

INTEGRATION OF 21ST CENTURY SKILLS AS EFFORTS TO DEVELOP “JUPE DITATA” CHARACTER OF BIOTECHNOLOGY SUBJECT

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Abstract

Integration is mixing up into a unified whole or round. Facing the era of 21st century learning is always dynamic quality improvement by integrating demands according to the times and needs to be done to develop the skills needed to face the teacher candidates, for example, the skills of the 21st century. Variety of 21st century skills are honed behaviors critical thinking, collaboration, effective, entrepreneurship, good communication, mastery of advanced electronic information and inquisitive attitude needs to be cultivated in the face of the demands of a globalized world. In addition, no less important to cultivate character behaviors, namely: honest (JUjur), the matter (Peduli), discipline (DIsiplin), obedient the rules (TAat pada aturan), and responsibility (TANGgung jawab) known by the acronym “Jupe Ditata”. This goal research to describe a model integrating 21st century skills in an effort to cultivate behavior laid out in the lecture biotechnology. This study uses the instructional design cycle includes the phases of analysis, planning, design, development, implementation, and evaluation and revision of each phase. The subjects were students of science education program of Surabaya in the biotechnology courses even semester academic year 2014/2015. Description research data integration models in the RPS (lesson plan) and the enforceability of the lecture on the material the food Biotechnology until Industrial biotechnology. Data was analyzed using descriptive analysis. The results of this research can be concluded that the behavior of the lecture biotechnology can be trained critical thinking, collaboration, entrepreneur, communication, and control of advanced electronic information with the values Jupe Ditata characters and can be implemented of biotechnology subject.

Key words: Biotechnology, Jupe Ditata Characters, 21st Century Skills

INTRODUCTION

Advances in science and modern technology in the early 21st century, is inseparable from the role of science as the basic science underlying technological inventions. Applications science concepts from simple to complex used in everyday life. Technology issues and analysis of natural systems are basically using the principles of IPA (Rosana, 2012: 18). Therefore, science can be said to have a very large role in the civilization of human life. Nur (2012: 1), states that in order for the individual, both as individual and society, to effectively benefit from these changes, the individual needs to have competence in 5 main skills, namely: (1) adaptability; (2) complex communication skills; (3) problem solving skills; (4) self-management and self-development; and (5) systems thinking. Accordingly Rosana, (2012: 18) states that skills need to be developed in science education in facing the challenges of the 21st century, namely: (1) related to information and communication skills; (2) the skills to think and solve problems; and (3) interpersonal skills and self-management skills.

The purpose of education is not master the subject matter, but look for life provision in

order to be successful. Problem-solving skills wisely and creatively (Samani, 2014: 5). How do we educate our students so that they can prepare themselves for a successful life in the 21st century full of challenges? How do we prepare them to live century information? How to empower them to be able to use the knowledge and skills that have been held in the past by using today's technology to discover new things in the future? Rosana (2012: 36) states that science education should be directed to be able to achieve the challenges of the 21st century, through learning to develop something more than just knowledge and leads to higher order thinking skills. To that end, the importance of the learning process that emphasizes on: making meaningful connection, constructivism, inquiry, critical and creative thinking, learning community, and using authentic assessment.

Science education courses with a vision to excel in science education, with one of the descriptions of the vision to excel in the quality of graduates (character, environmentally sound, and entrepreneurial). In line with this vision, the construction of urgency character has a very broad and multidimensional. According to the National Policy Document National Character Development Plan 2011-2025 states Character education is a conscious and deliberate effort to create an atmosphere as well as the process of empowering and developing learners to build personal character and / or a unique group-either as a citizen.

