Chapter 9
Agile PBL Research: Developing a Sustainable Research and Scholarship Agenda

Introduction

Traditionally, there has been, and continues to be, a huge dichotomy in the university between research on the one hand and teaching on the other. Barnett (2016) calls this dialectic of function, one of seven forms of dialectic that a university faces. Universities have seen themselves primarily as research institutions, and teaching has always played second fiddle. This is partly due to the status awarded to research in comparison to teaching. Furthermore, and related to this, funding has always been intimately tied to research output. The result of all this is that research is a much more profitable pursuit for those in search of career advancement and promotion than teaching, despite considerable efforts to change this. Even within research, educational research has had a struggle to gain recognition as a legitimate field of research, especially when it comes to applied educational research. This is exemplified at Maastricht University where 'after a prolonged and heated debate with opponents who viewed education as nothing more than a service, academic status was [finally] granted to the Department of Educational Development and Research in 1977' (Van Der Vleuten, Domans, & van Merrienboer, 2010, p. 219). However, that status is never guaranteed and needs to be reasserted at regular intervals.

The research versus teaching dichotomy has significant implications for the implementation of an agile PBL and therefore needs to be taken into account and addressed in a systemic way. A key characteristic of an agile PBL as we have outlined in this book is that the curriculum is continuously renewed and updated and thus never finalised. In this context, evaluation and data gathering about the efficacy of agile PBL becomes vital, and this needs to be engaged in by everyone who is involved in it, including teachers, industry representatives and, especially, the students (Healey, Flint, & Harrington, 2014). In other words, the lines between teacher and researcher, as well as between teacher and student and even between employer and employee, are increasingly (and deliberately) being blurred within an agile PBL ecology for learning. This impacts on people's professional identities, which means

M.Y.C.A. Kek, H. Huijser, *Problem-based Learning into the Future*,
DOI 10.1007/978-981-10-2454-2_9

that in most cases it will require a significant change management process. However, integrating research and scholarship into the teaching, learning and evaluation cycle will create significant 'carrots' in the form of a growth in individual research output and therefore individual career advancement (see also Chap. 6). The broad field called the scholarship of teaching and learning has been concerned with raising the status of teaching by linking it to a research and scholarship agenda for more than two decades now (Boyer, 1990; Hutchings, Huber, & Ciccone, 2011; Prosser, 2008; Shulman, 1987), with considerable success. In this chapter we will therefore draw extensively on the literature and models proposed within this field.

Importantly though, within an agile PBL ecology for learning, we are not content to focus purely on the scholarship of learning and teaching. Instead, we are concerned with extending the research and scholarship agenda to explicitly include educational innovation. Furthermore, technological advances are increasingly changing the higher education context (Bradwell, 2009; Davies, 2012; Huijser, 2008) and indeed the conceptualisation of knowledge itself, which in turn has an impact on the ways in which research and teaching are defined. As Benson and Brack (2009) note:

> Current advances in learning technologies offer unprecedented opportunities for collaborative engagement, access to information, interaction with content, and individual empowerment which have potential to raise questions about the nature of scholarship that may challenge existing beliefs and values, and assumptions about knowledge. (p. 74)

In other words, the nature of knowledge itself is changing: the way it is accessed, digested, consumed, engaged with and disseminated. This in turn has an inevitable impact on teaching and learning, and it has created the possibility, and indeed the practice, of ubiquitous learning (Cope & Kalantzis, 2009). As we have argued throughout this book, it is important that we engage with this seismic shift and that we develop a curriculum and pedagogy that is agile and adaptive enough to stay relevant and is continuously evaluated and improved. As always, the focus is on the outcomes of developing knowledges, skills, dispositions and attributes that are needed to function successfully, and with sufficient agency, in the twenty-first century. The research and scholarship agenda that we outline in this chapter is a collaborative pursuit and involves all stakeholders, including teachers, employers and students, in other words, all systems of an agile PBL ecology for learning. In the twenty-first century, research is a fundamental part of everything we do, which is why research and scholarship are fully integrated in an agile PBL curriculum.

