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**The University of Warwick
School of Engineering
Engineering Doctorate Programme**

Innovation Report:

**Changing the Model of Workplace E-learning:
A Platform to Facilitate Autonomous Social
E-learning for Adult Learners.**

Date: 22/09/2013

Name: Benjamin W. Betts, MBA.

Company: HT2 Ltd

*Submitted in partial fulfillment of the requirements for the award of an
Engineering Doctorate.*

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Executive Summary

E-learning has a significant blind spot (Dalziel, 2003). The predominant existing model of delivering instructional 'Courseware' via a Learning Management System (LMS) is expensive to produce and often isolating; eschewing many seminal lessons concerning the importance of social context in a learning scenario (Dewey, 1938).

Following a review of literature, a new method of facilitating workplace E-learning was devised, focused on user-generated content and the notion of a more social E-learning experience. This new method has subsequently been dubbed the Curatr Learning Cycle (CLC). To encourage user participation, a technique known as gamification was harnessed; the use of digital game-like progress measures in a non-game context.

A software platform was devised to enable the new approach to be tested in the real world. Following positive testing results, the software platform received a wide commercial launch and became known as 'Curatr'.

Using the CLC as a template of the actions that need to be facilitated for an effective social E-learning experience, organisations can create workplace E-learning that is quick to deploy, low cost and highly effective. The CLC and Curatr represent a potentially disruptive innovation to the workplace E-learning marketplace, with the possibility to displace earlier technology and existing methods.

Since its launch, Curatr has been recognised nationally and internationally as a disruptive innovation in workplace E-learning. The software has led to the commercial turnaround of its parent organisation and has been deployed to businesses globally. Research conducted as part of this project has led to the publication of journal articles, book chapters and conference papers.

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This innovation report is the product not just of the Research Engineer's efforts over the last four years, but also the combined efforts of a wide range of people.

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I must thank all of the organisations and individuals who have been brave enough to try and implement this innovation: doing something new is inherently risky and your decisiveness in choosing a different path has been a defining moment in both this project and my career.

Last, but my no means least, to my friends and family. My long-suffering girlfriend Emily has known me for three-and-a-half years – the complete duration of my EngD. Thank you for putting up with it. My mum and dad, you supported me in undertaking this qualification and never wavered in
Changing the Model of Workplace E-learning: A Platform to Facilitate
Autonomous Social E-learning for Adult Learners | Benjamin W. Betts

covering the bills, even when we had vastly better things to finance, like mortgage payments! Everything I do, I do in the hope of making you all proud.

**“E-learning has a significant
blind-spot...”**
Dalziel (2003, p.593).

1. Introduction

The classroom as a medium for workplace training and development may well have had its day. That isn't to suggest that workplace training is on the wane. On the contrary, a 12 per cent growth in US spending on corporate learning and development was seen in 2012 (O'Leonard, 2013). But it is to online alternatives that companies are turning; the E-learning market is growing at 23 per cent year on year, the fastest growth sector in education (IBIS Capital, 2012). Companies are today spending over \$2 billion a year on E-learning initiatives (O'Leonard, 2013).

Workplace E-learning has thus far concentrated mostly on delivering instructional content to users in an asynchronous, on-demand, slideshow-esque medium; a method commonly known as E-learning 'Courseware' (Clark & Mayer, 2011). This approach scales well and can be cost efficient when large numbers of learners are enrolled onto these courses – the 'per head' cost of E-learning at scale is significantly lower than the classroom alternative (CIPD, 2011). Adopting E-learning brings down the cost of organisational training further when incidental aspects of classroom training, such as a travel and the opportunity cost of time out of the office are taken into account.

Despite this feverish growth and attractive value proposition, E-learning as a medium for workplace learning is not universally popular. It is criticised for costing too much to develop, potentially being an ineffective method of teaching and leaving users with a poor opinion of the experience (Wang et al., 2005; Sun et al., 2008; Lee, 2009; CIPD, 2011; Lin, 2011). The latter point is a significant barrier to widespread adoption; theories such as the Technology Acceptance Model (Davis, 1989) suggest there is a direct relationship between a user's opinion of a new technology and the likelihood of them using the software again. Where no one wants to use E-learning, the benefits will inevitably fail to emerge. If

E-learning's growth is to be sustained, improvements in the time to develop, and to the cost and quality of the learning experience need to be made.

Since its inception, innovation within workplace E-learning has often been sustaining in nature (Christensen, 1997); for example, the popular E-learning authoring tool Adobe Captivate is now on its sixth edition (Adobe, 2013); the market leading Learning Management System (LMS), Blackboard, version 10 (Blackboard, 2013). Tools such as these seek to reinforce the existing 'Courseware' model of instruction; a tool to create E-learning content (Captivate) and a tool to deliver the content to learners (Blackboard).

But this paradigm runs counter to what is known about the creation of truly effective adult learning experiences, which are said to be personalised, experience-based and, perhaps most importantly, social (Dewey, 1938; Bruner, 1966; Knowles, 1970; Argyris, 1977; Bandura, 1977; Bloom, 1984, Levy et al., 2009). In fact, the vast majority of what we learn in the workplace comes as a result of what we learn on the job and what we learn from others (EDC, 1998). Workplace learning, it could be said, is an inherently social process. Typically, E-learning in the form of Courseware is an isolated, solitary activity (Dalziel, 2003). Whilst attempts have been made to bring more of this 'social' activity into the E-learning world (for example, Blackboard 10 promotes 'social learning' with discussion boards and blogs), workplace E-learning remains stubbornly focused on the instructivist, 'telling' approach facilitated by interaction with content alone.

This indifference isn't due to an inherent technological barrier; social software innovations have taken the world by storm. The social network Facebook connects more than 1 billion users (Facebook, 2013). YouTube, the video-sharing platform, has 72 hours of video footage uploaded and shared every minute (YouTube, 2013). Wikipedia, the

crowd-sourced encyclopedia, has amassed hundreds of millions of articles that document the world's history and knowledge, but with only a handful of paid staff (Wikipedia, 2013). A key difference between these initiatives and the 'socialisation' of E-learning is the underpinning methodology; Facebook, like workplace learning, is inherently social. Without people it wouldn't work. On the other hand, E-learning in its Courseware incarnation is inherently isolated. Attempts to add 'social' to the mix fail to address the methodological differences.

This innovation report tells the story of a research project brought about to create a new way of facilitating workplace E-learning that is inherently social in its approach. By suggesting a new methodology that harks back to seminal research on the nature of effective learning experiences, this research has sought to create a disruptive innovation that fundamentally undermines the existing model, seeking to bring breakthrough improvements to the time and cost to develop E-learning, as well as improving the quality of the workplace E-learning experience.

1.1. Research Aim & Objectives

This research focuses on the creation and evaluation of a social learning platform for use in online workplace training initiatives. By leveraging peer-to-peer social interaction as a core component of the learning process, the intention is to create a methodology that leverages employees experience in addition to learning content to create novel improvements in behavior and performance that might positively affect an organisations performance. This approach relies less on the creation of E-Learning content, which is costly and time consuming to develop, and as such could save organisations time and money. In order to achieve this aim it was necessary to meet the following objectives:

1. To understand the social factors that may influence the learning process;
2. To develop a new theoretical model for E-learning, encouraging learners to adopt a more 'social' approach;
3. To develop an innovation in E-learning software to meet the requirements of the new model;
4. To evaluate the effectiveness of the innovation.

