Fostering thinking skills supported by e-portals with case examples of blended mode Problem-Based Learning (PBL) participated by secondary school learners

Abstract

The integration of Information and Communication Technology (ICT) in science learning has been identified as an important component in the transformation process of many educational systems to impart the technology skills that is an essential 21st century skills to serve the new learning paradigm among the Net Generation students. In the advent of digital era, World Wide Web has spawned a wealth of new network-based applications with an overarching vision that supports specific blended mode learning programmes incorporating interactive e-platforms and m-learning. Student-centred learning opportunities were widened with more interactive activities that could engage their interest for science learning in the ever expanding knowledge-based societies. This article analyses the roles of e-portals incorporating Open Educational Resources (OERs) that foster thinking skills of learners through 'Problem-based Learning' (PBL) programmes. Cases are extracted from a bigger scale of longitudinal study that examined students' participation in the blended mode PBL anchored on social constructivist and socio-cultural framework. Blended learning activities were implemented leveraging on the effective use of OER to enhance learners' investigative skills with transformation of values-based classroom practices beyond formal teaching. PBL scenario (six contextual problems) adapted from secondary science entitled 'Water and Solution' was presented to project teams from two case study schools. Problem case 4 using 'within-case dynamic matrix' was further reported with exemplars elaborated. Students were administered with 'Fluid Intelligence Test'(FIT) encompassing evaluation of creative, critical/logical thinking and reasoning skills prior to PBL through scaffolded instruction (SI)(PBL-SI) with evaluation guided by POSITIVE rubric (accessible at http://forum.sp3aceman.net). Four aspects of POSITIVE rubric guide, 'Skills' enhancement (scientific/ICT), 'Information', 'Training/transfer of Higher Order Thinking' (HOT) and 'Evaluation/exchange/enrichment/exposure' are illustrated

with evidence of students' enhanced HOT. Innovative learning designs and on-line assessment with evidences of exemplary students' creative potentials involved in investigation using OER were identified which include interviews findings from two students who created web-portals using OER effectively. 'More/moderately successful students' were involved actively in mini science fair, congress/competitions and e-forum (http://forum.maays.net). Other pedagogical issues concerning of the importance of PBL and blended learning that promote thinking skills in line with research evidence as reported in TIMSS and PISA studies are also deliberated.