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The influence of participatory actions and collective agency on mechanical engineering students' work placement learning environments

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Abstract

Purpose – This article reports on a study that explored how individual factors, such as students' participatory actions and agentic factors, interact with the workplace contextual factors to create workplace learning environments that facilitate or hinder student learning.

Design/methodology/approach – The study followed a qualitative approach. It collected data from 34 work placement students using interviews. The students were studying for a diploma in mechanical engineering at a South African university of technology. The data were analysed using thematic analysis.

Findings – The study uncovered four themes relevant to the quality of work placement: the learning environment, student participation, collective agentic actions and the tasks performed. The study found that two learning environments are relevant for student learning: the potential learning environment and the experienced learning environment. It found that employability-enhancing activities and participation required that elements of the potential learning environment transfer to the experienced learning environment. It also found that the collective agency of the students and the industry mentors influences the transfer's effectiveness.

Originality/value – This study elucidates the factors and mechanisms that affect the quality of the learning environment during a work placement. A better understanding of the factors and mechanisms that create employability-enhancing experienced learning environments would enable universities to develop more effective pre-placement programmes, better monitor work placement student progress and better support industry mentors.

Keywords Work placement learning, Experienced learning environment, Student participation, Proactiveness

Paper type Research article

1. Introduction

Work placement is an effective strategy for preparing students for the world of work that cannot altogether be replaced by other forms of work-integrated learning (WIL) (Trede *et al.*, 2013). It involves placing students in a company as part of the curriculum to gain work experience. It enables students to develop employability-enhancing competencies before formal entry into the workforce. There are several modalities of work placement that engineering faculties employ. South African universities' engineering faculties offer two engineering diplomas, the Diploma in Engineering (DipEng) and the Diploma in Engineering Technology (DipEngTech). These diplomas are required for professional registration and practice as an Engineering Technician. For registration as an Engineering Technologist, a further year of study leading to an Advanced Diploma in Engineering (AdvDipEng) is required.

DipEngTech graduates need a year of relevant engineering experience before they could be admitted into the AdvDipEng. The DipEng students are admitted straight to the AdvDipEng. In

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addition to the duration, the DipEng is different to the DipEngTech in that it prescribes a minimum of 30 credits of WIL, which can be work placement, simulated work placement, or project-based learning (ECSA, 2020). The current format of the WIL is that students undertake six months of work placement during the last half of the final year. The advantage of this approach is that the hosting companies can offer the students longer internships that extend beyond graduation. This increases the likelihood of the internship leading to actual employment.

The biggest challenge to work placement as the preferred form of WIL at South African universities of technology is that they struggle to find industry partners to host work placement students (Reinhard *et al.*, 2016). A further challenge is that quality work placement opportunities that provide students with meaningful and worthwhile experiences are limited (Agwa-Ejon and Pradhan, 2017). Ngonda *et al*. (2022a) warn that token placements, poorly structured or inadequately supervised work placements do more harm than good. They indicate that such placements undermine learning, hinder employability skills development, and damage post-graduation employment prospects. Appropriate work placements develop the students' employability-enhancing competencies rather than token placements that benefit employers more than students (Patrick *et al.*, 2008)

To have employability-enhancing competency, students must acquire adequate declarative and procedural knowledge. These are sometimes referred to as knowledge-that and knowledge-how, respectively. Traditional instruction, such as lectures, seminars and workshops, is more effective in imparting declarative knowledge. It is less effective than work-based learning in developing procedural knowledge (Collins *et al.*, 1987). Work placement, a form of work-based education, facilitates the integration of declarative and procedural knowledge. However, its efficacy is influenced by individual factors, such as self-efficacy, self-determination, and impact and contextual factors, such as socio-political support, access to information and resources, opportunities for mobility and growth and meaningfulness (Feldmann and Sprafke, 2015).

Given the above, this study explores how individual factors, such as students' participatory actions and agentic factors, interact with the workplace contextual factors to create workplace learning environments that facilitate or hinder student learning. A better understanding of the factors and mechanisms that make employability-enhancing experienced learning environments would enable universities to develop more effective pre-placement programmes, better monitor work placement student progress, and better support industry mentors.

2. Work placement practices

Work-integrated learning (WIL) is an effective approach for enhancing the employability outcomes of students and exposing them to relevant professional practice. Various work-integrated learning (WIL) modalities involve theory and practice integration within the curriculum. These modalities require engagement in work-based tasks with an external partner. Regarding engineering education in South Africa, the Engineering Council of South Africa (ECSA) recognises the importance of WIL. It has recognised five modalities for this purpose: work-directed theoretical learning, problem-based learning, project-based learning, work placement and simulated work placement (ECSA, 2020). ECSA's stance aligns with global trends in engineering education, which increasingly emphasise the integration of theory and practice (Johri and Olds, 2011).