1.2. Motivation

HT2, the sponsoring organisation, has been a small player in the UK E-learning market since it's founding in 2000. Primarily focusing on the creation of bespoke E-learning content for use in workplace E-learning, HT2 has struggled to differentiate itself in an increasingly saturated marketplace. As such, a decision was taken by the Board to pursue a product-orientated strategy that would better market HT2's skills and thought-leadership to the industry. The research and development required to create a potentially successful new product to lead HT2's offering was therefore at the core of this research project. If successful, the new product would serve as a cornerstone of HT2's market positioning, differentiating the company from the crowd.

1.3. Research Method

This innovation report is the result of a mixed methods study spanning four years. To understand current thinking and benefit from previous experience a systematic literature review was undertaken. A systematic review was required given the discipline of software engineering, the fast pace of change within software engineering and the vast amounts of literature on learning (Kitchenham, 2004; Okoli & Schabram, 2010).

The systematic approach demands that a rigorous review of literature is undertaken in a scientific and auditable manner. This often begins with the definition of a research question, or research questions (Kitchenham, 2004). A method is then derived by which searches can be carried out in order to answer the research question(s) set. This method must be documented, such that future researchers might arrive at the same results (Kitchenham, 2004; Okoli & Schabram, 2010).

In our circumstances, suitable questions were derived from a combination of formulating the problem to be understood and a search of previous literature reviews in the field (Kitchenham, 2004; Minocha, 2009). In these circumstances the question: “What is known about the role of social interaction in a learning experience?” provided the initial goal for the review.

Relevant publications were targeted through a process of accessing research quality scores (González-Pereira et al., 2010) and narrowing the field down to the top 50 relevant journals. A combination of access to these known journals (via ATHENS), Google Scholar and Mendeley (an online reference tracking tool) was then used to locate relevant literature using searches directly related to the research question, including keywords such as ‘social’ and ‘collaborative’. Abstracts were catalogued and processed for likely relevant literature, with full texts downloaded as appropriate. On those full texts yielding relevant results, reverse literature lookups were conducted and cross-referenced to ascertain the most

relevant and oft-cited research within the field. This afforded a view of which literature was likely to be considered 'seminal' and of good quality. The results of this systematic process can be found in Submission 2, the literature review. Whilst it is thought that Submission 2 represents a fair and comprehensive overview of the literature relevant to the field of study, it should be acknowledged that learning, education and technology is a vast and fast-moving field and omissions are likely to have occurred. The scope of this EngD is not the exhaustive cataloguing of past literature, but the rigorous development of a new innovation. As such, the review completed is believed to be of an appropriate level of rigour to have fulfilled its obligations to the quality of this research.

In addition to the systematic literature review, a series of one-to-one interviews were conducted with industry specialists to further investigate the role of game-based learning. This primary research is covered in detail in Submission 4.

Evaluation of the innovation was undertaken through a series of mixed method primary research case studies. The research methods implemented in these case studies included quantitative regression analysis, participant surveys (both quantitative and qualitative), and extensive content analysis. Submission 5 details the use of these methods in the evaluation and refinement of the innovation in the light of user feedback. In addition, two research papers (Betts et al. 2013a; Betts et al. 2013b) and a book chapter (Betts, 2013) cover in detail the methodology employed in the evaluation of the innovation.

1.4. The Research Scope

This research focuses on the role of E-learning as it pertains to the training and development of individuals on behalf of organisations, or 'workplace E-learning' as it is known throughout this submission. Workplace E-learning is taken to refer to any organisational training and

development process targeted towards the employees, or customers, of an organization and facilitated primarily 'online'. This includes learning and development processes facilitated by third-party organisations on behalf of a company, such as is the case with university-led executive education. This research is also applicable to university-level education initiatives. Primary and secondary educational experiences are beyond the remit of this submission. Research was carried out primarily in the UK and USA, but there are no known barriers to limit the findings from being applicable on a worldwide basis.

1.5. The Research Engineer's Contribution

HT2, the sponsoring organisation, is a small UK-based business specialising in the engineering of online learning software for use by both university and workplace learners. In 2009, HT2 sponsored the Research Engineer (RE) with hopes of producing a new software product through research and development. The software product would compliment HT2's approach to the marketplace, playing to HT2's strength in the creation of collaborative E-learning experiences and helping to differentiate the company in an increasingly saturated marketplace.

At the commencement of the project the RE was Operations Director at the company. Having worked for HT2 since 2005, the RE was responsible for the day-to-day running of the business. His experience centered on the design and production of Internet-based software for use in online learning experiences. Having previously completed a Master of Business Administration (MBA) qualification, the Engineer Doctorate (EngD) qualification was attractive because of its demands to create real-world impact.

The RE was responsible for researching the field and defining a problem to be solved. The RE completed the theoretical 'CLC' model and subsequent specification for the innovation, and the architecture of the

software. A small team of software developers at HT2 was used to assist in the building of the innovation – a PHP development specialist and a Flash / ActionScript 3 specialist. Initial testing was completed with assistance from the University of San Diego, CA. Test results and surveys were compiled and analysed by the RE and specifications for modifications made and implemented with the assistance of HT2's development team. Work to create the iPad application was completed by HT2's Objective C developer, working to the specification of the RE. Business models for the commercial exploitation of the innovation were created and implemented by the RE with assistance of the wider team at HT2. Finally, research was conducted in conjunction with Warwick Business School and HT2, to be jointly published between the RE, the supervisor and the industrial mentor at HT2.

1.6. About the Innovation Report

This innovation report describes the story of a new innovation in workplace E-learning. It is ordered to reflect the Research Aims and Objectives stated earlier.

Starting from the evidence that workplace E-learning is failing to deliver on its promises, the report summarises relevant literature to arrive at a suggestion for an innovation that might change existing models of E-learning design and deployment. Having conceived of a new method, an Internet-based software application was engineered to meet the requirements of the new approach. This software was subsequently launched commercially and tested in different deployments around the world. Findings from the implementation of the new approach serve to further inform future E-learning developments in the workplace.

1.7. Reading Order of Submissions

This innovation report should be read in conjunction with the personal profile. If required, further detail can be found as to the research and development methodology in submissions 1, 2, 3, 4 and 5. Submissions should be read in the order 1, 2, 4; then 3 and 5. In addition, readers may find it beneficial to read the following associated papers:

- “Social Learning: Answers to eight crucial questions” (Betts, 2012);
- “Gamification as a tool for increasing the depth of student understanding using a collaborative e-learning environment” (Betts et al., 2013a);
- “The effect of Gamification on the quality of contribution in a Computer Supported Collaborative Learning environment” (Betts et al., 2013b).

“The principle that development of experience comes about through interaction means that education is essentially a social process.”

Dewey (1938, p.65).

