A teaching model to promote learning agility in a university course[1]

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ABSTRACT

Producing graduates with advanced problem-solving capabilities that function in ambiguous complex contexts is imperative for the academy and praxis. This paper articulates authentic learning theory within an agile problem based learning approach as a pedagogical curricular foundation for a conceptual model that diminishes boundaries between work and study to catalyse learning agility. It uses social problems requiring interdisciplinary collaboration to develop students' knowledge arenas using five learning loops; Individual Discovery, Disciplinary Collaboration, Interdisciplinary Collaboration, Expert Evaluation and Reflection. A knowledge arena is a locus for learning a specific domain. Learning loops are the experiential processes through which knowledge arenas are constructed to inculcate learning agility and gain industry relevant skills for work. The approach equips students with critical literacies, disciplinary mastery, interdisciplinary reflective thinking skills and prepares them to respond more successfully to uncertainty during decision-making. Each loop is incrementally complex to allow students to adjust their learning from teaching, corrective and informational feedback, research, and informational inputs from lecturers, tutors, industry and issue experts to apply them progressively with each iteration. The model can be applied to various higher education curricula.

Keywords: agile problem based learning, authentic learning, communities of learning, critical thinking, deep learning, learning agility

INTRODUCTION

Globally, higher education and contemporary business are currently experiencing exponential shifts largely driven by disruptive technologies that result in operational uncertainty, complexity and the need to respond to the ambiguities of a continually changing environment.

South African societal demands for transformation and inclusive curricula necessitated by the #FeesMustFall movement are sharp reminders of how powerful stakeholders can disrupt and redefine operations in order to remain relevant. If current trends continue, the future world of work will exhibit turmoil and dynamical business cycles that require marketing and communication educators to rethink curricula, current models of delivery and produce graduates that meet current and future work demands within a rapidly changing

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higher education context. Perhaps more importantly, the need to produce graduates that can solve problems using creative, innovative and critical thinking amid ambiguity has become an imperative for higher education and industry alike.

This paper articulates authentic learning theory within an agile problem based learning approach as a pedagogical curricular foundation for a model that diminishes boundaries between work and study to catalyse learning agility. It uses social problems requiring interdisciplinary collaboration to develop student's knowledge arenas using five learning loops: Individual Discovery, Disciplinary Collaboration, Interdisciplinary Collaboration, Expert Evaluation and Reflection. The model can be applied to various higher education curricula with a vocational focus or with some practical components.

AUTHENTIC LEARNING

Meyers and Nulty (2008) argue that through the interplay between the student's learning, the curricula and teaching methods employed, high quality learning can be attained, mainly through the introduction of deep learning approaches such as authentic learning.

Deep learning approaches

Deep learning is based on appropriate prior knowledge and requires meaningful engagement on the students' part, which can be facilitated by interest, a sense of purpose and challenge (Biggs & Tang, 2011). Deep learning leads to improved understanding, develops integration of knowledge and enables students to apply their own and other's ideas to new situations (Meyers & Nulty, 2008).

The concept of authentic learning is relatively new, however, other related concepts such as situational learning, action learning, project based learning, problem based learning, collaborative problem solving, and goal based scenarios have been used by educators for several decades (Ardley, 2006; Calver, Gold & Stewart, 2013; Rule, 2006). Authentic learning represents the shift in learning theory from behavioural to cognitive to constructivist in the past 30 years (Herrington & Herrington, 2007).

Constructivism

Constructivism assumes that students construct knowledge through their own activities that build on the foundation of their prior knowledge (Biggs & Tang, 2011). This constructed knowledge is based on social experiences and community interaction (Slavin, 2004) and not only by assimilating what is taught by educators (Maphalala, 2017). However, to build meaningfully on this knowledge, student learning should be situated in authentic learning environments that interface with challenges facing either a specific community or society. Therefore, authentic learning is student centred and empowers students by allowing them to use their personal frame of reference and evokes high order thinking skills.

