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The Pillars of Excellence in Education in the New Era

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This century brings a reform in education confronted with an epochal challenge that comes from the economy, science, and technology. Under this scenario, higher education could be shifted to an area where adaptability in education is emphasized (Queiroz-Neto et al., 2015).

This reform has been applied extensively using modern pedagogical tools (Serdyukov, 2015); including online platforms (Dening, Wenxue & Zhi, 1998); or utilizing specific hardware and software (Ferrari & Ferrari, 2011; Tian, 2008). In the same way, the student-centered learning process denominated PBL has been used since a couple of decades ago as a strategy to develop different skills and attitudes for medical education (Barrows & Tamblyn,1980) and other areas (Delyser et al., 2003).

The preparation of a student in a multilevel class can be extenuating, especially now that a series of skills are needed to enrich their professional and scientific careers (Metrolho & Costa, 2008). On this behalf, different reports have been written about the educational benefits of PBL (e.g., Albanese, 2000; Barrows, 1980; Barrows, 1986, Barrows, 1990, Stepien & Gallagher, 1993) applied to millennial generation engineering students (Ranky, 2010). Therefore, selecting a suitable teaching method for this century could improve the educational program effectiveness (Taylor et al., 2013).

According to the cone of learning proposed by Edgar Dole in 1946 and questioned by Lalley et al., multimedia material in teaching involves the students passively. For this reason, multimodal information (Dubois & Vial, 2000) and a bidirectional communication applied in a multimodal learning with multimodal teaching strategies (Yan, 2014) besides alluring the senses, provides mechanisms and tolls to place the student under different real-life scenarios specially when blended with PBL processes as the one we propose here.

In a multilevel class, intellectual traits and vocational ambitions vary (Sakurai, Tsuruta & Knauf, 2011). Accordingly, bringing up a solid foundation of a course is essential to give the students a wider vision of its use and its application into the real world. Only then, students are more likely to persevere and experience career success in engineering (e.g., Savery & Duffy, 1995; Spang & Spang, 2012) especially at the early stage of their studies.

As educators, finding a proper pedagogy for students with different academic levels and learning styles is challenging, especially in this new century. In the study carried out at Beihang University, we examined the application of the five principles of the Problem-Based Learning (PBL) process in a multilevel mathematics course. The five principles of our PBL process are: selection, presentation of the challenge, teamwork, assessment, and introspection. We analyzed the response of the students and demonstrate the important role the teacher plays on each one of them. We found that teaching in a multilevel class applying the proposed PBL process draws the interest, participation, and interaction of the students, develops different skills, and promotes the deep-level learning. Furthermore, the PBL process can be applied to theoretical and practical subjects, and we regard it as a pillar of academic success.

Further research using multimodal communication methods (Zhang, X. X., & Cabero, M. A. C, 2019) and multimodal strategies in teaching may help to develop deeper aspects of the proposed PBL process. Drawing on information gathered through the application of the five principles proposed in this PBL process may potentially shape how teacher educators can handle a multilevel class as they navigate the complexities of their role.

Moreover, creative thinking about what is possible to improve in the application of this process may help students to not feel overwhelmed by challenging subjects or abstract topics that form part of the academic curricula and may confirm the PBL process as a pillar of academic success.

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