

The Development of The Interdisciplinary Thematic Learning (INTEL) Model in Vocational Education

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The Industrial Revolution 4.0 took place along with the rapid development of science and technology, so that it spurred every line of life to be able to innovate optimally in facing the challenges of global competition and the emergence of new jobs. The purpose of this study is to develop learning models to provide integrated learning between vocational study programs through Model Interdisciplinary Thematic Learning (INTEL). This research was carried out collaboratively by creating a special class collaboration model between three vocational study programs (Mechanical Engineering, Electronics Engineering, and Culinary) at the Malang State University Faculty of Engineering. The research method was conducted by research and development of interdisciplinary thematic learning models, by taking the theme robotic culinary in Industry 4.0. There are four stages of development of INTEL Model, namely: 1) identifying technology in the world of work and student characteristics; 2) analysing instructional learning/competencies that students must have; 3) compiling a collaborative lecture strategy

including making the syllabus, lesson plans, and lecture modules; and
4) compiling evaluation and evaluation tools for learning implementation. The results of this study are expected to provide real experience in the work world; therefore, it will affect the improvement of competency skills of vocational education students.

Keywords: interdisciplinary learning, thematic teaching and learning, vocational education

INTRODUCTION

The importance of 21st century skills includes creativity, collaboration, critical thinking, and communication (4C) to face the challenges of the industrial revolution 4.0. The development of human resource competencies comes from a quality of the education process, where in the education process students are equipped with various skills to solve problems, find alternative solutions, and think creatively and evaluatively. Thinking skills are one of the life skills that need to be developed through the educational process. Thinking skills are very important to equip students to compete in the global world (Anjarsari, 2014).

The learning paradigm in the era of the 21st century must encourage students to find out by utilising information available from various sources, not only from the lecturer in the classroom; where learning is directed at being able to formulate problems (questions), not just solving problems (answering). Learning is designed to train analytical thinking (decision making) rather than mechanistic thinking (routine), and learning emphasises the importance of collaboration in solving problems (Sunardi, 2016).

However, when viewed from the lessons learned in vocational study programs at university, they have not tried to make a breakthrough in learning to provide learning experiences that enhance the real learning experience brought in lectures. The lectures conducted in the vocational study program are still conducted separately between vocational study programs so that students cannot see the synergy between the subjects studied from other study programs. Furthermore, when viewed from the real situation of the workforce they must be able to collaborate with colleagues, be able to solve problems together, and be able to discuss and communicate their ideas to colleagues who are not only from their fields (Mejerytè-

Narkevičienė, 2018). So that if the lectures are not conducted comprehensively with collaboration, it will be very difficult to provide these skills to students, as a result they will be less prepared to face the rapid changes in the world of work.

Responding to this matter, it is necessary to break through the implementation of lectures, especially in vocational education, by trying to implement a new learning model. One of the learning models that will be developed in this study is the Interdisciplinary Thematic Learning (INTEL) Model, which is developing an integrated Thematic Instruction learning model. Experts say that integrated thematic learning can improve learning outcomes/academic achievement (Henderson & Landesman, 1995; Soddart et al., 2002; Witt & Ulmer, 2010; Rustaman, 2015; John, 2015; Chumdari et al, 2018). In addition, the results of many studies prove that thematic learning can improve students' soft skills (Kovalik, 2014; Rusman, 2012; Fadillah, 2014; Ministry Education Order number 81a, 2013). However, so far the Integration Thematic Instruction (ITI) model has only been examined at the K-12 level, and has not tried to apply it at the higher education level, especially vocational education, which requires an increase in soft and hard skills compared to other levels of education.

With this research, it is expected to provide real experience in the world of work brought into lectures, so that it will influence the improvement of 4C (collaborative, communication, creativity, and technical thinking) skills of vocational students in the university. Therefore, a learning model can be used collaboratively from other vocational study programs at university, thus students will be able to compete in the tight working world that increasingly demands high soft skills in addition to hard skills.

LITERATURE REVIEW

Integrated Thematic Learning

Planning is the initial activity before the implementation of an activity program, and basically planning is a framework of thinking about what is to be achieved, how to achieve it and what and how many facilities are needed. Planning can be also said to be a decision-making process about alternative activities to be carried out in achieving a predetermined goal.

