declared homogeneous. Meanwhile, the Mann-Whitney test (non-parametric test) is used as an alternative to the unpaired T test if the results show that the data have non-homogeneous variances and are not normally distributed.

3 Results and Discussion
3.1 Results

The following are the results of the research that has been carried out: 1) Study on the students' requirements for the advanced Dietetics module; 2) Designing a module to assist the students in advanced Dietetics studies; 3) Expert evaluation of advanced Dietetics module designs and module revisions; (4) Revision and trial in small groups; and 5) Final product and large-scale group trials.

3.1.1 Analysis of Student Needs for Advanced Dietetic Learning Support Modules

Table 4 displays the research findings related to the advanced Dietetic module that students want.

Table 4. Student Assessment of the Desired Advanced Dietetic Support Book

No.	Question	Amount (n)	Percentage (%)
1.	Is a different and simpler advanced dietetics book necessary for a better understanding of the course?		
	A. It is necessary	29	96.7
	B. It is not necessary	1	3.3
2.	What is the content of an advanced dietetics book that you expect?		
	A. Only material content	1	3.3
	B. Materials and examples content	2	6.67
	C. Materials, examples, and exercises content	27	90
	D. Others, please explain	0	0

According to the data presented in Table 4, 96.7% of the sample students stated that a more accessible advanced dietetics book was needed, and 90% of the sample requested that the book should include materials, examples and practice questions.

Furthermore, interviews were conducted to find out more about students' difficulties in understanding the material and the need for advanced dietetic teaching materials. The findings are presented in Table 5.

Table 5. Student Interview Results on Advanced Dietetics Learning

No.	Question	Amount (n)	Percentage (%)
1.	Is advanced dietetics a difficult subject?		
	A. It is not difficult	15	50
	B. It is a little bit difficult	8	26.7
	C. It is difficult	7	23.3
2.	What makes it difficult for students to learn more about dietetics?		
	A. Making a nutritional diagnosis	12	40
	B. Using the right formula	9	30
	C. Creating Nutritional Care Proces (NCP)	4	13.3
	D. Unavailability of dietary references/books	4	13.3
	E. Lecturers are less communicative	1	3.3
3.	Do students understand when explained about advanced dietetic material?		
	A. Yes, I understand	16	53.3
	B. It depends on the lecturer	8	26.7

	C. I do not understand	6	20.0
4.	Is the advanced dietetics content contained in the textbook well-understood?		
	A. Yes, it is well-understood	12	40.0
	B. Not, it is not well-understood	18	60.0
5.	Is there a need for additional books in learning more about dietetics?		
	A. Yes it is necessary	25	83.3
	B. No it is not necessary	5	16.7

Table 5 shows that 40% of the sample said it was difficult to make a nutritional diagnosis, 30% said it was difficult to use the right formula, 13.3% said it was difficult to make NCP and there were not enough references or diet books, and 3.3% said it was difficult to understand the material advanced dietetics because the lecturer is less communicative.

In addition, Table 5 also shows 83.3% of respondents stated that additional books were needed for advanced dietetics studies and 60% of the sample did not understand the content or advanced dietetics material in the textbooks used at that time.

3.1.2 Development of modules to support advanced dietetics learning

According to previous study [16], the purpose of the development stage in research and development is to produce learning modules that are suitable for use in the learning process and have undergone revision and validation.

Learning modules must first be validated by a team of experts through revisions to the preparation of materials, practice questions, and independent assignments before they can be used in learning process. In the portfolio-based learning module, validation is carried out by providing a validation sheet containing columns of criticism and suggestions.

a. Prototype of Advanced Dietetics Learning Support Book (Module).

