Chapter 10
Reflections on the Roles of Community of Practice (CoP) in Engineering Education

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ABSTRACT

Community of practice (CoP) encompasses shared approaches for carrying out tasks with a view to facilitating intellectual neighborliness among learners, educators and practicing professionals. Despite the popularity of the CoP approach within industries and the medical education, the practice of using it in engineering education is not widespread as most educators have limited knowledge of how to implement CoP into their classrooms. Moreover, it is not clear from the engineering education literature how the implementation of CoP has enhanced conceptual understanding and imparted employable skills to learners. To address these concerns, available literature detailing the implementation of CoP across professional disciplines and education sector over the past one and half decades were evaluated with a view to identifying and documenting evidences of current practices of CoP, and subsequently developed into a framework for re-designing an important aspect of engineering curricula: work integrated learning (WIL). This will have an objective to successfully enhance conceptual understanding and impart employable skills to learners.

INTRODUCTION

Despite the popularity of the community of practice (CoP) approach within the industry, the practice of its use in engineering modules has not become widespread as most educators have limited knowledge of how to implement CoP in their classrooms. In addition, empirical studies on the effectiveness of CoP are limited and the research that does exist is primarily focused on its perceptions by users rather than how it fosters conceptual understanding and employable skills in engineering learners. Moreover,

it is not clear from the avalanche of available literature how the implementation of CoP in diverse engineering disciplines has contributed to the enhancement of conceptual understanding and impartation of employable skills to further education colleges' learners, undergraduate and postgraduate learners across the universities. To address these concerns, available literature detailing the implementation of CoP across engineering institutions, specialties of health science, education, as well as industries over the past fifteen years (2000 – 2015) will be evaluated. This is with a view to identifying and documenting evidence of current practices of CoP which had successfully enhanced learners' conceptual understanding and imparted employable skills. It is being anticipated that valuable lessons obtained from the literature will be employed in developing a framework for re-designing an important aspect of engineering curricula: work integrated learning (WIL) with a view to ensuring it transmit conceptual understanding and employable skills.

Firstly, the justification for the incorporation of CoP into engineering curriculum is provided. Thereafter, the background section of this chapter elucidates in detail the concept of CoP; highlights the distinguishing features of the CoP in comparison to other teaching and learning practices such as problem based learning and project based learning; while we also identify the nature of communities which are evolving among learners, educational institutions, industries and public sectors. Thereafter, we identify the learning theories which could guide the incorporation of CoP into engineering education via WIL; provide a clear link between the appropriate theoretical principle, the practice of implementing CoP in engineering education via WIL, and the role of facilitators or tutors. This chapter also addresses the developments of practices and support interventions associated with the emergence of CoP in an attempt to provide insights on how CoP could be repeatably and durably accomplished in engineering education. Finally, we develop a framework for implementing CoP in engineering education curricula on the conviction that CoP will enable engineering learners to negotiate their experience in order to construct and re-construct their identities as prospective professional engineers thereby acquiring knowledge and expertise necessary to impact more meaningfully on the society.

WHY INCORPORATING COP INTO ENGINEERING CURRICULUM?

Modern engineering education seeks to impart learners with creative and innovative knowledge as well as expertise in order to ensure that the experience of theory and practice gained while studying engineering in colleges and universities is integrated into solving real life problems which affect the entire spectrum of the socio-economic well-being of our societies. Therefore, modern engineering curricula are being re-designed in an attempt to equip engineering graduates with excellent planning, communication, team working, sound analytical and evaluation skills in line with employers' expectations (Stojcevski & Fitrio, 2008) since the challenges of modern engineering workplace demand that prospective graduate employees be highly skilful in engaging these competencies to solve real life problems. It was also asserted that employable graduates should have a new mindset in encountering the challenges and demands of the workplace by demonstrating creativity, perseverance, and aptitude for problem solving combined with working effectively as part of a team (Precision Consultancy, 2007). This is with a view to benefiting the workforce and the community such that businesses can keep abreast with keen competition in both local and global markets (Billett 2002; Kloppenborg & Baucus 2004; Fuller & Unwin, 2006; Yorke, 2006). To achieve this aim, it is important that engineering students be inculcated with the understanding of what their roles are in building and managing workplaces, as well as how to implement

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