High order thinking and the development of critical literacy

Brookhart (2010: 3-8) defines high order thinking as:

- *the transfer of knowledge* characterised by the recall, sense making and utilisation in varied contexts
- *critical thinking* which entails reasoning, reflection, questioning, comparisons, observations, exploring divergent points of view to make decisions
- *problem solving* which entails the creative, critical evaluation of content to reach a goal or the strategy employed to reach a goal.

The essential components of authentic learning as identified by Rule (2006) are developing critical literacy that requires exploring multiple perspectives and recognition of social barriers. In addition to

specific instructional outcomes, this mode of learning provides students with opportunities to develop life skills such as, problem solving, time management and team work. By participating in authentic learning environments, students take responsibility for their own learning as well as for the learning of others.

How context contributes to cognition and knowledge construction

Authentic learning rests on a view that student learning is promoted when it occurs in a meaningful context grounded in reality (Mims, 2003; Campbell & Oblinger, 2007) and acknowledges the interdependence of a situation and cognition (Herington & Oliver, 2000) for knowledge construction. In line with the authentic learning approach, Meyers and Nulty (2008) propose curriculum development that involves tasks and experiences based on relevance to the real world, are constructive, sequential and interlinked. Furthermore, tasks should require students to use progressively higher order cognitive processes that provide a challenge, are aligned with each other, and keep them motivated to learn (Meyers & Nulty, 2008).

Authentic activities designed to match the real-world disciplinary-related tasks of practitioners as much as possible (Lombardi, 2007) help students to contextualise and assimilate the content and develop the necessary skills they will use in their adult work experiences. Thus, authentic learning is a pedagogical approach that allows students to explore and construct concepts that originate in real-world problems by making connections between the new material being learnt and previously acquired knowledge and skills (Mims, 2003). However, context alone is not sufficient to engender learning, it needs to be coupled with a problem or challenge to achieve learning goals and sustain student interest.

PROBLEM BASED TEACHING

Problem based teaching offers students and educators the opportunity to co-create learning environments that incorporate real-life complex problems to prime students with various skills for individual and collaborative future work contexts. It is therefore important to examine the requisites, rationale and rewards for the effective use of this approach.

Real-life versus hypothetical problems

Hypothetical problems do not create the high levels of motivation in student learning that real-world problems rooted in accessible contexts do (Luar, 2013). We define a hypothetical problem, issue or scenario as

- imaginary, not practical and based on supposition versus reality
- devoid of contexts or details that students can easily grasp, relate to or research
- well structured for a single right answer by applying predetermined processes and limited concepts acquired through rote learning and memorisation (Cho, Caleon & Kapur, 2015: 4)
- do not require creativity or criticality to solve (Cho, Caleon & Kapur, 2015: 4).

Hypothetical problems can stunt a student's critical literacy and ability to conceptualise novel solutions in the face of complexity. The authentic learning process is purposely designed around authentic tasks set in meaningful and complex (Glatthorn, 1999) or challenging investigations (Luar, 2013) relevant to students' lives, their communities or broader society to engender empathy, buy in and enquiry (Pahomov, 2014). Beyond achieving module outcomes, students are expected to find solutions that change people's actions or attitudes (Rule, 2006) thereby creating solutions that have value beyond the learning achieved for target communities. Students are expected to communicate effectively their findings and strategy to their lecturers, peers as well as audiences and communities outside the lecture hall (Renzuli, Gentry & Reis, 2004).

Thus, the outcome of learning is a valuable product that can be shared with audiences outside the lecture hall (Pahomov, 2014). When learning is centred on topics of interests to students, they 'become emotional stakeholders' (Rule, 2006: 3) in the problem and its resolution. This aids the integration of the knowledge, skills and attitudes required to complete complex tasks. Subsequently, authentic learning cannot take place without a legitimate desire to acquire knowledge and skills (Pahomov, 2014) through deep engagement with content and standards of learning (Laur, 2013).

