Implementing the liquid curriculum: the impact of virtual world learning on higher education

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This paper presents findings from a large-scale study which explored the socio-political impact of teaching and learning in virtual worlds on UK higher education. Three key themes emerged with regard to constructing curricula for virtual world teaching and learning, namely designing courses, framing practice, and locating specific student needs. We argue that the findings indicate that 'liquid learning' and 'liquid curricula' are central concepts and practices that can be used to democratise the way technology-enhanced learning can and should be integrated into higher education.

Keywords: Liquid learning; curricula design; student engagement; assessment; virtual worlds; Second Life

Introduction

The facilitation of teaching and learning through the use of technologies such as virtual worlds (VWs) has expanded rapidly in higher education (HE) in recent years (Hew & Cheung, 2010; Wang & Burton, 2013). These developments have stimulated discussions about opportunities for educational change and the development of more flexible curricula that take account of the experiences and perspectives of students and tutors (Savin-Baden, 2008a).

This paper presents findings from a large-scale project which explored the socio-political impact of teaching and learning in virtual worlds on UK higher education, with particular reference to Second Life (SL), the most widely used VW in UK HE (Kirriemuir, 2010). Virtual worlds are three-dimensional graphical online environments, which users can change and manipulate, as well as work simultaneously on specifically tailored or self-developed projects.

Based on the project's findings, we argue that in order to enhance learning and teaching through the use of educational technologies, and in particular VWs, there needs to be a focus on the implementation of 'liquid curricula' as discussed by Savin-Baden (2008a, p. 158). Liquid curricula are defined here as curricula that focus on students' and tutors' stances and personal identities and provide opportunities to design modules and lessons in open and flexible ways. In practice this means that universities need to stretch beyond open courseware and closed virtual learning environments. Instead learning would need to be created around a constellation of uncertainties, such as negotiated assessment, and open and flexible learning intentions.

Three key themes that bear consideration for the adoption of liquid curricula in VWs were evident across the project and provide the focus for this paper:

(1) Designing courses and modules in HE that enhance flexibility and uncertainty in curricula. This includes re-consideration of effective learning and assessment and the risks associated with such approaches.
(2) Charting the discourses that shape students' experiences of learning in VWs. This includes understandings of discipline, digital games, and family and work which frame their conceptualisations of the technology.
(3) Taking account of students' perspectives on using VWs in order to understand their learning and support needs. This includes particular guidance with regard

to social norms in VWs and how the VW is implemented in a pedagogical context.

In presenting these themes we draw on Bauman's (2000) notion of 'the liquid' and suggest that engaging with a world of liquid uncertainties might bring to light new understandings in terms of new notions of community, different understandings of space and spatial practices, and recognition that e-learning spaces are increasingly hybridized, extended, and mixed in ways we are yet to understand fully. Findings from this study illustrate a need for liquid curricula for VWs and also suggest ways in which such curricula might be implemented with a view to overcoming challenges in democratic ways.

Literature review

The use of VWs in education is not a new phenomenon, but has increased considerably over the last ten years, hence the growing empirical research base informing pedagogical approaches is relatively recent (Wang & Burton, 2013). This research base has developed in concurrence with an increasing usage of VWs and in general. Analysis of VW consumption worldwide suggests that there are now more than 1.3 billion user accounts crossing multiple VWs, with the majority of those accounts being held by children between the ages of 10 – 15. 66.4 million unique users logged into a VW at least once in the final quarter of 2012 (KZero Worldswide, 2012). Although technology-enhanced learning (in a variety of forms) is now firmly located in HE (Kim, Lee, & Thomas, 2012; Selwyn, 2013), the majority of users are not experiencing VWs for the purposes of education, but rather for social and entertainment purposes. As a form of communication and interaction, they are proving popular and are being widely used. This does not mean that they can or should be automatically adopted for educational purposes, but it does mean that future students will be increasingly familiar with this form of technology. Yet these factors and statistics need to be considered in light of ongoing debates about young people's use of new communication technologies. Such debates are often negative, overlooking the meaningful and creative use of technologies (e.g. Thurlow, 2007). Turkle (2005, p. 14; similar 2011) has argued:

> 'The dramatic changes in computer education over the past decades leave us with serious questions about how we can teach our children to interrogate simulations in much the same spirit. The specific questions may be different, but the intent needs to be the same: to develop habits of readership appropriate to a culture of simulation.'

