The WOW Project: An Experiential Learning Approach to Developing Teamwork and Project Management Competencies in South African Engineering Education

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Abstract

This paper examines the implementation and impact of a Workplace Orientation Workshop within a South African industrial engineering programme, designed to cultivate essential graduate attributes mandated by the Engineering Council of South Africa. The study was guided by three research questions: how the WOW Project aligned with ECSA's GA8 criteria, how student participation contributed to teamwork and project management competencies, and what insights student reflections offered about the role of experiential learning in shaping responsible engineering practice. Employing a qualitative methodology, the study analyses student reflections on their participation in the Workplace Orientation Workshop Project. The analysis revealed three prominent themes: (i) preparation for professional transition; (ii) project management and leadership experience; and (iii) enhanced communication and interpersonal skills. Grounded in situated learning theory and problem-based learning principles, the WOW Project provided a practical platform for students to apply engineering management principles and develop critical competencies through experiential learning. Findings highlight the effectiveness of the WOW Project in bridging the gap between academic learning and professional readiness, fostering responsible engineering practices. Recommendations include expanding the scope of future Workplace Orientation Workshop Events and implementing structured feedback mechanisms to enhance student learning outcomes.

Keywords: Experiential learning, graduate attributes, engineering education, situated learning, problem-based learning

1 Introduction

South African universities are mandated by the Engineering Council of South Africa (ECSA) to integrate and assess eleven graduate attributes (GAs) within their engineering programmes (ECSA, 2018). These attributes ensure that engineering graduates possess the necessary competencies to address complex societal and professional challenges. Among these attributes, GA8 focuses on individual, team, and multidisciplinary working, which are critical for shaping engineers capable of delivering responsible and impactful solutions.

GA8 requires students to demonstrate knowledge and understanding of engineering management principles and apply them effectively in their own work, as team members and leaders, while managing projects. The associated learning outcomes include the ability to plan, organise, lead, and control tasks; perform individual work strategically and on time; function as a team leader; and communicate effectively in diverse professional contexts. These competencies are foundational for fostering teamwork and project management skills that align with the broader goal of producing responsible engineers.

For this study, the GA8 definition was based on the 2018 version (E-02-P-Rev4-1, September 2020), which was the officially available standard during the implementation of the Workplace Orientation Workshop (WOW) Project. The revised GA8 criteria, published in August 2023, were only released after the project had been completed and are therefore is not reflected in this work. In 2023, a final-year module titled *Industrial Engineering Professionalism and Ethics* was introduced as a platform for assessing GA8 through an experiential learning approach. This approach emphasises active engagement with real-world scenarios, enabling students to develop teamwork and project management competencies through iterative practice. By embedding experiential learning principles into the module design, students were encouraged to reflect on their roles as individuals and team leaders while navigating multidisciplinary challenges.

This paper describes the development of the project-based learning activities embedded in the module, as well as the assessment processes designed to evaluate students' mastery of GA8. It explores how experiential learning strategies were employed as an approach to fostering the development of responsible engineers,

with a focus on equipping them with skills for effective teamwork, ethical decision-making, and project execution in the South African engineering context.

To guide the study, the following research questions were formulated:

- How did the design and implementation of the WOW Project align with ECSA's GA8 criteria?
- In what ways did students' participation in the WOW Project contribute to the development of teamwork, project management, and professional competencies?
- What insights from students' reflections illustrate the role of experiential learning in shaping responsible engineering practice in the South African context?

2 Situated learning theory

Situated Learning Theory (SLT) provides a foundational framework for designing educational experiences that mirror real-world application contexts, fostering problem-solving skills essential for engineering practice (Renkl, 2001). SLT explains how learning occurs when students participate in a community of practice (Lave & Wenger, 1991), where they engage in meaningful activities that develop internal knowledge structures (Newstetter & Svinicki, 2014). Within such communities, students' progress from peripheral roles as novices to central roles as experts through Legitimate Peripheral Participation, which enables them to acquire expertise by actively engaging in collaborative practices (Lave & Wenger, 1991). This process not only enhances technical skills but also cultivates teamwork and leadership abilities critical for responsible engineering.