The critical literacies developed by ill-defined and open-ended problems

The ill-defined nature of the problem catalyses a learning process that involves students identifying the problem, seeking relevant information, categorising, analysing, synthesising and evaluating information (Renzuli et al., 2004). Meyers and Nulty (2008) acknowledge that during the learning process students progressively develop more complex and sophisticated ways of thinking.

The problems presented should also be open-ended, without prescribed paths to solutions and open to multiple interpretations (Lombardi, 2007) to demonstrate that complex issues do not have simple solutions. It is also an opportunity for students to develop the self-confidence needed to make decisions and develop coping mechanisms to overcome feelings of inadequacy and the fear of making the wrong choice when many options exist. Practically speaking, these skills are progressively acquired through an agile trial and error process. This presents several challenges for curriculum designers.

Despite the merits of a problem based teaching approach, in terms of developing students' critical literacies, student buy in and solutions to societal issues; the reality is that in the world of work, complex problems are seldom solved by one specialisation. To authentically create an environment which prepares students for the ambiguity created by open-ended problems, and the skills to work in diverse cross-functional teams, there is a need to expose students to problems that reach beyond disciplinary silos and boundaries (Oksiutycz & Azionya, 2017). A possible solution lies in the use of agile problem based learning which is about interdisciplinarity and using problems that require interdisciplinary solutions (Kek & Huijser, 2017). Although there is significant literature addressing agile concepts applied to management education, there is a lack of academic literature addressing how agile methods can be used broadly in learning environments, beyond management, systems development and engineering contexts (Parsons & MacCallum, 2019).

AGILE PROBLEM BASED LEARNING

Kek and Huijser (2017) position agile problem based learning as a curricular and pedagogical vehicle that diminishes boundaries between work and study, public and private spaces, formal and informal learning environments, to promote connected learning. The learning environment becomes an interconnected and collaborative space where all partners are involved in teaching and learning; students, employers and the wider social networks within and without the university (Kek & Huijser, 2017). Therefore, it is not a departure from authentic learning but rather an enhancement thereof.

Learning agility is defined as the ability and willingness to learn the right lessons experientially and perform those learnings in new scenarios/contexts (De Meuse, Dai & Hallenbeck, 2010; Lombardo & Eichinger, 2000). DeRue, Ashford and Myers (2012) emphasise the speed of learning (an ability to learn quickly) and an ease of movement across ideas, points of view and situations as central concepts of learning agility. Authentic learning with specific reference to agile problem based learning strives to build learning agility capabilities in students to prepare them for work by responding more successfully to uncertainty and making faster decisions.

Other requisites for an agile problem based learning environment

An authentic agile problem based learning environment must be experience based, place students in interdisciplinary communities of learning, have responsive and adaptive support mechanisms, and an integrated, varied assessment strategy. To prepare students authentically, curriculum designers and instructors must collaboratively create:

- ***An experience based learning environment:*** The cultivation of agile capabilities/skills require diverse opportunities to apply lessons learned, receive feedback, and then apply again (De Meuse et al., 2010) and are dependant on an individual's ability to self-reflect. Agile capabilities are a solutions-oriented mindset, principles and behaviours that solve problems incrementally within a specific timeframe according to stakeholder needs. Learning agility, therefore, is catalysed and learnt in accelerated, dynamic, and experience-based learning environments with early and frequent exposure to training experiences that call for adaptive responses (De Meuse, et al., 2010). Timeframes and expected deliverables must be articulated upfront during the problem briefing.

- ***Interdisciplinary communities of learning:*** A community of learning is defined as a system of relationships between people, the activities they are involved in, and the world (Ardley, 2006). Wenger and Wenger-Trayner (2015) identify several characteristics that communities of learning have such as: problem solving, information sharing, coordination and synergy between the members, discussing developments as the task progresses, identifying gaps and documenting work. Within interdisciplinary communities of learning, major tasks cannot be completed on an individual basis but as a multi-skilled collective to reflect the world of work characterised by complex problems tackled by teams reflective of diverse skills, ranks and socio-cultural backgrounds.

