Project based learning model with scientific approach, implementation of children's education of nation to facing the golden generation era

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Abstract: What is the project-based learning model? The project-based learning model is a learning model that uses the project (activity) as the core of learning. In this activity, students conduct exploration, assessment, interpretation, and synthesis of information to obtain various learning outcomes including knowledge, skills, and attitude. Currently learning in schools is still more focused on learning outcomes in the form of knowledge (knowledge) alone. It is very superficial, only up to the level of memory (C1) and understanding (C2) and has not been much touched on aspects of application (C3), analysis (C4), synthesis (C5), and evaluation (C6). This means that in general, learning in schools has not invited students to apply; to process every element of the concept learned to make (synthesis) generalisasi, and has not invited students to think critically on the concepts and principles that have been studied. In facing the global era and creating strong cadres of young generation cadres, educational institutions are expected to fulfill future conditions that fulfill educational qualifications such as curriculum, facilities and infrastructure, learning methods, quality of teaching staff, and management of educational institutions.

1. Introduction

According to population data, in the period 2015-2045, the pyramid of the Indonesian population will be ideal with the majority population aged 20-45 years or productive age. The year 2045 is thought to be the peak time of Indonesia's population productivity, where the current age of elementary and early childhood students who dominate the population in this country reaches its productive age. In other words, starting in 2045, Indonesia has a demographic human resource bonus which is often referred to as the Demographic Bonus.

The Demographic Bonus is expected to be a capital for the Indonesian country so that the current generation is the golden generation in 2045 which is a brilliant generation, potential, productive, literate, competent, characterized, and competitive. One of the most crucial efforts to realize the Demographic Bonus into a golden generation in 2045 is through education. Even though, the current situation is still far from excellent, but the motivation to move forward should always remain strong. Opening the gate of education for all is the only way to go to build the nation’s human resources [1].

The Law of the Republic of Indonesia Number 20 of 2003 concerning the National Education System Article 1 paragraph (1) states that education is a conscious and planned effort to realize a learning atmosphere and a meaningful learning process, so that students actively develop their potential [2]. Through education, the students' self-potential according to their nature is developed based on their
foundation through planned learning so that they can live properly with the surrounding communities including the world community. Skills that must be possessed by future generations in order to live properly in the world community in the 21st century, consisting of 16 skills categorized into three broad categories, namely foundational literacies, more competencies, known as 21st Century Competence, and character quality. The basic literacy ability category consists of six literacy skills, namely language and literacy, numerical, scientific, financial, information and communication literacy, as well as culture and citizenship. 21st Century competency category consists of four skills (4C), namely critical thinking and problem solving, creative thinking and innovation, communication, and collaboration.

Meanwhile, the character quality category consists of six skills, namely curiosity, initiative, never give up, adaptation, leadership, and socio-cultural [3]. 21st Century skills must be developed early on in students through education, so that in the productive age they can be creative, innovative creating a business for themselves and others that can create jobs, so that in the era of globalization and welcome the golden era with competition the strict is not and a problem 21st century skills will grow and develop in the prospective golden generation in 2045 through 21st century skills education. Three concepts of 21st century skills education have been adapted by the Ministry of Education and Culture of the Republic of Indonesia through the 2013 curriculum for elementary schools, junior high schools, high schools consisting of 21st Century Skills [4], scientific approach [5] and authentic assessment [6]. The three concepts were adapted to develop education towards the Creative Indonesia Gold in 2045 which was carried out to achieve the conformity of concepts with the capacity of students and the competence of educators and education personnel, so that the learning process can be carried out to develop 21st century skills in students.

2. Methods
Conceptual research method about Project-Based Learning Model with Scientific Approach, Implementation of National Children's Education to Face the Golden Age Era. By interpreting the Impact of the generation of gold, Project Based Learning Model with Scientific Approach, PjBL Implementation Research, The Cognitive Level, and Effectiveness Of Cognitive Education

3. Result and Discussion
3.1 Impact of the generation of gold
If the government policies are appropriate and well implemented, the Golden Generation of Indonesia will be a helper to the deterioration of the Indonesian nation in all fields, both economic, social, education, and others. And Indonesia will release its dependence on professionals from abroad if this bonus demographic can really be directed and utilized by the government. Like the countries of Japan and South Korea that have worked well with the generation of gold as a result of the bonus demographics that have caused these two countries to become very calculated countries in the world. And what about the concept of the golden generation? We need to first know so that we understand, so that when this book is read, it will be well understood and right. There are two meanings about the generation of gold. First, the golden generation is related to the condition of the Indonesian generation towards the age of the 100th Indonesian nation in 2045. The second is the generation of gold in the words. This second part will be discussed later. The process of education development must be a conscious effort from the government, society and family that must be carried out continuously so that the country, especially Indonesia, is able to proactively respond to these symptoms. Besides that, in facing the global era and creating strong cadres of young generation cadres, educational institutions are expected to fulfill future conditions that fulfill educational qualifications such as curriculum, facilities and infrastructure, learning methods, quality of teaching staff, and management of educational institutions

3.2 Project Based Learning Model With Scientific Approach
Steps of a scientific approach → Steps of project based learning
1. Observing → Start with the Essential question
2. Asking question → Design a plan for the project
3. Reasoning → Create a schedule
4. Attempting → Monitor the student and the progress of the project
5. Presenting → Assess the outcome and evaluate the experience

On the contrary, the activities in questioning and associating phase were less effective [7]. Meanwhile, compared with the research done by Nurohman [8], the writer agreed with the findings on his research. The teaching occurred in scientific approach matched with the steps occurred in project-based learning [8]. Scientific approach led the students to do experimenting to discover a new thing. Project-based learning is as a systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks. It implies that Project-based learning is developed based on authentic problems occurring in real life and it needs serious preparation of tasks. Meanwhile, Stripling, et.al [9], defines Project-based learning as the instructional strategy of empowering learners to pursue content knowledge on their own and demonstrate their new understandings through a variety of presentation modes.