The concept of a difficult character education is defined only by using one or two sentences. The concept of the character education will become more apparent when described by presenting documents related to character education. According to the National Policy Document National Character Development Character years 2010-2025 are typical values-good (to know the value of kindness, would do good, real good lives, and a good impact on the environment) which is inscribed inside and translated into behavior). Arranged Jupe character is a modification of the Six Pillar of Character & 49 Character Qualities that include characters that are developed Josephson Institute. Six pillars to these characters, consisting of: (1) Trustworthy, (2) Respect, (3) Responsibility, (4) Honesty, (5) Caring, and (6) Citizenship. From that, the value identificate into 5 grades dominant character that needs to be in Rehearse in biotechnology lectures, namely: (1) honest, (2) caring, (3) discipline, (4) obey the rules, and (5) responsibility known by the acronym "Jupe Ditata".

According Permendikbud Number 49 Year 2014 on the National Standards for Higher Education (SNPT) Article 5 of Competency Standards (SKL) is the minimum academic qualification criteria include attitudes, knowledge, and skills in the form of learning outcomes. Attitude in this context is correct and cultured behavior as a result of the internalization and actualization of values and norms that are reflected in the spiritual and social life through the process of learning, students work experience, research and / or community service learning associated with the dominant attitude "Jupe Ditata". The acquisition of knowledge is a matter related to the material Assessment Biotechnology Food Biotechnology, Biotechnology fermentation, and the Biotechnology Industry. Skills are trained in the context of this study, namely: (1) related to information and communication skills; (2) the skills to think and solve problems; and (3) interpersonal skills and self-management skills.

This study is in line Presidential Regulation No. 8 of 2012 on the National Qualifications Framework Indonesia, referred KKNi, is a hierarchy framework that can reconcile the competence and qualifications, equalize, and integrate the fields of education and job training and work experience in working order granting recognition of competence in accordance with the structure of employment in various sectors. Rosana, Dadan, et al (2013: 1-2) states THAT Descriptors tbsp qualification level 6 on KKNi generated by science education courses S1 generic description level 6 (first paragraph) which states "capable of utilizing science and technology in the field of expertise and are able to adapt to the situation encountered in solving the problem. To that end, it is important to prepare prospective physical education teacher who is able to face the demands of 21st century teaching and learning.

In general formulation of the problem of this research is: how is the process and the results

of the integration of 21st Century Skills For Behavior Cultivating Effort Jupe Ditata In Biotechnology Class. The purpose of this study, namely: describe the process and results of the integration of 21st Century Skills For Behavior Cultivating Effort Jupe Ditata In Biotechnology Class in the form of Learning Instructional products Lesson Plan for Semester (RPS).

RESEARCH METHOD

This research was aimed at developing research for the products with lesson plan. Development models used in this study is a model of instructional development cycle developed by Fenrich (1997: 56). The steps of the model visualized in Figure 1 below.

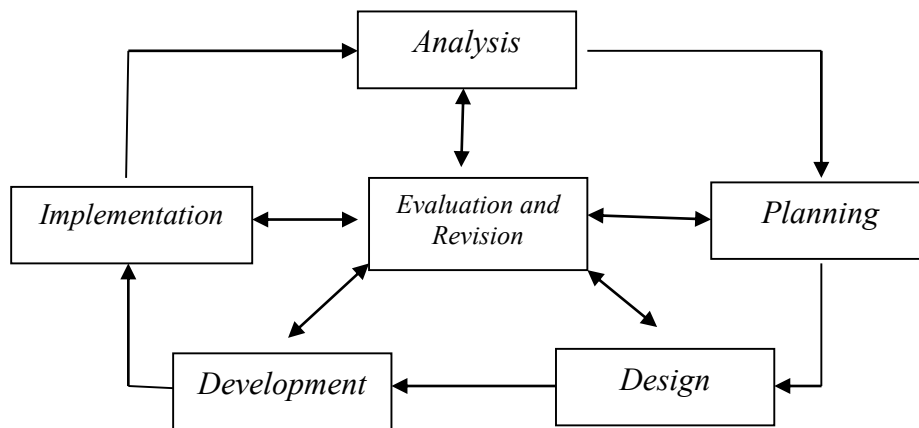


Figure 1
Model of Instructional Development Cycle
(Fenrich, 1997: 56)

These include instructional development cycle phases: analysis, planning, design, development, implementation, as well as evaluation and revision (Fenrich, 1997: 56). Step on the evaluation and revision phase is ongoing activities performed in each phase along the development cycle. Each phase is a checkpoint. Evaluation and revision for every phase, then obtained approval to continue the next phase. Instructional development cycle in Figure 2 can be broken down into phases of instructional development process as shown in Figure 2.