  Therefore, group collaboration in interdisciplinary communities of learning is an essential aspect of authentic learning as it promotes collaborative problem solving, integrated decision-making skills and the cross pollination of ideas and knowledge. Not only do students improve their skills through sharing but they are exposed to different perspectives and roles beyond their area of specialisation (Lombardi, 2007) or disciplinary silos to cultivate, sensitise and develop interdisciplinary thinking and problem solving.

  These communities of learning become an experiential locus of collaborative discovery driven learning for all participants regardless of specialisation. Group work in this context, requires students to use social discourse and language for sense making in relation to the world around them. This collaborative context allows students to reflect on their learning as individuals as well as in a group context.

- ***Responsive and adaptive support mechanisms:*** Although students are expected to navigate their own solution, authentic learning within the context of agile problem based learning is facilitated by lecturers, tutors and external experts that use the scaffolding learning technique. This technique varies from learning instructors giving students occasional support, prompts, appropriate feedback, guidance to the completion of an entire task (Brickell & Herrington, 2006; Lombardi, 2007). The support lessens as their ability to tackle the problem improves and progresses through increasingly complex tasks over a 'sustained investigation' requiring temporal and intellectual resources (Lombardi, 2007) to allow students to be inculcated with the relevant content and find a solution.

- ***An integrated and varied assessment strategy:*** The assessment strategy needs to cater for the sustained investigation which can last over a semester or a year. Assessment of learning

activities is integrated, formative and continuous versus just summative. Summative assessment is used to assess what the student has learnt, and formative assessment fosters learning through the identification of knowledge gaps and uses various remedial strategies (Northern Illinois University, n.d.). Therefore, authentic assessment involves varied assessment methods that are staggered according to tasks, instructional outcomes and their complexity. Assessment opportunities are broken up into timed blocks or iterations according to complexity and instructional goals/objectives to provide a dedicated time in which to create a quality solution. These blocks can be from a week to two months long. They offer students to reflect individually or as a group on how to improve a solution after critical feedback. These learning milestones are seamlessly integrated into the learning experience to reflect the world of work (Lombardi, 2007).

Designing an authentic learning environment for undergraduate students that requires interdisciplinary solutions can be challenging in terms of logistics, timing and aligning the curriculums of dissimilar disciplinary contexts, within rigid faculty requirements and learning outcomes. In their approach, the researchers argue that these principles should be adapted to the needs of students, lecturers' strengths, subject matter and the teaching context to promote learning agility in students.

BACKGROUND FOR THE MODEL'S CREATION

Scholarly teaching emphasises disciplinary or field-centred scholarship, which involves a reflective process where teaching practices that promote learning are published in peer reviewed articles to allow other educators to critique, adopt or build on them (Kek & Huijser, 2017). This paper endeavours to do the latter.

The conceptual model presented in this paper, stems from the findings of previous research conducted by the authors (Oksiutycz & Azionya, 2017) in the process of introducing a new curriculum for applied strategic communication (marketing and corporate) courses in the Department of Strategic Communication for second year students at the University of Johannesburg (UJ) in 2014. This was in response to changes in the marketing and communication industry, a need to improve the learning experience, performance and industry relevant knowledge and skills of students. When developing the new study modules, the lecturers used the Kozubska and McKenzie (2012) approach to authentic learning, which has the following characteristics: a small group of participants (community of learning), a project with a real-world problem, the client - problem 'owner', a set adviser and a timeframe. In addition, aspects from learning agility theory, particularly the emphasis on the use of feedback and the opportunity to apply lessons learnt in other tasks as outlined by De Meuse et al. (2010) and the use of an agile problem based approach to tackle serious social issues, including human trafficking, xenophobia and organ donation, were central concepts in the design of the learning environment.