Furthermore, debates around young people's use of digital technology have also been likened to academic 'moral panic', with the suggestion that those in opposition are seen as being out of touch (Bennett, Maton, & Kervin, 2008). Yet such debates, oppositional as they are, remind us of the importance of critiquing curricula and pedagogy even as practices become established. Five years past a significant period in VW empirical research (Wang & Burton, 2013), and in light of their increasing use, now would seem a useful point to pause and take stock of the pedagogical approaches employed within VWs.

Curriculum design for VWs has recently been underpinned by a (social) constructivist theory of learning (Inman, Wright, & Hartmann, 2010). For many designers and tutors, especially those working in distance learning contexts, SL's perceived ability to support social interaction has provided motivation for its use (Minocha & Roberts, 2008). It has been used to support dialogic learning (Petrakou, 2010), action learning based around group-led discussion (Wagner & Ip, 2009), and communal constructivism (Girvan & Savage,

2010). Salmon's (2005) e-tivities model has also been adapted to structure social interaction within the VW (Edirisingha, Nie, Pluciennik, & Young, 2009), and de Freitas and Neumann (2009) have developed an exploratory learning model for supporting immersive learning in VWs. Active approaches, such as experiential learning (e.g. Jarmon, Traphagan, Mayrath, & Trivedi, 2009), role-playing (e.g. Jamaludin, Chee, & Ho, 2009), and problem-based learning (e.g. Vallance, Martin, Wiz, & van Schaik, 2010), have also been employed. Yet despite these many cogent arguments and the varied possibilities for their use, the pedagogical rationale for teaching and learning in VWs has been highly contextualized, most often taking the form of case studies across individual courses. Whilst such an approach is valuable in the development of an empirical research base, it has also contributed to a lack of evidence synthesis on the process of curriculum development for VWs.

Wang and Burton (2013) identified five specific patterns in the empirical research base: exploratory studies (2007-2011), consideration of students' and tutors' attitudes and perceptions (2008-2009), evaluative studies (2009), examples of pedagogical approaches (2009-2010), and identification of factors affecting SL-based learning activities (2010-2011). We suggest that, upon the basis of this empirical research, future work in VWs needs to take particular account of the individual experiences of tutors and students, whilst continuing to explore new curricula for which VWs are particularly relevant.

It has been argued that VWs can offer new opportunities for curricula for uncertain times (Salmon, 2009 following Barnett, 2007; Savin-Baden, 2008a, 2010). The curriculum design typically employed in SL has tended towards student-centred approaches. Additionally, Cahalane, Finnegan, and Feller (2011) have highlighted the importance of flexibility in curricula in comparison to more structured approaches to facilitate effective collaboration, positing that such an approach can help to 'resolv[e] the tensions between individual virtuosity (such as technical skills, fluency and design style) and the need for collaborative control' (2011, p. 11). Other work has highlighted the important roles students' perspectives play in VW pedagogy. For example, Bayne (2008) has highlighted the disorientation which can occur as students experience the blurring of boundaries between fantasy and reality. She suggests that the uncertainty of interacting with others in VWs creates opportunities to explore identity, including its disorientating effects, arguing that for certain students, in certain contexts, learning in VWs can provide rich understandings of being in a digital age. Furthermore, VWs have been positioned as environments that can promote 'playfully social' learning (Graham, 2008), which can facilitate the important development of attitudes of mind and dispositions towards learning (Merchant, 2010), as opposed to a focus upon technical skills and curriculum content. Such arguments would seem to be resonant with ever-changing curricula.

Thus it is argued here that in order to enhance learning and teaching through the use of educational technologies, and in particular VWs, there needs to be a focus on the implementation of 'liquid curricula' (Savin-Baden, 2008a). These kinds of curricula are likely to be seen as risky since they prompt consideration of what counts as legitimate knowledge. In these kinds of curricula students will be encouraged to examine the underlying structures and belief systems implicit within what is being learned, in order to not only understand the disciplinary area but also its credence.