2. Background

Whilst pedagogy is most often concerned with maximising the effectiveness of the student-teacher relationship, the commercial realities of teaching a formal curriculum to every student has naturally meant a shift towards teaching in groups. This trend has been continued from the classroom into the virtual world, where learners are directed to take part in online learning, or E-learning. Most often E-learning is completed either in large groups or as 'on-demand' services in a bid to increase training efficiency (Wang et al., 2005; Lin, 2011). Such programmes are standardised and content focused, most often directing users to courses made up of modules and topics of content resources to be worked through at the users own pace, in isolation from other learners (Anderson, 2001; Dalziel, 2003; Vaughan & MacVicar, 2004; Clark & Mayer, 2011). Increasingly, E-learning authoring tools have sought to inject greater engagement into static content by way of animation or human-computer interaction. These methods create ever more inventive content, but are often time consuming to produce. This runs somewhat counter to the core reason as to why organisations turn to E-learning; to improve efficiency in terms of the time it takes to deliver training, the cost of delivering training and the time to competency for their employees (Towards Maturity, 2013).

These desired benefits are not always forthcoming (Wang et al., 2005; Sun et al., 2008). The initial cost to develop such courses remains high and a significant barrier to entry (Simmons, 2002; Sun et al., 2008; Lee, 2009). A 2009 report by the American Society of Training and Development (ASTD) suggested that softskills training for the workplace (such as a course on leadership) takes on average 4.6 times longer to develop for online than it does for use in a classroom setting (Kapp & Defelice, 2009). This investment in development might well be made up by frequent use, but evidence exists to suggest that workplace E-learning programmes often lack efficacy in terms of learning outcomes and the

attitudes they foster in their users (Sun et al., 2008; Lee, 2009; Lin, 2011). There remains a stubborn view amongst learning and development professionals that E-learning is not as engaging or motivating as face-to-face courses (Kim et al., 2005; CIPD, 2011). This is not surprising; where negative attitudes are created, widespread adoption of such systems is limited and their commercial value constrained (Davies, 1989; Sun et al., 2008). Quality of learning content isn't necessarily the issue; the beliefs and attitudes of users undertaking E-learning experiences are perhaps more decisive in gaining learners' continued acceptance of E-learning as the preferred method of workplace learning delivery (Davies, 1989; Sun et al., 2008; Lin, 2009). Where users fail to adopt a new technology, the pre-supposed benefits will inevitably fail to materialise. In many ways, E-learning is a victim of its past failures. Where E-learning has gone before, and failed, so widespread adoption is that much harder to achieve. It is not good enough for the next generation of E-learning innovations to provide bottom-line business benefits of time and cost reductions; they must also undo some of the damage that has been done with regard to user perception. The old model of self-paced, content driven, isolated learner E-learning should be re-visited (Dalziel, 2003). There exists a need for innovations in learning technology to appeal on all three fronts of time, cost and quality of experience.

Anderson (2001) proposed that successful E-learning is the result of a complex system, one that goes beyond the scope of a learning resource alone. E-learning is said to have a "significant blind spot" (Dalziel, 2003, p7) in its failure to look beyond learning content as the sole means of interaction, often overlooking the role of a teacher and peers in the learning process (Moore, 1989). Any new innovation in learning technology for the workplace would do well to look beyond the scope of E-learning as it stands today and perhaps seek to revisit the underlying model of instruction that creates the E-learning experience as we currently know it.

2.1. Back to Basics

Bloom's (1984) Two-Sigma Problem suggested that teaching in groups is substantially less effective than one-to-one tutoring. This is perhaps not surprising, as the classroom environment is compelled to proceed at the mean pace of understanding; it will be too slow for some and too fast for others. Bloom's research suggested that 98 per cent of students taught in a one-to-one or small (three or four students) environment would achieve better results than the average student in a class situation (1984). Bloom called this finding a 'problem' because of the shortage of resources that is experienced when attempting to find a teacher for every student (1984).

Bloom's (1984) study highlighted teaching techniques that proved to increase the efficacy of the experience for those in a classroom situation. Mastery learning, where a teacher gives feedback to their student and asks them what they would do differently were they to do the task again (thus mastering the subject) showed a substantial improvement of 1 standard deviation alone. However, mastery learning also leans heavily on the capabilities of the teacher to provide structure and feedback. Cooperative learning, where students work together to solve problems, assist one-another and provide moral support, was cited by Bloom as also potentially increasing efficacy by 1-Sigma.

Cooperative learning in a classroom environment tends to involve breaking larger classes into small groups. These small groups of students then work together to solve problems, receiving rewards for the group's performance (above and beyond recognition of any single student). The efficacy of cooperative learning was shown by Slavin (1980), who demonstrated a consistency of higher academic achievement by those students who worked in cooperative learning settings when compared to normal classroom counterparts. This finding was further reinforced by Bloom's (1984) work. However, Slavin's (1980)

work was perhaps too holistic in view to fully appreciate the mechanics of what caused cooperative learning to be successful in the first place.

2.2. Peer-to-Peer Learning in Context

Early epistemic theorists such as Skinner (1953) suggested a simplistic operant conditioning process as the core means of learning; that learning was the result of reinforcement given for performing a particular behaviour. Skinner's (1953) work, termed radical behaviourism, was demonstrated readily by rats, whom Skinner trained to press a button when a light came on in return for a reinforcement of food. However, Skinner's approach left little room for the social environment to be factored in to decision making and learning, beyond the roles of stimuli and reinforcement (Skinner, 1977). Chomsky (1971) highlighted this shortcoming by examining the way in which children learned language; children are able to utter sentences never before heard and without suitable reinforcement from modeling what had gone before. If they hadn't heard the sentences before, how could they have learned them? Radical behaviourism has fallen out of favour as a theory of learning and cognitivists, who appreciate the process of thought and not just the resulting behaviour, have come to the fore.

Theorists such as Vygotsky suggested that learning is a process which takes place most readily when a less able student works alongside a more able peer (Cole & Wetsch, 1996; Woo & Reeves, 2007). Typically this relationship took the form of apprentice and master; the master dutifully stretching the apprentices capabilities over time. Vygotsky termed this stretching as the 'Zone of Proximal Development', suggesting that the most successful approach to learning a new skill was for the apprentice to have his current skills stretched just a little beyond his current level of capability by the master, thus allowing new experiences to be integrated into existing schemas. As long as the new capability was within 'the zone', it could be learned (Zenios, 2011). The master might be said to provide the 'scaffolding' of a mental model for the apprentice to

connect experiences together for themselves and achieve higher levels of competency within the domain (Wood et al., 1976). However, it is perhaps misleading to think of the master as someone with authority or some measure of superiority over the apprentice; dialogue between any two people brings the opportunity for knowledge to be built. It is perhaps in this manner that cooperative learning is best thought; in sharing thoughts, ideas and theories we each get to build our knowledge with viewpoints from each other. Placing this approach in a practical context is thought to further improve retention and application skills (Kolb, 1984).