The learning environment was the result of a partnership between the Department of Strategic Communication and the following:

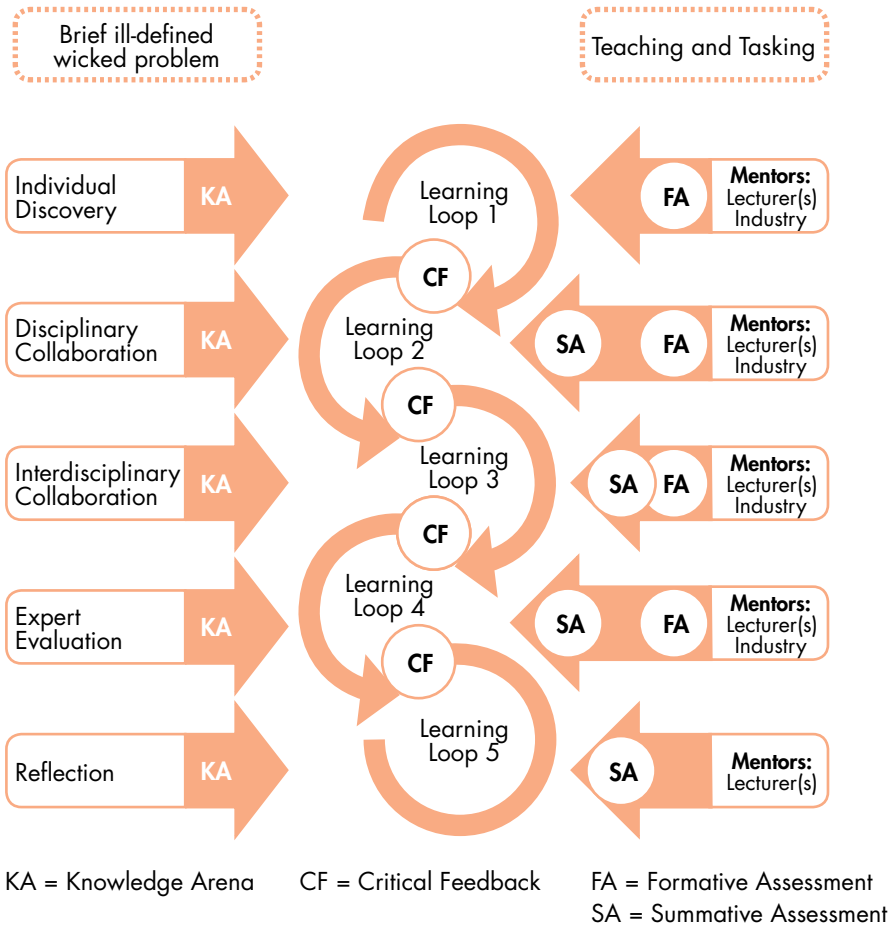
- various clients/problem owners, including the Pretoria Mission of the International Organisation for Migration (IOM), a United Nations Migration Agency, the Gauteng Department of Human Settlements, the Informal Settlement of Zandspruit, Sparrow Schools for special needs children and the Organ Donation Foundation. They briefed students, on a complex problem aligned to their core function that required a strategic communication campaign.
- the Direct Marketing Association of South Africa (as the marketing communication industry expert and set adviser that supported the teaching and learning)
- the Department of Graphic Design, the UJ Faculty of Art, Design and Architecture (FADA) provided interdisciplinary communities of learning consisting of five to eight students.

Although the focus of this paper is not to report on the research that was previously carried out by the authors (Oksiutycz & Azionya 2017), it is pertinent to explain briefly the methods used. Using action research, data were collected from students using a mixed method approach, including 94 questionnaires, 14 in-depth interviews and three focus groups over a period of four years. Throughput rates and assessment marks were also analysed to gauge the success of the new curriculum. During this period, 1001 students went through the programme. After five years of reflection, incremental improvements instituted from the action research, informal discussions and reflective assessment practices; the lecturers have developed a teaching model to promote learning agility (Figure 1), grounded in an authentic learning approach.

