

## Problem-based learning on doctoral level: fit for ‘pracademics’?

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### Abstract

**Research Question (RQ):** To what extent could problem-based learning (PBL) have a potential role on doctoral programmes as an activating learning approach for overcoming mid and late career doctorate candidates’ challenges?

**Purpose:** The purpose of the paper was to firstly explore challenges of experienced working professionals in doctoral education. Secondly, the existing models of problem-based learning (PBL) as practiced in the four original Universities first to employ PBL, were comparatively examined in order to assess the potential role of PBL in overcoming mid and late career doctoral candidates’ challenges.

**Method:** Through engaging with the peer-reviewed journal articles and publicly available Canadian, Dutch, and Danish universities’ documents on PBL, an analysis of well-researched and documented advantages and challenges of so-called ‘pracademics’ (practitioners entering academia) were carried out followed by a comparative analysis of diverse PBL models. In the end, interconnections between pracademics’ challenges and PBL features and procedures were identified.

**Results:** Five challenges that mid and late career doctorate candidates face regularly have been identified including their struggle with grasping Threshold Concepts in learning to be a researcher. Others involve passive learning environment, prior professional knowledge being undervalued, fear of failure as well as knowing the answer in advance due to over-eagerness to solve problems through their research and overreliance on professional experience. Comparative analysis of different PBL models featured some differences in problem types (practice-oriented, content-oriented and critique-oriented), teachers’ role (facilitator, tutor and supervisor) and educational processes and principles. Most of the PBL features could be instrumental in aiding pracademics in overcoming their challenges in doctoral education such as, for example, small group project work facilitating better understanding of Threshold Concepts as well as minimising ‘knowing the answer in advance’ attitude – to name just a few.

**Organization:** Not only higher education organisations but also other public or private sector organisations could benefit both from identifying their mid and late career employees’ challenges and from employing problem-based learning approach for further development of individuals, groups and teams.

**Society:** The contribution to society is reflected in the inclusion strategies of more mature candidates in doctoral education thus contributing to a cycle of lifelong learning.

**Originality:** The paper contributes to understanding of newly emerged type of doctoral candidates – pracademics – through visual mapping of interconnection between their challenges and the PBL features and procedures.

**Limitations / further research:** The paper’s scope was limited as it focused only on the four original Universities that have been applying PBL for the last 50 years. Also, studies on the use of PBL on doctoral level are still rare that consequently led to limited access to concrete examples.

**Keywords:** problem-based learning, activating learning approach, mature doctoral candidates, pracademics, threshold concepts.

## 1 Introduction

*'I am a 'pracademic', a term I use to identify myself colloquially as someone who has 'blended' experience as a practitioner and academic. My practical experience amounts to over 30 years in industry...' (a quote by a doctoral student in Kelly et al. 2021, pp. 236).*

The expansion of higher education, driven by various factors at individual, institutional and societal levels, has been noticeable since the second half of the 20th century (Schofer and Meyer, 2005). According to Börjesson and Dalberg (2021), higher education has become 'a societal sector of strategic interest for a large variety of stakeholders' (p.346). Within the higher education expansion, OECD (2022) recently reported a 25% increase in *doctoral level* attainment that is twice as high as overall tertiary education attainment. Sarrico (2022) claims that the expansion of doctoral education led to widening its scope beyond academia as well as to changing its nature and purpose. The doctorate is no longer considered a logical next step only for young students seeking an entry ticket to academia through their immediate progression from master studies to a doctoral degree. Especially in its part-time or professional doctorate version, doctoral education widened its scope beyond academia by attracting 'experienced working professionals' i.e. mid and late career candidates. Prompted by issues/problems they identified in their workplaces, they choose a doctorate programme to improve own professional practice in which they remain embedded both during and after completion of the doctoral studies. Rolfe and Davies (2009) explain that these mature doctoral candidates are interested in solving their real-life work-related problems through generation of knowledge *from practice for practice*. These are the doctoral students who view themselves as 'pracademics' referring to their unique position of being 'with one foot in academia and one foot in the world of practice' (Kelly *et al.*, 2021, p. 237). Thus, the current 21<sup>st</sup> century doctorate education's nature and purpose have indeed changed, as suggested by Sarrico (2022). It caters not only for the traditional candidates who progress from their bachelor/master degrees aiming to become *professional researchers* but also for newly emerged type of candidates, i.e. experienced working professionals/ 'pracademics' who aim to become *researching professionals* (Bourner, Bowden, and Laing, 2001).