Revisiting the Scholarship of Teaching and Learning (SoTL)

Boyer's SoTL

In his seminal work on the scholarship of teaching and learning, Boyer (1990) argued that the activity of universities should be reconceptualised. He identified four distinct but interdependent and interrelated forms of scholarship (cited in Laksov, Mcgrath, & Silen, 2010, p. 4):

1. Discovery – Can be equated with research, where we strive to discover new knowledge. This is what is sometimes called 'pure' or 'fundamental' research (Van Der Vleuten et al., 2010) and is separated from application-oriented research (or scholarship). We can see the jostling for position that is inherent in the terminology around this and the implied hierarchy of importance (Brew, 2006).
2. Integration – Involves relating new discovery to what we already know in practice. Of course this becomes more complex in an agile PBL context, as the disciplinary and university boundaries become increasingly blurred.
3. Engagement – This was initially called 'application', but was changed by Boyer into engagement, because it involves something more than just application; it involves both the application and use of new knowledge, 'so that a propulsive movement of the search for new discoveries and new fields of application is created' (Laksov et al., 2010, p. 4). This is interesting from our point of view, as it has an explicit 'future thinking' element to it. Moreover, it can be neatly aligned with the outcome of entrepreneurial skills and attitudes, which are key elements of an agile PBL. In other words, 'engagement' refers to both current and future applications of new knowledge and indeed potential future research agendas.
4. Teaching – This refers to the act of teaching, and the engagement part ensures an informed and conscious practice as an agile PBL teacher and an agile PBL student or, in an agile PBL ecology for learning, a combination of evidence-based and reflective practices.

   Boyer thus made an attempt to elevate the status of teaching in proportion to research, which, as noted above, has historically been on an unequal footing. The important shift here is from one in which teaching is seen as an isolated phenomenon, whereby the teacher is solely responsible for planning, conducting and evaluating teaching, to a situation that includes communication and dialogue between teachers and teachers, between teachers and students, between teachers and management and between teachers and support staff (Laksov et al., 2010). We can add partners such as employers outside the university to that mix as well, and of course we have already discussed the desirability of team teaching and assessing to address interdisciplinary problems.

   Others have built on Boyer's work (e.g. Kreber, 2001; Trigwell, Martin, Benjamin, & Prosser, 2000). For Shulman (2000), there are three broad rationales for advocating a serious investment in the scholarship of teaching and learning: professionalism, pragmatism and policy (the three Ps of SoTL).

Professionalism

With regard to professionalism, Shulman (2000) argues that each of us is a member of at least two professions – that of our discipline and that of our profession as an educator:

> In both of these intersecting domains, we bear the responsibilities of scholars – to discover, to connect, to apply and to teach. As scholars, we take on the obligation to add to the core of understanding, scepticism, method and critique that defines our fields and their ever-changing borders. (p. 49)

Of course in an agile PBL ecology for learning, again, the fields and borders become even more blurred than what Shulman imagined here. But the important point is that he is talking about two interconnected activities: (1) scholarly teaching and (2) the scholarship of teaching.

Scholarly teaching is 'teaching that is well grounded in the sources and resources appropriate to the field. It reflects a thoughtful selection and integration of ideas and examples, and well-designed strategies of course design, development, transmission, interaction, and assessment' (Shulman, 2000, p. 50). There is an emphasis here on the scholarship of a particular discipline, how that particular discipline should be taught and what the appropriate resources would be. Again, this becomes more complex in a radically interdisciplinary context. Essentially however, this is about professional currency and keeping up to date with what's happening in your field or discipline (Considine, 2010). In a twenty-first-century context, this may be more effectively achieved by teams (rather than individuals), and if such teams are interdisciplinary, they will need to consider applications across disciplines, which would be a value add because it would work towards the development of an important twenty-first-century skill.

Shulman's (2000, p. 50) second activity is the scholarship of teaching. 'We develop a scholarship of teaching when our work as teachers becomes public, peer-reviewed and critiqued, and exchanged with other members of our professional communities so they, in turn, can build on our work'. This is beginning to sound a lot like *research* in the traditional sense, but there are different degrees to it. In this case, it also includes reflective practice, if such practice means that you collect evidence and data about your teaching and that you subsequently use that data to publish articles about your practice in scholarly journals or academic books. Interestingly, some researchers and research administrators, particularly in the 'hard' sciences, dismiss this type of scholarship as 'show and tell' or 'soft' research, rather than 'pure' or 'fundamental' research, which again reinforces the strength of the dichotomy between 'research' and 'teaching'. More recently, some learning and teaching journals have begun to recognise the importance of this type of scholarship by creating space in their journal for 'practice reports' (Mcintyre, Todd, Huijser, & Tehan, 2010), which are scholarly papers, based on reflective practice. They are often characterised by writing teams, and mentoring in a scholarly and professional community is an important part of such practice. This would suit an agile PBL ecology perfectly, as students could be involved in the process and mentored into developing output for public scrutiny (Gibbs, 2014; Laksov et al., 2010, p. 4). Furthermore, it would not need to be restricted to written output, but could include various forms of digital media where appropriate, sometimes referred to as alternative dissemination (O'Sullivan, 2009).