Another theoretical group, the social constructivists, formed primarily out of the work of Piaget, argue that we each build our own form of knowledge based on our experiences, dialogue and meaning-making (Marn et al., 2000). We each literally 'construct' knowledge for ourselves, based on our experiences (Papert, 1993). Whilst teaching in a classroom setting with abstract examples is perhaps now the normal mode for student-teacher interaction, learning experiences that take place within an appropriate context are said to be more effective learning experiences as they offer greater opportunity for this construction process to take place in a realistic setting (Dewey, 1938; Bruner, 1966). When we elect to believe that learning is an experiential process, that is that we learn through experience, then we must also acknowledge that learning is an inherently social process (Dewey, 1938; Kolb, 1984). Even Skinner (1977) recognised this, suggesting that environmental factors accounted for variation in behaviour. However, he failed to appreciate that the social environment itself could be the product of the cognition. Our individual perception of the world is unique, not some permanent and fixed map that we equally share. Social context is irremovable from the learning process. The cues, signals and behaviours we witness all impact on our learning.

Kolb (1984) built on the work of Dewey and Piaget to define the 'experiential learning cycle' (Figure 1), a holistic overview of the learning

process. In the cycle, which can begin at any point, concrete experience is followed by reflective observation, which leads to abstract conceptualisation and finally to active experimentation. Kolb extended his model to include 'learning styles' which exist at the four stages. However this extension of the core model has been rightly critiqued for lacking any rigorous empirical evidence (Smith, 2001). Kolb's model is also somewhat isolating in nature; it makes no reference to the potential influence or impact of social learning. Additionally, Jarvis (1987) suggested that Kolb's work was incomplete in the context of adult learners. Jarvis reasoned that not all experiences lead to learning, a concept that is particularly relevant when dealing with self-motivated adult learners. Some learners may disregard information or experiences as irrelevant or incorrect. This in itself is not a problem, but should be a decision that is arrived at through critical thought, not simple dismissiveness. In addition, adult learners working at their own pace may work through the model in different cycles or order; repeating stages or skipping them entirely due.

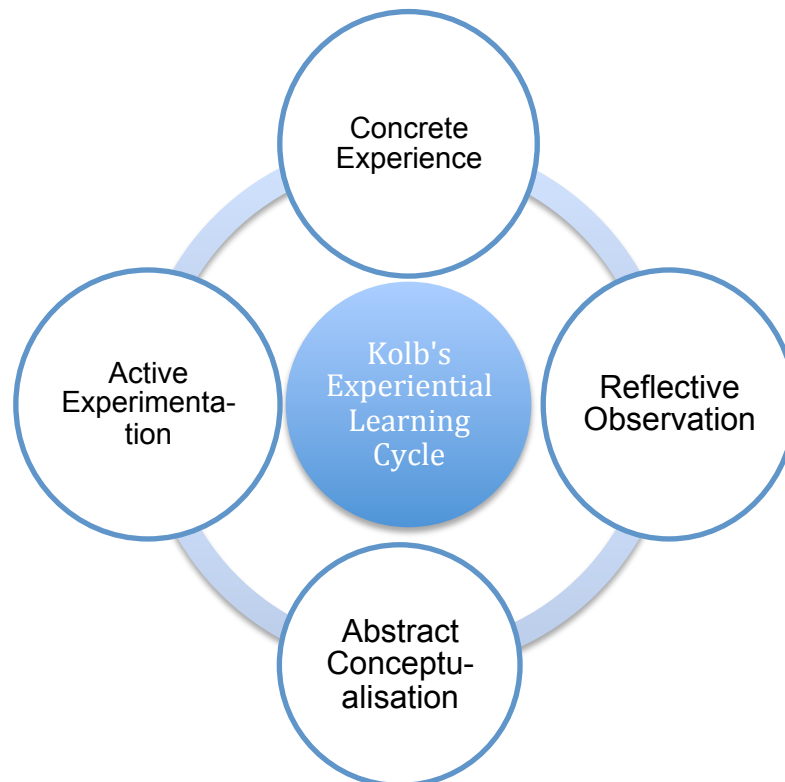


Figure 1: Kolb's Experiential Learning Cycle (1984; p33).

2.3. Teaching Experienced Learners

Andragogy (Knowles, 1970) has found favour as a theory of adult learning, especially in the workplace, despite a lack of empirical evidence (Blondy, 2007). Andragogy remains compelling because it recognises the motivations, thinking and desire for application that experienced learners bring to any event. Knowles (1970) suggested four key assumptions differentiated between a pedagogic and an andragogic approach:

1. The concept of the learner. In pedagogy, learners are thought to be dependent on the direction and instruction of the teacher. Andragogy suggests self-directedness is important to the learner, who will ultimately decide the direction and instruction to accept.
2. The learner experience. Andragogy suggest learning from experiences, where pedagogy promotes a more passive “transmittal” technique (Knowles, 1970, p.44).
3. A readiness to learn. Pedagogy assumes that learners are ready to learn when they are told to; andragogy suggests that learning occurs as and when it is needed.
4. Orientation to learning. Pedagogy suggests that learning is a process of knowledge transfer, for application at some later point. Andragogy sees education as a path to competence in the short term, to be applied today.

Whilst perhaps often thought of as the difference between teaching children and teaching adults, Knowles himself acknowledges that both pedagogy and andragogy can be appropriate for all demographics and that the relationship between the two approaches is closer to a “continuum” than a binary function (1970, p.43). Andragogy calls for learning experiences that are self-directed and experiential in technique. It also suggests that experienced learners are more likely to question the value of a particular lesson or objective. Argyris’ (1977) work on the nature of learning in organisations characterised this concept as representing double-loop learning; not just accepting the goal and

attempting to reach it despite failure, but fundamentally questioning the goal and modifying attempts to reach it based on experience. E-learning remains firmly pedagogic in its approach; set lessons that are often to be learned by rote. When E-learning is instructivist in nature, it falls short as a vehicle to promote organisational learning; the double loop theory requires learners to examine not only content, but context, relevance and experience.

2.4. Social Context in Learning

Much of the research completed on the impact of social context to learning took place long before the Internet enabled social interaction to take place digitally and at distance. For example, Bandura's (1977) Social Learning Theory took a deeper look into the way in which children and adults mimic behaviours. Where Skinner had seen only behavioural reinforcement, Bandura saw a more complex system of both immediate and future reinforcement, alongside cognition and past experiences. Bandura suggested that three key social elements contributed to a new learned behaviour; modeling, self-regulation and self-efficacy. In the first instance, a person sees a new behaviour being exhibited by another person. They believe the new behaviour might be beneficial in some way and as such, make an approximation of the behaviour for themselves. This Bandura called modeling, or observational learning. Having modeled the behaviour, the person experiences a degree of self-regulation, a notion of how well the behaviour was approximated and what the outcome was. This is formed by the way in which one perceives the environment they are in. If positive reactions were elicited by the behaviour, it becomes more likely that the person will repeat what they have just done. Finally, self-efficacy is used by the person to judge just how well made the approximation was in relation to the model and their peers. If the behaviour was modeled well, the person perhaps judges themselves to be somewhat talented at exhibiting the new behavior and so the likelihood of performing the model again increases. All of these

factors have what Bandura termed 'reciprocal determinism'; they reinforce each other. In this way Bandura suggests we model and evolve behaviours from one another in a community.

Dewey (1938) suggested the nature of a learning community impacts heavily on the quality of the educational experiences it produces. Lave & Wenger (1991) coined the term 'situated learning in communities of practice' to further illustrate the importance of the community when learning from one-another in an applied context. Communities tend to exhibit not only a similar level of understanding between the participants, but also a shared language and culture. Such shared activities and dialogue are said to represent a powerful method for professional development (Zenios, 2011, p.261). Thomas and Seely Brown (2011) suggest that the term 'collective' might be more relevant to an Internet-based group of learners working together.