Research supports that situated learning environments facilitate knowledge transfer to real-world contexts more effectively than traditional methods (Catalano, 2015). As students transition toward full participation in their communities of practice, they develop advanced skills in management, collaboration, and communication, key competencies for addressing complex engineering challenges responsibly (Herrera, 2020).

One instructional model aligned with SLT is Problem-Based Learning (PBL), which has been shown to promote deep learning approaches over superficial ones (Renkl, 2001). Deep learning, as first described by Marton and Säljö (1976), is characterised by intrinsic motivation, active engagement, and the intention to integrate and critically evaluate knowledge, leading to robust and transferable understanding. By contrast, surface learning, also conceptualised in their work, tends to rely on rote memorisation and fragmented knowledge, often driven by extrinsic factors such as exam performance (Marton & Säljö, 1976). This distinction is particularly relevant in PBL contexts, where learners are required to actively construct meaning through problem-solving and collaboration, thereby reinforcing the hallmarks of deep learning while countering tendencies toward surface approaches. For engineering students, PBL offers numerous benefits: fostering active learning, self-directed capability, interdisciplinary thinking, and transversal skills such as teamwork and project management (Cruz Moreno et al., 2023; Du & Kolmos 2009). Additionally, PBL enhances self-confidence, self-efficacy, a sense of belonging (Du et al. 2020; Kolmos & de Graaff 2014), and teamwork capabilities (Boelt et al. 2022). These outcomes align closely with GA8's focus on individual work effectiveness, team leadership, and communication.

The design of the GA8 assessment project drew heavily on these principles of SLT and PBL. By embedding situated learning practices into the module *Industrial Engineering Professionalism and Ethics*, students were provided with opportunities to engage in authentic problem-solving scenarios that developed their teamwork and project management competencies while preparing them to become responsible engineers.

3 Module structure and management

The GA8 assessment was embedded in the *Industrial Engineering Ethics and Professionalism* module through a carefully designed project that operationalised principles of both SLT and PBL. The Workplace Orientation Workshop (WOW) Project served as the central activity, providing students with an authentic context to develop teamwork and project management competencies while addressing ECSA's GA8 criteria. This section outlines the module structure, preparation steps, and pedagogical strategies used to scaffold student learning and ensure meaningful engagement with GA8.

3.1 Overview of the WOW Project

During the first class of the semester module, students were introduced to the WOW Project as a practical means of assessing GA8. The lecturer proposed that the assessment meet the following criteria:

- Be meaningful and contribute to student development;
- Provide a foundation for future cohorts to build upon;
- Serve the industrial engineering student community;
- Teach practical life skills to prepare students for the workplace; and
- Fulfil ECSA's GA8 requirements.

The WOW Project tasked students with organising, planning, and executing a series of workshops aimed at preparing industrial engineering students for workplace challenges. This was particularly important given that the current engineering curriculum does not include in-service training or industry-based experience. By addressing this gap, the WOW Project aligned with broader goals of shaping responsible engineers equipped for professional practice.

In this paper, the term WOW Project refers to the overall student assignment, which involved planning, organising, and managing workplace-preparedness activities, while the WOW Event refers to the culminating implementation day when the student-designed workshops were delivered.

3.2 Pedagogical design

To ensure successful execution of the WOW Project and foster GA8 competencies, five preparatory steps were implemented:

3.2.1 Team foundation

Thirty-four final-year students enrolled in the module were divided into eight teams. Teams consisted of two to five members each, reflecting real-world multidisciplinary work environments where team sizes vary based on project scope. Team formation provided students with an opportunity to engage in collaborative practices central to SLT's concept of Legitimate Peripheral Participation (Lave & Wenger, 1991).

3.2.2 Self-Reflection on strengths and weaknesses

Once teams were formed, students participated in a self-reflection exercise to identify their individual strengths and weaknesses as team members. Each student shared their reflections within their teams, fostering metacognitive awareness of their roles in contributing to project success. This activity encouraged students to take ownership of their personal development while promoting effective teamwork.