The complexity of contemporary engineering challenges and industrial demands drives the global shift toward incorporating WIL in engineering education. Modern engineering problems require a diverse skill set beyond theoretical knowledge, necessitating engineers to operate in uncertain, ambiguous, and interdisciplinary settings (Froyd and Lohmann, 2014). Concurrently, industry expectations for graduates with theoretical understanding and practical skills are prompting educational institutions to align their curricula with workforce needs (Mills and Treagust, 2003). Employers value graduates who can transition from theory to practice, demonstrating competencies in project management, teamwork, and technical skills (Passow, 2012).

The environments in which students engage in work placement activities significantly impact their professional growth. This is particularly true in the case of students of mechanical engineering, which is a skill-based course that requires a lot of fieldwork experience. Various frameworks and studies have examined the factors that contribute to effective learning in these settings, particularly emphasising participatory actions, collective agency, and the quality of internship experiences. One relevant theoretical approach to understanding learning in work placement environments is Engeström's Activity Theory, which provides a holistic view of human activities within social settings. Engeström (1987) highlights that learning is shaped by the interaction between the individual (subject), the task at hand (object), and the tools or resources available (mediating artifacts). More also, the broader social structures such as rules, community, and division of labour, are powerful in determining how learning unfolds within these environments. Tensions or contradictions within these systems often drive learning, as individuals and groups must navigate and resolve these challenges to achieve their goals. This framework is particularly relevant to mechanical engineering students, as it emphasises the complexities and the interdependent nature of learning in real-world settings, where both individual and collective agency are critical.

When it comes to workplace learning, Billett's (2004) participatory practice explains the significance of learning through active engagement in social practices. Billett argues that learning is not a separate process but rather deeply integrated into everyday activities. He emphasises that workplaces provide rich learning environments where students gain knowledge by participating in authentic tasks and interacting with experienced professionals. The interplay between the individual's engagement and the opportunities offered by the workplace, referred to as affordances, shapes the learning experience. For mechanical engineering students, this means that their ability to acquire skills during work placements depends not only on their participation but also on the degree to which they are granted access to meaningful tasks and resources. Moreover, the guidance and support from mentors contributes a lot in facilitating students' transition from novice to more skilled practitioners, which aligns with the need for structured supervision in technical fields.

Another dimension to look at is the quality of work placements. Hora *et al*. (2020) identified key components of a good internship experience that are highly relevant to engineering students. According to their study, high-quality internships should provide structured learning objectives, active supervision, and meaningful opportunities for students to apply theoretical knowledge in real-world situations. This ensures that students not only gain practical skills but also see the relevance of their academic learning in professional settings. Furthermore, internships should include opportunities for reflection, enabling students to critically assess their experiences and integrate them into their broader professional development. These reflective opportunities are important for mechanical engineering students as they translate technical tasks into deeper learning experiences. Hora *et al*. (2020) also stress the importance of professional networking and inclusivity within the work environment, ensuring that students feel supported and can build connections that will serve them in their future careers.

Adding to this discourse, Andrews and Higson (2008), in a European study on graduate employability, highlight a critical issue: students often perceive the tasks undertaken during work placements as too administrative or routine, which can limit the development of their "hard" technical skills. However, they also recognise the value of these tasks in cultivating essential "soft" skills like communication, teamwork, and adaptability—skills that employers increasingly prioritise. This finding underscores a challenge in mechanical engineering work placements, where students may prioritise technical proficiency over soft skills, even though both are crucial for employability (Andrews and Higson, 2008).

The role of universities in preparing students for work placements is very important. Universities must not only equip students with technical knowledge but also ensure that they understand the importance of soft skills in the workplace. As Hora *et al*. (2020) highlight, a quality internship should offer structured learning objectives and meaningful tasks, enabling students to apply both hard and soft skills. Universities should collaborate with employers to design placements that provide a balance of technical tasks and opportunities for interpersonal skill development. This balance is especially important in mechanical engineering, where students' expectations of acquiring technical expertise must align with the broader demands of the professional environment.

