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Developing Materials of Advanced Nutrition Course to Enhance Functional and Nutraceutical Food Processing at Food and Nutrition Concentration Course of Home Economics Department

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Abstract

The present study aimed at investigating the undertaking of Advanced Nutrition course learning, (2) to analyze the feasibility and effectiveness of instructional materials on functional and nutraceutical food processing based on local food and development results. The study was a research and development of which the procedure followed the design and development research by Richey and Klein. It constituted two phases of development. They were (1) comprehensive product development and (2) developmental process of product components. The internal and external validations were employed. The internal validation was carried out for components of the instructional materials by using peer review and focused group discussion, whereas the external one was applied with the try-outs. These validations involved nutrition experts, peer supports, lecturers and students of the Food and Nutrition Concentration Course of the Home Economics Department. The method used for the try-out phase was descriptive qualitative and quantitative. The results indicated that (1) development of the teaching materials further increases the functional and nutraceutical food processing competence nutraceutical on the basis of local food, (2) the teaching materials could be applied independently or in groups, on any matter ended with practice questions and tasks in accordance with the purpose of each material, (3) modules and learning of the development outcomes were feasible and effective in improving the competences of the students in accordance with the demands of the curriculum that could be achieved by the students after applying teaching and learning materials of the development results.

Keywords: *development, instructional materials, functional food and advanced nutrition*

1. INTRODUCTION

1.1. Background of the Study

Education is organized as a civilizing process and the empowerment of learners that lasts a lifetime. That process requires lecturers who can serve as a role model, have willingness to build up and develop the potentials and creativity of learners. This implies that there has been a paradigm shift of educational process, from teaching to learning paradigm shift. Since learning is regarded as a process of interaction of students with faculty and learning resources in a learning environment, the learning process needs to be planned, applied, evaluated and monitored in order to be effectively and efficiently implemented.

The world of education cannot cope with the rapid advancements of technology in the industrialized world. About 60% to 80% of the competencies developed in universities are less relevant with the competencies required by the industrialized world, in particular, the ones connecting with entrepreneurship. In addition, learning for new subjects listed in the competency-based curriculum cannot be carried out effectively because it is still oriented to conventional learning models.

Advanced Nutrition Learning for students at the University of PGRI Adi Buana has not yet successfully accomplished adherent to the purpose of competency-based curriculum due to the

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limited facilities and infrastructure. The teaching and learning materials (learning methods, learning strategies, learning approaches, course schedule, as well as models of learning) for Advanced Nutrition course are not yet adequate for the achievement of the students' competencies of the functional food processing. It is because the processes and infrastructures for the students' practicum for students are not yet standardized as required. The laboratory facilities and infrastructure of the Home Economics Department have not met the requirement as well. Apart from that, the effective and efficient learning of Advanced Nutrition has not yet developed and applied. It can be seen from the observation data that the implementation of learning in terms of teaching materials, schedules, learning approaches, the number and the type of equipment, and the means or tools of learning used varied.

1.2. Limitation and Research Focus

Based on the afore-mentioned problem, this study was limited to the development of learning materials for Advanced Nutrition course competencies. This material development is very important because of the problems related to the learning process can be solved as well.

1.3. Statement of the Problem

Based on the background of the study, the identification of the research problems, and their limitation mentioned above, the problems raised in this study are:

- (1) How is the implementation of Advanced Nutrition learning and practicum on functional and nutraceutical food processing?
- (2) Is the teaching materials and lesson plan of Advanced Nutrition vocational competences feasible and effective to improve the competences of students in the cognitive and psychomotor aspects in the implementation of the practice of functional and nutraceutical food processing?

1.4. Objectives of the Research

Based on the formulation of the above problems, the objectives to be achieved in this study are: (1) to analyze the implementation of learning of the vocational competences of Advanced Nutrition currently applied and the implementation of functional and nutraceutical food processing practices, and (2) to analyze the feasibility and effectiveness of the vocational competence learning materials for Advanced Nutrition.

1.5. Specifications of the Developed Products

Based on the formulation of the problem and research objectives above, this research is a research & development (Design and Development Research), because the main purpose of research is to produce teaching materials for Advanced Nutrition competences and to validate the developed products made. The learning approach used is Student-Centered Learning. The study employed a combination strategy of group and individual learning strategies according to the students' characteristics. The materials are prepared for the learning process of competences in Advanced Nutrition. The competency standards used as reference in the preparation of the teaching materials and the learning process of the following vocational competences: Nutritional science, Basic Knowledge of foodstuffs, analysis of Functional Food Science and Nutrition functional and nutraceutical food product processing.