2.5. The Social Web.

It has been suggested that new forms of communication are transforming the way in which we learn from each other (Siemens, 2005). This is made possible by the architecture of participation that has emerged in Internet technology – much of the technology we use today values creation over consumption and so the number of connections we make between people and ideas grows exponentially (Kamel Boulos & Wheeler, 2007). The opportunity to learn from and with one another has never been as vast as it is today. That is not to say that we haven't always learnt in groups; just that today those groups are more geographical dispersed and diverse than ever before.

Where communities of practice were once defined within geographical boundaries or as small groups of like-minded individuals collaborating in a long-distance relationship, today they are less constrained. The rise of the Internet as a means of both synchronous and asynchronous

communication has meant that the barriers to create a community of practice have fallen dramatically. Physical spaces are no longer required to interact; collaboration between companies or indeed between countries can now be facilitated from any location.

Throughout the Internet's short existence, communities of practice have been created and used for online learning. Many of these communities make use of asynchronous discussion board technology to allow learners to communicate with each other. Often this communication is triggered, shaped and encouraged by an online moderator, or e-moderator (Salmon, 2001). The role of the e-moderator is akin to that of the teacher in a classroom setting. Direction, insight and encouragement all fall within the role requirements of a good e-moderator (Salmon, 2001). However, this can create a shortfall in supply. Suitable personnel need technical skill, subject matter knowledge and online teaching abilities to fulfill the role. This could have prevented the growth of the Internet as a medium for social learning, however, it has become increasingly obvious that an e-moderator isn't always required for insight and learning to be generated.

During the 1990s, the Web was primarily used as a vehicle to transmit information to end-users. Whilst communities of practice did collaborate through the network, these groups tended to be technical in nature owing to the usability constraints that early Internet technology presented to the average consumer. Creating and publishing original content was not straightforward; many people were still getting to grips with the notion of the personal computer. This time came to be known as the 'Web 1.0' and although it is still a large part of the web we know and use today, it has been superseded by a more participative and social web, the 'Web 2.0' (O'Reilly, 2005). Emerging largely out of the dot-com bust around the turn of the millennium, the Web 2.0 movement encouraged users to publish information back to websites, to create new content and to establish benefits from collective intelligence. Websites began allowing

users the freedom and control to publish words, pictures, videos and other digital content for sharing and exchange. Technologies such as Blogs, video sharing and Wiki's encourage users to co-operate virtually in the creation of community websites and can be defined as follows:

- Blogs, short for 'web logs', are a form of published diary writing, where an author automatically shares his or her blog entries with readers. Typically, blogs allow for visitors to comment and respond to entries. Increasingly, microblogs such as Twitter have emerged as a form of short-hand blogging, limiting the author to posting just 140 character messages at a time.
- Video sharing has increased rapidly in popularity due in part to the prevalence of video cameras (now a familiar function in smartphones) and partly due to the falling costs of digital storage and bandwidth availability.
- Wiki's require a group of collaborators to contribute and refine a single page of content, such that any member of the group may edit or delete the work of any other member. These individual pages are then hyperlinked together to form a networked document of content. Wikipedia, the largest such example of a Wiki, is widely regarded as one of the foremost repositories of human knowledge.

There is an acknowledgment that the concept of digital literacy and the way in which we use the Web 2.0 as a platform to publish and broadcast our ideas has led to divergence in the population (Prensky, 2001; Bennett et al., 2008). White & Le Cornu (2011) suggests a continuum now exists between those who readily share their lives online, digital residents, and those who rarely engage in such practices (and if they do, do so for practical utility purposes, not socialising), digital visitors. It appears to all intents and purposes that the residents are winning - 250 million pictures are shared on Facebook, the social networking platform, each day (Facebook, 2013).

2.6. Online Peer-to-Peer Learning in Practice

Many examples of using the Web to facilitate social learning interactions exist today. Perhaps most commonly cited is the use of online discussion boards, which allow students to write messages to each other asynchronously (Garrison & Cleveland-Innes, 2005). Universities swiftly adopted this technology in order to better facilitate distance-learning courses (Prinsen et al., 2007). Both individual and group work can be directed by teachers commenting and replying to student's contributions. The success of these initiatives tends to rest with the level of participation that students give to such activities. Not only is participation required to facilitate a successful social learning experience, it has also been shown to be independently beneficial for student outcomes. Several studies have commented on the relationship between the level of student participation and subsequent learning outcomes; increased participation resulting in better achievement of grades (Cho et al., 2005; Palmer et al., 2008; Darabi et al., 2008; Cheng et al., 2011; Michinov et al., 2011; Xie, 2012).

A different approach to E-learning than the standard Courseware approach (Clark & Mayer, 2011), known as Learning Design, has experienced some popularity, with the notion of merging group discussion with curated digital content as a course of learning (Dalziel, 2003). As described by Dalziel (2003) a group of students might first debate a topic using an online discussion board and then gain exposure to a range of content on that subject, as collected and shared out by a teacher. Subsequent to this another round of discussion is held in small groups and finally each participant writes up a reflective report. Learning Design is said to advocate context over content, activity over (knowledge) absorption and multi-learner environments (Dalziel, 2003).

Increasingly, discussion boards are giving way to Web 2.0 technologies (discussion boards, or bulletin boards as they were known, pre-date the Web 2.0 movement by some years) that enable rich media to be used and more collaborative practices to be employed. For example, Wiki's have been used in educational activities (Glassman & King, 2011), where students have been asked to create new content and 'remix' others contributions. Learning Management Systems such as Moodle or Blackboard have embraced not only discussion boards, but blogs, Wiki's and other 'Web 2.0' features as a core part of their software. There are drawbacks to these implementations. Glassman & King (2011) remarked that many students failed to grasp the correct method for creating a Wiki page – they simply chose to add to the content, instead of critically refining each others contributions.

Web 2.0 platforms for education are today being created or leveraged from existing platforms. For example, Kahn Academy, a poster-child example for online education, was founded by one man recording and sharing math lessons on YouTube for his nieces and nephews. Edmodo, a social network for education, seeks to replicate much of the functionality of Facebook but in a secure, online classroom environment. LORE, a US software company, is attempting to make a more 'social' learning management system that also somewhat replicates the Facebook approach.

Massively Open Online Courses (MOOC's) represent another method by which huge numbers of participants can take an online course. Often MOOCs are presented in the form of video lectures to be watched, questions to be answered and debates to be discussed. MOOC's have experienced a quite remarkable climb to fame; universities such as Stanford and MIT have heavily backed commercial startup companies like EdX, and Coursera to create online courses that can be taken by very large groups of learners. It is not uncommon for classes to reach the hundreds of thousands of students. However, MOOC's are not without

their issues; completion rates are generally low (less than 10 per cent) and few offer any tangible form of course credit (Parr, 2013).