3.2.3 Learning styles

Students completed Kolb's (2014) learning styles instrument to identify their preferred learning styles: converging, diverging, assimilating, and accommodating. Each style reflects a distinct way of engaging with learning. *Converging* emphasises practical problem-solving; *diverging* draws on imagination and multiple perspectives; *assimilating* favours a concise, logical approach; and *accommodating* relies on intuition and

hands-on experience. Teams discussed how these styles could complement one another during project execution. This exercise helped team leaders allocate tasks strategically and anticipate challenges based on individual preferences. It also reinforced PBL's emphasis on self-directed learning, which refers to a process in which individuals take the initiative in diagnosing needs, setting goals, identifying resources, implementing strategies and evaluating outcomes (Knowles, 1975).

3.2.4 Conflict management

A workshop session introduced students to different conflict management styles (Thomas & Kilmann, 1974): avoiding, accommodating, and competing. *Avoiding* involves disengaging from the conflict; *accommodating* prioritises the needs of others; and *competing* focuses on asserting one's own position. Through discussion and role-play, students explored their preferred styles and developed strategies for navigating interpersonal challenges in collaborative work. This activity aligned directly with GA8's requirement for effective communication in multidisciplinary contexts.

3.2.5 Researching workplace preparedness

Teams conducted research into workplace preparedness using a Delphi process to identify key topics for the WOW Event sessions. The Delphi process is a structured communication technique used to obtain a consensus of opinion from a panel of experts on a particular topic, typically through a series of questionnaires or rounds of feedback (Hsu & Sandford, 2007). Students explored literature on what graduates need to know before entering the workforce, focusing on skills such as professional conduct, technical expertise, and adaptability. Six topics were selected based on consensus among teams. The selected topics and speakers are listed in Table 1.

Table 1: WOW topics and speakers.

Topic	Invited Speakers' Portfolio
Financial management, payslips, deductions, tax	Financial accountant
Professional communication, skills and conduct required	Networking expert and financial planner
Transitioning from campus to workplace, managing stress, work-life balance, being a woman in the workplace	Three former industrial engineering students
Entrepreneurship for graduates	PhD in Business Management and entrepreneur; and Entrepreneurial coordinator at a further education training college
Smart manufacturing and Industry 4.0	Founder of the Advanced Mechatronics Technology Centre
Resume writing and preparing for interviews	Senior company director and PhD in Human Resource Development Engineering manager

For the WOW Project, two dedicated project management teams oversaw the overall logistics, communication, and evaluation. One team focused on overall project management, including securing the venue, managing invitations and RSVPs, handling marketing and technology, designing feedback forms, and compiling a final report. The second project management team coordinated the six 'action teams', ensuring they met deadlines, proofread communications, created a promotional video, and designed and managed the collection of feedback on the team experiences. Each of the six action teams, in turn, was responsible for

one specific topic. This involved contacting and briefing the speaker, introducing the speaker at the WOW Event, providing a vote of thanks, designing and summarising feedback questionnaires, and delivering both written and oral reports on the session.

3.3 Execution of WOW

As part of the broader WOW Project, each team was responsible for organising one workshop session during the semester. Teams determined dates, invited speakers from industry or academia, planned logistics, and prepared content tailored to their chosen topic. The workshops provided practical insights into workplace demands while fostering transversal skills such as leadership, collaboration, and communication, all key components of GA8.

By engaging in these activities, students transitioned from peripheral participants in their community of practice to active contributors capable of managing complex projects collaboratively (Herrera, 2020). The WOW Project exemplified SLT's emphasis on situated contexts while leveraging PBL principles to promote deep learning and interdisciplinary skill development.

3.4 Contribution to responsible engineering

The WOW Project was structured to address GA8 competencies by providing students with opportunities to engage in teamwork, project management, and ethical decision-making tasks, thereby supporting the development of responsible engineers prepared for professional challenges in diverse contexts. By designing workshops that served their peers and future cohorts, students demonstrated leadership qualities aligned with societal responsibility, a critical attribute for modern engineers.