This research was conducted in the IPA Education Studies Program, State University of Surabaya (Unesa). These cities are intentionally (purposive) based on the consideration that the researchers acted as a lecturer on the course. The timing of the study is in the academic year 2014/2015. The subjects were students of the science education program biotechnology class B in Even Semester Academic Year 2014/2015 as many as 40 people. Data used in this study are primary data. The tools used in this study were a questionnaire. Descriptive analysis to describe the process and results of the integration and student responses related integration of 21st century skills as a character to train Jupe Ditata.

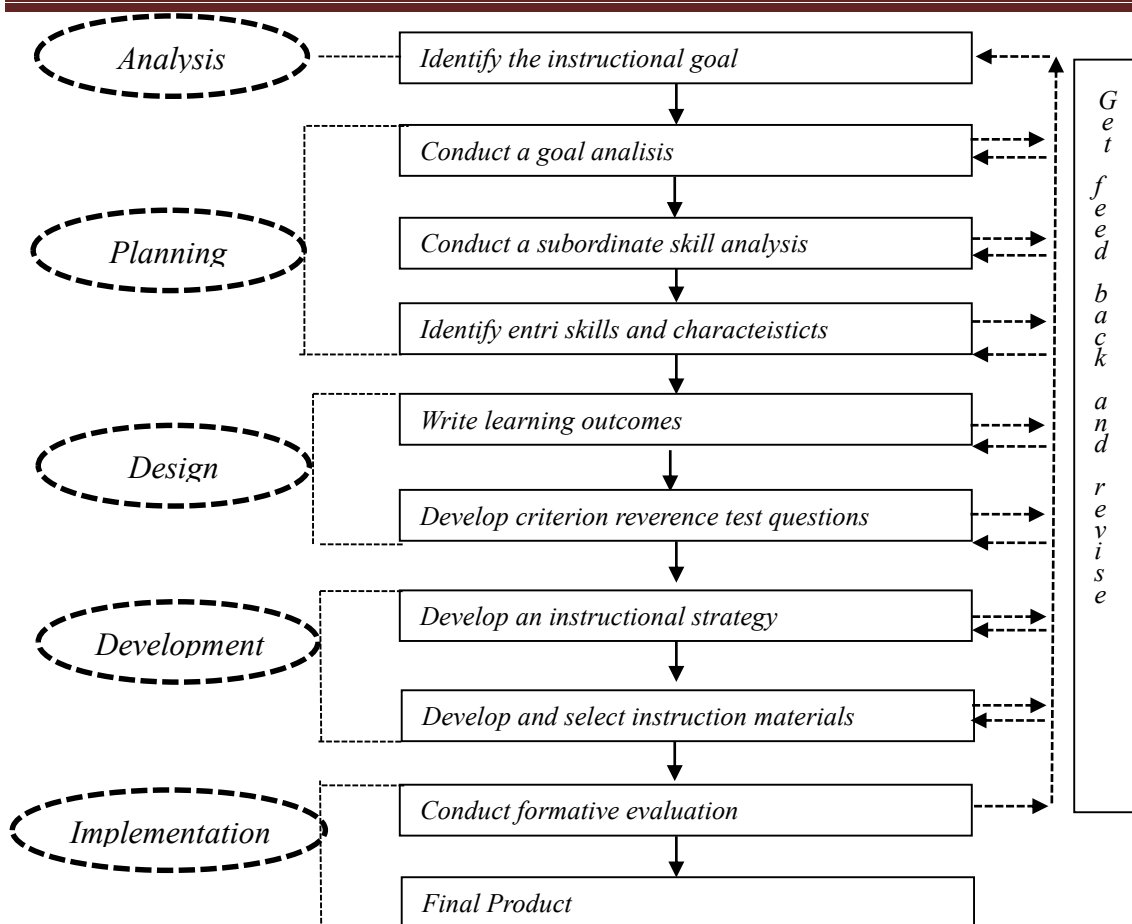


Figure 2
Steps Instructional Design Process
 (adapted from Fenrich, 1997: 65)