Methodology

The large-scale project comprised three doctoral studies undertaken and supervised by the authors of this paper. Analyses presented in this paper represent themes identified across the three studies, the unique focus of each being:

(1) Tutors' experiences of VW use in HE, and the design and development of VW pedagogy – using case study methodology (Creswell, 2013).

(2) Students' perspectives on using VWs as learning technologies – using constructivist grounded theory methodology (Charmaz, 2006).

(3) Students' understandings, expressions, and management of identity in VW learning – through narrative inquiry methodology (Riessman, 2008).

Ethical approval was obtained from the research ethics committee at the host university and negotiated with all other research sites. Data were collected over a period of 18 months across 12 UK universities using VWs in a variety of disciplines: computing, chemistry, education, employability, environmental health, geography, information sciences, and theatre. Teaching contexts differed, including campus-based and distance education, both full-time and part-time study arrangements, and undergraduate and graduate courses. Over 90 interviews and focus groups with students, VW practitioners, and key stake holders in HE were undertaken, in addition to 130 hours of fieldwork observations collected across seven university modules.

Participatory Action Synthesis

Whilst separate in their study design, data from the three studies have been brought together for the purposes of this article to form a 'synthesis' through a constructivist lens. Thus both the experiences and structures reported upon by research participants have been examined in context. This synthesis of individual accounts has demanded pragmatic approaches to the translation of field data to produce overarching concepts. This process is termed *'Participatory Action Synthesis'*, which is explained in summary below and in more detail elsewhere (Wimpenny & Savin-Baden, 2012).

Participatory Action Synthesis (PAS) is a methodology for synthesising primary research data from different but associated studies, allowing for a collated analysis of different data sets, as well as combined knowledge construction through collaborative and integrative means. In addition to combining data sets for meta-interpretation, PAS is participatory as it comprises of a team process that acknowledges and integrates not only the different backgrounds of participants and contexts but also those of the different researchers involved. Additionally, PAS integrates cycles of individual and group analyses and interpretation and re-analysis and re-interpretation, taking account of findings from the initial individual studies. This led to the identification and definition of uniting themes, which led to further opportunities for in-depth analyses. Thus, when communally discussing findings and interpretation, it became apparent that certain findings, persisting in all three individual studies, could be linked to a particular uniting theme, the design and practice of curricula, and that certain changes regarding curricula design could unite students and tutors teaching and learning in VWs in new and improved ways.

Whilst validity and trustworthiness have provided a base for researchers to document the integrity of qualitative research, we argue for the notion of plausibility following Major and Savin-Baden (2010, p. 181): They define plausibility as 'a technique for ensuring rigour is qualitative research synthesis that involves locating the truths and the realities in the study, adopting a critical approach and acknowledging the complexities of managing 'truths' in research.' In short, we need to present a plausible case of research contexts and participants' experiences of phenomena. We acknowledge that the researcher, as a subjective individual, plays an integral part in the data analysis process (Finlay & Gough, 2003; Smith & Deemer, 2000). Thus to ensure rigour when conducting PAS, special attention was paid to:

- What was not said, and ensuring shared views were not privileged
- What expressed realities were accepted without any scrutiny
- Which experiences/opinions initially seemed improbable, and what conditions might have shown those to be real
- What contradictions were revealed

Findings

The findings presented here represent three distinct themes across the studies which indicate that the use of VWs in HE might facilitate the adoption of liquid curricula.

(1) Designing courses and modules in HE that enhance flexibility and uncertainty in curricula.
(2) Charting the discourses that shape students' experiences of learning in VWs.
(3) Taking account of students' perspectives on using VWs in order to understand their learning and support needs.

The following section focuses on tutors' experiences, whilst the second and third section concentrate on data collected from student participants.