Work placement provides a significant advantage to students by enhancing their employability. Traditional teaching methods like lectures, seminars, and workshops are useful in imparting declarative knowledge (Collins *et al*., 1987). This is not enough for employability. To acquire competencies that enhance employability, students need both declarative and procedural knowledge. Procedural knowledge is more effectively developed in work-based learning methods such as work placement (Billett, 2020). In some instances, work placement can lead to actual employment. A South African study found that some host companies offer students longer internships that extend beyond graduation, which increases the likelihood of the internship leading to actual employment (Jacobs, 2015).

Despite its benefits, work placement in South Africa faces significant challenges. One of the biggest challenges is finding industry partners willing to host work placement students (Mutereko and Wedekind, 2016). Additionally, quality work placement opportunities that offer students meaningful and worthwhile experiences are limited. Poorly structured or inadequately supervised work placements, often called token placements, do more harm than good (Ngonda *et al*., 2022a, b). They undermine learning, hinder employability skills development and damage post-graduation employment prospects. It is worth noting that these challenges are not unique to South Africa; they are common in many countries due to the high costs and resources required to host students (Patrick *et al*., 2008).

Through its positioning in the curriculum, work placement facilitates the integration of declarative and procedural knowledge. However, various individual and contextual factors influence its effectiveness in facilitating the integration (Inceoglu *et al*., 2018). Individual factors include self-efficacy and self-determination, which have been found to influence students' learning outcomes in work placements (Bandura, 1997). Contextual factors such as sociopolitical support, access to information and resources, opportunities for mobility and growth, and the meaningfulness of the work. This study explores how individual and contextual factors interact to create workplace learning environments that facilitate or hinder student learning. By understanding the factors and mechanisms that produce employability-enhancing experienced learning environments, universities can develop more effective pre-placement programmes, better monitor work placement student progress, and better support industry mentors.

3. Theoretical framework

This study was underpinned by situated cognition theory, sometimes called situated learning theory. Situated cognition theory is a group of theoretical positions that share the assumption that knowledge, learning and cognition are inextricably situated in their sociocultural settings of production and use (Ormrod, 2016). The theory shifts from the cognitivists' conception of learning as a mental process, conceptualising it as a product of social activity. Situated cognition theory postulates that students learn through guided performance of work assignments (Brown *et al*., 1989) and participation in workplace activities (Lave and Wenger, 1991).

Lave and Wenger's (1991) legitimate peripheral participation theory is one of the most significant situated learning theories. This theory shifts the focus away from relationships between students and their teachers to students and the entire community of practice. Legitimate peripheral participation refers to the process through which newcomers become old-timers. The process is premised on the community practice of accepting newcomers as its members. This acceptance is required before the newcomers can access a shared repository of resources such as experiences, stories, cognitive and physical tools and ways of solving problems. The theory is premised on the idea that learning concerns the whole person acting in the world rather than cognitive processes in the mind (Lave and Wenger, 1991).

In work placement learning, the students are newcomers to the workplace community. The community's acceptance gives the newcomer authority to enter the community. If the community of practice does not accept a person, he or she might render or receive service from the community but will remain an outsider or a transactional participant (Karalis, 2010). Lave and Wenger (1991) state that the term "legitimate" defines belonging, indicating that, unlike a transactional participant, the legitimate peripheral participant is identified by the community as one of its members. They further state that learning through participation entails changing the community's location, power dynamics, and identity development. Lave and Wenger (1991) indicated that participation would be peripheral, full or central.

Karalis (2010) explains that in later work, Wenger added more detail to the concept of level of participation. The updated version of the five levels of participation is summarised in Figure 1. They reflect what newcomers go through as they learn and develop competence through participating in the community of practice.

The five levels of participation delineate distinct roles and engagement dynamics within the community, running from the outer to the core (Ngonda, 2020). The first level comprises transactional participants who engage in exchanges of services or information but remain external to the core dynamics of the community. Moving closer to the community centre are peripheral participants who are newcomers beginning to find their place within the group. Unlike transactional participants, they feel accepted and acknowledged by the community, even if they have not yet been fully integrated.