The selection criteria for all participants is a critical success factor. Problem owner (client) selection should simultaneously serve societal needs but should be appropriately matched with the relevant disciplinary curriculums. Very importantly, for the model to work the problem owner and relevant industry experts/ partners (set adviser) must exhibit commitment and availability. Without their active participation in the planning stages and role specific interventions, the model does not operate optimally.

Similarly, the selection of interdisciplinary counterparts needs to ensure that students are in a similar grade level or possess the maturity to interact respectfully and learn from each other. Therefore, teams are constructed in such a way as to create balance. This avoids unnecessary power struggles (an us against them mentality). However, the pairing depends on the disciplines involved, logistical requirements and the brief.

Figure 1:
An authentic learning environment for learning agility – a teaching mode



The model (see Figure 1) uses learning loops to develop the knowledge arena of students. The knowledge arena is a locus for learning around a specific domain that enables a student to internalise learning agility for future scenarios. The learning loop is a critical process and mechanism through which a knowledge arena is experientially constructed. Learning loops are not linear and allow students to adjust their learning in response to inputs in the form of teaching, research, appropriate feedback and/or salient information.

Individual discovery

To prompt the exploration and construction of concepts that originate in the real-world problem, students are tasked with carrying out research. This formative assessment requires students to seek, categorise, analyse, synthesise (Renzuli, et al., 2004) and critically evaluate relevant content on an individual basis. This stage is critical and ensures students have more than a superficial knowledge of pertinent issues in relation to the brief. Before submission, an industry expert delivers a master class on relevant industry/ disciplinary related content to develop further the individual discovery knowledge arena.

During lectures, lecturers as subject experts create appropriate links between theoretical concepts and the brief and application of content in other contexts. A few class activities tied to the task are incorporated within this learning loop. Written and verbal feedback is given for the class activities. However, before moving to the disciplinary collaborative learning knowledge arena and loop, students are given critical feedback which is evaluative and informative. What distinguishes high agile performers is their solicitation of feedback (De Meuse et al., 2010) in consultations, asking questions during lectures/tutorials/class activities and implementing corrective strategies and learnings in the next learning loop.

The intra-disciplinary collaborative learning

To allow for the application of learning from the corrective and informational feedback, students are given a similar brief with more cognitive complexity, disciplinary and multi-role task completion requirements. They form self-organised disciplinary groups. Within this learning loop and knowledge arena, the industry expert gives a final master class. The session includes examples on how the brief can be answered using the principles outlined in the master class. The sessions are interactive and designed to elicit informational feedback.

Students are also at a stage where they can engage with the brief and the content more deeply. The industry expert tasks students with a rubric based on the problem owner's brief outlining marks and key expectations for the industry adjudication. A peer benchmarking technique is used by asking the previous year's winner(s) to present their strategy to the class and reflect on their key learning. In addition, tutors who have passed through the process are available for consultation and strengthen the peer benchmarking technique.

This learning loop is designed to evoke disciplinary mastery through collaborative data driven decision making and the identification of the key problem facing the client or problem owner. Additionally, this learning loop encourages collective and coordinated problem solving, the use of critical reasoning defined as reflection, questioning, information and ideation comparisons, observations, exploration of divergent viewpoints in the decision-making process by Brookhart (2010).

A strategy is then innovated by students after the critical evaluation of content and learning from informational and corrective feedback they receive from workshops, individual and group consultations, class activities and disciplinary related content. It should be noted that as the project progresses the tasks become progressively multifaceted and with inbuilt less scaffolding techniques. Students are required to present and effectually communicate their strategy to their lecturers during presentations using PowerPoint. Students receive real time feedback about their strategy in relation to the brief and develop skills they will use during the final industry and client presentations.