Pragmatism

Shulman's (2000) second rationale is pragmatism, because he is concerned that scholarship has a practical application and should not be purely focused on research output, as 'pure' research tends to be:

> By engaging in purposive reflection, documentation, assessment and analysis of teaching and learning, and doing so in a more public and accessible manner, we not only support the improvement of our own teaching. We raise the likelihood that our work is transparent to our colleagues who design and instruct many of the same students in the same or related programs. (p. 50)

Certainly this would gain even more currency in an agile PBL context, where interdisciplinary team teaching is an integral part of the process (Martyn, Terwijn, Kek, & Huijser, 2014). Team teaching itself already increases the likelihood of increased transparency between different teachers, but systematically implementing engagement in purposive reflection as a team, and documented assessment and evaluation of practice will align nicely with a continuous improvement and innovation agenda. Indeed, as we have noted throughout this book, while programs may have an integrity that is constant, the courses or units within are fluid and subject to perpetual change, as they seek to remain relevant in fast-changing contexts. Furthermore, the problems that students address 'on location' in various workplaces create many more variables than in the average classroom and should thus be rigorously and continuously evaluated. A 'pragmatic' scholarship agenda can serve a key role in this pursuit of developing a sustainable research and scholarship of teaching and learning agenda.

Policy

With regard to policy, Shulman's third P, the need to be accountable to external auditors and accrediting agencies has created an increasing need for the university to show 'measurable' outcomes (or at least outputs). To put it simply, engaging in this process is a matter of survival for the university, rather than a choice. The best engagement strategy is therefore to take some control over the process itself, and in particular taking charge of what is being measured and how it is being measured. Shulman (2000, p. 52) warns in this respect against metrics being employed 'because of convenience or economy of use, rather than because they serve as authentic proxies for the learning and development we seek to foster'. More recently, debates around applications of learning analytics are also beginning to address these concerns (Gasevic, Dawson, & Siemens, 2015; West et al., 2015). Applying learning analytics *for* learning is a particular problem when it comes to agile PBL, because it is subject to continuous change and adaptation. In addition, 'economy of use' does not take account of the 'messiness' involved in agile PBL, for example, the many intangible factors that have a major impact but cannot be easily measured. As Shulman suggests, one way of taking some control over the process is to demand an input into what indicators should be used to measure outcomes:

> They [indicators to measure the outcomes of higher education] should be the result of carefully conceptualised, designed and deployed studies of teaching and learning in each of our fields, conducted by scholars qualified to pursue them. This kind of work cries out for a vigorous scholarship of teaching and learning engaged by discipline and field-specific scholars of teaching (p. 52)

or, in our case, engaged by interdisciplinary (and cross-organisational) teams of agile PBL teachers, internal staff, partners outside the university and potentially students. More recently, and in response to the scholarship and research opportunities that data (and/or learning) analytics provide, Laurillard (2014, para 16) has made a similar point about teachers taking control of the agenda:

> Big data could improve teaching, but not without educators taking control of this extraordinary methodological gift. At present the field is being driven almost entirely by technology professionals who are not educators and have never taught online. Instead, we could be recruiting all lecturers everywhere to collaborate and generate their own large-scale data collection and analysis. Then big data could really make a difference.

Like Shulman however, Laurillard's argument suggests a functional concern for dealing with administrative impositions and a need to take control over the measures and indicators of teaching and learning outcomes, in terms of how the data is collected, what data is collected, how the data is being interpreted and what that data is being used for as a measurement (Knight, Buckingham Shum, & Littleton, 2014; West et al., 2015).

Trigwell and Shale's Model of Scholarship of Teaching

Rather than providing a rationale for the scholarship of teaching and learning however, as Shulman does, Trigwell and Shale (2004, p. 524) come from a different angle and outline three core aims:

- It should be a means through which the status of teaching may be raised.
- It should be a means through which teachers may come to teach more knowledgeably.
- It should provide a means through which the quality of teaching may be assessed.

This underlies a key overriding point, which is about students' experiences of university learning. 'Ultimately, it is that experience that a good conception of scholarship of teaching must serve to enhance' (Trigwell & Shale, 2004, p. 524). The point here is that different aims and objectives are often presented when it comes to the scholarship of teaching and learning. Shulman's approach, as outlined above, is functional and pragmatic and as a result focused to a large extent on universities' administrative requirements and academics' career development. These are important considerations, but Trigwell and Shale (p. 527) firmly shift the focus to students and their learning experiences and therefore by extension to learning outcomes: 'excellence in teaching discourse and excellence in the teaching that enables students to learn are two different things. If all that the scholarship of teach-

ing achieved was greater sophistication in the ways we talk about teaching, it would have failed in its fundamental aims'. So the question then becomes: do we conduct scholarship of teaching and learning to improve the teaching and the learning outcomes of our students? Or do we conduct scholarship of teaching and learning to improve our professional standing and thereby advance our careers, in a similar way that 'pure' research does? Or can there be a productive combination of the two?

