iJournals: International Journal of Social Relevance & Concern
ISSN-2347-9698
Volume 8 Issue 3 March 2020

Pedagogical Approaches:Better WaystoIn-HouseTrainingsfor Employees in Engineering Corporates

Mahdi Keramatikerman,Ph.D., MIEAust[1]; Amin Chegenizadeh, Ph.D., M.ASCE[2]; and Hamid Nikraz, Ph.D.,FIEAust[3]

[1]Engineer, Arup Australia Services Pty Ltd, 61-63 Suncorp Tower, Townsville4810, Australia. (E-mail: mahdi.keramati@arup.com)

[1]Senior Lecturer, Department of Civil Engineering, Curtin University of Technology, Kent Street, Bentley, Perth, Western Australia 6102, Australia.

(Corresponding author,E-mail: amin.chegenizadeh@curtin.edu.au)

[3] Professor, Department of Civil Engineering, Curtin University of Technology, Kent Street, Bentley, Perth, Western Australia 6102, Australia. E-mail: h.nikraz@curtin.edu.au

DOI< 10.26821/IJSRC.8.3.2020.8301>

Abstract: Every year engineeringcorporates invest thousands of dollars on training and technical developments of their human resources. This massive amount of investments helps these companies to grow, achieve reputation, and to have a higher turnover in a long-run. This also makes them a more preferred option when comes to hiring staff. Many of these investments are in form of in-house technical trainingswhich are arranged and prepared by senior staff for less experienced employees.However, these training courses are very practical and effective for companies to reach their goals since they get devised to address their deficiencies and/or to prepare them with the cutting-edge knowledge in their field. They may not receive enough attentions by juniors due to selection of improper teaching and learning methods and ignoring pedagogical approaches.This article

highlights the importance of a bespoke methodological approach applicable in engineering corporates by considering their unique characteristics.

Author Keywords: Pedagogy; In-house Trainings; Engineering Corporates

1. INTRODUCTION

In-house training is a common way of up-scaling staff in engineering corporateswhich helps companies to reach their long-term and mid-term goals andtheir staff have a better professional and technical career developments.These training courses are usuallyrecognisedashighly effective since the curriculum and teaching materials are specifically devised to address some specific range of issues related to the company's business. Thedelivery method of these bespoke training coursesis important as an improper delivery method can simply waste the time, resources and may not reach to the targeted objectives.

To successfully deliver an educational program, three stages of curriculum, pedagogy, and assessment play crucial roles and have a similar importance (Wyse et al. 2015; O'Sullivan 2013; Byrnes et al. 2010). Fig. 1 shows components of a successful educational program. In the curriculum stage, the teaching materialsthat are supposed to be taught to the leaner areplanned and designed. This stage usually happens at a higher level considering the strategic and long and mid-terms organisation needs. Pedagogy/andragogyand assessment stages are devised by highly experienced teachers which encompass methodology of deliveryand evaluation the learners progress.

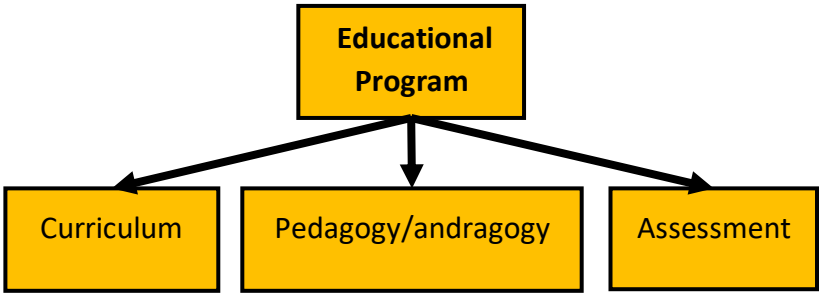

Fig. 1 Components of a successful educational program

As shown, pedagogy and andragogy are two terms in educational program that refer to teaching and learning philosophies of the youth and adults respectively.However, the pedagogy is a more common term and covers a broader range of age (LaVelle et al. 2020; Mukhalalati and Taylor 2019). Therefore, referring to pedagogy covers education of both youth and an adult leaner in this article. In fact, pedagogy is an adaptive philosophy of teaching and learning which is devised based on the unique characteristics of leaners, educationalsetting, and objectives of the program to help leaners to have a beneficial learning experience. To devise a pedagogical

program in a specific setting, characteristics such as age, race, gender, background, social, cultural, political, demographic, and historical specification can vary a pedagogical approach with same audiences (Warin and Adriany 2017; Britzmanet al. 1995).

Design and utilisation of a pedagogical approach forin-house training inan engineering corporation has itsdetails and specifications that should be considered and well-planned by the instructors beforehand.