4. Research methods

This paper describes a qualitative study that reports on the experiences of thirty-four mechanical engineering students from a single university of technology in South Africa. The students were selected using maximum variation purposeful sampling from a population of 245. Maximum variation purposeful sampling is preferred in studies seeking to discover patterns that cut across diverse experiences (Patton, 2015). One of the work placement coordinators served as a key informant for the research and assisted in identifying participants who fit the study criteria. The study used interviews and student logbooks as the primary data sources. It also used observation to assist the researcher in understanding the background of students' experiences. The authors transcribed the interview audio recordings and retyped the logbook entries. These were imported into NVivo for computer-assisted thematic analysis

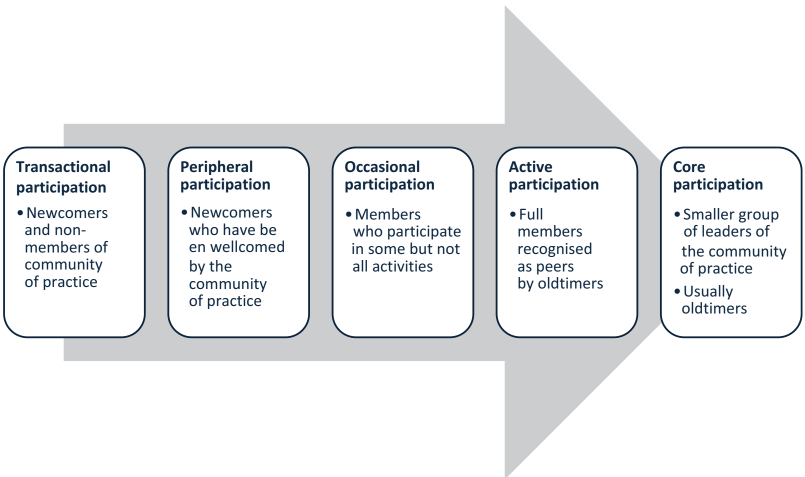

Figure 1. A description of the levels of participation in a community of practice. Source: Authors' own work

(Ngonda *et al.*, 2022b). The thematic analysis was iterative, starting with developing initial codes from twelve cases. After that, the initial codes were processed into higher-level codes using code comparisons, cluster analysis and hierarchical charts. The process was repeated with additional cases until no further codes emerged after additional five cases, indicating theoretical saturation. The authors then coded the remaining seventeen cases. This extra coding was done to strengthen evidence of code associations and patterns. Lastly, the higher-order codes were categorised into themes. The study received ethical approval from Faculty Ethics in Research Committee.

5. Findings

This article reports on four themes that emerged from the analysis: the learning environment, collective agentic actions, student participation and the tasks performed.

5.1 The learning environment

The environment within a hosting company constitutes a potential learning environment (PLE). This PLE comprises all the things in a workplace that would contribute to student learning, such as the practitioners, their activities, tools, and the artefacts produced. The PLE exists because the workplace is structured for producing goods and services and is not ordinarily a learning site, only a potential one. PLE represents the *theoretical or intended environment* where learning could occur. It includes the resources, opportunities, and structures that are available or designed for learning but may not be fully utilised by students. The PLE is often the ideal or planned environment, including all the possible supports and tools that could enhance learning if fully accessed or engaged with. When a work placement student enters the workplace, another environment, the experienced learning environment (ELE) is socially constructed from the PLE. ELE refers to the actual conditions and experiences students encounter during their learning process. It encompasses the tasks, interactions, and support systems students engage with, as well as the challenges and opportunities they face in real-time. The ELE is shaped by factors such as mentorship quality, access to resources, the nature of tasks, and the social dynamics within the learning setting. Essentially, it is what students *actively experience* and how these experiences influence their learning outcomes. In most cases, ELE is different from PLE and the key difference is that the PLE is about what is possible or available for learning, while the ELE focuses on what students actually experience and how they use the available resources in practice. The gap between the PLE and ELE can highlight areas where opportunities are missed or where learning environments can be better optimised to match the intended design.

Some of the elements in the PLE are absent from the ELE. The WPL students do not experience all constituents of the PLE. For example, Chimwemwe (pseudonyms used for the participants) participated in briefing sessions and performed administrative work but did not participate in hands-on engineering work such as maintenance. For her, the PLE included office-based and hands-on engineering work. However, her ELE was limited to office-based engineering work.

> There would be an engineering meeting every day. If there were breakdowns, the manager would ask the process and the maintenance guys to explain the problem and their plans. He would also ask if I had anything to add . . . I participated in meetings and did many administrative jobs, sending quotations and putting posters on the factory floor. However, I did not join in fixing the breakdowns. They did not invite me. I understand that you cannot trust a student to do your work, but you let us do the small things. I feel that the company did not have a strong student programme. Chimwemwe

There is an inherent risk in assigning students to crucial work assignments. This risk had the potential to limit the transfer of PLE to ELE. Other student experiences in this study indicate this was not always the case. Some students, such as Chisomo, were exposed to hands-on engineering work. Chisomo reports that he was involved in hands-on maintenance work, a contrary experience to Chimwemwe.