The assessment strategy utilises a combination of assessment types to encourage students to think about their strategy more deeply. The final exam includes questions that elicit reflection on different aspects of the solution/strategy, and the relationship between the strategy and theory. Students incorporate feedback from the two learning loops. At this point students have the necessary disciplinary knowledge to collaborate effectively with students from other disciplines.

Interdisciplinary collaborative learning

In this cycle of the model, students collaborate with peers from another discipline to develop their interdisciplinary collaborative learning knowledge arena. Students from one discipline craft a brief based on their vetted strategy. This process ensures knowledge transfer after reflection and sense making. The collaboration in interdisciplinary communities of learning develops and sensitises interdisciplinary thinking around the strategy. Students from different disciplines operate as experts in their field. Additionally, the collaborative context allows students to reflect on their learning as individuals as well as in a group context.

During the process of collaboration, students recall pertinent disciplinary and brief-related knowledge content. The skills they learnt around problem solving, time management, team work in the previous learning loops are further developed as they learn to communicate effectively their findings and strategy to their peers within their assigned learning communities. In this phase, the choice of whom to work with is removed to mimic adult working conditions. This loop also incorporates a mixed assessment strategy which includes submissions and presentations to lecturers and peers. Critical feedback, both informational and evaluative, is given to students in a few formative and one summative assessments before progressing to the final stage in which they present their strategy to the problem owners and industry experts respectively.

Expert evaluation

In this final learning loop, shortlisted interdisciplinary communities of learning present first to the problem owner. The feedback and learnings from these sessions and all the mentors throughout the model are incorporated and used to refine the final strategy presented to a panel of industry experts. The industry mentors evaluate student presentations (pitches) according to the brief given in learning loop two. Students receive real-time and comprehensive feedback from a practitioner lens.

The industry experts nominate the top collaborators for entry into an industry-related award. Students are given a final opportunity to incorporate feedback from this session. The work is further judged by a different set of industry experts. Students hand over these strategies to the problem owner for implementation. By this stage, participating students have developed self-reflection techniques as evidenced by the emails and informal discussions with shortlisted candidates about the process and key learnings.

Reflection

Reflection is the final stage of the agile learning model. Reflection is useful in learning from any experience as it turns experience into knowledge applicable across different contexts (McAlphine & Weston, 2000). Mules (2018) suggests that reflection is an essential element in educating professionals. In our model we use retrospective reflection-on-action (McAlphine & Weston 2000), which prompts the students to reflect on their learning experiences and outcomes. Formal reflective sessions such as class discussion and writing short reflective essays are encouraged at the end of a learning period. Reflection also allows the lecturers to improve their teaching practice.

DISCUSSION

The model uses the principles of authentic learning and incorporates aspects of learning agility theory. Furthermore, it demonstrates that agile methods can be applied to learning contexts to enhance project

based learning (Parsons & MacCallum, 2019). With reference to authentic learning, results from four years of action research previously conducted by the authors (Oksiutycz & Azionya, 2017) reveal that ideally, learning loops one and two should run for a semester to allow for a 'sustained investigation' (Lombardi, 2007) with clearly defined milestones for students and mentors. Secondly, centring learning on a real versus hypothetical problem achieves buy-in from students (Luar, 2013).

The Millennials and Generation Z respectively want to be part of positively contributing their talents and time to worthy causes and lean towards collaboration in their social lives. This attitudinal trait is tapped into learning loop two to strengthen buy-in. Students voluntarily select the communities of learning (small groups) in which they wish to work and therefore self-manage the group dynamics of collaboration better. Self-organised teams provide students with support, mutual learning opportunities and a sense of empowerment and agency over their own learning (Parsons & MacCallum, 2019).