2. Engineering Corporates' Specifications

Every organisation has its own unique type ofculture, employees, requirements, and targets that are effective in their pedagogical approach. Human resources are big differentiators in every engineering corporatesand understanding type of people who works for these companies, can help toutilise a suitable approach. For instance, employees in engineering organisations have a high level of education, innovative and creative, have a strong knowledge of maths and computing sciences and an advanced digital user. Fig. 2 shows this characteristics in a diagram. Similarly, personnel of engineering corporates usually provide services to the like-minded people in governmental organisations by providing professional reports and advices, performing calculations and designs, and attends technical meeting.

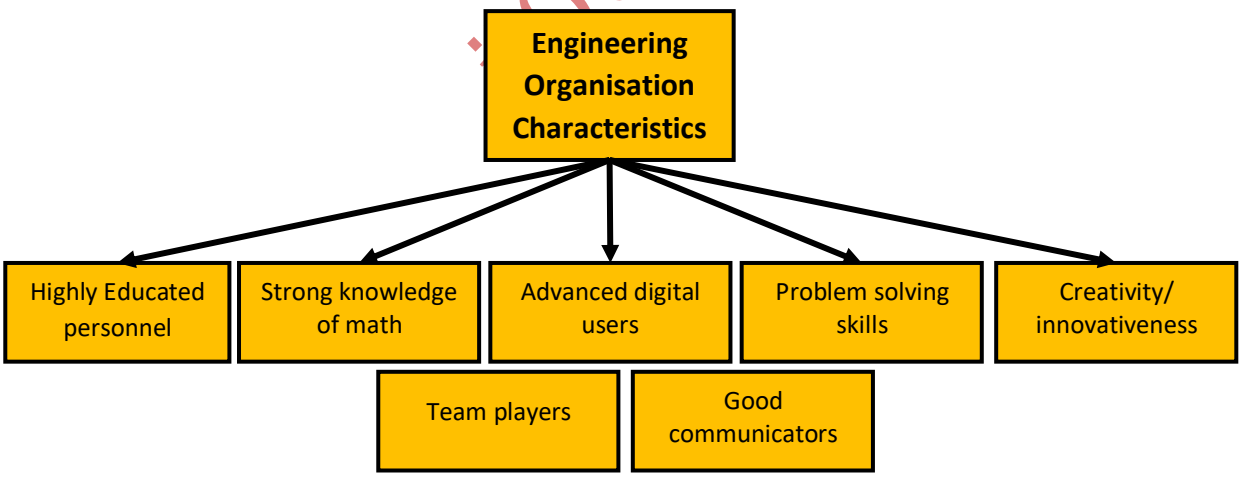

Fig. 2 Components of a successful educational program

Delivering projects in a high quality, on time, and within the budget is an ultimate target in every engineering organisation that almost all other targets work around this main objective. Understanding an engineering setting, involved people and their characteristics help to understand the better understand an organisation and to utilise a good pedagogy approach to reach targets.Of course,there are other characteristics that are unique in an engineering organisation that should be considered case by case at the time of the pedagogy utilisation.

3. Applicable Pedagogical Approaches

There are various pedagogical approaches applicable in an engineeringcontext according to the characteristics of the personnel as they are the big differentiators. These methodologies have been listed in the Fig. 3 as a diagram. Utilisation of the pedagogy approaches such as crossover learning, learning by argumentations, context-based learning, adaptive teaching, cooperative learning, case-method teaching, and experiential learning can be effective in an engineering context as they require characteristics that live in personnel of engineering corporates. Below provide more descriptions on each approach and how they can be utilised in an engineering setting.