2. THE THEORETICAL FOUNDATIONS

2.1. Review of the Related Theories

2.1.1 The Basics of Philosophy of Learning in Vocational Education

In accordance with National Education Act No. 20 of 2003 on National Education System, education is a conscious and deliberate effort to create an atmosphere of learning and the learning process so that learners are actively developing the potential for them to have the spiritual power of religion, self-control, personality, intelligence, character, and skills needed for them, society, nation and state. The vision of national education is the realization of the education system as a

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social institution that is strong and authoritative to empower all citizens of Indonesia to develop into a human quality so capable and proactive to answer the challenges of the times that are always changing (Ministerial Regulation No. 41 of 2007). The curriculum of the Home Economics Department has noticed some fundamental things as follows: (1) education must instill strong and clear values as the foundation of formation of character and development of human life; (2) education should give something meaningful, both ideally and pragmatically, in accordance with the needs of learners, and (3) education should provide direction planned for the mutual interest of the students, families, communities, nations, and states (MONE, 2004). Vocational education consists of a wide range of expertise in areas of existing expertise in the world of work. All areas of expertise have goals that generally refer to the content of the National Education System Act Article 3 of the National Education Goals and the explanation of Article 15 which states that vocational education is secondary education that prepares students primarily to work in a particular field. Specifically, the goal of Food Management Program is to equip students with the skills, knowledge and attitudes to be competent: (1) to work either independently or fill up vacancies that exist in the world of business and industry as an expert in Food Management (2) to choose a career, compete, and develop a professional attitude.

The purpose of vocational education and philosophy outlined above is in line with what has long been put forward by Charles Prosser who is an important figure in the establishment of vocational education (Vocational Education or Career and Technical Education) in the United States. Prosser suggests sixteen theorems of vocational education.

2.1.2 Learning on Vocational Education

Implementation of learning for Advanced Nutrition is conducted in the laboratory. Practical lesson in the laboratory is intended for workability of learning according to the learning objectives in the mastery of competencies as written in the standard of competence which is the basis for curriculum development. Learning in the lab is a very important part of the learning process. Students will learn and remember information longer after carrying out laboratory experiments.

According to Wena (2009:135), the learning process in the study program should: (1) be based on problem-solving and experimental approach and involve experience in planning methods and decision-making; (2) introduce the learner to a broad spectrum of technology and productive work situations; (3) develop special procedures concerning valuable practical skills such as tool use, repair and maintenance and safety procedures, and appreciate the value of work; (4) develop an appreciation of design, workmanship and good quality; (5) develop the ability to function as a team member and to communicate technical information; (6) be close to the local environment without limiting oneself.

As aforementioned, it is understood that the implementation of learning in vocational education includes learning theory and practice. The study program should be in cooperation with the professional community in the field. By doing so, learning in vocational education leads to relate itself to the world of business and industry.

2.1.2.1 Learning Models for Development of Teaching and Learning materials of Advanced Nutrition

One's competences in the Advanced Nutrition cover competences in the cognitive, psychomotor, and affective aspects. Accordingly, the following explanation addresses mastery learning model, model of competency-based learning, computer-based learning model and experiential learning as models of learning that can be used for the preparation of teaching materials and learning competencies of Advanced Nutrition.

2.1.2.1.1 Mastery Learning Model

Competency-based learning must be adherent to thorough learning principles (mastery learning) to be able to master the attitude, science (knowledge) and in order to work in accordance with his profession as demanded by the set competencies. In order to learn thoroughly, it needs to develop learning principles as follows: (1) Learning by doing (learning through activities/concrete

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activities which provide a meaningful learning experience developed into a product-based learning, and (2) Individualized learning (learning by observing the uniqueness of each individual)

2.1.2.1.2 Competency-based learning model

This section discusses competency-based learning model proposed by Voorhees (2001: 5-13). The model of conceptual learning for competency-based learning was compiled by the US Education Department. The competency-based learning model is described as a ladder with each rung affects the steps above or below. The bottom rung is the Foundation; these two skills, namely the ability and knowledge are developed in the learning process. The third step is the competencies acquired through learning and experience, and the latter is a demonstration (performance) as a result of applying the competencies acquired. This top-level performance-based learning can be assessed.