As a doctoral educator and supervisor at four different European higher education institutions, I have been supporting 'pracademics' on their doctoral journey for nearly ten years. I witness how the doctoral education equips them with a research-informed framework for addressing the identified issues in their professional practices where 'leading change on an institutional level is their goal' (Taylor, 2007 cited in Rayner *et al.*, 2015, p. 159). The experienced working professionals' ongoing embeddedness in professional practice is interpreted by Kelly *et al.* (2021) as their advantage. This view is supported by Klein and Rowe (2008) who consider their involvement in doctoral education beneficial for them, their professional practice and

society due to their ‘unique capacity to serve as future boundary spanners between academia and practice’ (p.683). Although I can relate to the mentioned advantages mentioned, anecdotal evidence from my practice taught me not to ignore the challenges of their positionality ‘on the cusp between the university, the work context, and the profession’ (Taylor, 2007, p.154) especially in the beginning of their doctoral journey. In their research on the mid and late career doctoral candidates’ first year experience, Petty *et al.* (2012) discovered major challenges they face during academic ‘onboarding’ and Robertson’s (2017) research confirms that the challenges at the beginning of their doctoral journey may result in changes of university programmes, the extended candidatures or ‘dropping out’ mainly due to feelings of disempowerment. Among the reasons for these feelings are exposures to passive learning through lectures and through reading literature on theory as well as inadequate supervisory arrangements which have a negative effect on the mid-career candidates’ self-efficacy and give the impression that their prior knowledge and professional experiences are ‘undervalued’ (*ibid*, p.568). Long before ‘experienced working professionals’ entered doctoral education, Dewey (1916), a renown educational reformer, argued for the value of giving learners ‘something *to do*, not something to learn, as when the doing is of such a nature as to demand thinking, or the intentional noting of connections, learning naturally results’ (p.154). The Eurograduate survey (Meng *et al.*, 2020) of graduates’ experiences during their time as students show similar supporting findings about the value of *activating* forms of learning.

The question is whether doctoral education for ‘pracademics’ is missing the opportunity to both *activate* their prior professional learning and to provide *activating learning environment* to aid them in acquiring competencies of ‘researching professionals’. Coming from work environments where they proactively analyse and solve problems, they bring into the academia what both Taylor (2007) and Servant-Miklos (2020) emphasise as the current higher education focus, i.e. closing the gap between education and the top 21<sup>st</sup> century necessary skill - complex problem-solving (World Economic Forum Future of Jobs report, 2016, p.22). As the working professionals enter-doctoral programmes with already developed problem-solving skills, it is worth considering whether problem-based learning (PBL) could be a fitting approach in the early stage of their doctoral journey. Problem-based learning features frequently as a vehicle to both develop and utilise existing complex problem-solving competencies and its popularity, since the birth of its name in the early 1970s (Barrows & Tamblyn, 1980), shows no sign of slowing down. Originally developed for medical education, problem-based learning has been extensively practiced at various universities especially in Canada, the Netherlands and Denmark, where it has seen numerous institutional varieties. This discussion paper explores the question *to what extent problem-based learning could have a potential role on doctoral programmes as an activating learning approach for overcoming mid and late career doctorate candidates’ challenges*. Through engaging with the peer-reviewed journal articles and publicly available Canadian, Dutch, and Danish universities’ documents on PBL, the paper first presents advantages and challenges pracademics face before summarising PBL’s variations and its applications in doctoral programmes followed by an overview of PBL’s potential role in

overcoming their challenges. The paper concludes with a reflective account on how the exploration of the potential role of PBL on doctoral level for working professionals could inform the pedagogy and design of doctoral programmes in the future.

## **2 Advantages and Challenges of Experienced Working Professionals in Doctoral Education**

Some scholars (e.g. Kelly *et al.*, 2021; Klein and Rowe, 2008) argue that experienced working professionals' full engagement in their practice is beneficial as it introduces 'engaged scholarship' into doctoral education. Engaged scholarship is described by Enders (2005) as an answer to a paradigm shift in doctoral education - from the Humboldtian model striving for advancing knowledge by original and critical investigation (Günther, 1988) towards the so-called professional model. Seen by Boyer (1996) as a reaction to the 20<sup>th</sup> century's questioning of the usefulness of pure academic scholarship for the world of practice, engaged scholarship not only achieves wider societal applicability but, in Hodgkinson and Rousseau's (2009) opinion, also enhances existing problem-solving and leadership/managerial *capabilities* through promoting a research-informed practice. As mid and late career doctoral candidates are usually well-positioned in their organisations, they also have *opportunities* to fully engage in leading change on institutional levels (Taylor, 2007) and thus both produce and apply new knowledge to create new practices. Indeed, Barker (2004) defines engagement as 'reciprocal practices of civic engagement into the production of knowledge' (p. 124) and Barnacle & Usher's (2003) research on part-time candidates in fulltime employment reports on their strong belief that doing research enhances and 'informs their work through disciplinary expertise and research knowledge' (p.353). Based on the above arguments, it would be reasonable to conclude that 'pracademics' commence their doctoral journey with few challenges and with considerable advantages of (a) their *background*, i.e. knowledge and experience stemming from embeddedness in practice; (b) their well-established problem-solving and leadership/managerial *capabilities* and (c) the *opportunities* to introduce new practices through their change agents' roles.