Liquid curricula as risk

This section presents findings in relation to tutors' experiences of VW curricula. We outline the ways in which tutors designed curricula, managed flexible approaches to learning, and considered the risks associated with such approaches. Virtual world curricula were perceived as particularly risky with regards to:

- The facilitation of 'effective' learning
- Assessment strategies

Tutors interviewed in this study discussed VWs in relation to their ability to support effective learning. For some tutors, providing effective learning meant continuing with proven practice and thus removing the risks associated with flexibility and experimentation:

'If I was teaching daily with a large group of students [my use of Second Life] would have been more immediate and I would probably have been able to be a lot more experimental, which would probably have had some good outcomes and some not so good outcomes. With [my institution], they have to be very certain before they bring something, so people can't afford to be experimental. So [...] we have had to be careful and we have had to be rigorous and we have had to say, "actually, yes", we know for certain that this works and we can offer this to students.'

Here, the adoption of a VW brought with it a level of uncertainty (and thus risk) deemed unacceptable at this particular institution. This resulted in the transference of face-to-face classroom practices into the VW, in an attempt to de-risk new forms of pedagogy. Such an approach would seem to acknowledge the potential for liquid learning through VWs yet

also deem such liquidity as too risky. Yet for other tutors, this shift into the VW provided a prompt to reconsider their understandings of effective learning:

> 'It's not just a good space for students to learn things, it's also really good as a staff development tool. […] it forces you to think, "Well, what it is I really value, how do I teach, what do I think about learning, what am I doing with these students?"'

For many tutors in this study, assessment was a particularly risky aspect of liquid curricula. Oftentimes, tutors turned to essays or presentations outside of the VW in order to ensure effective assessment. Yet for one participant, the adoption of a flexible approach to learning demanded a similar approach to assessment:

> 'It's anomalous, I think, to offer people opportunities to learn in different kinds of ways and then revert to very traditional forms of assessment, or very rigid course patterns […] It's a contradiction really.'

For this tutor, who was familiar with VWs but did not teach within them, the adoption of VWs for learning, yet use of traditional forms of assessment, lay counter to liquid curricula; such a curriculum would be one fraught with contradictions. The risk here did not lie in the adoption of assessment suitable for liquid curricula but in *failing* to adopt such an approach. Yet for many VW tutors, adapting assessment for flexible approaches to learning was equally risky:

> 'One can do a lot more in the area of assessment than possibly some people fear, but screwing up your assessment is just the show-stopper, so one tends to be conservative about it.'

For this tutor, the riskiness involved in flexible approaches to assessment did not emerge from the practice of assessment itself but rather the *accountability* involved. The importance with which summative assessment is accorded in HE precluded experimentation, for fear of failure. Failure, in this instance, would seem to mean an inability to prove the effectiveness of student learning through VWs. And proving such effectiveness was determined in part by the very notion of the liquid curricula which, as we have suggested, may require re-consideration of what it means to 'read' and 'interrogate' in a digital age as became evident in the following quote:

> 'What's the point of assessing something in Second Life if you're not going to pay attention to any of the things that make it a Second Life assignment. So I just decided to take it as it was and try to grapple what it means to construct academic discourse in that kind of space and what it means to reflect on the literature.'

This tutor was required to assess a non-textual assignment in SL; for her, the need to take account of different (and unfamiliar) forms of reading and interrogating student learning characterised it as 'a Second Life assignment'. The tutor was thus required to develop new forms of assessment for non-textual assignments, demanding new and flexible ways of conceptualising 'effective' learning. Risk in pedagogy for VWs, then, emerged from the seeming incongruence between the use of oral, spatial, and visual strategies with the more traditional notions of 'effectiveness' in HE, which tend to orient around textual discourse (Lea, 2004). Yet this risk was also used productively, as a means to challenge established practice, and thus reconsider what 'effective learning' means in a digital age.

Having considered the influence of tutors' stances upon liquid curricula for VWs, we now turn to students' perspectives and discourses informing their engagement with VWs.

Liquid curricula as engagements with students' perspectives

This section presents a series of students' perspectives and discourses that influenced students' engagement with learning in and with VWs in HE. Following Gee (2000, p. 183), we see 'discourses' as:

> 'ways of talking and writing about, as well as acting with and towards, people and things […] such that certain perspectives and states of affairs come to be taken as "normal" or "natural"'.