Owing to the nature of the project, close interaction and communication amongst teams and team members were vital for the success of the project. Students commented that they made new friends and connections creating a greater sense of community among the cohort.

The assessment of GA8, as detailed in the next section on research method, required students to submit a comprehensive document that included both team-based and individual components. The team sections covered the formation of the team, the identification of team values, the process for task allocation, and the rationale behind the selection of the WOW Event topic, supported by a reference list. Each team member was responsible for contributing a section that detailed their individual conflict management style, their assigned tasks within the project, and an explanation (with examples) of how they applied the principles of planning, organising, leading, controlling, communication, and time management. These individual sections also included a self-reflection on their learning experience, covering aspects such as project management skills, teamwork, professionalism, ethics, and stakeholder engagement. Finally, each submission included a reference list and a mark sheet.

4 Research method

This study employed a qualitative methodology (Borrego et al., 2009) to investigate the enactment and effects of GA8 assessment within a South African engineering education context. Grounded in SLT (Lave & Wenger, 1991) and experiential learning (Kolb, 2014), it examined how active participation in a real-world project facilitates the application and integration of graduate attributes into students' professional development, aligning with the goal of shaping responsible engineers. The descriptive and interpretative research design (Elliott & Timulak 2005; Kim et al., 2017) leveraged student self-reflections, akin to Kovanović et al. (2018), providing insights into their experiential learning processes and the development of key competencies. Data from eight student group reflections, generated during self-assessment exercises, team meetings, and the WOW Project execution, formed the basis of the core analysis. These reflections were scrutinised through content analysis (Vaismoradi et al., 2013), a systematic approach for identifying patterns, themes, and meanings within textual data. The content analysis process involved several key steps: (i) data

preparation, which included transcribing and organising the student reflections; (ii) open coding, where the researchers immersed themselves in the data to identify initial concepts and codes; (iii) category development, where related codes were grouped into broader, more meaningful categories; and (iv) thematic analysis, where the relationships between categories were explored to identify overarching themes that captured the essence of the student experiences. These reflections were used to extract themes related to teamwork, leadership, theoretical application, problem-solving, and growth, all of which directly correspond to the criteria for GA8 assessment. The analysis aimed to understand how the GA8 project contributed to the development of teamwork, project management, and responsible engineering competencies. Ethical considerations were rigorously followed, with university ethics committee approval ensuring ethical compliance, participant consent, and data confidentiality in the research process.

5 Results: Shaping competent and responsible engineers through experiential learning

The analysis of student reflections on the WOW Project revealed three prominent, interconnected themes: (i) preparation for professional transition; (ii) project management and leadership experience; and (iii) communication and interpersonal skills enhancement. These themes highlight the transformative impact of experiential learning in shaping competent and responsible engineers, aligning with the study's focus on ECSA's GA8 criteria and the broader goals of South African engineering education (ECSA, 2018). Each theme demonstrates how active participation in a real-world project facilitates the application and integration of graduate attributes into students' professional development (Kolb, 2014; Lave & Wenger, 1991). This section provides a more expansive and narrative version of these results, delving into the nuances of each theme and its sub-themes, while also connecting them back to the theoretical frameworks of SLT (Lave & Wenger, 1991) and PBL (Renkl, 2001).

5.1 Theme 1: Preparation for professional transition

All groups collectively emphasised the WOW Project's overarching goal of preparing students for the transition from university to the professional work environment. This theme encapsulated the essence of WOW as a pivotal platform for bridging the academic and professional realms, underscoring the necessity of equipping students with practical skills and real-world knowledge. The project served as a conduit for translating theoretical knowledge into actionable competencies, essential for navigating the professional landscape.