Yet, in one of the rare studies carried out by experienced working professionals themselves into their own lived experience of the doctoral journeys, Rayner *et al.* (2015) mainly report on the challenges caused by 'a fluid and complex relationship' (p. 158) between their intertwined roles of practitioners and researchers. The title of their co-authored academic journal article 'Why has my world become more confusing than it used to be?' sends a clear message about multiple challenges. Petty *et al.* (2012) capture some of the challenges contributing to this confusion through two focus group interviews with first year mid and late career doctoral candidates and through end of year evaluation questionnaires. They discover that doctoral education's early stages strongly question the evidence base for their practice and thus

challenge their *background knowledge and experience* leading to deconstruction of their worldview and exposure to previously unacknowledged assumptions. Although these challenges are usually appreciated later in their doctoral studies, the way and stage at which they occur cause distress due to their professional experience being undervalued (Robertson, 2017) and their problem-solving and managerial *capabilities* under-utilised.

Petty *et al.* (2012) employ the conceptual framework of career transition theory (Nicholson and West, 1988) including a five-phase cycle of preparation, encounter, adjustment, stabilisation, and preparation for the next transition to identify at which stage mature doctoral students face the greatest challenges. They report that practitioners who ‘enrolled onto the programme wanting to change practice’ (p.13) believe in the preparation phase (enrolment) that the timing is just right in relation to where they are in their careers. While the early encounter phase (the first few months of the programme) is the honeymoon experience for most of them, the adjustment phase is the one bringing shocks and surprises. As experienced working professionals pursue their reading and thinking, they struggle to accept new ideas and concepts through passive absorption and long for Dewey’s experiential approach, for ‘something *to do*’ (Dewey, 1916, p.154). These longings are attributed by Kiley (2017) to ‘pracademics’ struggle with so-called Threshold Concepts. During a UK national research into characteristics of strong teaching and learning environments, certain concepts emerged as crucial in each discipline and while these concepts are different in different disciplines, Meyer and Land (2006) argue that they can all be referred to as ‘threshold’ concepts with similar features. However, Kiley (2017) argues that they are ‘generally troublesome’ (p. 551) because of their transformative nature. In Meyer and Land’s (2006) view, truly grasping a threshold concept transforms individuals due to conceptual and ontological shifts. ‘We are what we know’ (Cousin, 2006, p.4) and ‘turns’ in understanding new threshold concepts are initiations into new realms of any subject. As ‘pracademics’ come from different disciplines, the Threshold Concepts they need to acquire are not subject based (they usually have a firm grasp of those), but rather, as Kiley (2017) puts it, the Threshold Concepts ‘in learning to be a researcher’ (p.551). Kiley lists them as problem/research question formulation, argument development, knowledge creation, theoretical and analytical frameworks, research paradigm, academic writing (Humphrey & Simpson, 2012), creativity and ‘doctorateness’ (Trafford & Leshem, 2009). Supervisors report challenges ‘pracademics’ face with the Threshold Concepts under three categories: (1) knowing the answer in advance, (2) overreliance on practice rather than theory or research and (3) over eagerness for their research to ‘solve real problems’ (Kiley, 2017, p.555). When experienced working professionals encounter the Threshold Concepts ‘in learning to be a researcher’ for the first time, they view them as too demanding to grasp and too *theoretical* to accept which leads to fear of failure (Petty *et al.*, 2012). Coming from being in positions of experts for years, mature doctoral candidates find this ‘disturbing’ and ‘challenging’ and fall into ‘the black hole of lostness’ (Petty *et al.*, p.14).

It is of little surprise then that they start getting disillusioned by seeing their work becoming ‘theoretical’ instead of ‘practical’ and ‘useful’ (Kiley, 2017). According to Kelly et al. (2021), the disillusionment leads to mature doctoral candidates taking on passive roles in already passive learning environments featuring mainly reading and writing. Doctoral educators and supervisors are encouraged both by Kelly et al. (2021) and Kiley (2017) to understand these challenges fully so that they can develop an activating learning environment for experienced working professionals in doctoral programmes. Based on the most frequent advantages and challenges of experienced working professionals in doctoral education (summarised in Table 1), a problem-based learning (PBL) approach as a vehicle for activating learning environment for experienced working professionals in doctoral programmes is explored in the next section.