From analysing students' reflections it became evident that particular discourses informed students' stances and their interactions in VWs. These discourses focused primarily upon (but were not exclusive to):

- Discipline
- Digital games
- Individual circumstances and biographies

It became apparent that there was a disjunction when students discussed the link between disciplinary contents and the use of VWs. Students questioned whether the VW cohered with their perceived disciplinary standards and other technologies used within disciplinary practice (e.g. geographic technologies, theatre spaces, computing environments). This computing student's reflection upon the links between different disciplines and SL exemplifies the relevance of disciplinary arrangements on students' engagement with VWs:

> 'For the sciences I think it [Second Life] would just be great, you could have an illustration, a 3D sculpture or something and go "this is DNA, press it and see what happens" and then it launches the DNA, that's something. It's a good environment for showing the practical elements of what things do, like climb inside a combustion engine and then watch everything, tick and stroke away. I'd find something like that really valuable if I was learning. Maths? I don't really see how something like Second Life could help with that apart from just the discussion of it. […] History I suppose because you could just recreate world events.'

In this case the VW was discussed at a more strategic level and the technology was critiqued in terms of its perceived attributes in relation to practices within the sciences, engineering, mathematics, and history. Thus the discourse of discipline provided a frame of reference for situating VWs in relation to broader disciplinary landscapes in HE.

Students also commented on the relationship between gaming media and VWs with regard to features such as graphical qualities and interaction style. VWs were often positioned as congruent or incongruent with *particular types* of digital games, such as first-person shooter or puzzle games, and these associations influenced all levels of student interaction and engagement. For example, previous experiences in digital games shaped students' engagement with spatial practice: actions when navigating and interacting with others within the virtual environment. However, assumptions about spatial practice drawn from previous experiences differed amongst students, and between students and other users of SL, as one student's experience illustrated:

> 'Being used to the sort of video game aspect whereby you can just run into people and nothing really happens because it's computer simulated [...] I was like walking through these people, I was nudging them aside. And as you would in real life, people basically commented on that and said "hey, stop pushing people around that's not polite" [...]I didn't realise that they were bothered by just being pushed aside a bit.'

Here, the student's association between the VW and other digital games was conflicted by other users' engagement and practices, which in consequence had direct impact on shaping the students' further actions in the learning context.

Students' perspectives of the VW were varied and idiosyncratic, even when they drew upon issues common to many students. Whilst the discussions of discipline and discourses of digital games were overtly linked to the context of using VWs, students' engagement with VWs was also influenced by their individual biographies and current circumstances. Articulations of, for instance, family situations or work circumstances were specific to students for whom these discourses were already pertinent, particularly those studying part-time, with full-time employment, and/or spouses and dependants – and often mentioned in contrast to what was perceived as being different to other students. These family and employment situations were individual, albeit with some commonalities, and so too were the intersections between family, employment, and the VW.

The discourses influencing students' engagement with virtual worlds were pervasive and socially based, yet also individually interpreted and organized in a variety of ways. One example of these assorted interpretations is the variety of digital game reference points, with their differing associated spatial, temporal, and communicative frameworks, drawn by participants in situating the VW, which we have discussed at greater length elsewhere (Wimpenny, Savin-Baden, Mawer, Steils, & Tombs, 2012).

Liquid curricula as opportunities for tailored guidance

This second section about students' experiences presents the support students expected from tutors. Whilst using VWs was acknowledged to offer new opportunities to investigate learning more openly and flexibly, and driven by students themselves; for some students this seemed to result in anxieties, reservation and, on certain occasions, in students objecting or resisting to use VWs for their learning. It was evident that the cause of this irritation was a lack of guidance offered to students to enable them to understand how the technology was anticipated to support them in their learning experience. This lack of communication between tutors and learners led some students to question the pedagogical intent of learning in VWs compared to more 'traditional' learning and teaching methods.

Students experienced using VWs such as SL as different from other virtual environments they had experienced before. This is illustrated in the following excerpt in which a student requests a more substantial induction to social norms, boundaries, and potential risks when learning in VWs.