A critical component of this preparation was instilling a sense of *real-world relevance*. The necessity of real-world relevance was unanimously recognised across the groups, highlighting the project's role in providing tangible applications of academic learning. The students underscored the criticality of aligning educational experiences with industry demands and professional practices. For instance, Group 1 lauded the project for its ability to "equip students with the necessary tools and knowledge to transition smoothly into the corporate world", while Group 4 commended its "practical approach in preparing us for the realities of the working environment".

Another vital aspect of preparing for the professional world involved *skills development*. Skills development emerged as a key focus, with the WOW Project being perceived as a crucible for honing essential professional skills such as networking, personal branding, resume writing, and interview techniques. This facet of the WOW Project was particularly emphasised by Group 2, who noted the importance of "developing networking skills and understanding the value of a personal brand in the professional world". Similarly, Group 5 highlighted the WOW Project's focus on "the critical skills of resume building and interview techniques as vital for the job market".

Furthermore, the WOW Project fostered *collaborative learning*. This was a pronounced theme, reflecting the WOW Project's success in creating a community of learning and cooperation among students. This aspect

celebrated the diversity of perspectives and the richness of shared experiences that enhanced learning outcomes. Group 3 observed the "collaborative nature of the WOW Project, where students from different years and disciplines came together", whereas Group 6 pointed out the "shared experience and the collective effort in organising the event, which enhanced our learning and teamwork".

Finally, the students gained invaluable *professional insight*. The interaction with industry professionals provided students with real-life perspectives and practical advice on various career paths. Group 7, who valued "the insights gained from industry speakers", and Group 8 who appreciated "the opportunity to interact with professionals, gaining firsthand knowledge and advice on career progression", vividly captured this sub-theme.

5.2 Theme 2: Project management and leadership experience

The second prominent theme across the groups was project management and leadership experience, underscoring the WOW Project's role as an experiential learning platform (Kolb, 2014). This theme highlighted the practical application of project management principles and the cultivation of leadership skills through direct involvement in organising the WOW Event.

A critical aspect of this experience centered around *project planning and execution*. This was where students applied theoretical knowledge to real-world scenarios, navigating the complexities of organising a large-scale event. For example, Group 1 detailed the systematic approach to "planning, organising, and executing the workshop", reflecting the hands-on experience gained in project management. Similarly, Group 4 described their journey of "setting objectives, defining roles, and managing timelines", illustrating the practical application of project management skills.

In addition to planning, the WOW Project fostered *leadership development*. This sub-theme involved students reflecting on their experiences of leading teams, making decisions, and guiding the project to success. Group 2 highlighted the development of "leadership skills through steering committee meetings and decision-making processes", while Group 5 emphasised "taking initiative and leading various aspects of the event, which honed our leadership abilities".

The event also shined a light on *team collaboration and dynamics*. This area focused on the interpersonal and group dynamics encountered during the project. Group 3 noted the "challenges and learning experiences in team collaboration, enhancing our ability to work in diverse groups". Group 6 shared insights into "navigating team dynamics and leveraging individual strengths for collective success", demonstrating the importance of effective teamwork in project management (ECSA, 2018).

Finally, the WOW Project necessitated *problem-solving and adaptability*. This theme captured the students' ability to address unexpected challenges and adapt to changing circumstances. Group 7 recounted "tackling unforeseen issues and adapting our strategies", showcasing the critical thinking and flexibility required in project management. Group 8 discussed "the need for quick problem-solving and adaptability when facing logistical hurdles", highlighting the dynamic and unpredictable nature of managing real-life projects.

5.3 Theme 3: Communication and interpersonal skills enhancement

The third theme identified across the groups was communication and interpersonal skills enhancement, focusing on how the WOW Project contributed to the development of students' communication abilities and interpersonal interactions. This theme underscored the significance of effective communication and relationship-building in a professional setting, highlighting how these skills were critical for successful integration into the workplace (ECSA, 2018).

One crucial aspect was the development of *effective communication practices*. This theme emerged strongly, with students detailing how the WOW Project supported the honing of their communication skills. Group 1 emphasised "the importance of clear and concise communication in coordinating the event", showcasing the practical application of communication theory. Group 4 noted their growth in "articulating ideas and

presenting in front of an audience", reflecting on the enhancement of their public speaking and presentation skills.