Table 1. Advantages and challenges of experienced working professionals in doctoral education

| <b>Advantages and challenges of experienced working professionals in doctoral education</b>  |  |
|--|--|
| <b>Advantages</b>  | <b>Challenges</b>  |
| <p><i>Background</i></p> <ul style="list-style-type: none"> <li>Engaged scholarship/embeddedness in practice (Kelly <i>et al.</i>, 2021; Klein and Rowe, 2008; Hodgkinson &amp; Rousseau, 2009)</li> </ul> <p><i>Capabilities</i></p> <ul style="list-style-type: none"> <li>Problem-solving skills</li> <li>Managerial/Leadership competences</li> </ul> <p><i>Opportunities</i></p> <ul style="list-style-type: none"> <li>(Potential) change agents’ role (Taylor, 2007)</li> </ul> | <p><i>Background</i></p> <ul style="list-style-type: none"> <li>Prior knowledge and professional experiences ‘undervalued’ (Robertson, 2017)</li> <li>Knowing the answer, overreliance on practice rather than research, and over eagerness for their research to solve real problems (Kiley, 2017)</li> </ul> <p><i>Capabilities</i></p> <ul style="list-style-type: none"> <li>Under-utilised problem-solving capabilities while grappling with Threshold Concepts in learning to be a researcher (Kiley, 2017)</li> <li>Practitioner’s knowledge and expertise challenged = facing failure (Petty <i>et al.</i>, 2012)</li> </ul> <p><i>Opportunities</i></p> <ul style="list-style-type: none"> <li>Lack of opportunities to use own proactive and complex problem-solving skills (passive vs. activating forms of teaching and learning)</li> </ul> |

### 3 Summary of the PBL Features and Procedures

The term ‘problem-based learning’ is attributed to Barrows, a leading figure at the Canadian McMaster University Medical School in the early 1970s (Barrows and Neufeld, 1974). Although Barrows named the problem-based learning, Servant-Miklos (2020) clarifies that Barrows was not the one who developed it but only labelled retrospectively what Evans and his team used in 1965 as an experimental approach to learning (Spaulding, 1991). It spread further to the Dutch Maastricht University Faculty of Medicine under the label of problem-steered education (as cited in Servant-Miklos, 2020) with a structured seven-step procedure. Simultaneously, in Denmark, two new universities were founded in the 1970s (Roskilde and Aalborg) and employed a new approach to learning that was labelled ‘problem-oriented project work’. Although problem-based learning originated in medical education, it later spilled over into engineering and other fields such as psychology, law, economics, and many other disciplines (Servant-Miklos, 2020).

In their meta-analysis of PBL, Walker and Leary (2009) summarise its main features, defined by Barrows (2002), as (1) *ill-structured problems* that are purposefully designed to challenge students and generate multiple rather than only one correct solution; (2) *student-centred approach* where agency is with students deciding what they need to learn; (3) *teachers as facilitators or tutors* who forgo lectures focusing on content for the purpose of challenging students with meta-cognition questions and modelling learning processes and (4) *authenticity* as a basis for selection of problems that are aligned to ‘professional or real world practice’ (Walker and Leary, 2009, p.14)

#### 3.1 Comparison of the four original Universities models of PBL: Problem Types

Servant-Miklos (2020) delves into comparison of these features and its variations as employed by the original four Universities (MacMaster, Maastricht, Roskilde and Aalborg). She structured her analysis under three headings: how problems are designed, teachers’ roles, and how educational process is organised/structured. Her analysis of problems showed that at MacMaster and Maastricht Universities, teachers write problems for students who are, in that case, presented with a problematised situation. Contrary to this practice, the Danish Universities in Roskilde and Aalborg leave problem formulation to their students, who are thus required to problematise situations themselves. At MacMaster, problems were at first practice-oriented but post 1990, content-oriented problems were introduced. Maastricht uses predominantly content-oriented problems focused on exploring/explaining the phenomena in question. The Roskilde University employs critique-oriented problems engaged with a critical view of both science and society (Servant-Miklos, 2020). This earned them a reputation and accusations of having Marxist and political activism inclinations. Hence, the other Danish university (Aalborg) aimed to avoid political crisis and distanced itself from the Roskilde PPL model (problem-oriented project learning). However, their version of problem-based learning

still includes critique-oriented problems in the field of social science and humanities but not in technical school where practice-oriented problems are preferred. According to Servant-Miklos, most of the above types of problems seem to be rooted in either Rogers' (1959) humanistic psychology focusing on individuals, i.e. on a student-centred approach where the choice and formulation of problems are left to them or in Dewey's (1916) 'to do'-focused experiential, participatory educational philosophy. Additionally, the Roskilde critique-oriented problems are influenced by the Frankfurt School's critical philosophy and underpinned by critical theory that, according to Horkheimer (1976), offers social critique to effect social change.