> At university, we did not learn much about conveyor belts. We just learned about your regular belt drives. Here, I learnt how to mount the conveyor belt, the entire structure, the belt and everything. Then, I moved on to the mechanical maintenance department, where my day-to-day job is with the artisans; we work wherever we have breakdowns, not just the conveyor belt system. It is about the entire system, like from the rock breakers that crush the ore and then that goes onto the belt because, with your belt, there is a certain tractability and certain size of ore that can go onto the belt. Chisomo

The flexibility of a particular workplace aids or constrains the transfer of elements from the PLE to the ELE. Flexibility refers to how accommodating a workplace is to students' learning needs, such as tolerance for errors and delays to work delivery. The nature of the industry sector and company culture influence the flexibility of a particular hosting company. For example, Malvin explained that at his hosting company, there was a low tolerance for work errors because of the strict quality requirements of their industry sector.

> There is a difference in how you understand consequences when you compare the university and the real world. Okay, you know the consequences of actions when you are here at the company instead of at the varsity. In the real world, they don't look at you as an individual but how it reflects on the company. So they would say, you have supplied us with the wrong parts. Out of maybe 50000 parts, if they find one part is wrong, they will send the batch to us. So if we delay their production, they will ask us to pay them because of only one faulty part that has been identified. Malvin

This does not imply that if a workplace environment is flexible, then most of the elements of that PLE will be reflected in the ELE or vice-versa. However, more effort is required to produce an efficacious ELE in a rigid workplace than in a flexible one.

5.2 Student participation

The work placement students achieved all four levels of participation in workplace activities. Some students were transactional participants and performed tasks that solely served organisational goals. For example, Thomas complained that he was only assigned minor administrative work, such as laminating paper and putting up posters.

> I disliked that they did not, even other engineers, value students. You see, I chose engineering for a reason. I cannot go into a working environment and be asked to laminate papers. You find that the person will not call you when they are doing actual engineering stuff. While they are busy doing the designs and layouts, they will do it by themselves. When they are done, they will give you papers to laminate and ask you to go on the factory floor and put them up. Thomas

The students' responses focused on technical aspects. Their perceptions of the quality of the activities they were exposed to did not account for other valuable skills, such as interpersonal skills. Even transactional participants learnt valuable skills from the work placement. An example of this is Kelvin, who worked as a machine operator on a bottling line at a beverage company

> I am pushed to talk to different people, the electricians and the engineers. There are some engineers who are working on the other lines. They are not on our line. So I have to go there and talk to them and ask them something, you know, questions relating to the machine that I am operating. Kelvin

Other students were peripheral participants and worked under supervision, performing minor tasks for their supervisors. These students had access to guided practice. Others were occasional participants. They participated fully in some activities but were excluded from participating in others. Chimwemwe discussed earlier, is an example of an occasional participant. She participated in meetings but did not participate in hands-on maintenance activities.

Furthermore, some other students were active participants who oversaw projects, interacted with hosting companies' clients and represented the hosting companies at off-site activities. These students were treated as full-time employees of their hosting companies.

> First, you become an operator. Later, you move into the CNC office. In the CNC office, you will nest all the parts the other project managers need. Once those parts have been nested, they will be sent to the CNC machine. You will manage that as a type of small project. You control the plates that come in that are needed to be cut, everything along that line. Once you are done with that, you become a project manager and manage small projects. Thokozani

5.3 Collective agentic actions

The findings indicate that collective agentic actions have two components, mentor capacity and student proactiveness. Mentor capacity refers to a mentor's authority to assign work and delegate tasks. In most cases, mentor capacity was related to a mentor being senior enough in a hosting company can instruct other employees to work with the student, thereby expanding the student's ELE.

The experience of Beston illustrates the influence of mentor capacity on a student's ELE. Beston's industry mentor gave him the latitude to choose the areas of the company's plant where he wanted to work. This was because the mentor's position gave him authority to assign roles and tasks to employees.

> I had a meeting with the engineering manager, who told me I should go to the plant and see what they have. He said mechanical engineering is a huge field. He said I must find what I want to learn and the outcomes I want to achieve. He said I must draw my own schedule and then come and present it to him, and my placement will be based upon that. I told him I like the thermodynamics stuff they have, compressors and other stuff. We agreed on the sections I should work in, and that has formed my whole schedule. It would have been pointless for them to say what I must learn because it was my opportunity to learn. Beston

Additionally, students' proactiveness also influenced the nature of work assignments and their level of participation. Proactive students were more likely to discuss their learning needs with their mentors' thereby allowing the mentors to find ways of meeting them. In addition, proactive students tended to participate in choosing work assignments. For instance, Malvin explains that she had regular student-level projects initially, but this changed when she started being proactive.