3.3 The Cognitive Level
The Cognitive Level was the sole domain of reference and consists of Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. In view of these, Table 1 summarizes the comparative descriptions of the different typologies reviewed above leaving out the social constructive aspects of learning.

| Content Domain | Gagne | Merrill | Kraiger et al | Bloom |
|----------------|-------|---------|---------------|-------|
| Cognitive      |       |         |               |       |
| Domain         |       |         |               |       |
| Verbal         | Remember verbatim/paraphrased | Cognitive learning | Knowledge (C1) | Comprehension (C2) |
| Intellectual skill | Use a generality | Application (C3) | Analysis (C4) |
| Cognitive strategy | Find a generality | Synthesis (C5) | Evaluation (C6) |

3.4 Effectiveness Of Cognitive Education
So far, there has not been a comprehensive study incorporating or comparing a representative sample of cognitive education programs; therefore, evaluation of the effectiveness of cognitive education must be based on separate evaluative studies of specific programs. Let us look at some characteristics of good educational program evaluation. Evaluation of education programs in general is fiendishly difficult because school-based education involves a large number of uncontrolled and uncontrollable variables. To justify confidence in their conclusions, evaluation of the effectiveness of cognitive education programs should have at least the following characteristics:

a. Random selection and random assignment of classes and subjects
b. Selection of criterion measures that reectspecific goals of program
c. Precise specification of methods (for teachers and replication)
d. Multiple teachers permethod, permitting assessment of teacher effects
e. Relevant comparison, control, or contrast groups
f. Blind testing (examiners unaware of subjects’ treatment group)
g. Multiple assessments (to identify in ection points in change curves)
h. Follow-up assessments (to assess durability of effects)
Few, if any, studies have met all of these requirements. It is especially difficult to achieve random selection and assignment of subjects and classes. One usually must take whole classes rather than select individuals, in which case the strictly correct procedure for data analysis is to treat classes as subjects, that is, \( N \) = number of classes. Comparison across studies is not very meaningful partly because the exact procedures used in the classrooms are rarely specified in sufficient detail to support replication. Teachers might or might not carry out faithfully what they were trained and requested to do, which makes supervision essential for assuring fidelity of treatments. The studies highlighted in this section of the literature review have made use of existing measures and, in some cases, designed their own assessments for evaluation purposes. Scalable, valid, and reliable assessments of cognitive, intrapersonal, and interpersonal competencies are clearly needed.

| Table 2. 21st Century domains and competencies |
|-----------------------------------------------|
| Domains                                       | Example Competencies (Knowledge and Skills) |
| Cognitive Domain: Competencies related to thinking skills, such as reasoning, problem solving, and memory. This domain also includes content knowledge and creativity. | ● Academic Content Skills |
|                                               | ● Critical Thinking |
|                                               | ● Technological Literacy |
|                                               | ● Active Listening |
|                                               | ● Problem Solving |
|                                               | ● Creativity |

Intrapersonal Domain: Affective competencies used to “set and achieve one’s goals” (Pellegrino and Hilton, 2012).

|                                              | ● Self-Regulation |
|                                              | ● Metacognition |
|                                              | ● Grit |
|                                              | ● Flexibility |

Interpersonal Domain: Competencies used to express, interpret, and react to information.

|                                              | ● Communication |
|                                              | ● Collaboration |
|                                              | ● Conflict Resolution |
|                                              | ● Leadership |

These definitions and competency examples were developed from a review of Pellegrino and Hilton’s [10] original definitions as well as Huberman and colleagues [11] recent application of this framework in their evaluation of the Deeper Learning Network.

Research studies on the relationship between PjBL and students’ academic achievement continue to outnumber research studies examining PjBL’s effects on other learning outcomes such as intra and interpersonal competencies [12]. This disparity is likely related to the challenges associated with assessing deeper learning outcomes [10]. Clearly, the development of valid and reliable measures of intra and interpersonal competencies should be a top priority for the PjBL research community. Although the existing body of research on PjBL’s effectiveness does not offer clear conclusions about the efficacy of a PjBL approach, the review of PjBL research on student outcomes has suggested a number of ways to move the research literature forward; these are described in the next and final section of this review.

4. Conclusion
The generation of gold in 2045 is the hope of the future of the Indonesian people. Education is a very central media in preparing a generation of gold, especially its character. Educational processes based on values of honesty, truth and justice are educational processes that humanize humans.

Much has changed in education research, practice, and policy widely cited literature review [12]. PjBL research was needed in light of recent emphasis on mandates like standardized testing, which he believed tended to “move schools in the direction of traditional, teacher-directed instruction” [12]. This
new focus on higher level thinking skills as well as intra- and interpersonal skills aligns well with the goals of a PjBL approach. Additionally, advances in educational technology make information on instructional innovations like PjBL more accessible to teachers, opening up new opportunities for implementation.

Although practitioners and education reform advocates are interested in taking PjBL to scale, the research evidence has not kept up with the increasing interest in PjBL from the field. More rigorous evidence is needed to confirm whether PjBL is a better approach to prepare students for college and career than traditional teacher-directed methods. This review has offered some recommendations for advancing the research agenda in a direction that would help build the evidence needed to decide whether specific PjBL models are ready to be brought to scale.

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