The WOW Project also facilitated *building and networking*. Students acknowledged the WOW Project's effectiveness in fostering professional connections (Lave & Wenger, 1991). Group 2 highlighted "the networking sessions that allowed us to connect with industry professionals and peers", demonstrating the WOW Project's role in expanding professional networks. Group 5 pointed out the "opportunities to build relationships and expand our professional network", illustrating the event's contribution to their networking skills.

The event also emphasised *teamwork and conflict resolution*. Working in teams and resolving conflicts was another significant aspect of this theme. Group 3 described their experience in "learning to work collaboratively and resolving disagreements constructively", showing the WOW Project's influence on team dynamics and conflict management. Group 6 shared their approach to "open dialogue and mutual respect in overcoming team conflicts", emphasising the development of teamwork and interpersonal skills (ECSA, 2018).

Finally, many students reflected on the importance of *listening and empathy*. This was a key insight, with students reflecting on these crucial communication aspects. Group 7 discussed "the practice of active listening and showing empathy in team interactions", underscoring the WOW Project's role in enhancing emotional intelligence. Group 8 mentioned "enhancing our ability to empathise and understand diverse viewpoints", highlighting how the event helped in developing their listening and empathy skills.

In summary, the analysis of student reflections revealed three interconnected themes demonstrating the effectiveness of the WOW Project: enhanced preparation for professional transition, significant gains in project management and leadership experience, and notable improvement in communication and interpersonal skills (Kolb, 2014; Lave & Wenger, 1991; Renkl, 2001). These findings underscore the value of experiential learning in fostering competencies aligned with ECSA's GA8 (ECSA, 2018), indicating the WOW Project's success in providing students with practical skills and experiences relevant to their future careers.

6 Conclusion and recommendations

This study addressed three guiding research questions. First, it demonstrated how the design and implementation of the WOW Project aligned with ECSA's GA8 criteria by embedding teamwork, leadership, communication, and project management tasks within an experiential learning framework. Second, it showed that student participation in the WOW Project contributed to the development of essential competencies, as evidenced by reflections on teamwork, project planning and execution, leadership, and professional readiness. Third, it highlighted, through students' qualitative reflections, how experiential learning created opportunities for shaping responsible engineers prepared for ethical decision-making and professional practice within the South African context.

The WOW Event, integral to the *Industrial Engineering Professionalism and Ethics* module, therefore proved to be a pivotal initiative for bridging the gap between academic learning and professional readiness for final-year engineering students. By organising and participating in the WOW Event, students were able to apply engineering management principles in real-world scenarios, acquire project management and leadership experience, and enhance communication and interpersonal abilities. These findings reinforce the value of experiential learning as a pedagogical approach that strengthens the integration of graduate attributes into engineering curricula.

For future initiatives, it is recommended to broaden the scope of the WOW Event to include workshops on emerging industry trends, ethics in engineering practice, and strategies for lifelong learning. Additionally, implementing structured feedback mechanisms, such as pre- and post-event surveys, would provide quantitative data to complement the qualitative reflections and inform continuous improvement processes.

It is important to acknowledge the limitations of this study. The reliance on self-reported data introduces the potential for bias (Gonyea, 2005; Rosenman et al., 2011), and the study's scope was confined to a single university context and a specific cohort of students. Future research should consider incorporating objective measures of skill development (e.g., performance evaluations) and expanding the study to include multiple institutions and longitudinal data collection to assess the long-term impact of experiential learning on career trajectories. Furthermore, exploring the influence of individual learning styles and personality traits on the effectiveness of such programmes could provide valuable insights for tailoring experiential learning opportunities to meet diverse student needs.

7 References

Boelt, A. M., Kolmos, A., & Holgaard, J. E. (2022). Literature review of students' perceptions of generic competence development in problem-based learning in engineering education. *European Journal of Engineering Education*, *47*(6), 1399-1420. https://doi.org/10.1080/03043797.2022.2074819

Borrego, M., Douglas, E. P., & Amelink, C. T. (2009). Quantitative, qualitative, and mixed research methods in engineering education. *Journal of Engineering Education*, *98*(1), 53-66.