To answer those questions, we need to first take a step back and consider some conceptualisations of the scholarship of teaching and learning. Trigwell and Shale (2004, p. 525) draw on Kreber's (2001) work who identifies four differing conceptualisations:

- The process by which teachers conduct and publish research
- Scholarship of teaching as teaching excellence
- Scholarly processes in which teachers make use of the literature of teaching and learning to inform their own practice
- A combination of the first three, but explicitly includes one or more essential new scholarly elements, such as reflection or communication

In terms of the questions posed above and like Shulman (2000), Trigwell and Shale (2004) make an important distinction between 'scholarly' activity and 'scholarship' as a product. The latter refers to the first conceptualisation and is expressed in artefacts such as journal publications, while the former refers to conceptualisations two and three and is about a type of teaching practice that draws upon educational publications and is thus evidence based. The fourth conceptualisation provides a potential answer to the question about whether 'scholarly' activity and 'scholarship' as a product can be combined. In other words, it is possible to engage in both, at the same time, but only if the right balance is struck. If it is not, then there is a lot of scope to revert back to the unproductive research versus teaching binary referred to above, in which scholarship outcomes (artefacts) become the key focus, rather than teaching excellence.

With regard to striking the right balance, Trigwell and Shale (2004, p. 529) use the term 'pedagogic resonance', which they define as 'the bridge between teacher knowledge and student learning'. This is the key point for them and one which is very interesting from an agile PBL perspective. Their rationale is as follows:

> If we are interested in making knowledge in teaching [rather than knowledge about teaching] the substance of the scholarship of teaching (that is, defining as scholarship, the public demonstration of the knowledgeable activity that leads to learning), then our students and their experiences of our teaching constitute a crucial part of the critical scrutiny that such scholarship requires. If the knowledgeable activity of teaching were to be what we take to be the basis of our scholarship, the disciplinary community would include not only other teachers but also our students – not just as objects but as connoisseurs, and even 'legitimate peripheral participants'. (Trigwell & Shale, 2004, p. 528)

This is attractive from our point of view, because it blurs the lines between teachers and students, and indeed allows us to see such roles as being positioned on a continuum, whereby the ultimate objective is to move students into positions of independence and towards adopting the roles of peers and collaborators. Indeed, we

would take this even a step further and suggest that students should be legitimate participants (rather than peripheral ones) in an authentic scholarship agenda as soon as possible and of course as long as it is appropriate. Importantly, this should not be mistaken as devaluing the role of the teacher, as the whole enterprise actually relies on the sound, evidence-based and skilled judgement of the teacher. In other words, the extent to which students are involved in authentic scholarship should not be a dogmatic decision, but a carefully evaluated one, and one based on scholarship and team discussion about the agile PBL ecology for learning (see Chap. 2), designing for the next generations of learners (see Chap. 3), interdisciplinarity and authentic problem design (see Chap. 4), authentic assessment (see Chap. 5) and mattering environments to support students and staff (see Chaps. 6 and 7). In this way, reflective practice can be fully integrated from an agile PBL perspective and thereby becomes an integral part of every student's way-of-being, which in turn will lead to students with strong critical (self-)reflection and adaptive skills, while they learn at the same time to be subjected to peer review and critique. Both are important twenty-first-century skills and dispositions.

Trigwell and Shale's (2004, p. 530) scholarship of teaching model has three main components that overlap to some extent:

1. Knowledge – which includes knowledge of discipline, knowledge of teaching/learning, conceptions of teaching/learning and knowledge of context
2. Practice – which includes teaching, evaluation/investigation, reflection, communication and learning
3. Outcome – which includes student learning, documentation, teacher learning and teacher satisfaction

For our purposes here, there are two very attractive elements within this model. Firstly, there is an explicit recognition of 'collaborative engagement together, through the act of teaching, [which is] the act of academic engagement in deliberate, collaborative meaning making with students' (Trigwell & Shale, 2004, p. 530). This is contained in the Practice part of the model, and the actions contained in that part of the model are thus not meant to be applied to individual teachers working in isolation, but rather to interdisciplinary teaching teams in collaboration with students and employers and, to add to the complexity of an agile PBL ecology for learning, other wider university teams (teachers and professional staff) that share responsibility in creating a mattering environment for students (Kuh, Kinzie, Schuh, Whitt, & Associates, 2005; Museus & Jayakumar, 2012).