> 'I think more basic training of the whole social part of Second Life in the course, because when we first started, we just got thrown in [...] It would be better to be a bit more forewarned just about the different things that are on Second Life and what you could stumble upon and things like that.'

This student indicated that she lacked direction whilst she explored and used the VW in the educational context. The student expressed her alarm in entering a sex club in SL by accident. She proposed that a module using a VW should encompass more explanation upfront of the content of SL and warnings around potential risks regarding sexual content, as well as reflections on inherent social norms and rules. It was evident that without adequate understanding of in-world behaviours and etiquette (despite the environment seemingly free and without boundaries) that learning experiences could lead to students feeling vulnerable, insecure and questioning whether what was learnt was actually useful and needed.

Another aspect highlighted by students concerns the difference between 'traditional' teaching and teaching that involved digital technologies such as VWs. Many students expressed anxieties about technology-led learning replacing reflection, exchange, and the more 'traditional' discussion and debate with fellow students and tutors, as experienced within, for example, university seminars. In the following example a student questioned whether the reasons for embedding VWs were entirely driven by pedagogy:

> 'I would expect more and more use of such electronic teaching, but I think, there's also got to be that care [needed]. Traditional methods are still useful and not to just ignore them, because [tutors] can do it all online. Because there are some things that you can't, you shouldn't do, and you shouldn't just use it because it's a way of getting funding or a way of saving money.'

This student seemed to suspect that money making and saving opportunities were the driving factors behind the application of VWs in the module and not a direct link to specific knowledge and skills. However, the student seemed to suggest that traditional teaching methods, that had demonstrated effectiveness in the past, were not so easily replaceable, and that the integration of VWs in education would not necessarily enhance learning and teaching in pedagogical terms. This view was supported by other students who expressed the need for additional opportunities to discuss their learning experiences and how they might be better able to confidently explore and use the technology further in their learning, for the module and beyond.

Using VWs as a means of providing students with opportunities for their learning not previously envisaged was illustrated in this quote from a female student on an employability module:

> 'You've got to give people stuff to work with, otherwise they get really freaked out, because it's so liberating and free. Our lecturer was saying, "you guys have got to think like designers, you've just got to free your mind and do this." And [some students] just could not handle it, because they hadn't been taught how to free their minds. They just thought, "it's a trick." It took me a while to get round that, but once you do, it's quite liberating.'

What is revealed here is that even the experience of liberty and flexibility of learning in virtual environments can be disturbing in the context of education when it is perceived as unusual. Moreover, it can be viewed by some students as being a trick or trap set by tutors and curriculum designers, and as such can lead to students' resistance. Thus, tutors need to convey what might be achievable or possible within settings of liquid curricula in technology-enhanced education today, as will be further discussed in the following discussion section.

Discussion

At the outset of this paper, we suggested that VWs might provide opportunities to facilitate liquid learning and develop liquid curricula for HE. 'Liquid learning is characterised by emancipation, reflexivity and flexibility' (Savin-Baden, 2008b, p. 26), adapting to an ever-changing 'liquid modern' (Bauman, 2000). In this discussion section we identify key issues that need consideration and offer guidelines for the creation of liquid curricula (for VWs) in HE. These issues are: the design of courses and (re-)examination of pedagogy for VWs, the role of risk, and the democratisation of HE.

Findings from this study suggested that the use of VWs as learning technologies often prompted re-consideration of what counted as effective learning, and, concurrent to this, consideration of how to facilitate effective learning for VWs within current HE paradigms. In some instances, the structuring approaches provided by quality assessment mechanisms proved helpful; at other times, constricting. What is certain is that the development of curricula for VWs is carried out within and at the boundaries of current curricula structures. In doing so, tutors find themselves in risky spaces, in which risk is perceived as both a threat and an opportunity which emerges from uncertainty (Marshall & Ojiako, 2010). We suggest that a liquid curriculum is one which not only takes account of the stances of students but also encourages consideration of tutors' stances in order to facilitate effective learning. The integration of tutor perspectives and needs with student perspective and needs, we suggest, will help to democratise the ways in which teaching and learning is developed and facilitated in HE.

