

## **The effectiveness of PBL online on pre-service science teachers' creativity and critical thinking: a case study at Universiti Malaysia Sabah**

### **Abstract**

In this paper we scrutinized the effectiveness of combining the Problem-Based Learning (PBL) approach and Online Learning medium in improving students' creative thinking particularly amongst physics students. A cohort of 61 science undergraduate physics students from the School of Science and Technology (SST), and 41 pre-service physics teachers from the School of Education and Social Development (SESD) of the University Malaysia Sabah comprised the sample. The sample was broken up into experimental and control groups, with the experimental group experiencing the PBL and online learning activities, and the control group more traditional learning conducts. Both groups were supported via an online learning environment, which acted as the main medium for learning. Participants' creativity was evaluated using a previously validated instrument, the Torrance Test of Creativity Thinking (TTCT) administered before (pre-test) and after (post-test) the intervention. Examination of these data, points to statistically significant differences between the traditional and PBL groups in creative thinking. Thus the research findings suggest that PBL and Online learning are capable in improving physics students' and pre-service science teachers' creative thinking effectively