2.7. Computer Supported Collaborative Learning and the Participation Problem.

Computer Supported Collaborative Learning (hereafter CSCL) has emerged as a method to facilitate advanced learning through online discussion and Web 2.0 activities (Prinsen et al., 2007). Where other models of E-learning concentrate solely on learner-content interaction (Moore, 1989), CSCL seeks to leverage teacher-learner and learner-learner interaction, allowing students to contribute, create and critique each others work (Darabi et al., 2011).

CSCL is thought to require the presence of a teacher, or e-moderator, within a small class of students in order to motivate participation and facilitate meaningful discourse (Salmon, 2000; Dillenbourg, 2002; Garrison & Cleveland-Innes, 2005). The same could be said of approaches like Learning Design (Dalziel, 2003). Without this direction, the value of CSCL becomes somewhat questionable (Dillenbourg, 2002; Garrison & Cleveland-Innes, 2005; Xie, 2012). This need inevitably leads to a lack of scalability in the approach; the need for a 'hands-on' e-moderator is restrictive in terms of both capacity and commercial reality. Because of this, CSCL could be thought to lack the cost effectiveness and scalability of other E-learning approaches. However, the approach could be rapid to deploy; relying on group discussion as opposed to pre-prepared learning materials would suggest a rapid rollout should be possible.

Measuring the value of participation in CSCL is a critical step in analysing the effectiveness of the approach. This was investigated by Garrison et al. (2001) who proposed the concept of 'Cognitive Presence' as a model for valuing learner's contributions. Meyer (2004) drew comparable results using both Garrison's model and Bloom's Taxonomy of educational objectives (1956) when measuring the quality of contribution in a CSCL environment. However, Garrison's model is thought of more favourably in online circumstances as it was developed specifically for use in CSCL,

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where Bloom's taxonomy is somewhat more generalised (and older, having been conceived before CSCL was possible).

Cognitive Presence is said to have four phases through which participants in a discussion progress on their way to critical enquiry: The Triggering Event; Exploration; Integration and Resolution. Park (2009) further classified these four phases into sub-phases. Park (2009) suggested that the Triggering Event is often associated with Clarification and restating the problem. Exploration then encompasses aspects such as information sharing, divergences, personal narration and opinions. Integration occurs when a participant builds upon an earlier point, creates a novel solution or suggests a justified hypothesis. Finally, resolution sees the application of the new thought generated in the discussion and a wrap-up. Participants should look to progress through these steps in order to successfully assimilate experiences.

Of course, in order to attain the higher levels of cognitive presence, everyone in a learning experience must participate (Garrison & Cleveland-Innes, 2005). However, Nielson (2006) suggests that in any given online collaborative environment, 90 per cent of participants will 'lurk' and fail to actively engage in conversation or contribution (but they may read heavily). 9 per cent of participants will offer a facile level of contribution; the occasional comment or suchlike. Just 1 per cent of participants will consistently create original content. Making participation optional would appear foolhardy in the light of such collective tendencies.

Teachers know this. As such, it has become relatively commonplace for educational institutions to tie participation in online activities to final grades in an effort to promote participation. But this approach runs somewhat counter to research on the nature of intrinsic motivation. Deci et al. (1999) meta-analysis of the effects of extrinsic rewards on intrinsic motivation suggested that completion-contingent exogenic rewards (rewards that occur as a result of having done something, as opposed to those that occur in the process of doing something) actually detract from

a participant's level of intrinsic motivation. The theory suggests that a committed individual offered no rewards for participation would participate more effectively than an individual who participated for an external reward, like money or course credit.

2.8. Intrinsic Motivation for a Learning Activity

To understand this finding it is necessary to understand the wider context in which intrinsic motivational research exists. Deci and Ryan (1985) suggested that a feeling of self-determination underpinned the basis of whether or not an individual will experience intrinsic motivation to perform a particular activity. Self-Determination Theory (SDT) proposes that a person's level of intrinsic motivation for an interesting task is moderated by the degree of autonomy, competence and psychological relatedness they experience whilst completing the task (Deci & Ryan, 1985). Autonomy refers to the level of free-choice that a participant is allowed to express in undertaking the task. Competence is the notion that participants need to feel they are increasing in mastery of a task in order to pursue it. And finally, relatedness refers to the notion that an individual is impacted by, and impacts on, others undertaking the task.

Cordova & Lepper (1996) suggest that contextualisation, personalisation and choice are all significant determinants of an individual's intrinsic motivation for a learning activity. Cordova & Lepper (1996) came to this conclusion following experiments that involved the use of computer games to engage students in learning experiences in which the students personalised a fantasy context to their own desires and were given other instructionally irrelevant choices to personalise the game (such as choosing a spacecraft to represent themselves). Those who experienced all three conditions self-reported significantly higher levels of enjoyment and a willingness to do more complex work than those students in a control group. What's more, post-experiment testing revealed those students who experienced all three variables performed significantly

better than their counterparts in the control group. This finding reinforces earlier research by Malone (1981) that suggested the fantasy elements of a computer game were central to the intrinsic motivation experienced by players of a game.

Cordova & Lepper's findings are made more interesting because of the nature of the choices given. Cordova & Lepper (1996) cite a previous study (Parker & Lepper, 1992) in which giving students just a single choice to personalise an experience had no bearing on the outcome. This suggests that a 'tipping point' of choice and control is required for an activity to be intrinsically motivational; on balance it must appear that the student is in control, even if the choices are facile and fundamentally unrelated to instructionally relevant choices. However, as Cordova & Lepper's (1996) findings were conducted with a group of young students for whom a sense of autonomy might have been granted by relatively facile choices, the authors are unable to suggest if such a strategy would be successful for adult learners. Deci & Ryan's (1985) SDT would tend to suggest that it would, although the choices given may need to move beyond fantasy. This need for further work is reinforced by the nature of other studies – for example, Malone (1981) also studied children and learning.

Tension exists in the SDT approach where notions of competence conflict with those of reward. Extrinsic rewards are often said to detract from intrinsic motivation (Deci & Ryan, 1985). There is said to be a fine line between "controllers of behaviour versus affirmations of competence" (Deci et al., 1999, p628). In order for a participant to feel like they are progressing, some measure of competence is required. As long as the individual accepts this measure autonomously, intrinsic motivation is reinforced (Deci & Ryan, 1985).

Overall, Deci et al. (1999) suggest that tangible, expected rewards that are engagement-contingent (given for participation), completion-contingent (given for finishing the task) or performance-contingent (given

for finishing the task at a certain quality threshold) all undermine the overall level of intrinsic motivation experienced for an activity (after taking in to account any positive effect of the reward). However, extrinsic rewards can also work as motivators. For example boosts to motivation are experienced consistently when unexpected rewards are given (Deci et al., 1999). Endogenous rewards (those inherent to the task) are also said to buck the trend (Cordova & Lepper, 1996). Positive effects are shown in the application of external rewards for activities that are determined by the participant to be dull and uninteresting (Deci et al., 1999). This latter point is perhaps most relevant in the context of workplace E-learning, a task which is said to be “uninteresting but relevant” for many participants (Roca & Gagne, 2008, p.1589). In such circumstances so called ‘autonomous extrinsic motivation’ has been found to be a better predictor of engagement (Roca & Gagne, 2008). This situation occurs when a participant in an activity internalises extrinsically specified goals as one’s own (Deci & Ryan, 1985; Roca & Gagne, 2008).