### **3.2 Comparison of the Four Original Universities Models of PBL: Teachers' Role and Educational Process**

At MacMaster and Maastricht, the role of teacher is more of a tutor delivering tutorials to small groups of students and thus guiding them through problem-solving process whereas at both Danish Universities, teachers act as supervisors who could be either participants in the project work or consultants to be called upon when needed. Stemming from their different roles, tutors and supervisors are engaged in different educational processes. At all four universities, working with small groups of students through a structured procedure is a pre-dominant mode. At MacMaster and Maastricht, there are no traditional courses and lectures are offered only in exceptional situations. Tutorials at MacMaster and Maastricht are held in designated rooms for small groups of five students (later raised to 8-12) along with home-based studies or Landscape studies at home (in the Netherlands). At Roskilde and Aalborg, an even distribution of time (50% each) is dedicated to project work and lectures. The Roskilde University utilises a so-called 'house system' where one house consists of eight teachers and 98 students divided into project groups of 6-8 students which is mirrored at the Aalborg university except for the name – 'houses' are replaced by 'storgroupe - 'large groups' (identical number of students as elsewhere).

All four universities' websites quote their own PBL's structured procedure (usually consisting of seven steps with different labels). At MacMaster, they include (1) identification of the problem, (2) exploration of pre-existing knowledge, (3) generation of hypotheses and possible mechanisms, (4) identification of learning issues, (5) self-study, (6) re-evaluation and application of new knowledge to the problem and (7) assessment and reflection on learning (Walsh, 2005). At Maastricht, their 7-step procedure is referred to as the 'Seven Jump' strategy involving clarification of concepts in the given problem, definition of the problem, brainstorming based on prior knowledge and common sense, elaboration of proposed explanations, formulations of issues for self-directed learning, self-study and sharing findings in the group combined with evaluation of knowledge acquisition (Moust *et al.*, 2005, p.668). At Roskilde, they involve (1) project work, (2) problem orientation, (3) interdisciplinarity, (4) participant control, (5) exemplarity, (6) group work and (7) international insight and vision



(“Problem-oriented Project Learning”, 2024). At Aalborg, the procedure is toned down to three main steps, problem analysis, problem- solving and problem reporting. The procedure is described as focused on working analytically on interdisciplinary problems according to result-oriented methods, cooperating with the business community on authentic professional problems and developing teamwork (“Problem based learning (PBL) at Aalborg University”, 2024).

Although the above steps in the PBL structured procedures may have different labels, they share Piagetian and Vygotskian constructivist roots in involving students in problem analysis to create solutions through activating learning environment leading to emergence of new mental models that aid adaptation of previous assumptions to newly constructed knowledge (see Piaget, 1985; Smith, 2017). The above analysis of the PBL’s types of problems, teacher’s role and educational process within the four original Universities structured PBL procedures is summarised in Table 2.

Table 2 Summary of the four original Universities' versions of PBL

|                               | <b>McMaster University</b>   | <b>Maastricht University</b>   | <b>Roskilde University</b>   | <b>Aalborg University</b>  |
|-------------------------------|--|--|--|--|
| <b>Problems</b>               | <b>Teachers:</b> write problems<br><br><b>Students:</b> presented with a problematised situation   |  | <b>Students:</b> write problems/required to problematise situations themselves   |  |
|                               | <b>Practice-oriented:</b> focused on professional practice<br><br>+<br><b>Content-oriented</b> (post 1990)   | <b>Content-oriented:</b> focused on exploring and explaining the phenomenon  | <b>Critique-oriented</b>   | <b>Practice-oriented</b> (Technical school)<br><br><b>Content-oriented</b> (Social Science and Humanities)<br><br><b>Critique-oriented</b> (Social Science and Humanities) |
| <b>Role of teacher</b>        | <b>Tutor</b>   | <b>Tutor</b>   | <b>Supervisor</b>  | <b>Supervisor</b>  |
| <b>Educational process</b>    | <b>Small groups taken through a structured procedure (3-7 steps)</b>   |  |  |  |
|                               | <b>Tutorial groups</b>   |  | <b>Project work</b>  |  |
|                               | <b>No traditional courses</b><br>Lectures in exceptional situations  |  | <b>50% project work</b><br>50 % traditional courses  |  |
|                               | <b>Small group rooms for tutorials</b><br>+<br><b>Home Base</b> (for self-study)<br><br>Symbolic and physical structure: groups of 5 students (later 8-12) | <b>Small group rooms for tutorials</b><br>+<br><b>Study Landscape</b> (for self-study)<br><br>Symbolic and physical structure: groups of 6-8 students (later 8-12) | <b>House system</b><br>Symbolic and physical structure<br><br><b>1 House</b> = 96 students, 8 teachers, and a secretary, project groups of 6-8 students                                    | <b>Storgruppe (Large group)</b><br>Symbolic and physical structure<br><br><b>1 Storgruppe</b> = 96 students, 8 teachers, and a secretary, project groups of 6-8 students   |
| <b>Educational principles</b> | Influenced by Rogers' <b>humanist psychology</b> and Dewey's <b>education philosophy</b><br><br>Later embraced <b>constructivist approach</b>              | Strongly influenced by <b>constructivist approach</b> (the psychologists in the tradition of Piaget)   | Strongly influenced by <b>critical philosophy</b> and pedagogy (the Frankfurt School)<br><br>Partly inspired by Rogers' <b>humanist psychology</b> and Dewey's <b>education philosophy</b> | Influenced by Rogers' <b>humanist psychology</b> and Dewey's <b>education philosophy</b>   |