The second attractive element relates to the Outcome part and includes the outcomes and artefacts of collaboration, 'including both students' and teachers' learning, the documentation that constitutes artefacts of the teaching act, such as course outlines, evaluation results, investigation results, etc., and teacher satisfaction. All contribute to what might be made available for public scrutiny' (Trigwell & Shale, 2004, p. 530). Trigwell and Shale do not explicitly include academic publications in the 'outcome' section of their model, but of course they could be part of the outcomes, and they could also be collaborative efforts between teachers and students and professional staff inside the university such as academic advisors in learning

centres; educational developers, marketing professionals and student services staff; and partners outside the university such as employers and parents of students. Within an agile PBL ecology for learning, artefacts can of course (and ideally *should* as much as possible) include authentic products created such as engineering prototypes, reports and technical and non-technical solutions.

Furthermore, the 'etc.' part of their outcomes is also increasingly likely to include different types of media (e.g. videos shared on YouTube or Vimeo), as well as social media channels like Facebook groups or Twitter feeds, which have a more immediate and perpetual character, but which nevertheless produce data that can be used for evaluative purposes. To reiterate Benson and Brack's (2009, p. 78) important point:

> Recent developments in e-learning and teaching which place emphasis on aspects of social engagement and learner control, and appear to go beyond current understandings of democracy in the classroom, challenge assumptions about the role and control of teachers, and of the control of knowledge. They also challenge a range of other assumptions which include: the way scholarly work becomes public, peer-reviewed, critiqued and exchanged; the ownership of the work; and the criteria used to judge its quality.

We are only at the very beginning of this process of change, but the changes are nevertheless rapid and relentless. In many ways the traditional model of published peer-reviewed output is being superseded by a different and much more immediate form of peer review in a plethora of online, and increasingly mobile, spaces (Thelwall & Kousha, 2014, 2015). It is important that we engage with these changes in an agile PBL ecology, without losing the value of a more sustained and focused peer review process, which traditionally constitutes an important element of the scholarship and quality agenda. Again, this is not an either/or dilemma, but rather a fluid movement that ensures currency at all times but at the same time incorporates and preserves valuable elements of traditional academic practice, which is still prevalent in much of the higher education sector.

Trigwell and Shale's (2004) model of the scholarship of teaching is based on a realisation that the line between teachers and students has hitherto been too firmly drawn. 'Students do not appear as partners in learning. They do not appear as neophyte scholars in the community. They do not appear as critics or connoisseurs of teaching. When they do appear it is as objects of concern, objects of analysis, or presumptively passive consumers' (Trigwell & Shale, 2004, p. 534). In other words, they see teaching as an activity 'that emerges in collaboration with students as *partners* in learning' (p. 534, original emphasis). Thus, this serves an agile PBL research and scholarship agenda perfectly, and indeed agile PBL provides clear opportunities for collaborative partnerships between teachers and students, but also between teachers and employers, between teachers and professional staff and between teachers, professional staff, employers and students, in whatever combination is appropriate at the time. These need to be relationships based on trust and respect for the prior knowledge that each brings to the table. As noted, this can be imagined as a 'feasible utopia' (Barnett, 2013) as an agile PBL ecology for learning, but the 'ducks need to be aligned' as every ecology is potentially fragile.

Laksov, McGrath and Silen's Model of Teaching and Learning

Laksov et al. (2010) provide us with another scholarship of teaching and learning model that they have adapted from D'Andrea and Gosling (2005). Their model is much more stripped down than Trigwell and Shale's (2004) and shows a continuum within a university context, which leads from teaching to educational development, to the scholarship of teaching and learning, to educational research and ultimately to research itself. It thus keeps the dichotomy between teaching and research in place to some extent, but it allows for considerable movement between the two, with the scholarship of teaching and learning wedged between educational development and educational research. However, the value for our purposes lies in their treatment of the model and how they describe the implications and practical application of it. They describe the scholarship of teaching and learning (SoTL) as including the following elements:

- Theoretical knowledge of teaching and learning
- Skill to teach including a variety of different methods
- Experience of teaching and learning at different levels
- A deliberate approach to learning and knowledge
- An interest in education
- Content knowledge, or knowledge of the subject that students should learn [otherwise referred to as discipline knowledge]
- Pedagogical content knowledge, i.e. knowledge of how students can best learn a particular topic (Laksov et al., 2010, p. 6)

This is still rather teacher centred, as it assumes that the teacher is responsible for all of it, and there is no mention of a collaborative partnership with students. However, Laksov et al. (2010, p. 7) do mention collaboration explicitly when they usefully outline the ways in which SoTL becomes visible:

- Teaching is performed consciously at different levels – teaching is not purely based on intuition, but is designed and performed based on existing evidence.
- Learning and teaching is examined at different levels – this refers both to the examination of existing research and scholarship on a conceptual level and to the evaluation of teacher's own practice.
- Changes are applied and teaching is developed at different levels – the outcomes of the above examinations are applied to the next cycle of course development and teaching practice.
- Experiences of teaching and learning are published – the data gathered during the evaluations are written up in publishable form and thereby subjected to public scrutiny and peer review.
- Collaborations are established between teachers, students and at a system level – this is where collaborations are mentioned, but they are not particularly explicit about how to achieve such collaborations or indeed what kind of collaborations they are referring to.

In relation to the last point, the system level element, even if they do not elaborate on it, is important, as it suggests that some of these practices have to be very consciously and systematically implemented if they are to lead to overall sustainable practice (Chap. 8). This may take the form of time and space being created to allow for SoTL and, for productive collaboration, for example, to create a mattering environment to support students in agile PBL programs and university life in general (see Chap. 6) as well as staff (see Chap. 7). It may also be systematically locked in the form of various 'carrots' such as teaching awards, but also scholarship awards, where examples of excellence in scholarship (which may either be witnessed in terms of learning outcomes or in terms of publication outcomes) are celebrated. There is no stronger incentive than seeing your peers being celebrated for a practice that you could be involved in as well. In terms of the scholarship awards, these should of course include collaborations, which means that students and employers as well as professional staff in the institution would be eligible for these as well in an agile PBL ecology for learning.

Educational Research

When it comes to the scholarship of teaching and learning, there is definitely a sense of immediacy and practical application about it. In other words, it is an important part of continuous improvement and evidence-based practice. We have already outlined the importance of such practice in an agile PBL ecology for learning. However, this focus on immediacy should not become a limiting factor in terms of the evidence base. This applies to the ways in which scholarship is applied to teaching, but also to research practice that is focused on the future. A wider (educational) research agenda should therefore be incorporated into, and blended with, the scholarship of teaching and learning agenda. Part of this agenda would be a focus on innovation and development, as well as research into entrepreneurial opportunities (Macmahon & Huijser, 2015). The latter would apply to both students and professional staff inside the university and partners outside the university or in some cases to all. An explicit research agenda not only allows for a focus on the future, but if this agenda is integrated into the curriculum, it also inculcates students with a 'researcherly' disposition (similar to a scholarly disposition).

At Maastricht University (a PBL institution), the Faculty of Health, Medicine and Life Sciences has established a systematic approach to embedding educational research into its everyday practice. Van der Vleuten et al. (2010) identify what they call two organisational conditions – academic status for educationalists and a recognised research program – as having been critical for education research in their institution. This reinforces our point above about the need for a systematic approach to research and scholarship, including a systematic approach to creating space and time for it, as well as recognising it as a valuable and therefore valued activity. The research program in Van der Vleuten et al.'s (p. 219) case study pursues the following goals:

- To investigate the nature of human learning and learning environments
- To collect scientific evidence for health professions education
- To drive educational innovation
- To educate staff in education research

From the first point, we can see that this is a broader research agenda than scholarship of teaching and learning agendas usually are, and there is a broader research focus that zooms in on the broader idea of human learning and learning environments, which coincides with agile PBL ecology for learning. The data collected in this way would inform the learning and teaching design, which would then be further evaluated and redesigned, based on the scholarship agenda, much like Laksov et al.'s (2010) continuum. To make this more concrete, the research agenda would result in evidence-based ideas about what makes for an effective learning environment in the twenty-first century and how this changes over time. This would then be used to inform appropriate agile PBL problems, assessments, teaching and continuous improvement initiatives. Again, we are using *agile* PBL in a broad and 'fluid' sense because it needs to be responsive to a changing evidence base and emerging data and issues that the research agenda provides over time. This is not simply a reactive process, but also very much a proactive and future-oriented one. For example, if we have identified (based on available research) that our graduates need 'particular' skills to function in the twenty-first century (Davies, Fidler, & Gorbis, 2011), then our institutional research agenda should, for example, focus on the best ways to stimulate these 'particular' skills. This would then in turn inform the design of problems in a PBL ecology for learning, as well as the circumstances under which such problems would be addressed, for example, in a classroom or in a workplace (Edwards, 2015), or a combination thereof.