2.1.2.1.3 Experiential Learning Model

The learning model is related to the learning styles of students. Kolb's learning theory specifies the four different learning styles, which are based on a four-stage learning cycle (can be interpreted as a training cycle). Kolb's model offers two ways to understand a variety of individual styles of learning, and also an explanation of the cycle of experiential learning that applies to all. The learning model that is the basis of learning is learning by doing suggested by the competency based curriculum in vocational schools (MONE, 2004). It reveals from the beginning of the learning cycle that is a real experience (concrete experience), according to the learning process on vocational education that focuses on learning practices to obtain real experience. It is expected to develop an effective learning process of competences of Advanced Nutrition.

3. METHOD

3.1 Procedure of Development

According to Richey and Klein (2007: 8) design and development research consists of two main categories: (1) research product and tool, and (2) research models. The stages of research on the category of product development are: analysis, planning (design), development, and evaluation. While the development tool is basically the same with product development but it puts a more emphasis on: (1) development (development of tool), and (2) use (tool use). The steps undertaken for the research model includes: (1) development, (2) validation, and (3) use. In this research, a model by Richey and Klein (2007: 65) is used.

3.2 Pilot Testing

The pilot testing is trying out the learning activities in the Food Management Concentration Course of the Home Economics by the students who are expected to have the same characteristics as those that will use the instructional materials. The implementation is usually done in one location. The trial focuses on aspects of acceptability and practicality of quality curriculum materials. Because the pilot test can be regarded as a prerequisite for field testing, the information obtained from the pilot test is more towards a purely descriptive (Finch and Crunkilton, 1999: 297). According to Dick, Carey and Carey (2005: 289-290) data for the evaluation of small groups in addition to pre-test and post test is a attitude questionnaire and in-depth interview with the students in the group.

3.3 Design of Pilot Testing

Prior to the trial to the implementation of the study, the first students are given a description of the learning scenario. The learning scenarios contain a description of the procedures to be used for Advanced Nutrition, and practice using modules/materials and instructional media that have been drafted. Instructional materials learning are arranged there instructions for lecturers in implementing the learning, these steps are briefly described in the Learning Map (viewable on

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learning modules for Nutrition Advanced and designed for each meeting in Learning Implementation Plan (RPP). In the conduct of this trial, the faculty and students carry out learning using the instructional materials for Advanced Nutrition competences.

3.4 Subjects of Pilot Testing

The subjects of the pilot testing try to experience the external validation phase and research into the use of teaching materials in learning Advanced Nutrition. The trial is carried out by eight to twenty students in a small group (Dick, Carey, and Carey, 2005: 288). Learning to use the teaching materials can be accomplished if the components of the learning process that are developed can be met, learning in the laboratory of Skin Beauty. In order for the process of researching the use, the subjects in the form of pilot study can be done, then selecting the schools that have adequate means in accordance with the specifications of the teaching materials studied. It involves 20 students, 1 lecturer and 1 observer.

3.5. Types of Data

The data are obtained from the administration of the test, qualitative data as to obtain a description of use in the learning module. The main data is document of the implementation of learning such as: the students' result sheet on the capabilities checklist, the students' result sheet on exercises or tasks, notes on learning implementation in accordance with the lesson plans, images of learning process and the results of student practice, video learning implementation, notes on the comments of students and comments of the lecturers during the trial, and the description of the learning process of students and the teaching faculty.

3.6 Method of Data Collection and Research Instruments

In the validation phase of the internal components of instructional materials and learning design, the data collection method used is analysis of the review results by the experts. At this stage of the external validation, the data collection methods used is observation of the learning implementation, documentation and interviews. The researchers in this instance serve as an observer of the process of learning about nutrition by using the teaching materials of the nutritional competence. For the implementation of learning, the data collection and data analysis are performed continuously during the course of the study in forms of pre-observation, and observation of learning about nutrition which have been piloted previously. The results of the pilot testing concerning the application of teaching are: (1) the procedure recommended in the use of the model, (2) the conditions that support the successful use of teaching materials, and (3) the explanations of the successes and failures in the use of instructional materials in the teaching (Richey and Klein, 2007: 13).