As advocated by Lombardi (2007) and Luar (2013), presenting students with an authentic and complex problem, such as human trafficking, xenophobia, that can be solved in many different ways, sensitises students to the ambiguity present in the business and social world and develops their advanced problem-solving skills. To be authentic, these problems should reflect those faced by practitioners (Cho, Caleo & Kapur, 2015). Student buy-in is reinforced by using a real problem owner, as recommended by Kozubska and McKenzie (2012); worthy beneficiaries, simultaneously provide additional motivation to engage in deep thinking and a cognitive challenge.

The learning experience and agile problem based learning environment designed by the model, mimics future work, allows students to master the theoretical and applied principles of their discipline using role playing. Students are assigned tasks and roles similar to those found in industry. Not only are students exposed to different roles, but tasks create opportunities for them to operate experientially in them. Cho, Caleo and Kapur (2015) emphasise that students learn by participating in authentic activities that typify a profession, whereby students acquire the knowledge, values and skills like practitioners (Cho, Caleo & Kapur, 2015). As the project progresses, tasks become more complex to catalyse the development of more intricate and sophisticated ways of thinking as stated by Meyers and Nulty (2008).

In the final phases of the model, students are put into interdisciplinary teams to mimic work requirements and build the necessary critical thinking needed for a strategic mindset. As in any industry these communities of learning work together on a strategy to 'sell to' their peers, lecturers, the problem owner or industry. Johnson (2017) concurs by emphasising the need for students to be able to communicate information in varied formats to diverse audiences persuasively. She further rates communication as a foundational skill without which collaboration and criticality cannot take place. An invaluable skill in practice as students will be required to foster buy-in for their ideas in adult work scenarios. An added benefit of collaboration for students is the application and acquisition of project management skills, leadership (for group leaders), and negotiation and conflict resolution skills. The prospects for industry mentorship and internship opportunities are further incentives to develop learning agility. These opportunities both represent the opportunity to gain experience and invaluable industry feedback.

Students' knowledge arenas benefit from the input of different mentors (subject experts, peers, and industry and problem owner representatives). Students develop resilience by learning how to deal with negative feedback and different perspectives (Salmon, 2018). Feedback is essential for an effective learning environment; self-reflection helps students understand their progress and alternative ways to improve their learning (Maphalala, 2017). The model helps students develop emotional and cognitive coping mechanisms and respond by using corrective strategies (information seeking and implementation of corrective feedback) thereby cultivating agile behaviours and characteristics. The model has an inbuilt

agile behaviour mechanism by giving students the opportunity to implement corrective feedback in other tasks albeit which exhibit more complexity as recommended by De Meuse et al. (2010).

Using an integrated formative and continuous and reflective summative assessment strategy, the model cultivates high order thinking skills, learning agility capabilities, and interdisciplinary collaborative works skills. The model can be applied in diverse disciplinary settings and can be adapted to large and small class sizes as was the case in its development. For large class sizes, groups should consist of around six to eight students. As a minimum requirement large groups must have a pair of students from each discipline. Disciplinary coupling helps students have a sounding board and someone from a similar knowledge arena who speaks their 'disciplinary language' particularly in the third learning loop.

A limiting feature of the model is that not all students benefit from feedback about their solution from the problem owner and industry experts. The practical reason for this is that it is not easy for lecturers to get the deep involvement of collaborators outside of learning institutions in educational projects. Involvement requires a lot of time and effort. This can be mitigated by other solutions, for example by creating short debriefing videos where industry experts give general feedback. Furthermore, not all students get internship opportunities as a result of educational projects. In addition, the model is based on teaching at a public university in the field of communication and it would benefit from empirical testing in another teaching environment to ascertain its relevance to the broad educational context. Despite these limitations, it can be argued that the model strives to create a balance between designing realistic adult work scenarios and providing students with access to valuable learning opportunities.

CONCLUSION

The conceptual teaching model presented here strives to prepare students for the complexity faced by private and public organisations by cultivating agile behaviours such as reflection, incorporating feedback successfully, problem identification and data driven decision making. The model primes students to respond successfully in new scenarios by learning the skills they acquired during the programme.

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