The second goal refers to educational research that is specifically tailored to particular disciplines, in Van Der Vleuten et al.'s (2010) case, the health professions. We have already discussed the need to go beyond disciplinary silos in earlier chapters (e.g. Chap. 4), so in agile PBL, the research focus should not purely be on individual disciplines, but rather should have an inbuilt focus on interdisciplinarity and on problems that require interdisciplinary approaches in order to address them successfully. Much like the interdisciplinary teaching teams we have been advocating, the research agenda should also be characterised by interdisciplinary research teams. To reiterate and to allay fears of 'watering down' disciplinary strength, this does not mean that we advocate doing away with disciplines altogether. Far from it, we recognise the legacy and the continuing importance of discipline-based specialisations. However, evidence increasingly suggests that most problems in the twenty-first century require a multidisciplinary approach (Mulderig, Macan, Hendricks, & Noel, 2014) and therefore an ability to work across disciplines or at the very least an ability to work in interdisciplinary teams. Universities have long had a silo mentality when it comes to disciplinary research, and this attitude continues to reverberate across the sector despite rhetoric to the contrary. For example, in our case study here, those in the health professions increasingly need to work in teams that combine, for example, business, entrepreneurial, marketing and

technological expertise, rather than being purely focused on health and medicine, while another 'silo' takes care of another bit, and never the twain shall meet. Working across those tasks with a team that is used to discussing each other's roles and mutually reinforcing each other's skills is much more effective, and it is thus part of the research agenda to explore how such skills are most likely to develop, without undermining the development of discipline-specific expertise.

The third goal, research that drives educational innovation, is central to a research agenda in an agile PBL ecology for learning. In other words, in an agile PBL curriculum, nothing is taught in the same way twice, which again does not mean that there are no disciplinary fundamentals that are not part of the curriculum. However, it means that the way they are taught differs with every iteration of a course, because the problem that students need to address (in interdisciplinary teams) is different every time. A research agenda that focuses on educational innovation is therefore crucial, because agile PBL is about continuous innovation. This works both on the level of the curriculum and the teaching agenda itself, but importantly, it also applies to the level of teaching for innovation. In other words, agile PBL is not content to simply teach what is and what should be; rather, it has a strong focus on instilling in students a focus on what could be or perhaps a focus on a 'feasible utopia' (Barnett, 2013). This involves skills and dispositions that include critical thinking, entrepreneurialism (Oosterbeek, Van Praag, & Ijsselstein, 2010), social entrepreneurialism and future thinking (among others). All of these therefore need to be an integral part of the research agenda, and they need to be present in the teaching and learning context, for example, integrated in an agile PBL problem. This goal therefore exemplifies the nexus between research, scholarship, teaching and learning, as well as the merging of roles between researchers, teachers, employers and students. This is what we are talking about when we refer to the need to recognise and value the fluidity of siloed disciplinary boundaries and the need for agility in an agile PBL ecology for learning.

The final goal, educating staff in educational research, is a crucial element in the research agenda, as it is part of the overall agenda of change that is required in an agile PBL ecology for learning. In the current university climate, there are voices that advocate a more rigid boundary between researchers and teachers (Matchett, 2012; Probert, 2014), but we argue strongly that research, scholarship, teaching and learning are all part of a shared teaching and learning context and should not be separated. Quite the opposite, we argue throughout this book that the boundaries between systems are porous and should allow for liquid knowledge to flow in, out and in between. And that means interdisciplinary teams require a combination of skills, which includes research skills and design based on scholarship. In our case here, this applies to an agile university context, but we would argue that it applies to any disciplinary context, as there are no disciplines that exist in isolation, and if there are, they would likely benefit from some interdisciplinary contact. To return to Van der Vleuten et al.'s (2010) final goal, educating staff in educational research is therefore a very important part of an agile PBL ecology for learning and should be structurally built into each academic's workload and career progression pathways.

In the students' case, structurally build research skills in the agile PBL curriculum and have students partner as coresearchers in research.

From Theory to Practice

If we consider Laksov et al.'s model and continuum of teaching through to research, with the scholarship of teaching and learning somewhere in the middle, then this raises an urgent question: who is going to do what, and when? In other words, in practice, many academics feel devalued, overworked and demoralised enough as it is (Hil, 2012). How are we going to make them engage with agile PBL that requires them to engage in a number of roles and tasks that are different from the traditional teaching paradigm, as discussed in Chap. 7, and on top of that require them to engage in the scholarship of teaching and learning and in the university's research agenda?