> They gave me one project that lasted about two months. It is something that if you give me now I can do in one or two weeks. I would just sit there and do it. I realised that when I started being proactive, I got better projects. I can actually say that my current project is a better one. It is actually a project that goes to management, which can get you recognition, not just a small project that no one cares about. Malvin

In a way, the collective agency of the WPL students and their mentors promoted the transfer of elements from the PLE to the ELE. What was needed was a student-focused, high-capacity industry mentor and a proactive work placement student.

5.4 The tasks performed

The work placement students performed tasks from managing projects to photocopying and putting up posters. Some students performed tasks that did not require engineering skills. The students referred to these mundane tasks as "no engineering" tasks. These tasks would sometimes occur within broader engineering environments. An example was operating a machine by pressing a button, as with Kelvin and Chuck. The students felt that the tasks they were assigned did not involve enough technical engineering work. Other "no engineering" tasks included operating production machines, removing welding splatter using a grinder, and inspecting the quality of automobile components using go and no-go gauges, among others. Perhaps students' categorisation of some tasks as having no engineering value reflects their growing professional identity as engineers or engineering technicians.

> I worked as a machine operator operating palletiser machine. Kelvin

> I am a machine operator. I am a packing machine operator. I press a button. That is what I do every day. Chuck

Other students performed tasks that they considered appropriate for entry-level engineering practitioners. Appropriate duties included performing complex cognitive tasks. For example, Oliver designed overhead cranes, and Martin led an engineering team that installed industrial boilers off-site.

> I designed overhead cranes and performed stress analysis to see if they would not fail in service. I also took into account legislation. I had to run simulations on [FEA software] and put on loading limits with the relevant factor of safety on it. Oliver

> I was given a boiler inspection project in [City]. I ran the entire project, from collecting the tools to coordinating the project. I was the project leader. We stayed in [City] for two months, April and May. It was five guys. I went with a welder, two labourers and a boiler maker. Martin

The nature of the tasks performed was essential to the students. They thought that tasks such as computer-aided drawing (CAD), finite element analysis (FEA), machine component design, machine installation and maintenance and programming computer numerically controlled (CNC) machines were appropriate learning tasks. Those who performed these activities were proud of their accomplishments. For instance, Mark was happy that his CAD abilities were considered comparable to that of a professional:

> We had to put a 16 mm plate to make it thicker and for support. The same thing happened on another boat. My boss asked me to draw our solution for the other boat so we could show them what they needed to do and how to cut the plate to size. So I drew it in [CAD], and they were very impressed. He said it was the standard of the Naval architect that they use. He told people that I drew so well. I felt good about myself because of that impression. Mark

A common complaint that the students made was that they felt that the University did not adequately prepare them for some aspects of engineering work, such as people-related tasks or tasks related to managing engineering work. As a result, they considered these tasks as being "thrown under the bus". It was clear that the complexity of the "thrown under the bus" tasks were similar to what they considered appropriate. The difference was in the autonomy that they operated under. The students preferred a gradual withdrawal of support by the industry mentors instead of a rapid withdrawal of close guidance.

Figure 2 represents associations between various secondary codes that were uncovered during thematic analysis, among student proactiveness, tasks performed and the level of participation in work activities. This figure suggests that students learnt through participation and by performing work activities within the ELE. Chisomo alluded that they participated in the work assignments of the hosting company's employees. He said, "my day-to-day job is with the artisans". In learning through participation, the quality of learning depended on the extent of student participation. Participation provided students with access to guidance.

The associations suggest that students would become active participants by the end of their work placement regardless of initial participation level. Students who were active participants performed practitioner-level tasks without supervision ("thrown into the deep-end" tasks). Students on other participation levels worked under supervision. Transactional participation was associated with "no engineering' tasks and occasional participants with appropriate-level tasks. The associations suggest that a change in participation level was possible. However, it required intervention by either the student or the industry mentor. Transactional participants need to be given appropriate tasks to become peripheral participants. In turn, peripheral participants are required to be proactive to become occasional participants. Transformation into active participants required collective action by the student and the industry mentor. Finally, the industry mentors needed to entrust the students with "thrown into the deep-end" tasks, and the students needed to perform such challenging work assignments resiliently.