The initial product design of the advanced dietetics module was prepared based on the principles of: 1) module characteristics, 2) module design, and 3) aspects of the feasibility of curriculum-based teaching materials.

b. Module Design Based on Module Characteristics

A learning module must at least include learning objectives, resources, and assessments used in the module. Competency Standards (SK) and Basic Competency (KD) in the introductory or introductory sections, serve as the basis for the initial design of advanced dietetic modules. The contents of the module consist of learning materials supplemented by practice questions and case studies that meet the minimum requirements for a learning module.

c. Module Design Based on Module Design Terms

According to previous research [11], the results of research and development must be a new work plan based on an evaluation of the previous system and a review of the latest references, which must include indicators of a good work system. New product design with specifications is the final result of this activity.

The writing of modules was discussed in the design stage of this module, which also includes a discussion of the arrangement of the modules from the first page to the last page, including cover, introduction, and closing pages. In order for the module to be appropriate and effective for use in learning, several factors must be considered in its preparation, as discussed in the discussion of module elements. In this case, Al-hazimi (2012) asserted that the cover of a study guide may be as important as its content. The high-quality color cover pages give a first impression of the contents of the guide. The advanced dietetics module "Standardized Nutrition Care Process (PAGT)" is organized into several chapters based on lecture topics.

The advanced dietetics module is organized according to several factors that must be considered when creating an effective module, including:
(1) Format
   This module uses A4 paper size 21 cm x 29.7 cm and has a portrait layout like books in general. to make it easy for students to use.
(2) Organization
   This module is divided into several chapters and sub-chapters with practice questions, clear and systematic descriptions of material, and case studies to make it easier for students to understand each chapter.
(3) Letter shape and size
   This module uses Times New Roman font size 12pt. Chapter and sub-chapter titles use capital letters with a font size of 12 points.

(4) Consistency

The shape of the letters and the size of the font are presented unchanged in all modules with the same spacing and margin spacing to give a neat and readable impression to students.

Research that has been carried out previously [4] claimed the module consists of seven components, namely: 1. Specific objectives for the class; 2. Basic instructions that contain a description of how learning can be carried out effectively in the classroom, the time required to carry out the module, the media and resources used, the evaluation procedures, and the tools used; 3. The activity sheet contains lesson content that students must master; 4. Worksheets with questions and problems that students need to answer and solve; 5. A summary of material to assist understanding; 6. The sheet used as an evaluation to determine whether the objectives of the learning module have been achieved or not; and 7. Formative test answer keys to match formative test results and determine mastery of the material.

3.1.3 Expert Team Evaluation of Advanced Dietetics Module

A study [17] has found that expert judgment determines the validity of teaching materials in research and development. Two nutrition experts who are also lecturers in the DIII Nutrition Study Program, Kendari Health Polytechnic and one lecturer who has experience in making teaching materials, evaluated the development of this module.

The expert team verified several aspects, including the module cover, content, presentation, layout, graphics, and language appropriateness. Table 6 presents a summary of the results of the expert team's validation.

Table 6. Recapitulation of expert team validation results

No.	Assessment Aspects	Percentage	Criteria
1.	Module cover evaluation	84	Very feasible
2.	Content eligibility	90	Very feasible
3.	Presentation eligibility	84	Very feasible
4.	Layout feasibility	84	Very feasible
5.	Graphical qualifications	84	Very feasible
6.	language eligibility	92.5	Very feasible

It is known that the developed module is suitable for use in advanced dietetics learning based on the validation results from the expert team for all aspects of the developed module assessment. In this case, the average obtained is 86.4% which is included in the "very feasible" category. The findings of this study are in line with previous research [12] which found that the results of expert validation of the developed teaching materials reached an average of 83% in the "very feasible" category, indicating that the developed teaching materials can be used.

3.1.4 Small Group Trials and Revisions

A limited trial of the advanced dietetic module that was developed was carried out on 15 students of the DIII Nutrition study program at the Kendari Health Polytechnic of the Ministry of Health. In this stage, students were asked to read and observe the module, then provide an assessment of the module by filling out a questionnaire containing several assessment aspects, namely aspects of module appearance, presentation of material, benefits, and interest in using the module. Table 7 presents a summary of the results of student assessments of the advanced dietetics module that had been developed.