The answers (and they are multiple) are not simple, but they do relate to instilling a sense of excitement and a sense of involvement in something revolutionary (a 'feasible utopia') and in something that has the potential to have a huge impact on the way we approach the 'business of educating students'. The answers relate to a number of different factors:

- Change management in a way that provides a certain amount of control to staff and a feeling that they matter, leading to a sense of ownership among staff. This means that one cannot simply impose the radical changes required for agile PBL to work, without involving staff in the process from the very beginning.
- Related to the first point is the importance of creating space and time for staff to engage in continuous experimentation, assessment, evaluation and research, without feeling completely overwhelmed and going to ground as a result. We discussed the use of communities of practice and action learning groups in this respect in Chap. 8, and these communities of practice and action learning groups can be a similarly important part of a sustainable research and scholarship agenda.
- Build into the university's human resource policy and process to create spaces for staff (academic and nonacademic) to take 'time out' from the university to the macro-system as sabbaticals or industry/professional internships for an extended period of time. Engagement in these out-of-university spaces can only renew staff's thinking, feeling and doing and help the university to sustain research and scholarship agenda.
- As part of the research agenda, it is important to provide staff with choices in what research special interest groups to engage with, or indeed which special interest group they would want to establish. In principle, there should be no limits to what can be included here, as long as the groups themselves can convincingly justify their need of existence and contribute to a sustainable and innovative research process and outcomes.

- Apart from time and space (in terms of workload), these action learning groups and communities of practice need incentives to stimulate particular outcomes. It is therefore a good idea to structurally build in potential (and competitive) rewards based on performance and outcomes (rather than outputs). Rewards can, for example, take the form of actual staff awards for performance, but can also include performance-based travel stipends for research and scholarship purposes.
- Incentives can include the research and scholarship outputs themselves, in the form of journal articles, book chapters, video presentations and so on. If an action learning group or community of practice can convincingly argue that they will produce a big research or scholarship outcome and/or product, if given focused development time, an incentive can be a funded writing retreat for that group (obviously based on track record and merit) (Barrett & Moore, 2011).
- Rather than a traditional model of staff professional learning, staff's expertise is recognised and utilised by other communities of practice and action learning groups. This not only allows staff to further develop their own expertise, but it is also a way of valuing prior skills, knowledge and expertise, which can be a strong motivator.

These are just some ideas around a radically changed practice model. However, the strongest incentive by far is that teaching in an agile PBL ecology for learning becomes a motivating and exciting practice in itself, and research and scholarship are literally woven through the curriculum. Everyone is involved in research, scholarship, design, teaching and learning, and this has the potential to remove the traditional dichotomy between teaching and research and create a more productive space where these different areas flow into and interact with each more seamlessly.

Van der Vleuten et al. (2010, p. 222) identify the central success factor for their research program as being that 'all staff members involved in education research also participate in educational development and teaching activities. Actual problems encountered in educational practice are often starting points for research'. Again, we can add students to research action learning groups and communities of practice, as well as employers and professional staff from the related systems of the agile PBL ecology for learning, and this would only diversify the input, thereby potentially strengthening the outcomes. In addition to the practical suggestions here, action learning groups and communities of practice themselves should have input in what kind of incentives would have a stimulating effect on their own practice, as a sense of ownership, and a level of control over the agenda is vital if any of this is to come off the ground. If this model works as it is envisaged, new initiatives and innovations will be generated at the grassroots, and senior management will only need to provide the broad boundaries and strategic directions or in short operate as facilitator.

Conclusion

We began this chapter by identifying a strong and lingering dichotomy between research and teaching, and throughout this chapter, we have argued what we have argued throughout this book: that the strict disciplinary and activity boundaries that characterise university structures and practice are no longer in step with what is needed in the twenty-first century when they move out of the university. We have argued that graduates need different skills that we do not necessarily teach in traditional university classrooms (including more traditional PBL-based classrooms). We have also argued that the nature of knowledge itself, and therefore the nature of all knowledge-related activities, such as teaching and learning, as well as research and scholarship, is changing and requires different approaches from the ones that have been in place for hundreds of years. This does not mean that we no longer value rigour or disciplinary specialisations; quite the contrary, we probably need them more than ever. However, it does mean that the knowledge environment has changed radically and that we have to respond to those changes and continue to respond to them if we are to stay relevant and if we are to have an ongoing impact on the agenda for continuous change in the twenty-first century. Most importantly, we have to be proactive in our responses to these changes if we want our students to be in a powerful position to engage with and direct the agendas for the twenty-first century. To do so, they need to be research and scholarship literate and involved in an agile research and scholarship agenda, and the same applies to their teachers and partners outside the university. So while research and scholarship are situated in the exo-system in the agile PBL ecology for learning, it should flow in and out, through all other systems through its porous boundaries, thereby informing, and being informed by, all other parts of the ecology.

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