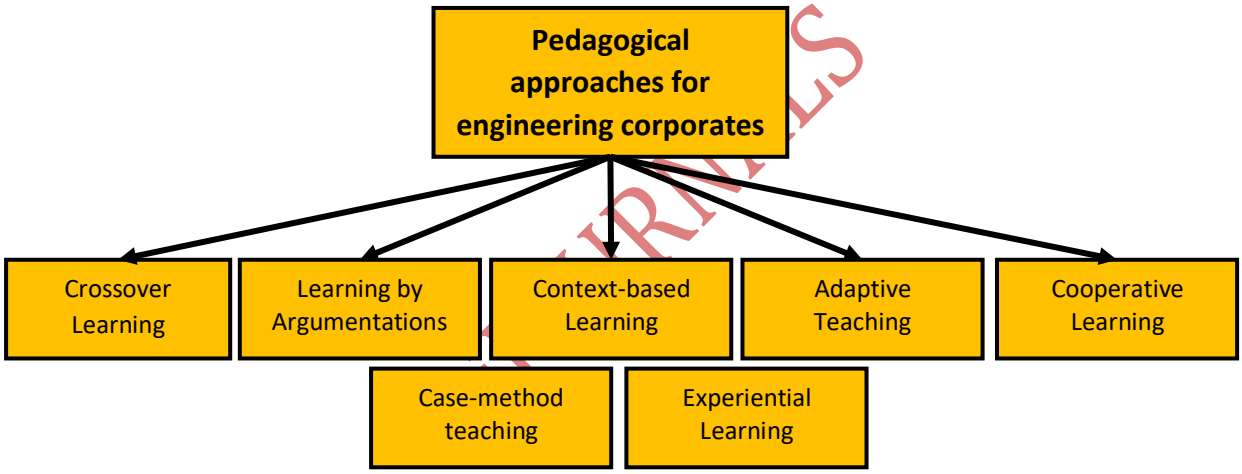

Fig. 3 Applicable Pedagogical approaches in an engineering setting

3.1. Crossover learning

The traditional contexts of learning encompass a class in a school, university, college etc. However, in this method, teaching and learning are occurred in an informal context. This can be a bridge between informal and formal learning and enrichesthat (Bleske et al. 2016;Sharples et al. 2015; Nash 2009). Engineering corporates are usually engaged with real world and practicalprojects which each of them comes with some unique complexities. Providing on-site training opportunities enriches the training in the classrooms and make that more effective.

3.2. Learning Through Argumentation

Learning through argumentation can be very beneficial as this happens collaboratively and learners can elaborate each other's understanding (Newton et al. 1999; Veerman 2000). Engineers have a strong problem-solving skill by elaborating an issue, reasoning and argumentation.

3.3. Context-Based Learning

In this method, the learning occurs in a context that has been made by the instructor by communicating with the surroundings. The teaching setting can be anywhere like a formal classroom or a project site and students learn from their prior experienceby combining new information, analysing and interpreting them in the newcontext.In fact, this is a learner-centred approach that application of the ideas initiates the ideas, which may provide more engagement and interest for the learners (Avargil et al. 2012;; King and Ritchie 2012).

3.4. Adaptive Teaching

In traditional teaching world, despite of varieties in learning abilities, instructors usually utilise same teaching materials for all learners which is not an effective approach. In the adaptive teaching system, the old teaching materials are assessed and is a basis to devise a new and bespoke teaching materials for every student.Assessment of a time-spent on a mathematical problem can be a benchmark to designa bespoke teaching material and to an adaptive learning(Allen et al. 2016; Vogt and Rogalla 2009). This pedagogy approach is applicable for many contexts as well as engineering context.

3.5. Cooperative learning

In a cooperative learning approach, learners collaboratively work together to reach to a specific goal or to perform a task. Teachers also have a crucial role in cooperative learning in selection of the team members and by engaging to the groups challenging them, asking questions, and providing some directions. Utilisation of this approach help in socialisation of leaners and how to tackle a goal in a group (Gillies 2016; Ballantine and Larres 2007). Cooperative learning is a good approachfor engineering corporates as their employees have a strongteam workskill to address an issue or to find a solution for a real-world problem.

3.6. Case-MethodTeaching

Case studies can be amongst the most useful approaches for engineering institutions. Teaching around a specific case study with providing opportunity for learners to discuss and providing their analysis and interpretations. The case method approach can be devised to promote specific skills of the learners. For instance, by providing

an already happened case and providing some information about the situation, possible solution that could have been taken are discussed and the problem analysis skills of the team can utilise to solve the issue. As another example, providing case in a stage by stage and progressive manner that needs the learners to decide before to go to the next stage is another venue for utilisation of the problem-solving skills(Kunselman and Johnson 2004; Mostert and Sudzina 1996;).

3.7. Experiential Learning

In a simple word experiential learning means learning by doing something and gaining knowledge from experience (Clark et al. 2010; Gentry 1990). This approach can be utilised in an engineering setting to improve acquisitive skills such as report writing, computation, and design.

4. Conclusions

A unique and proper pedagogical approachis required to deliver a successful educational program which should be utilised and implemented according to the unique characteristics of the educational setting. Engineering corporates usually holdsbespoke and in-house training courses for their personnel in order to deliver high quality outputs and achieve a higher benefit for their organizations. To achieve the most beneficial outcomes out of these training courses, proper pedagogical approaches in teaching and learning should be considered. In this article, suitable pedagogical approaches for an engineering setting were discussed and proposed.