Table 7. Recapitulation of Student Assessment of Modules

No.	Assessment Aspects	Percentage	Criteria
1.	The aspect of writing display is easy to read and understand	100	Strongly understand
2.	The aspects of the content display in the module	90	Strongly understand
3.	The aspect of presentation of the material facilitates understanding	73.3	Understand
4.	Case examples are easy to understand and in accordance with the daily life	66.7	Understand
5.	Examples of questions presented help	73.3	Understand

	students to understand the material		
6.	The material in this module helps students to learn independently	86.7	Strongly understand
7.	Aspects of the benefits of the module	86.7	Strongly understand
8.	Increase motivation to learn	100	Strongly understand

Based on Table above, the average score of the students' responses obtained 84.6%, indicating that the aspects have met the criteria of "very understanding". The findings of this study are in line with the previous research [12] which shows that students understand teaching materials developed by researchers for banking accounting and microfinance courses. This is also supported by another research project [16] which reveals that the assessment response to learning modules based on subject portfolios related to administration of facilities and infrastructure has a very strong category of 86.46%.

3.1.5 Large group trial and final product

Researchers can find out whether the advanced dietetics module is successful or not in improving student learning outcomes by comparing the scores of class A and class B students in the fifth semester of the 2016/2017 academic year. The findings of this study are consistent with the previous research [18], that in order to determine the effectiveness of the module, student and lecturer satisfaction and student performance are evaluated and compared to the previous year. Table 9 contains information about the results of the pretest control group and the experimental group.

Table 9. Descriptive Analysis Results of Pretest Values

group	n	Mean	Std. Deviation
Control	30	42.17	12.84
Experiment	30	43.67	7.184

Based on data from the pretest results, the mean value of the control group is 42.17 with a standard deviation of 12.84, while the mean value of the experimental group is 43.67 with a standard deviation of 7.184. Table 10 displays the results of the independent T test for the mean difference test.

Table 10. Independent T Test Results on Group Pretest Scores

group	df	Say. (2-tailed)	Mean Dif	Std. Error Dif	Information
Control Experiment	58	0.579	-1.500	2.68688	H0 is accepted

Based on Table 10, the p value obtained is 0.579, which is below 0.05, so H0 is accepted. It indicates that there was no difference in students' initial abilities. It can also be said that there was no influence from other factors related to students' initial abilities.

The mean post-test score for the control group is 48.67 with a standard deviation of 10.08, while the mean post-test score for the experimental group is 60.0 with a standard deviation of 12.87. This means that the mean score of the post-test learning outcomes of the experimental group is higher than the control group. Table 11 contains information about the posttest results of the control group and the experimental group.

Table 11. Descriptive Analysis of Post test scores

Group	n	Mean	Std. Deviation
Control	30	48.67	10.08
Experiment	30	60.0	12.87

The independent t-test was carried out after the results of the data normality test and data homogeneity from the post-test scores in the control and experimental groups showed that the data were homogeneous and normally distributed. Table 12 displays the results of the independent t test for the mean difference test.

Table 12. Independent T Test Results on Group Post Test Values

group	df	Say. (2-tailed)	Mean Dif	Std. Error Dif	Information
Control Experiment	58	0.000	-11.333	2.98399	H0 is rejected

The results of the independent t-test analysis in table 12 show that there is a difference in the average value of the post-test results between the experimental class and the control class. Based on the value of p = 0.000 <0.05, it can be concluded that there is a significant difference between the mean post-test results for the Advanced Dietetics course for the fifth semester students of the 2016/2017 academic year class A and class B. This study showed that the group of students who were given the dietetics module advanced had a higher average score.