Designing courses and (re-)examining pedagogy

Virtual world environments have been considered as opportunities to move away from the scaffolding of teaching and learning in HE (Savin-Baden, 2008a, 2008b). In particular, these characteristics, alongside their creative opportunities, can support the adoption of different learning values from other learning spaces.

Educators interviewed for this study suggested that VW pedagogy should take account of concepts associated with liquid curricula, such as flexible approaches to assessment. Yet VW assessment research is still very much in its infancy (Reiners, Gregory, & Dreher, 2011). Assessment methods have typically re-introduced structure into the VW environment, such as in the SLOODLE project (Livingstone, Kemp, & Edgar, 2008). Alternatively, summative assessment has been undertaken outside of the VW entirely. Attempts to adopt such curricular approaches, therefore, require careful consideration of not only the assessment paradigms which tutors currently work within, but also the tutor and student identity challenges associated with shifting towards different types of curricula (Jarmon, Traphagan, & Mayrath, 2008).

In this context both students and tutors are seen as learners. Tutors are learners in the educational context, entering new environments, of which some students might have different or more knowledge compared to their tutors. Additionally, tutors need to learn about their students' perspectives and knowledge frameworks as proposed by Kegan (2009). Following this tutors are given the opportunity to integrate this new knowledge about their students into their facilitation approaches. Open and flexible teaching enabled through liquid curricula can provide an opportunity to integrate students' experiences and perspectives, their own aims, and subsequently their own needs.

In this study we found that engagements with educational technologies entered into current networks of meaning in student participants' lives: discourses in context of which participants framed their engagements with VWs. As such meanings exist, it is inevitable that educational technologies will intersect with them, not least through the role of existing experience and meaning in shaping current learning (Mezirow, 1991). However, given the

idiosyncrasies of participants' interpretation and subsequent deployment of discourses such as discipline, education, and digital games, designers of curricula need to be aware that the intersection between meanings will often be unpredictable, catalysing unanticipated associations and learning.

Valuing risk

Concepts of risk have been found to infiltrate both students' and tutors' discussion of engagements with SL. Analysis of risk can offer us insight into the ways discourses – particularly of HE, assessment, learning, and technology – are mobilised in discussions of SL and educational technologies more broadly. For example, challenges around the design of experimental assessment approaches can inform about the 'normal' discursive framing (following Gee, 2000) through which pedagogy is conceived. Analysis of risk also updates our understanding about the clash of discourses and the struggle for definition that pervades the design of VW curricula, exemplified in both the concerns of tutors over assessment and of students over guidance and the purpose of educational technologies.

The question is not 'which of these associations and intersections is most credible?', but rather 'what influence do these associations and intersections exert and how might this generate possibilities for our curricula?' Designing liquid curricula thus means not only recognising the need for 'programmes' to be more tacit, risky, and malleable, but also more responsive to the ways in which these educational technologies are received and engaged by their participants. Uncertainties can become less anxiety provoking when students' and staff perspectives and expectations are directly taken into account.

Students in this study drew upon existing understandings, including ideas of discipline, digital games, family and work, in order to frame their conceptualisations of the VW technology. Students' conceptual framing of learning situations should, therefore, be closely intertwined with curricula design in order to balance student perspectives and staff pedagogic vision. Having experience with online games, even with VWs directly, does not automatically transfer to or inform students how to use them in the context of HE. The study findings revealed that students needed particular kinds of support in order to integrate VW learning into their HE experience.

Supporting students requires more than just being able to explain how VWs work 'technically', although this is an important part of using them in education as not all students are familiar with VW facilities and tools (Jones, Ramanau, Cross, & Healing, 2010). However, social norms as well as the openness of the environment require social skills and cultural awareness, which is different to closed environments in other simulations. Familiarity with specific VW norms and the ability to guide students (with the help of other students) is a necessity for tutors.