RESULT OF THE RESEARCH AND DISCUSSION

The results of the study with reference to the stage of development of instructional development Fenrich (1997), which includes five phases, namely: (1) the phase of analysis, (2) the planning phase, (3) the design phase, (4) phases of development, and (5) Implementation is described as follows.

Analysis Phase

The analysis phase is done sub-activities, namely identifying common learning goals of the project (identify the instructional goal). In the analysis phase of the analysis related to Law No. 12 of 2012, the National Science Teachers Association (NSTA), Indonesian National Qualifications Framework (KKNI) and 21st Century Skills Form General Purpose Learning. Law No. 12 of 2012 on Higher Education Article 18, states that the Bachelor is an academic education that prepares students to be intellectually and / or scientists cultured, able to enter and / or setting up employment, as well as be able to develop themselves professionally. This means that the development of S1 college curriculum should refer to the requirements contained in the article. In order to be a good candidate for a science teacher at the National Science Teachers Association (NSTA) (2012: 1-3) set a standard 6 for the preparation of science teachers, namely: (1) understanding of the content (content knowledge), (2) understanding of the content (content pedagogy) , (3) learning environments (learning environments), (4) safety (safety), (5) the impact on student learning (impact on student learning), and (6) have the understanding and skills in a

professional manner (professional knowledge and skills).

Results meeting Studies Program S1 Science Education Workforce Education Institutions (LPTK) in Indonesia on June 9, 2012 in Yogyakarta, has agreed qualification descriptors Human Resources (HR) KKNI oriented 6th level for S1 Education Science, namely: (1) utilizing science and technology in the field of expertise and be able to adapt to the situation at hand in the resolution of problems; (2) control of profound theoretical concepts in the field of science and science education, as well as to formulate procedural problem solving; (3) is able to take strategic decisions based on analysis of information and data, and provide guidance in selecting a variety of alternative solutions; and (4) are responsible for their own work and can be given responsibility for the achievement of the organization's work.

Tastes change society in the era of globalization and information technology is also quickly changes. If in the past, most people simply demand that public educational institutions to produce graduates general science. According to Gallagher, (2012: 1-2) in the document Partnership for 21st Century Skills formulate 21st century skills into three general skills, namely: 1) skills related to information and communication; 2) the skills to think and solve problems; and 3) interpersonal skills and self-management skills.

Based on the above analysis and the characteristics of biotechnology materials for high education level then identify the instructional goals are students able to study and development of reasoning about the principles of biotechnology include food biotechnology, fermentation biotechnology, industrial biotechnology, genetic engineering, primary metabolites, secondary metabolites, and tissue culture by integrating entrepreneurial perspective (2014: 107-108). From the planning phase to proceed.

Planning Phase

Details of the activities in this planning phase 3 sub-activities, namely: (1) conduct a goal analysis; (2) conduct a subordinate skills analysis; and (3) identify entry skills and characteristics.

Results of conduct a goal analysis generates Competence Description biotechnology lecture as follows: (1) Make use of instructional media learning resources and ICT to explore the data, gather information, and problem resolution to support the implementation of learning; (2) Mastering the theoretical concept of the principles of biotechnology field include the theory and practice in depth and formulate the procedural problem solving; (3) Ability to make decisions based on analysis of information and data as well as provide guidance in choosing alternative solutions; and (4) Responsible for informing the results of the analysis of data and information both orally (presentation) and writing (scientific article) or Poster.