(based on Servant-Miklos, 2020)

## 4 Application of PBL in graduate programmes

The previous section's analysis focused on the application of PBL in higher education with majority of institutions employing it on undergraduate level. Research into the use of PBL in graduate programmes is rather rare, yet quite informative and promising.

In their small-scale research, Candela *et al.* (2008) explore the application of PBL' focus on real-life problems in an innovative doctoral-level course for nurses offered *early in the programme* at a USA university. The innovative course asked six mature students to set up a virtual School of nursing, run it for one semester and deal with any problem that emerges. Unsurprisingly, majority of the professional, relational, and systemic problems or in other words, practice/content/critique-oriented problems mirrored their real-life work-related problems. In a survey, students reported high satisfaction with the course especially due to its positive impact and being *one of their first courses*. One student captured PBL's transformative nature when acknowledging that in their professional setting, 'often times [they] can only see one solution to a problem, and this experience created a forum for considering others' (Candela et al, 2008, p. 118). Another offered an insight into how helpful it was to be on the receiving end of 'opposing arguments and thus practice having everyone else disagree' (*ibid.*, p.118) as well as requiring development of solid argumentation for own opinion. The students' experiences indicate that working on real problems could aid them in overcoming some of the academics' challenges such as under-utilised existing problem-solving skills (they were engaged in solving real problems in real time), 'knowing the answer' (group work on a project offered more than one solution) as well as experiences opposition while grappling with the Threshold Concepts in learning to be researchers (disagreements in groups were challenging but led to grasping one of the Threshold Concept - argumentation development).

On the other hand, Fenwick (2002) commented, in her research on PBL's group process and implications for graduate education of the mid-career professionals, that they particularly valued groupwork in intensive courses during their summer residences of five weeks in year one and four weeks in year two. This condensed and intensive educational process saw mature professionals being divided into small groups while working on real organisations' problems presented on day one. For five days, each group worked tirelessly and creatively to design one or more solutions to be presented on Friday to organisations' representatives. Formative and later summative feedback about individuals, group work and problem-solving process are provided by observant faculty members. Each week candidates got re-arranged into new groups and got a new organisational problem to solve. Mid-career professionals valued group work as it supported them in acquiring 'self-knowledge' and taught them not to rely only on their professional experience but also on theory. Self-knowledge was evident in one professional's reflection about their world being black and white and as 'being a fairly strong leader, [they] thought it was [their] job to advance [their] opinions' (Fenwick, 2002, p.12). Another