Democratisation of higher education

It is suggested here that curricula should be designed in ways that generate opportunities to explore the process of learning together *with* students, taking account of both tutors' and students' perspectives and experiences in education and beyond. Accepting that students are also 'informed learners' with their own learning strategies (which may or may not cohere with tutors' strategies), based on former learning experiences, has an impact on how they approach learning with and in VWs.

Yet implementing liquid learning does not mean creating unstructured curricula without links to subject, discipline, learning aims and objectives, or without assessment, but rather that tutors and students are given the opportunity to develop these aspects together in an equal partnership. This argument has been made previously (Bovill, Cook-Sather, & Felten, 2011; Lave & Wenger, 1991), but rarely seems to happen in practice. Students often seem unprepared for situations of freedom and uncertainty, feeling curious but uncomfortable. Some students even reject these situations as untrustworthy and/or wait to be told what is 'right' and what is 'wrong'. In a liquid curriculum these positions are potentially more difficult to find and need to be defined by both tutors and students.

At the same time we need to be aware of technological determinism. Questions remain as to the merit of developments in the use of digital technologies and new approaches to learning, particularly whether they are educationally valuable and have the potential to engage students effectively. Theorists such as Castells (1996) have argued that flows of capital, information, technology, organizational interaction, images, sounds, and symbols go from one disjointed position to another and gradually replace a space of locales. This has led some authors to suggest that change has resulted in curricula with relatively little pedagogical underpinning (e.g. Land, 2004) and often a trend toward technological determinism (e.g. Oliver, 2011). One argument is that changes in technology arise independently, with the result that there is a tendency to adapt, rather than shape, technology (MacKenzie & Wajcman, 1999). Yet at the same time all institutions are concerned about how students engage with their studies, how learning is designed, student retention (Tinto, 2006), and questions of widening participation (Bryson & Hand, 2007). Perhaps what is needed is a mapping of VW theories, pedagogies, and practices so that it is possible to delineate their impact. This will enable those using or wanting to develop VW learning to be clear(er) about the purpose, practices and pedagogies involved.

Conclusions

In this paper we have presented a synthesis of findings from three PhD studies undertaken between 2009-2012, at which point VW research and practice had reached a peak. Our intent was to consider tutors' and students' experiences of VW curricula. Students and tutors work and learn together in an educational context delimited by notions of uncertainty, engagement with rapid technological advances, and the embedding of technology into HE. Yet we are also cognisant of the need to avoid technological determinism.

Our findings resonate with notions of 'liquid curricula', in which liquid curricula are defined as curricula that focus on students' and tutors' stances and experiences, and can provide opportunities to design modules and lessons in open and flexible ways. Three aspects of a liquid curriculum for VWs have been considered. Firstly, curricula design in relation to assessment. Whilst it is likely that many VW educators are working within and at the boundaries of assessment structures in creative and flexible ways, findings from this study have shown that not only do such structures pose challenges to pedagogical design but they are also personally challenging and risky. Secondly, we have addressed the influence of students' histories in shaping perspectives of VWs. Such findings reinforce claims that curricula, in order to be effective, need to take account of these histories. Thirdly, we have illustrated the importance of providing guidance to students, concluding that whilst providing opportunities for flexibility and creativity in education is important, this must also be matched by acknowledgement and account of students' concerns.

A liquid curriculum would seem to offer a means by which to adapt to these changing circumstances, yet also take account of the constellation of identities and stances informing approaches to learning. We have argued particularly for this in relation to VW research,

which has only recently begun to focus on the individual experiences of students and has yet to consider the impact of individual tutor stances and experiences. The ethos, however, might be extended to educational technology – and perhaps simply 'education' – more broadly, with liquidity at the heart of curricula design and the relationship between students, staff, and educational programmes. What strikes us most of all is that whatever is available to us that can be adapted or adopted for HE should be harnessed to improve student learning. However, in this changing landscape of new and risky pedagogies through, for instance, flipped classrooms, the use of chat bots for learning, or the introduction of Massive Open Online Courses further research into the impact of liquid curricula on students is essential. For some, possibly many, HE institutions virtual learning is now the norm; HE is on the move, and virtual learning is something we need to take with us into an unknown future, whilst recognising that living at the interstices of learning and technology are important places to stand.

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