Table 1
Results of Analysis Subordinate Skills

Aspect	<i>Subordinate Skill Analysis</i>
Attitude	Shows the attitude (1) fairness (JUjur), (2) caring (Peduli), (3) discipline (DIsiplin), (4) obedient the rules (TAat pada aturan), and (5) responsibility (TAnggung jawab)
Knowledge	Finding the idea of reading, discussion, checking themselves and communicate the results of the discussion on ICT media on food biotechnology study materials, biotechnology fermentation and biotechnology industries.
Skills	(1) Information and communication skills; (2) thinking and solving problems; and (3) interpersonal and self regulatuion skills.

Table 2
Results of Analysis of Characteristics and Skills Taught

<i>Subordinate skill analysis</i>	<i>Identify entri skills and characteistics/ Indikator</i>
Attitude	
Honest	be honest; don't deceive; cheat; or steal; be reliable; do what you say you'll do; build a good reputation; truthfulness; be loyal- stand by your family & friends and country.
Caring	be kind; be compassionate and show you care; express gratitude; forgive others; availability & help people in need
Discipline	on time; loyalty; boldness; decisiveness; have the courage to do the right thing; & be self-disciplined.
Obedient the rules	play by the rules; take turns and share; be open-minded; listen to others; don't take advantage of others; & don't blame others carelessly.
Responsibility	do what you are supposed to do; persevere; keep on trying!; always do your best; use self-control; & think before you act- consider the consequences
Knowledge	
Finding reading idea, discussion, self checking, and communicate result discussion by ICT media in food biotechnology, fermentation biotechnology, and industries biotechnology.	Explain the meaning of biotechnology.
	Describe the underlying principles of biotechnology.
	Review the development of biotechnology.
	Distinguish between conventional and modern biotechnology.
	Describe the impact of the application of biotechnology.
	Explain the meaning of food biotechnology.
	Communicate factor of the (intrinsic) that influence the development of microorganisms in food.
	Communicate to external factors (extrinsic) that influence the development of microorganisms in food.
	Identify food preservation.
	Communicate the sense of fermentation.
	Describe the process of fermentation.
	Identify fermentation media.
	Describe the basic process of fermentation.
	Provide examples of microbial fermentation technology and products result.
Explain the meaning of the biotechnology industry.	
Communicate the context of the development of the biotechnology industry in Indonesia.	
Communicate the business potential of biotechnology industry (food) in Indonesia.	
Exemplifies the plan in marketing industrial biotechnology.	
Skills	
Information and communication skills	Skills to create a poster.
	Skills of searching on the Internet.
	Berkomunikasidengan skills using technology.
Thinking and problem solving	Critical thinking.
	Creative thinking.

Subordinate skill analysis	Identify entri skills and characteisticts/ Indikator
skills	Problem solving.
	Decision making.
Self Regulation and interpersonal skills.	Cooperation skills in
	Teams for complex tasks in an efficient, effective, and fast.
	The skills to design, manage, and anticipating something happening simultaneously.
	The skills to identify and react autonomously to changing conditions,

Modified from the Six Pillar of Character & 49 Character Qualities

Design Phase

Details of the activities in this design phase 2 sub-activities, namely: (1) write learning outcomes; and (2) criterion develop Reverence test.

Results sub-activity is write learning outcomes. Graduation of S1, qualifying is at 6th level. At this level, learning outcomes, are required to: (1) are able to apply their areas of expertise and utilize science and technology in the field in solving problems, and be able to adapt to the situation at hand, (2) control of theoretical concepts in depth knowledge of the field and be able to formulate procedural problem solving, (3) is able to make the right decisions based on analysis of information and data, and is able to provide guidance in selecting a variety of alternative solutions independently and groups, and (4) are responsible for their own work and can be held accountable for the achievement of the work organization (Jatmiko et al, 2014: 1-2). The achievement of this study has been showing 6th level of KKNI.

Results of sub-activities are developing assessment criteria. The results of this phase of the product in the form of assessment sheet that was developed with reference to the indicators that have been set in advance, include: (1) The Assessment attitude (in the form of a test sheet Reviewing attitudes and self-observation, (2) Sheet Knowledge assessment (multiple choice and essay), and (3) sheet and its skills assessment rubric.

