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TOWARDS A FRAMEWORK FOR MODELLING INNOVATIVE EXPRESSIONS

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Abstract

Rubrics are powerful instruments to help direct students' learning towards a set of pre-defined learning outcomes. Defining a set of objectively defined rubric items that also triggers critical thinking and creative expressions remains to be a big challenge. This paper explores the knowledge gaps that hinder the formulation of such rubrics. The need for an instrument to systematically identify and chart innovation is then highlighted. A framework based on Genrich Altshuler's Theory of Inventive Problem Solving (TRIZ) is explored for formulating rubrics that correspond to and measures the learners' stage in problem solving while explicitly linking to innovative expressions. The resulting rubrics, which separate critical thinking and problem-solving forms part of its criteria and descriptors in addressing the knowledge gaps mentioned earlier. The proposed framework has enabled the benchmarking of student works with the global collection of millions of patents and offers a new perspective for measuring the ability to innovate.

Keywords: TRIZ course; critical thinking; innovative problem solving; assessment rubrics

1. Introduction

The rapid growth of globalization and advancement in technology has given rise to the greater emphasis on the competencies needed for the 21st century (Tarlochan & Hamouda) [1]. Thus, many educational institutions across the globe have revamped their educational policies to integrate the required 21st century skills into the teaching and learning of various subjects and courses (Voogt & Roblin) [2].

While the integration of 21st century skills, especially critical thinking and problem-solving skills in the process of teaching and learning remains an uphill task, the challenge is even greater in assessing these skills as they are not only complex but also require appropriate assessment tasks that elicit those skills (Griffin & Care; Shively, Stith & Rubenstein) [3,4].

Rubrics are often recommended as an important teaching, learning as well as assessment tool. However, the development of rubrics for assessing complex skills especially critical thinking and innovative problem solving has not been dealt extensively. The paper focuses on the exploration and development of a framework for developing rubrics as a means for assessing critical thinking and innovative problem solving in university level courses.

The framework proposed here builds upon the elements of Theory of Inventive Problem Solving (TRIZ), which is a systematic innovation method widely adopted by leading corporations of the world. TRIZ is a systematic approach that consists of inventive problem-solving tools which have been proven to be effective in developing innovation and invention. Realizing the potential of TRIZ, many (Belski, Baglin & Harlim; Chung, Dzan & Lou; Lou et al.; Keong et al.) [35, 36, 37, 38] have incorporated TRIZ into courses or workshops tailored for their target audience.

This paper could serve as a reference or guideline for academics and ease the challenges faced in developing sound rubrics for enhancing teaching, learning and assessment of complex skills especially for critical thinking and problem-solving skills.