According to Susana (2016) planning is a systematic process in making decisions about actions to be taken in the future. It is called systematic because it is done by using certain principles including, decision making processes, use of knowledge, scientific techniques, and organised activities. With the planning, a program will be implemented and controlled properly, because the planning determines goals, methods, etc. that can support the process of implementing a program.

Integrated thematic learning model has an understanding (MoEC, 2016): (a) Integrated thematic learning is carried out with the principle of integration which uses the theme of unifying; (b) Learning activities combine basic competencies from several lesson contents at once in one face; (c) Integrated thematic learning is useful in providing a meaningful experience for students, because when students understand various concepts, which can be through direct experience and can connect with other concepts that have been mastered before; and (d) Integrated Thematic based on a combination of integration processes.

Integrated learning model developed by Forgaty (1994), namely (1) the fragmented mode 1 (separate models); (2) the connected model (connected model); (3) the nested model (nested model); (4) the sequenced model (ordered model); (5) the shared model (divided model); (6) the webbed model (model of spider webs); (7) the threaded model (the model is infiltrated); (8) the integrated model (integrated model); (9) the immersed model; and (10) the networked model (network model).

There are several thematic learning goals according to the Ministry of Education and Culture (2016), including: (a) Easily focusing on one particular theme or topic. (b) Study knowledge and developing various subject competencies in the same theme. (c) Having an understanding of the subject matter more deeply and impressively. (d) Developing better language competencies by linking various other subjects with the personal experience of students. (e) Being more passionate about learning because they can communicate in real situations, such as: telling stories, asking questions, writing while learning other lessons. (f) Feeling the benefits more and understanding the meaning of learning, because the material presented in the context of the theme is clear. (g) The teacher can save time, because the subjects presented in an integrated manner can be prepared at once and given in 2 or 3 meetings or



even more for enrichment. and (h) character and morals of students can be developed by raising a number of values according to the situation and conditions.

Unlike conventional learning, thematic learning has the following characteristics: (1) Child-centred; (2) Students actively find out and are not told; (3) Provide direct experience; (4) Flexible; (5) Presents concepts from several subjects in one learning process; (6) Emphasises the application of the concept of learning by doing something (learning by doing) where teachers are expected to be able to plan meaningful learning experiences; and (7) Learning outcomes can be developed according to the interests and needs of the children (MoEC, 2016).

Forgaty (1994) provided an example of integrated thematic learning that is applied to learning, which is the webbed model and the integrated model.

1. The Integrated Model (Integrated Model)

The integrated model combines various fields of study based on overlapping skills, concepts, and attitudes. Integrated model learning is designed based on one activity carried out to achieve various basic competencies from various disciplines of science. The Integrated Model can be described as follows (Figure 1):

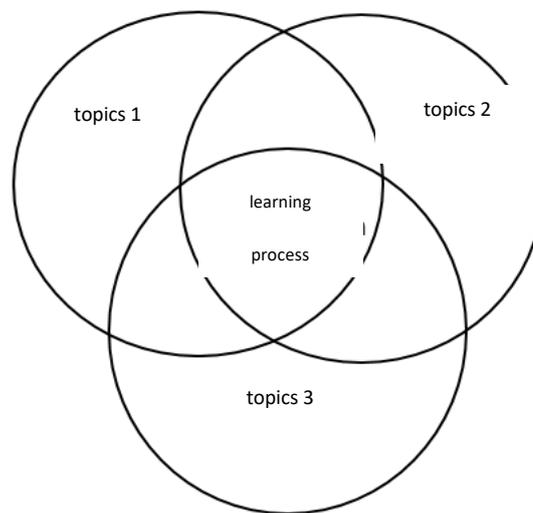


Figure 1. integrated model combines.

2. The Webbed Model

The spider web model is developed by determining themes or topics as hooks of competencies in various subjects. Themes can be determined based on needs or through negotiations between teacher and students. Themes are chosen from things that are close to students. The model of spider web can be described as follows (Figure 2):