3.2 Discussion

This is in accordance with the previous research findings [6] that it is effective to improve students' learning outcomes in class XI MIA at SMAN 7 Padang by using a buffer solution module based on discovery learning. In addition, according to another study [19], there are differences in student learning outcomes when the inquiry-based module and the motion material module are used. Furthermore, it was also stated [20] that students of the informatics engineering study program benefited from using the module to study computational mathematics and improve their learning outcomes.

Another study [21] found that the entrepreneurship module at SMA Negeri 1 Menganti Gresik had a significant influence on student learning outcomes before and after it was implemented. According to the findings of another study [17], teacher-made visual aids facilitate student understanding and improve learning outcomes. In addition, it was also discovered [22] that higher OSCE scores in the intervention group, indicating that the new module designed by the researchers effectively increased the knowledge and skills of medical students regarding evidence-based infant feeding practices. Furthermore, research findings [23] showed that students who used the module have, or on average, better learning outcomes than students who did not use the module. Additionally, another research finding [19] stated that the use of inquiry-based modules on motion material and not using modules on motion material had a different effect on student learning outcomes, with the effectiveness of using modules on learning outcomes of 0.30 (moderate).

According to research findings [24], students whose learning outcomes were improved by receiving printed teaching materials performed better than students in the control group (without treatment). Therefore, learning with printed teaching materials is considered capable of providing solutions to improve students' learning outcomes. According to another research project [25], learning with modules causes an increase in learning outcomes by 57%, or an average N-Gain score of 0.57.

Furthermore, it was also stated [24] that various factors influence differences in learning outcomes, including internal factors (health, intelligence attitudes, interests and talents of students), external factors (social and non-social environment), and learning approach factors.

4. Conclusions and Recommendations

Based on the results of the study, the researchers made several research conclusions, namely:
a. The results of the need analysis of the students and lecturers regarding the desired advanced dietetics module found that 96.7% of the students stated that there was a need for other advanced dietetics books that were easier to understand and 90% wanted the module to contain material, examples and practice questions. In addition, the course lecturer also stated that a module was needed with an increased number of case exercises in order to increase student understanding.
b. The advanced dietetic module prototype was produced based on the front module framework consisting of: (1) cover page containing: module code label, state-owned label, field/study program expertise, in this case is Diploma III Program in Nutrition, competency expertise, module title, illustration image (representing activities carried out in module discussion), institution, in this case is Poltekkes Kemenkes Kendari, and the year module was compiled; (2) preface; (3) table of contents; and (4) module position map, a diagram showing module position in the overall learning program, but not yet equipped with a glossary. The dietetic module prototype continues after the front module framework, consisting of; (1) Competency standards, (2) description, including a brief explanation of the name and scope of the contents of the module, (3) the final goal to be achieved by students after completing a module, and (4) checklist mastery of Competency Standards.

c. The results of the assessment by the expert team on the aspect of the module cover obtained a score of 84%, which is classified as very feasible. Meanwhile, the score obtained from module content is 90%, which is classified as a very feasible category. In the aspect of module presentation, a value of 84% is obtained and classified as very feasible. Furthermore, the module layout aspect obtained a value of 84% which is classified as a very feasible. In the graphical aspect, a score of 84% is obtained and classified as very feasible, while the linguistic aspect is obtained with a value of 92.5%, which is classified as very feasible. Based on the average results of student assessments of the advanced dietetics module, it can be concluded that from the aspect of appearance, presentation of material, and benefits, it is included in the very feasible category (84.6%).

d. The results of this study show that there is a significant increase in the mean midterm exam scores for students who are given the advanced dietetics module.

5. Suggestion

Based on the results of the study, the researchers suggest, among others:

a. The advanced dietetics module can be applied to advanced dietetics learning in order to increase students' knowledge and skills in carrying out the Standardized Nutrition Care Process (PAGT) for patients with nutritional problems.

b. Advanced dietetic modules need further development with regard to the media used to support teaching materials, for example interactive computer-based modules and multimedia products in digital formats (*e-learning*).

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