Studies in motivation and learning have revealed close links between increased motivation and better educational outcomes (Malone, 1981; Cordova & Lepper, 1996; Roca & Gagne, 2008). Even Bloom (1984) suggested that ‘time on task’ improved the attainment of learning outcomes, but many of those who have studied the area in more detail suggest that the effect is more profound than simply spending more time working towards a goal.

Roca & Gagne (2008) combined SDT with the Technology Acceptance Model (TAM) to articulate six key interrelated factors that determined an individual’s desire to further utilise E-learning software (see figure 2).

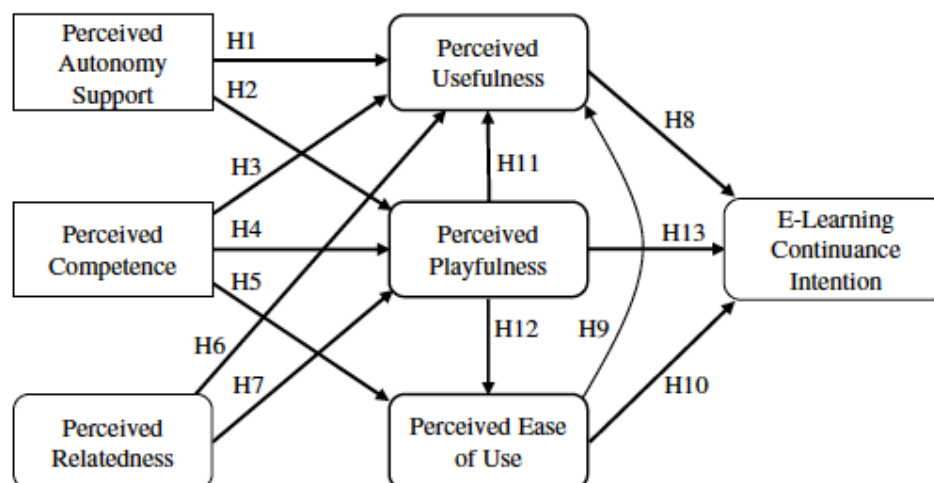


Figure 2: TAM for E-learning, as adapted from Roca & Gagne, 2008, p.1598.

TAM introduces the simple notions of perceived usefulness and perceived ease of use as core drivers to a users willing adoption of an IT systems (Davis, 1989, as cited in Roca & Gagne, 2008). Roca & Gagne (2008) built upon this to include the notion of 'playfulness'. By examining the attitudes of workplace learners using an E-learning system, the factors listed in the model were found to be significant determinants of users willingness to accept the E-learning and do more work (Roca & Gagne, 2008). However, TAM has been critiqued because of its simplicity (Bagozzi, 2008); it fails to account for factors in adoption such as social pressure, design aesthetics or personal goals. Actual adoption of a new technology is almost certainly more complex than TAM infers.

In recent years, SDT research studies have begun to shine a light on the motivation properties of digital games (Przybylski et al., 2010). Games are thought to give users autonomy over their experiences, allowing them to express free choice in many aspects of the experience, from the direction they choose to the way they look. Notions of improving competence have long since been a part of gameplay; Csikszentmihalyi (1990) suggested the notion of 'flow' to describe an immersive state that exists when a person is totally engrossed in the activity they are performing. Games seek to reach this state of 'flow' by matching a

player's current level of ability to the challenge of task at hand, or stretching that ability just beyond. And, increasingly, games are played in multi-player environments that allow players to relate not only to those in the room with them, but also with players dispersed all over the world. So-called 'Massively Multiplayer Online Games' (MMOGs) are played by millions of participants at a time.

2.9. Digital Games, Motivation and Learning

An extensive overview of the game-based learning landscape can be found in Submission 4. What follows here is a brief summary of these findings.

Przybylski et al (2010) weren't the first to highlight the potential of games to increase motivation for a learning experience. Malone (1981) investigated the intrinsic motivational properties of computer games for educational purposes. He suggested that games could be used and learned from in the design of educational experiences. Cordova & Lepper's (1996) theories on choice and fantasy were put to the test using computer games as the mediating technology.

Although a relatively young field in scientific and educational terms, the benefits of using computer games for teaching and learning have already been well established by a number of studies (McFarlane & Sparrowhawk, 2002; Garris et al., 2002; Squire et al., 2004; de Freitas & Jarvis, 2006, Egenfeldt-Nielson, 2006; Sitzmann, 2011). In examples such as Squire et al. (2004), students using computer games as a part of the learning process outperformed control groups in terms of both academic performance and anecdotal knowledge. Squire et al. (2004) suggested the situational nature of games brought benefits to students, allowing them to envisage abstract concepts in a virtual space. Accelerated learning and the development of critical thinking skills are cited in research as observable benefits of employing digital games for

learning (de Freitas & Jarvis, 2006). But perhaps the most often cited benefit of employing a digital game for learning is an increase in learner motivation (Malone, 1981; Cordova & Lepper, 1996; Ricci et al., 1996; Garris et al., 2002; Egenfeldt-Nielson; 2006; de Freitas, 2006; Kapp, 2012).

It would be easy to assume that supplanting E-learning with game-based learning would alleviate the issues organisations face when deploying online learning. However, the cost and skillset required to design, build and deliver a digital game for learning tends to be prohibitively high. This is perhaps not surprising given that the skillset required to produce a game can be diverse; instructional designers, programmers, graphic artists and game designers come together in the production of a digital game for learning. Sitzmann (2011) suggests that the games for workplace learning cost on average \$3m-\$5m (USD) to produce. Prensky (2001) suggested \$1m as an average figure. The American Society for Training and Development (ASTD) reports an average build effort of 1346 development hours to create a simulated environment (Kapp & Defelice, 2009). Smaller scale games or even commercial games used for serious purposes can all undercut these costs, but it seems somewhat unlikely that the bespoke development of a serious game for learning can compete in terms of cost and time to deploy when compared to more standard E-learning activities.

2.10. Gamification as a Method of Increasing Online Engagement

Whilst the development of a game for learning might be out of the reach of most E-learning courses, there exists the possibility to learn from the motivational properties of games and to apply these lessons to non-game environments. The field of 'gamification' seeks to utilise progress measures found in computer games such as 'points', 'levels' and 'badges' to shape and encourage participation (Kapp, 2012). Deterding et al. (2011) suggest gamification is the practice of using design elements

characteristic of games in non-game contexts. Gamification differs from a full game because its design incorporates only some of the elements that might otherwise be included in a game. These designs and feedback patterns are placed into real-world or otherwise 'non-game' contexts to facilitate users' progress towards a purposeful goal (other than completion of the game, which tends to be the purposeful goal in a whole game experience). The aim of gamification is to increase the frequency of behaviours that designers see as necessary to fulfill the purpose of an experience. For example, the geo-location app 'Foursquare' requires users to press a 'check-in' button when they reach a location that they wish to share with their followers. In an attempt to encourage this behaviour, Foursquare's designers chose to reward participants with points which translate into badges for frequent check-ins. Users aren't playing a game; they are telling their friends where they are, but the 'experience points' brings a playful and competitive element to an otherwise mundane task.