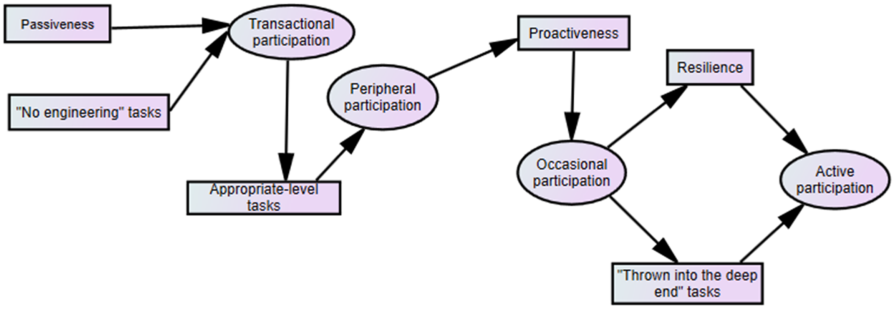

Figure 2. Associations amongst agentic actions, levels of participation and tasks performed in the experienced learning environment. Source: Authors' own work

6. Discussion

Uncovering of the existence of two environments, the PLE and the ELE, in work placement settings implies that the productive work placement learning environment is individually oriented. Thus, two students placed in the same hosting company achieve different outcomes. When adopting work placement learning, universities must understand that workplace activities have goals other than student learning. Work placement students are not best suited to delivering operational workplace goals (Kramer-Simpson, 2018; Ngonda *et al.*, 2022b). Thus, in most cases, quality work placement will not happen on its own without intervention from the work placement coordinators, the industry mentor and the students. A good hosting company does not automatically result in good work placement experiences. Several enabling factors need to be present, primarily related to the collective agency of the work placement students and their industry mentors. Table 1 summarises key aspects of potential and experienced learning environments.

Figure 3 illustrates two factors, mentor capacity and student proactiveness, that influence the process of transfer of constituents of the PLE into the ELE. It is clear from this that the students and their mentors are key role players in ensuring successful work placement as they jointly push constituents of the PLE into the ELE.

The industry mentor's role in enabling as much transfer of PLE components into the ELE hinges on the authority to assign meaningful tasks to the students, provision of contingent scaffolding and understanding of work placement learning goals and how to assess their

Table 1. A comparison of potential and experienced learning environments

Potential learning environment	Experienced learning environment
Structured for production but includes elements that could support learning (e.g. tools, practitioners, tasks)	Socially constructed from the PLE; shaped by real-time interactions and experiences
Includes all resources, supports, tools, and opportunities available in the workplace	Includes the tasks, interactions, support systems, and challenges experienced by the student
What could be learned or accessed	What is actually learned and accessed
Influenced by workplace structure, availability of tools and experts, theoretical learning design	Influenced by mentorship quality, task assignments, social dynamics, and support from the host company
Can highlight missed opportunities, underutilised resources, or overly idealistic expectations	Demonstrates the real-world limitations of workplaces as learning environments
Represents potential learning outcomes if fully accessed	Reflects actual learning outcomes, which may be narrower or broader than expected based on how much of the PLE is engaged

Source(s): Authors' own work

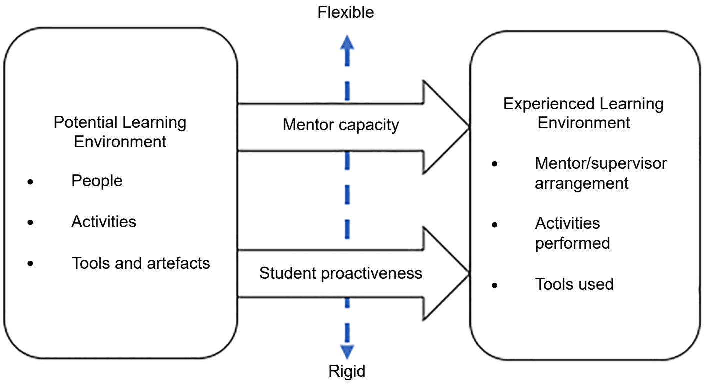

Figure 3. Transfer process from the potential learning environment to the experienced learning environment.
Source: Authors' own work

achievement. Appropriate level work for students is vital for learning within the ELE. Therefore, they need to be carefully chosen and adequately prepared. First, industry mentors need to be sufficiently high in their organisations' hierarchy to secure, structure and allocate work for the students according to their learning needs. Second, they need to be adequately trained to perform their role. This would enable them to understand what the University expects the students to achieve during the work placement. In addition, their preparation would focus on the rationale and strategies of securing appropriate work for their students.