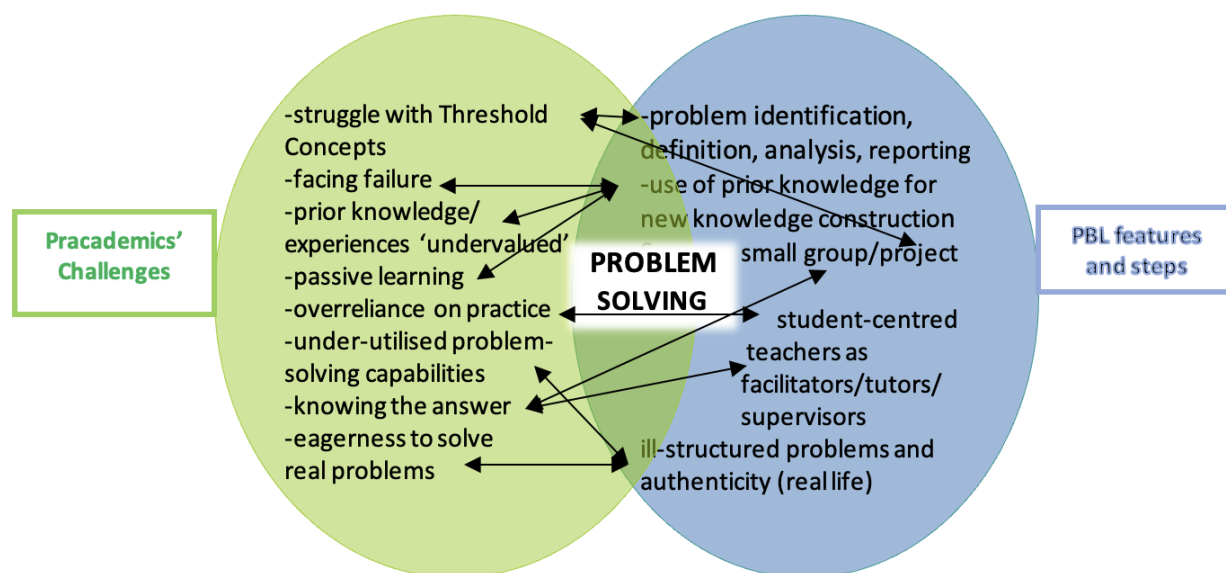
professional claimed that ‘pulling the theory into that problem made the learning more interesting, more dynamic’ (*ibid.*, p.15). Furthermore, group work on real organisational problems led to professionals developing systems thinking and realising that problems need to be mapped out based on ‘whose problem is it and to what degree’ (*ibid.*, p.14). This study consisting of 166 questionnaires and 20 follow up interviews emphasises the role of group project work as vehicle for overcoming pracademics’ challenges: passive learning through an intensive and activating learning environment, overreliance on practise rather than on theoretical framework through the acquired self-knowledge, own eagerness to solve problems through systems thinking and the Threshold Concept in learning to be a researcher through designing creative solutions. However, Azer (2005) warns about an easily overlooked challenge of needing to train faculty to employ PBL while Shanley (2007) notes a need for additional resources to assist professionals working together as the experiences in different small groups can vary widely.

In their higher education brief, Turner and Triezenberg (2010) report on the use of PBL for PhD in biomedicine and analyse the impact of *first-year* month-long modules each focusing on a different human disease. Each module poses a relevant research question, and doctoral candidates draft a research proposal addressing the question. During the first two semesters, they frame hypotheses, draft experimental plans, develop alternative methodological approaches and thus acquire various Threshold Concepts in learning to be researchers. What the above presented examples have in common is their use of PBL in the *early stages* of doctoral programmes.

## **5 On PBL’s Potential Role in Overcoming Pracademics’ Challenges**

This paper aimed to explore the question *to what extent problem-based learning could have a potential role on doctoral programmes as an activating learning approach for overcoming mid and late career doctorate candidates’ challenges*. Based on the presented pracademics’ challenges as well as on summaries of PBL as practiced in the four original universities and of its application in doctoral programmes, it is possible to draw some connections between specific PBL features and pracademics’ challenges in early stages of doctoral education. For example, PBL steps of problem identification/definition/analysis/reporting as well as one of the PBL’s crucial feature – group and project work - may assist pracademics in their struggle with Threshold Concepts in learning to be a researcher through argument development and relying less only on professional knowledge and more on theory and research. Furthermore, the PBL activation of prior knowledge for new knowledge construction could help working professionals overcome their fear of failing, impression that their professional knowledge is undervalued, and passive learning. PBL student-centred approach might be useful for overcoming pracademics’ overreliance on practice while small group work with teachers as

facilitators/tutors would provide safe environment for minimising ‘knowing the answer in advance’ attitude. Pracademics’ under-utilised problem-solving skills and over-eagerness to solve real life problems through their research could be tackled by PBL ‘s posing ill-structured problems based on authenticity. The presented interconnections between pracademics’ challenges and PBL features and steps are illustrated in Figure 1.



**Figure 1** Interconnections of PBL features/steps and pracademics’ challenges

The above figure shows that PBL shares its central concept of problem-solving with pracademics, and as such could, to a large extent, contribute to an activating learning environment for overcoming majority of pracademics’ challenges especially in the early stages of doctoral education, i.e. in encounter and adjustment phases when they experience shocks and surprises (Petty *et al.*, 2012).

The analysed journal articles and public documents provided crucial insights into how PBL could support pracademics and thus improve doctoral programmes especially in its early stages (year one and two). The improvement could start by taking an opportunity to *activate* pracademics’ prior professional knowledge in a problem-based *activating* learning environment to aid them in acquiring competencies of ‘researching professionals’ (Bourner, Bowden, and Laing, 2001). Other improvements could include (1) intensive/condensed problem-based courses (e.g., summer residences of a few weeks, long weekends, month-long courses), (2) small groups’ project work on organisational real-life problems (e.g., university-industry partnerships), (3) workshops for development of pracademics’ systems thinking and self-knowledge and (4) PBL training for students and faculty.

