

Development and Validation of Scientific Literacy Questionnaire and Technological Literacy Scale for In-Service Science Teachers

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This paper aimed to present a developed and validated instrument to measure the Scientific and Technological Literacy among in-service Science teachers. Items capturing the concept of scientific and technological literacy were developed through literature review, interviews and focus group discussions. The instruments were checked for content validity, tried out, statistically treated for reliability, and then tested in different divisions in Region X, Mindanao, Philippines. The Scientific Literacy questionnaire and Technological Literacy scale were tested by 97 in-service Science teachers through Google forms. Major revisions on the directions, content items and scoring were done based on the results of reliability tests and recommendations of panel of experts: one science education expert (SEE), one chemistry education expert (CEE) and one chemistry content expert (CCE). The Scientific Literacy questionnaire has a Cronbach's alpha of 0.788 which is considered as good. The Scientific Literacy questionnaire was then item analysed for discriminative index. It was then revised and trimmed down from 25 questions to 20 questions. For Technological Literacy Scale, it was trimmed down from 20 questions down to 10 questions based on the content validity of the panel of experts. Its Cronbach alpha is 0.881 which is greater than 0.70 This means that the value is pretty good. The correlation of every item in the scale with every other item is strong. The Technological Literacy was then revised and finalised into 10 questions with parameters within the context of science teachers. The developed and validated Scientific Literacy Questionnaire and Technological Literacy Scale shall be used to assess the Scientific and Technological Literacy of science teachers or any subjects for that matter. Science teachers can make use of the findings of this research by aligning their practices and approaches in the teaching of science, emphasising Scientific and Technological Literacy among students. Moreover, the result of this study may set directions for future research in the field, such as studies that may focus on feedback, assessment, or teacher professional development, among others.

Keywords: Scientific Literacy, Technological Literacy, Scale, Questionnaire, Cronbach's alpha

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Computer Programming, Puzzles and Mathematics Education

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Mathematical puzzles have been a fascinating field for many people, but they mostly just enjoyed the puzzles made by some puzzle creators. The authors of this paper think that mathematical puzzles can be helpful for active learning of mathematics. Although mathematics education has not changed much for a long time in the history of school system, active learning of mathematics has become a hot topic among its teachers. For example, according to a policy by the Japanese Ministry of Education, teachers must use active learning strategies in the classroom, and this policy should be applied to any subject. Since one of the authors is teaching at a Japanese junior and senior high school, he is well aware of the classroom situation in Japanese schools – in short, teachers are struggling to meet the demand of Japanese ministry of education; many mathematics teachers, in particular, are confused because they find it difficult to implement the so-called active learning for this subject. The authors, therefore, propose an active learning method for mathematics in which mathematical puzzles are used. While they do not think that their method is the only viable option for mathematics teachers, they have found that students can be creative when such puzzles are provided as learning materials – these are effective because it is more fun to study good mathematical puzzles than study standard textbook of mathematics. If you choose puzzles carefully, you can find many puzzles that can cultivate mathematical skills. With mathematical puzzles, it is easy to create new puzzles, and teachers can carry out active learning smoothly. At this conference, the authors plan to present some puzzles that can be used in the classroom.

Keywords: Mathematical puzzle, Active learning, Mathematics education