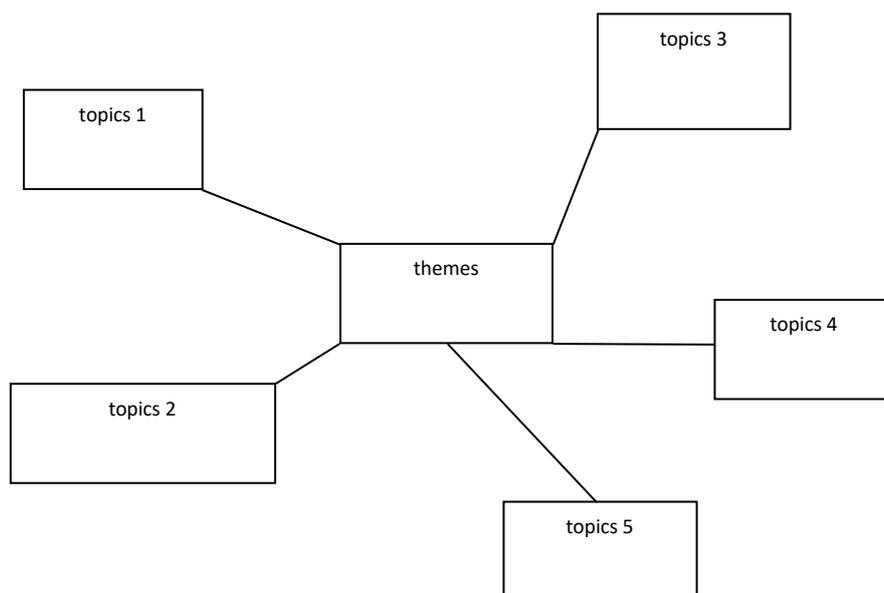


Figure 2. The spider web model.

Planning Integrated Thematic Learning

The Ministry of Education and Culture (2016) explains the steps in designing integrated thematic learning.

1. Determine Themes in One Academic Year

Integrated Thematic Learning is carried out using the principle of integrated learning. Integrated learning uses a theme as a unifying learning activity that combines several subjects at once in one face, to provide a meaningful experience for students. Because students are understanding the various concepts they learn and this is always through direct experience, and connecting them with other concepts they have mastered. The implementation of Integrated Thematic learning begins with a theme that has been chosen/developed by the teacher that fits the needs of students. When compared to conventional learning, thematic learning seems to place more emphasis on the theme as a unifying various subject, that takes precedence over the meaning of learning, and the relevance of various concepts of subjects. The involvement of students in learning is prioritised, and learning that aims to activate students, provides direct experience and there does not appear to be a separation between subjects. Determining themes in one school year is the first step in designing thematic learning. Themes can be set by policy makers, teachers, or set together with students.

2. Formulate indicators for each basic competency of each subject

Before basic competencies are mapped in each theme within a school year, these basic competencies need to be detailed in advance in the form of indicators. Indicators are formulated from basic competencies, in aspects of knowledge and skills. Formulation of indicators is based on keywords in basic competencies and appropriate operational verbs.

3. Mapping basic competencies of all subjects in one school year

4. Creating a theme network of all subjects

5. Sharing theme networks becoming a sub-theme

6. Dividing the sub-theme network into a daily network (daily activity plan)



7. Preparing learning material

8. Assessment of Achievement of Competence

The concept of valuation refers to assessment for learning for assessment, assessment as learning, and assessment of learning. Assessment for learning is an assessment to encourage the achievement of student competencies; assessment as learning stimulates, and assessment of learning measures student competency achievement.

RESEARCH METHODS AND DEVELOPMENT

Research on the Development of The Interdisciplinary Thematic Learning (INTEL) Model in Vocational Education uses research and development. The purpose of this research is to develop an interdisciplinary thematic learning model that can be used in vocational education college. The research and development model used is the Dick and Carey approach which is aligned with the ADDIE model. Briefly, the following explanation of the Dick & Carey and ADDIE Research Model phases in this study are: (1) The needs and objectives analysis, (2) Conducting Instructional Analysis, (3) Learners and Contexts Analysis, (4) Formulate Performance Objectives, (5) Develop Instruments, and (6) Develop Instructional Strategies.

The next steps are, namely: (7) Developing and Selecting Instructional Materials, (8) Designing and Conducting Formative Evaluation of Instruction, (9) Designing and Implementing Summative Evaluation, and (10) Conducting Instructional Revisions. The research on the development of this integrated thematic learning model was carried out at the Faculty of Engineering, State University of Malang, in the period January to April 2019.

The subject of this research is the INTEL model that was developed with integration from three vocational college study programs (mechanical engineering, electrical engineering, and culinary technology) with thirty college students and three lecturers. The instrument design was conducted by developing a questionnaire. Validating the instrument to see the contents validity was conducted by six evaluation experts.