AUTHORS BIOGRAPHICAL INFORMATION

DrMahdi Keramatikermanis an Engineer at Arup Australasia, Queensland, Australia. He received his BS and MS in civil engineering from two prestigious university in Tehran, Iran in 2008 and 2010. He also gained his PhD from Curtin University, Perth Western Australia in 2019.

DrAmin Chegenizadeh is a Senior Lecturer at Curtin University, Perth, WA, Australia. His research interests include Ground improvement and Liquefaction.

Professor Hamid Nikraz is a Professor at Curtin University, Perth, WA, Australia. He received his BS, MS and PhD in civil engineering from Curtin University. His research interests include Ground improvement, Pavement, and Geo-environment.

REFERENCES

Allen, M., Webb, A. W., & Matthews, C. E. (2016). Adaptive teaching in STEM: Characteristics for effectiveness. *Theory Into Practice*, *55*(3), 217-224.

Avargil, S., Herscovitz, O., &Dori, Y. J. (2012). Teaching thinking skills in context-based learning: Teachers' challenges and assessment knowledge. *Journal of Science Education and Technology*, *21*(2), 207-225.

Ballantine, J., &Larres, P. M. (2007). Cooperative learning: a pedagogy to improve students' generic skills?. *Education+ Training*.

Bleske, B. E., Remington, T. L., Wells, T. D., Klein, K. C., Guthrie, S. K., Tingen, J. M., ... &Dorsch, M. P. (2016). A randomized crossover comparison of team-based learning and lecture format on learning outcomes. *American journal of pharmaceutical education*, *80*(7).

Britzman, D., Santiago-Valles, K., Jimenez-Munoz, G., Lamash, L., & McLaren, P. (1995). Dusting off the erasures: race, gender and pedagogy. *Postmodernism, postcolonialism and pedagogy*, 145-166.

Byrnes, H., Maxim, H. H., & Norris, J. M. (2010). Realizing advanced foreign language writing development in collegiate education: Curricular design, pedagogy, assessment. *The Modern Language Journal*, i-235.

Chinn, A. C. and Clark, D. B. (2013). Learning through collaborative argumentation. *The international handbook of collaborative learning*, *314*.

Clark, R. W., Threeton, M. D., & Ewing, J. C. (2010). The Potential of Experiential Learning Models and Practices in Career and Technical Education and Career and Technical Teacher Education. *Journal of Career and Technical Education*, *25*(2), 46-62.

Gentry, J. W. (1990). What is experiential learning. *Guide to business gaming and experiential learning*, *9*, 20.

Gillies, R. M. (2016). Cooperative Learning: Review of Research and Practice. *Australian Journal of Teacher Education*, 41(3).

King, D., & Ritchie, S. M. (2012). Learning science through real-world contexts. In *Second international handbook of science education* (pp. 69-79). Springer, Dordrecht.

Kunselman, J. C., & Johnson, K. A. (2004). Using the case method to facilitate learning. *College Teaching*, *52*(3), 87-92.

LaVelle, J. M., Lovato, C., & Stephenson, C. (2020). Pedagogical Considerations for the Teaching of Evaluation. Evaluation and Program Planning, 101786.

Mostert, M. P., &Sudzina, M. R. (1996). Undergraduate Case Method Teaching: Pedagogical Assumptions vs. the Real World.

Mukhalalati, B. A., & Taylor, A. (2019). Adult Learning Theories in Context: A Quick Guide for Healthcare Professional Educators. *Journal of medical education and curricular development*, *6*, 2382120519840332.

Nash, R. J. (2009). Crossover pedagogy: The collaborative search for meaning. *About Campus*, *14*(1), 2-9.

Newton, P., Driver, R., & Osborne, J. (1999). The place of argumentation in the pedagogy of school science. *International Journal of science education*, *21*(5), 553-576.

O'Sullivan, M. (2013). New directions, new questions: Relationships between curriculum, pedagogy, and assessment in physical education.

Sharples, M., Adams, A., Alozie, N., Ferguson, R., FitzGerald, E., Gaved, M. &Roschelle, J. (2015). *Innovating Pedagogy 2015*: Open University Innovation Report (4).

Veerman, A. L. (2000). *Computer-supported collaborative learning through argumentation* (Doctoral dissertation)

Vogt, F. and Rogalla, M., (2009). Developing adaptive teaching competency through coaching. *Teaching and Teacher Education*, *25*(8), pp.1051-1060.

Warin, J., &Adriany, V. (2017). Gender flexible pedagogy in early childhood education. *Journal of gender studies*, *26*(4), 375-386.

Wyse, D., Hayward, L., & Pandya, J. (Eds.). (2015). *The SAGE handbook of curriculum, pedagogy and assessment*. Sage.