For work placement students, proactiveness is an essential behavioural attribute needed for successful placement. Research shows that industry mentors frequently express frustration that students do not clearly communicate their needs (Kramer-Simpson, 2018). They equate proactiveness with initiative and commitment. Consistent with these findings, this study reveals that students who demonstrate greater proactivity tend to achieve more favourable outcomes in their work assignments. By informing the industry mentors of their learning needs and lobbying for appropriate level work assignments, the students promote the transfer of elements of the PLE into the ELE. Thus, students would benefit from pre-placement training that assists them in developing proactive dispositions and how they should manage themselves during their placement. Although it is often assumed that these role-players are familiar with what is expected of them, pre-placement preparation would ease some students' frustrations during work placement.

Work placement students also learnt by performing work activities because learning is inherent in all work activities, even without guidance. For instance, when one repeatedly performs a work task, performance becomes faster, tacit and autonomous refers to this as proceduralisation (Anderson, 1982). This is also how students learn to perform activities better and faster in the workplace. However, it seems that this learning is influenced by the students' perceptions of the tasks.

Active participation is desirable as it is associated with high self-efficacy. High self-efficacy and proactivity are crucial for employability (Dacre Pool and Sewell, 2007). In addition, active participation is associated with resilience. This association might have arisen due to active participants' exposure to challenging tasks. Resilience here refers to the capacity of students to sustain participation in challenging situations.

7. Conclusion

This study found a difference between the potential learning environment, the work environment apart from the student and the experienced learning environment. The implication of this is that it cannot be assumed that securing a good and occupationally relevant hosting company will translate to a successful work placement. Also, two or more students placed in a single hosting company could have different work placement learning outcomes. The study further found that the similarities between the potential learning and experienced learning environments depended collectively on student proactiveness and industry mentor capacity. These two factors represent the collective agentic actions that transfer elements of the potential learning environment into the experienced learning environment. In addition, more elements of the potential learning environment are transferred to the experienced learning environment leading to authentic and meaningful work placement experiences if the collective agency is higher. It is worth noting that the transfer is associated with increased participation in authentic workplace activities. Students who are active participants are exposed to an experienced learning environment that is closer to the potential learning environment. The importance of mentor capacity in this study aligns with Hora *et al*. (2020), who emphasise that active supervision and guidance are crucial in shaping meaningful internship experiences. Mentors play a pivotal role in assigning appropriate tasks and fostering students' professional development through reflective opportunities. This study supports Hora *et al*.'s (2020) findings by demonstrating that students with proactive mentors experience work environments that better align with their learning goals and professional aspirations.

8. Implications and recommendations

This study has implications for how universities prepare and monitor student learning during a work placement. There is a need to shift emphasis from assessing student performance during work placement to creating conditions that facilitate the development of employability-enhancing competencies. Universities must prepare and create an empowering environment that enables their students to articulate their learning needs to their industry mentors. To achieve this, they must train industry mentors in student-supportive behaviours. Most industry mentors are professional engineers or technicians who are not typical educators. They were not trained to structure, support, monitor and assess student learning during a work placement. Their effectiveness would be enhanced if they were provided training addressing these aspects of work placement. To reduce cost, this training would be in the form of self-paced online learning for potential industry mentors. A further benefit of training is that it would promote a more structured and consistent quality of work placement programmes across the partner organisations.

It is clear from the findings that high capacity industry mentors and student proactiveness are essential ingredients of successful work placement. Universities may promote successful work placement by selecting high capacity industry mentors and adequately training them for their roles. They must select industry mentors appropriately positioned in the organisations' hierarchies. Ngonda *et al*. (2022b) showed that if industry mentors, such as executives, are too senior, they are often too busy to attend to the daily students' learning needs. A suitable level for mentors would be positions such as engineering manager or workshop manager, as these individuals often handle everyday operational matters. Increasing the number of high-capacity mentors requires expanding industrial partnerships. The expansion could be done if universities leveraged their Industry Advisory Boards, alumni and professional associations. Most engineering departments have Industry Advisory Boards and discipline-specific professional associations whose members could be involved in recruiting partner companies for work placement.

9. Limitations

The authors acknowledge the study's limitations and recognise that a larger study encompassing several disciplines would produce more transferable results. This study's participants were from the mechanical engineering department of a South African university.

Also, as a qualitative study, the generalisability of the findings is limited. This does not mean that the findings of this study have no value, as they would form the basis of future extensive and cross-country multi-disciplinary studies.

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