

## **The Role of Inventive Thinking in Winning Science Project Competition in Indonesia**

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### **ABSTRACT**

The report on PISA from 2000 to 2015 showed that Indonesia was below the average of the international PISA scores in science literacy. The 2013 national curriculum has incorporated research and the 21<sup>st</sup> century skills but it was corrected in 2016 due to the lack of readiness of the teachers and the students in adopting the 21<sup>st</sup> century skills. Several studies have reported the lack of science skills of Indonesian students has detrimental effect on Indonesia's ranking in PISA and TIMSS. Hence, science and higher-order thinking skills are important to be taught in schools. Higher-order thinking is a precursor to inventive thinking. The theoretical framework in this study was based on a model of enGauge 21<sup>st</sup> century skills by Burkhardt et al. They proposed six elements of inventive thinking: adaptability, self-direction, curiosity, creativity, risk-taking, and higher-order thinking. The purpose of this study was to identify the inventive thinking of the Indonesian students in the context of science project competition. This study was a quantitative research using a survey method to collect the empirical data. The population in this study was 700 secondary school students who were the 2017 participants of science project competitions in Indonesia. Based on Krijie and Morgan's sample size table, a sample of 250 students was selected by using stratified random sampling. The main instrument used in this study was a set of questionnaires that possessed an overall reliability of 0.97 using Cronbach Alpha index. The key finding of the study showed that the students believed that they possess inventive thinking ( $M = 4.13$ ;  $SD = 0.34$ ) in the context of science project competition. The data from the questionnaires also revealed that inventive thinking is reflected by curiosity, adaptability, risk-taking, creativity, and higher-order thinking. The open-ended items illustrated that in order to win a science competition, these aspects are required: novelty, creativity, adequate science and research facilities, and the end result of the project must have impact on the society. Finally, this study contributed to the new framework of inventive thinking in the context of winning a science project competition.

**Keywords:** Inventive thinking, enGauge 21<sup>st</sup> century skills, science project competition, PISA, Indonesia