3.7 Quantitative Data Analysis

The quantitative data analysis is conducted to answer the second and third research problems regarding the feasibility and effectiveness of the module and the learning process. It is carried out by comparing the components of a long learning process with learning components developed by using a comparative descriptive analysis (Sukmadinata, 2008: 79). The components of learning are analyzed in advance with the aim of finding differences or contrasts, in accordance with what has been cited by Spradley (2007: 247). The learning by using the teaching materials is regarded as effective if it can improve the competence of students in the learning competencies of Advanced Nutrition, particularly regarding the functional and nutraceutical food processing.

4. RESULTS

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The study results constitute the description and data analysis obtained from the observation, documentation, field notes on the learning, development of the teaching materials in the form of module on Advanced Nutrition and its pilot testing. To be more specific, it results in the preliminary study comprises the description and analysis of the implementation of learning, the results of pilot testing and data analysis, and a review of the product.

4.1. Pilot testing

Before the pilot testing is implemented, the researcher makes the preparation including: the laboratory room and its learning facilities, for instance, tools and accessories, materials, procurement, processing tools and serving tools. It is conducted five times in ten meetings. Each meeting has a three-hour lesson (3 X 50 minutes) at the Food Management Laboratory of University of PGRI Adi Buana Surabaya. The purpose of the pilot testing is to determine the feasibility/workability of the instructional materials and the planned learning and their effectiveness in boosting the students' competences in the functional and nutraceutical food processing. The feasibility means that the instructional materials developed can be presented for the learning of functional and nutraceutical local food- based processing. The materials are considered to be effective if the end of the pilot testing the students have the competences and skills in the local food functional management.

4.2 Students' increased competence obtained by students in the teaching and learning by using the instructional materials

The analysis of the increased competence of the students during the learning of local-food-based functional processing in the pilot testing results in: (1) the observer's field notes, photos, and videos concerning the observation of the students' learning process, (2) the results of the students' tasks and assignments, (3) the results of students' practicum on the manufacturing of food, and (4) students' notes. Those data are subsequently classified on the basis of the performance indicators stated in the learning module and the course semester plan for each meeting.

There are three competence standards to be achieved in the learning of the functional food processing based on local food. They are: (1) the knowledge of the nutrient content of local food, (2) the food processing into products of cuisines, and (3) the description of the composition of the resulting products and functioning of the produced.

The learning process must therefore be analyzed in terms of sequences of the learning, for instance, from easy to difficult, from simple to complex, and developing the students' independent learning.

The competence of students in the learning competencies of Advanced Nutrition, particularly regarding the functional and nutraceutical local food- based processing gradually increased from the first meeting to the sixth meeting. At the seventh meeting the students' competences have been fully attained and mastered to 85. They have the abilities in: product planning, analyzing the nutrition data from functional foods, food ingredients, food processing of ingredients for functional food and functional and nutraceutical food products. From the eighth to tenth meeting, the students are expected to develop their skills in having practices independently as much as possible.

4.3 Teachers and students' opinions analyses

All of the students responded that the learning by using the module was interesting. It greatly facilitates the flow of the learning. The purpose of learning and making the materials developed is to increase the students' competences. In relation to the aforementioned students' responses, it can be inferred that the purpose previously stated has been achieved.

The students' competence in managing the manufacturing of functional food products independently is what is required by the competence standards. Competence is defined as the

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ability of the students in the domains of affective, cognitive, and psychomotoric. In the pilot testing the students' affective domains are not measured. However, the students were seriously learning and following the steps written in the materials. In terms of the students' cognitive domain, the students were able to do the practicum and tasks which could improve their cognitive abilities. The students' skills also improved after the learning.

4.4 Feasibility/Workability of the teaching materials as result of the development

The instructional materials and learning as results of the development can be implemented if the learning facilities and infrastructure of functional and nutraceutical food processing are available. From this learning, it is suggested that the development of the learning process should be undertaken. The result of observation of the learning reveals that the students could follow the learning steps easily due to the availability of the module, laboratory facilities and infrastructure of the learning process. The instructional materials of functional and nutraceutical food processing could serve to learn the local setting. In addition, the development of program facilitates the learning itself. All of the students responded that the learning is interesting; whereas the lecturers suggest that the instructional materials can be implemented for the future learning process.