Development Phase

Meanwhile, the activity carried out in the development phase is two sub-activities, namely: (1) develop a strategy/learning model; and (2) selecting and developing teaching materials package. Strategies/learning model in the form of an assignment is writing a paper, referring to biotecnopreneurship modules and materials from the Internet. Selecting and developing instruction materials in the form of Internet resources for student accordance with the demands of the 21st century pillars, namely Mastery and komunikasai information technology and life skills and skills carrier. Biotecnopreneurship book is a teaching materials developed in cooperation with the Institute of Agriculture (IPB) .sil sub activities develop assessment criteria. The results of this phase of the product in the form of assessment sheet that was developed with reference to the indicators that have been set in advance, include: (1) The Assessment attitude, (2) Sheet Knowledge assessment (multiple choice and essays), and (3) sheet and its assesment rubric skills.

Implementation Phase

This phase includes two phases for large events, namely trialed on a limited scale in science education study program to see the feasibility and constraints. In obtaining relevant data of lecture implementation, field constraints, and suggestions for improvements are reflected from the data presented student questionnaire responses as follows.

Response college students about the competence of the candidate to support biotechnology science teacher respondents said "yes" as many as 39 (97%) of people and not as much as 1 (3%) people. Some reasons include: the development of science, foster creativity, the material appears in the SMP, and many related practicum daily. The states are not the only reason to focus on biotechnology materials simple.

Response college students about the competence of the candidate to support biotechnology research respondents said "yes" as many as 40 (100%). Some reasons include: new innovation, proposal generation PKM-P, solving environmental problems, and make scientific articles.

Response college students about the competence of prospective employers to support biotechnology respondents said "yes" as many as 39 (97%) of people and not as much as 1 (3%) people. Several reasons were agreed are: the results of research associated with the business/ sale, use of waste, entrepreneurship thinking, seeing business opportunities, make food/ drink with the help of microorganisms. While the states are not the reason the material presented merely a theory about the marketing of products that are less meaningful. The student response habituation related Arranged Jupe attitude are presented in the following table.

Table 3
Results of Analysis of student responses related to habituation attitude Jupe

No	Attitude	<i>Student Attitude</i>
1.	Honest	Create reports furnished documents such as photos, fill in the data according to the results, do not manipulate the data, honest exam time
2.	Caring	Share duty, waste utilization, working teams.
3.	Discipline	Collection of tasks on time, arrived on time.
4.	Obedient the rules	Using the agreed rules of writing, raise their hands to answer and ask, lectures according to RPS, making articles by Formad PKM AI
5.	Responsibility	The task is done, the collection of duties, attendance attendance

Problems were encountered, namely: the difficulty of coordinating the team, the number of tasks, time-consuming, difficult material obtained, the lack of assistance, lack of laboratory facilities, the lack of discussion of modern biotechnology, the time of day. Some suggestions for improvements are recommended, namely: memeperhatikan time, research assistance, research materials provided, additional time to 3 credits, at present competent speakers from outside of biotechnology, research variation, (eg tempeh, tape, yogurt, etc.), time morning lectures, the visit of the industry.

CONCLUSION AND SUGGESTION

Conclusion

The conclusions of this study are: integrating diverse skills of the 21st century consists of 3 general skills, namely: (1) related to information and communication skills; (2) the skills to think and solve problems; and (3) interpersonal skills and self-management skills were honed skills can get used to the behavior of critical thinking, collaboration, effective, initiative, kewirausahaan, good communication, mastery of advanced electronic information, and questioning attitude as an attempt to cultivate honest character (JUjur), the matter (Peduli), discipline (DISiplin), obedient the rules (TAat pada aturan), and responsibility (TAnggung jawab) through biotechnology lectures.

Suggestion

Based on the findings and conclusions of research results above, it can be recommended

by the researchers are learning in science education courses in the subject of particular activities should be based. In order for student activities directed, it is necessary to develop a more operational student worksheet in conducting research. The student still must be guided intensively for doing research with time-plus. In addition, it is necessary variation of activities, such as visits industries.

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