Catalano, A. (2015). The effect of a situated learning environment in a distance education information literacy course. *The Journal of Academic Librarianship*, *41*(5), 653-659.

Cruz Moreno, S. I., Chance, S., & Bowe, B. (2023, September 11-14). *Exploring women's teamwork experiences in engineering education: A phenomenological analysis*. 51st Annual Conference of the European Society for Engineering Education (SEFI): Engineering Education for Sustainability, Dublin, Ireland.

Du, X., & Kolmos, A. (2009). Increasing the diversity of engineering education – a gender analysis in a PBL context. *European Journal of Engineering Education*, *34*(5), 425-437.

Du, X., Naji, K., Sebah, S., & Ebead, U. (2020). Engineering students' conceptions of collaboration, group-based strategy use, and perceptions of assessment in PBL: A case study in Qatar. *International Journal of Engineering Education*, *36*(1), 296-308.

Elliott, R., & Timulak, L. (2005). Descriptive and interpretive approaches to qualitative research. In M. Forrester (Ed.), *A handbook of research methods for clinical and health psychology* (pp. 147-159). SAGE Publications Ltd.

Engineering Council of South Africa (ECSA). (2018). *Ensuring the expertise to grow. Forms to use in accreditation visits documentation. E-13-P, Revision 3*.

Gonyea, R. M. (2005). Self-reported data in institutional research: Review and recommendations. *New Directions for Institutional Research*, *127*, 73-89.

Herrera, S. P. M. (2020). Situated learning theory. In J. Egbert & M. F. Roe (Eds.), *Theoretical Models for Teaching and Research*. Creative Commons Attribution-NonCommercial 4.0. http://opentext.wsu.edu

Hsu, C. and Sandford, B. (2007). The Delphi technique: Making sense of consensus. *Practical Assessment, Research & Evaluation, 12*, 1-8.

Kim, H., Sefcik, J. S., & Bradway, C. (2017). Characteristics of qualitative descriptive studies: A systematic review. *Research in Nursing & Health*, *40*(1), 23-42.

Knowles, M. S. (1975). *Self-directed learning: A guide for learners and teachers*. Cambridge Adult Education.

Kolb, D. A. (2014). *Experiential learning: Experience as the source of learning and development*. FT Press.

Kolmos, A., & de Graaff, E. (2014). Problem-based and project-based learning in engineering education: Merging models. In A. Johri & B. M. Olds (Eds.), *Cambridge handbook of engineering education research* (pp. 141-160). Cambridge University Press.

Kovanović, V., Joksimović, S., Mirriahi, N., Blaine, E., Gašević, D., Siemens, G., & Dawson, S. (2018, March). Understand students' self-reflections through learning analytics. In *Proceedings of the 8th International Conference on Learning Analytics and Knowledge* (pp. 389-398).

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press.

Marton, F., & Säljö, R. (1976). On qualitative differences in learning: I. Outcome and process. *British Journal of Educational Psychology, 46*(1), 4–11.

Newstetter, W. C., & Svinicki, M. D. (2014). Learning theories for engineering education practice. In A. Johri & B. M. Olds (Eds.), *Cambridge handbook of engineering education research* (pp. 29-46). Cambridge University Press.

Renkl, A. (2001). Situated learning, out of school and in the classroom. In N. J. Smelser & P. B. Baltes (Eds.), *International encyclopedia of the social & behavioral sciences*. Elsevier.

Rosenman, R., Tennekoon, V., & Hill, L. G. (2011). Measuring bias in self-reported data. *International Journal of Behavioural and Healthcare Research*, *2*(4), 320-332.

Thomas, K. W., & Kilmann, R. H. (1976). Thomas-Kilmann Conflict Mode Instrument. *Group & Organization Studies, 1*, 249-251.

Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing & Health Sciences*, *15*(3), 398-405.