FINDING AND DISCUSSION

The results of the development of integrated thematic learning with sequence steps as follows (see Figure 3): 1) Analysis of basic competencies (KD) by synchronising between subjects, 2) Analysis of indicators, 3) Analysis of technology requirements 4.0, 4) Determination of themes, 5) Making nets theme, 6) Compiling syllabus, 7) Designing lesson plans, and 8) implementing learning (Ulmer, 2010; Rustaman, 2015).

The KD analysis is carried out to obtain a comprehensive and complete picture of all competency standards, basic competencies, and indicators of the various subjects that will be integrated into the themes made. There were two events in conducting the mapping, namely (1) studying core competencies and basic competencies contained in each subject, followed by identifying basic competencies that were integrated, and (2) first determining the integration themes, followed by identifying KD from the lectures that match the theme.

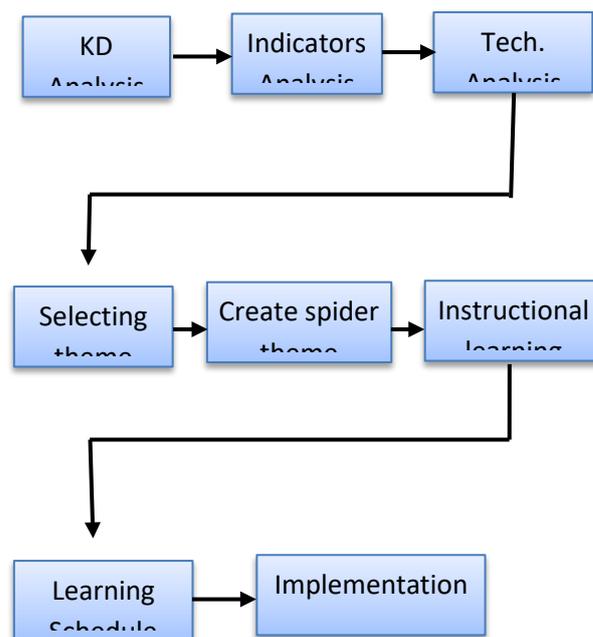


Figure 3. Integrated thematic learning scheme

Based on Figure 3, in determining the theme, consideration must be given to conceptual thinking, the development of skills and attitudes of students, learning resources, measurable learning outcomes, continuity of themes, and adaptation to the needs of students. For this reason, the chosen theme must be related to other concepts (Rusman, 2012). Other than that,

the theme should be known or familiar so that students can easily understand the concept of the theme presented, and the theme must allow for exploration of real events.

The last thing that needs to be emphasised is the implementation of learning development. Learning activities are designed to provide learning experiences that involve mental and physical processes through interaction between students, educators, the environment, and learning resources (Andrian et al., 2018). Some things that need to be considered in the selection of learning activities, such as: (1) provide opportunities for students to find, process, and find their own knowledge under the guidance of educators (Ila & Winitkun, 2017); (2) have distinctive characteristics in developing theme abilities; (3) adapt to the abilities of students, learning resources, and available facilities; (4) vary by combining individual or group activities; and (5) pay attention to individual abilities such as talents of interest, background, and various problems that may be faced by students (Ulmer, 2010: Fadilah, 2014).

CONCLUSION

From this research, it can be concluded that the three main aspects in the development of integrated thematic learning are in accordance with Indonesian characters, namely: 1) the first aspects related to curriculum adjustments used, national character, integration of thematic learning with the source of teaching materials, development of syllabus and lesson plans, and the condition of the learning environment to increase the potential of the character of education; 2) learning activities that exist in integrated thematic learning, including: learning objectives, teaching materials, methods, learning activities (appraisal, delivery of material, giving questions, concluding, discussion, closing), learning media, and evaluation; and 3) expected learning outcomes including increasing students' hard skills and soft skills.

Integrated thematic learning model is very suitable for use in learning that emphasises new discoveries (inquiry learning) and the themes given - there are students who must be able to solve problems in accordance with the era. Thus, students will feel challenged and can provide flexibility to explore the skills they have.



In addition, lecturers as educators must be more sensitive to see technological developments in the present era, to find inspiration for new themes that are used as a means of directing students to improve the competencies they need in the world of work.



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