5. CONCLUSION

5.1. Conclusion on the product

1. The instructional materials for the learning of Advanced Nutrition to enhance the competence of functional food processing of local foodstuffs can be used for the students individually or in groups. At the end of the materials, tasks and assignments in accordance with the learning objectives are provided.
2. The laboratory facilities used for the learning of Advanced Nutrition is supplemented with reference books, and learning media in the forms of visualization video of materials of the learning modules.
3. The developed instructional materials and the learning are feasible in terms of time and laboratory facilities and infrastructure of Food Management.

5.2 Suggestions for the use of the materials

The development of the instructional materials requires all the components of learning process which include: learning and teaching materials, learning tools, instruments for evaluation, LCD projectors and screen, learning module in accordance with the availability of the learning facilities within the same framework of the module as the one used in this study).

REFERENCES

- Akker, J.V. (1999). *Principles and Methods of Development Research*. Retrieved from http://projects.edte.utwente.nl/smarternet/version2/cabinet/ico_design_principles.pdf
- Borg, W.R., & Gall, M.D. (1989). *Educational Research An Introduction (5th Ed)*. New York: Longman.
- Bungin, B. (2003). *Data Penelitian Kualitatif, Pemahaman Filosofis dan Metodologis ke Arah Penguasaan Model Aplikasi*. Jakarta: PT Raja Grafindo Persada.
- Depdiknas. (2003). Undang-Undang RI Nomor 20, Tahun 2003, tentang Sistem Pendidikan Nasional.
- Pardjono. (2008). *Urgensi Penerapan Konstruktivisme dalam Pendidikan Kejuruan*. Pidato Pengukuhan Dosen Besar Universitas Negeri Yogyakarta.

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- Pribadi, B.A. (2009). *Model Desain Sistem Pembelajaran*. Jakarta: Dian Rakyat.
- Postholm, M.B, & Moen, T. (2010). Communities of Development: A new model for R&D work. *J Educ Change* ,DOI 10.1007/s 10833-010-9150-x.
- Rehm, M.L. (2008). Career and Technical Education Teachers' Perceptions of Culturally Diverse
- Richey, R.C., & Klein, J.D. (2007). *Design and Development Research*. New York: Routledge.
- Riyanto, A. (2009). *Kurikulum Pendidikan Teknologi dan Kejuruan, Pengembangan Serta Implementasinya*. Lecture Materials. Bandung. Universitas Pendidikan Indonesia.
- Samani, M. (2012). *Rekonstruksi Pendidikan. Kumpulan Pemikiran tentang Perlunya Mengkontruksi Pendidikan di Indonesia*. Surabaya: Unesa University Press
- Ozsagir, A, et.al. (2010). *The Relationship between Vocational Education and Industrial Production in Turkey*. International Journal of Economic Perspectives. Vol.4 Issue 2,439-448. <http://www.econ-society.org> diakses 10 Juni 2011
- Rukmana, A. & Mulyati, S. Y. (2008). *Pengelolaan Pendidikan*. Bandung: Jurusan Administrasi Pendidikan
- Purwanto, Ngalim. (2010). *Prinsip-prinsip dan Teknik Evaluasi Pengajaran*. Bandung: PT. RemajaRosdakarya.
- Purwanto, N. (2010). *Administrasi Dan Supervisi Pendidikan*. Bandung: PT. RemajaRosdakarya
- Rohiat. (2008). *Manajemen Sekolah-Teori Dasar dan Praktik*. Bandung: Refika Aditama
- Seidel, J.V. (1998). *Qualitative Data Analysis*. Retrieved on 18 July 2011, from <ftp://ftp.qualisresearch.com/pub/qda.pdf>
- Straus, A. & Corbin, J. (2009). *Dasar-dasar Penelitian Kualitatif (Terjemahan Muhammad Shodiq dan Imam Muttaqien)*. Yogyakarta: Pustaka Pelajar.
- Suparno, P. (1997). *Filsafat Konstruktivisme dalam Pendidikan*. Yogyakarta: Kanisius.
- Sukardi. (2008). *Metodologi Penelitian Pendidikan Kompetensi dan Praktiknya*. Jakarta: PT. Bumi Aksara.
- Sukmadinata, N.S. (2008). *Metode Penelitian Pendidikan*. Bandung: PPs UPI dan Remaja Rosdakarya.
- Wena, M. (2009). *Strategi Pembelajaran Inovatif Kontemporer*. Bumi Aksara: Jakarta.

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