There is no doubt that the role of PBL on doctoral level deserves further research as it seems like pracademics are here to stay.

*Having been the ‘so what’ muttering practitioner sat across the table from academics during my time in industry I don’t want that to happen to me. I wish to develop theories that change practice’* (quote by a doctoral student in Kelly et al., 2021, p.236).

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## **Povzetek:**

### **Problemsko zasnovano učenje v doktorskih programih: za 'prakademike'?**

**Raziskovalno vprašanje (RV):** V kolikšni meri bi lahko imelo problemsko zasnovano učenje (problem-based learning -PBL) potencialno vlogo v doktorskih programih kot aktivacijski učni pristop za premagovanje izzivov doktorskih študentov, ki so na sredini ali v pozni fazi svoje kariere?

**Namen:** Namen prispevka je bil najprej raziskati izzive izkušenih zaposlenih strokovnjakov v doktorskem izobraževanju. Drugič, obstoječi modeli problemsko zasnovanega učenja (PBL), kot se izvajajo na štirih prvotnih univerzah, ki so prve uporabile PBL, so bili primerjalno preučeni, da bi ocenili potencialno vlogo problemsko zasnovanega učenja pri premagovanju izzivov doktorskih študentov, ki so na sredini ali v pozni fazi svoje kariere?

**Metoda:** S pomočjo pregleda recenziranih člankov in javno dostopnih dokumentov kanadskih, nizozemskih in danskih univerz o uporabi problemsko zasnovanega učenja je bila izvedena analiza raziskanih in dokumentiranih prednosti in izzivov tako imenovanih 'prakademikov' (praktikov/strokovnjakov, ki vstopajo v akademsko sfero). Sledila je primerjalna analiza različnih modelov problemsko zasnovanega učenja. Na koncu so bile identificirane medsebojne povezave med izzivi prakademikov ter značilnostmi in koraki problemkso zasnovanega učenja.

**Rezultati:** Ugotovljenih je bilo pet izzivov, s katerimi se redno srečujejo doktorski študenti, ki so na sredini ali v pozni fazi svoje kariere, vključno z njihovimi težavami pri razumevanju ključnih konceptov za raziskovalce. Drugi izzivi vključujejo pasivno učno okolje, občutek, da je njihovo predhodno strokovno znanje podcenjeno, strah pred neuspehom, pa tudi vnaprejšnje poznavanje odgovora zaradi prevelike vneme in želje po reševanju problemov in pretiranega zanašanja na strokovne izkušnje. Primerjalna analiza različnih modelov problemsko zasnovanega učenja je pokazala nekatere razlike v tipih problemov (usmerjeni v prakso, v vsebino ali kritiko), vlogi

učiteljev (facilitator, tutor in supervizor) ter izobraževalnih procesih in principih. Večina značilnosti problemsko zasnovanega učenja bi lahko bila ključnega pomena pri pomoči strokovnjakom pri premagovanju njihovih izzivov v doktorskem izobraževanju, kot je na primer projektno delo v majhnih skupinah, ki omogoča boljše razumevanje ključnih konceptov za raziskovalce, in tudi zmanjša past "vnaprejšnjega poznavanja odgovora".

**Organizacija:** Ne samo visokošolske organizacije, temveč tudi druge organizacije javnega ali zasebnega sektorja bi lahko imele koristi tako od prepoznavanja izzivov svojih zaposlenih, ki so na sredini ali v pozni fazi svoje kariere kot od uporabe problemsko zasnovanega učnega pristopa za nadaljnji razvoj posameznikov, skupin in timov.

**Družba:** Prispevek k družbi se odraža v strategijah vključevanja zrelejših kandidatov v doktorsko izobraževanje, kar prispeva k ciklu vseživljenjskega učenja.

**Izvirnost:** Prispevek ponuja razumevanje nove skupine doktorskih študentov – prakademikov – z vizualno kartografijo (cartography) medsebojne povezanosti med njihovimi izzivi ter značilnostmi in koraki problemsko zasnovanega učenja.

**Omejitve / nadaljnje raziskave:** Obseg prispevka je bil omejen, saj se je osredotočal le na štiri prvotne univerze, ki uporabljajo problemsko zasnovano učenje zadnjih 50 let. Prav tako so študije o uporabi problemsko zasnovanega učenja na doktorskem študiju še vedno redke, kar je posledično povzročilo omejen dostop do konkretnih primerov.

**Ključne besede:** problemsko zasnovano učenje, aktivacijski učni pristop, zreli doktorski študenti, prakademiki.

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