Gamification is inherently appealing as a concept as it is relatively easy to implement in a post-hoc manner – any system or process can be made to offer up a measure of progress as the participant moves through the event. What's more, anecdotal evidence from industry suggests that the gamification of a process can prove to be highly successful in meeting business targets; Badgeville, a gamification platform provider, reports increases in user engagement by as much as 650 per cent in its case studies (2012). There is perhaps little reason to doubt these metrics as truthful; examples of such practices have been found in the commercial world for many years. Badgeville founder Kris Duggan suggests that they are in fact a 'behaviour platform', preferring to shy away from the term 'gamification' (2012). Examples such as frequent flyer miles could be considered early examples of similar methods; allowing a customer of an airline to earn rewards for reaching certain milestones in terms of number of miles flown. Supermarkets give 'reward points' to shoppers as part of a loyalty programme, allowing these 'points' to be redeemed at certain

times and against various offers. These techniques are long-established marketing tools proven to increase engagement with a brand over the long-term.

However, gamification differs from loyalty programmes in that, traditionally, loyalty programmes materially benefit the participant with some item of monetary value. Gamification systems tend not to do this, instead relying on social comparison and the urge to progress within 'the game' in an endogenic reward pattern – you earn points simply because it is a part of a game and we all enjoy some feeling of mastery, however that feeling is manifested. Critics suggest that gamification in this mold promotes facile engagement that borders on exploitation (Bogost, 2011). The term 'pointsification' was coined as a more accurate, but somewhat derogatory language to define gamification (Robertson, 2010). Detractors such as Bogost and Robertson suggest that gamification has little in common with a game, save for taking some of the more obvious feedback mechanisms and making them core to the experience, as opposed to a side-effect of progress. Gamification isn't the first movement to attempt to tap into the motivational properties of games; 'funology' sought to take a more playful approach to work and life as a response in part to the success of the experiments in fantasy and motivation by Malone (1981) (Deterding et al., 2011). There perhaps emerges a further distinction, that of 'gamefulness', which more accurately describes the inspiration behind play and how this might be used to make activities more intrinsically appealing (McGonigal, 2011, Deterding et al., 2011). Gamefulness can be seen to encompass more of the ludic features said to make games compelling exploratory and reflective exercises (Deterding et al., 2011).

Whilst the name gamification and the nature of the progress measures used imply some relationship to a digital game, the similarities often end there. Where games are said to require elements such as challenge, fantasy, role-play and win-states, gamification requires none of these

elements. Instead, gamification shares more of its heritage with fields such as choice architecture, where experiences are specifically designed to manipulate behaviour (Thaler & Sunstein, 2009). For example, supermarkets place their in-store bakery towards the rear of the store in order to tempt customers deeper in to the shop. To the layman, gamification appears to be capturing the essence of what makes a computer game compelling without necessarily needing to build a full computer game. But the reality is that gamification builds upon the popularity of games as a basis in shared language that increasing numbers of consumers understand. As the average age of a game player increases, so does the awareness that a 'experience point' or a 'level up' is a desirable outcome. In doing so it builds upon many years of experience perfecting Human-Computer Interaction (Deterding et al., 2011) and research into the efficacy of short-term rewards as a part of long-term process (McClure et al., 2004). The evidence for something akin to gamification to be used as a method to facilitate increased user participation is compelling. However, questions must be raised as to the suitability of gamification across all settings and all genres. For example, gamification makes significant use of phrases and terminology that might not appeal to all audiences. Where 'experience points', 'badges' and 'virtual gifts' mean nothing to an end-user, there is a disconnect between the intended impact and the probable outcome of offering these sorts of incentives. Even where the basis in shared language exists, gamification practitioners such as Kris Duggan (2012) warn against seeing gamification as a one-off development, suggesting that in order to keep the rewards interesting they must constantly be tweaked, changed and modified. Without this campaign driven approach gamification may lose its allure over the long-term.

In addition, many of the practices fly in the face of intrinsic motivational theory (Deci & Ryan, 1985), which suggests that engagement-contingent rewards can be detrimental to the intrinsic motivation one experiences for a process. However, this theory holds only for activities that participants

desire to participate in (Deci & Ryan, 1985; Roca & Gagne, 2008). It is perhaps questionable as to whether or not all workplace learning activities are desired by their participants; they tend more to be a function of organisational demand for compliance or change. The net effect of such contingent rewards becomes somewhat uncertain in these circumstances. It might be that gamification provides users with an extrinsic measure that they can internalise as desirable. Outperforming competitors and achieving high levels of self-efficacy, as demonstrated by reaching the top of a leaderboard for example, might be considered an autonomous extrinsic motivator (Roca & Gagne, 2008).

2.10.1. A Note on the Rise of Gamification as a Trend

Gamification was not a term in regular parlance when this research was initiated. Whilst game-based learning had been popular for decades, the use of game-like progress measures in non-game situations remained largely without documentation. Using Google's Insight Tracker tool to analyse the popularity of the term 'gamification' over time, we can suggest that the term only entered popular usage about half-way through 2010 (one-and-a-half years after this research commenced).

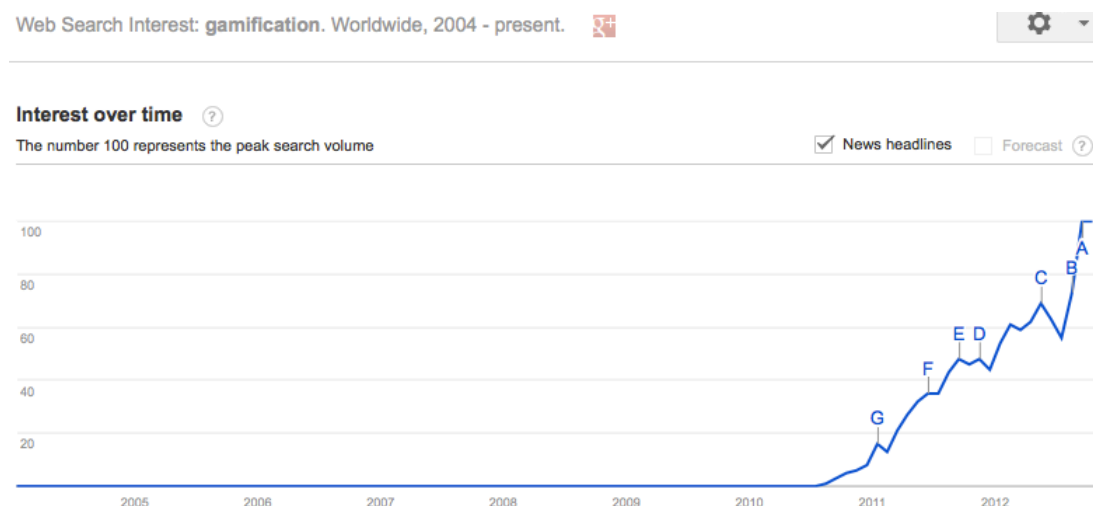


Figure 3: The rise of gamification as a trend (created using Google Insights).

Since that time its rise has been somewhat exponential, to its current peak now (end of 2012). Gartner, a research organisation, suggests that gamification will be utilised within 50 per cent of all innovation processes within companies by 2014 (Gartner, 2012).

Little significant peer-reviewed literature as to the efficacy of gamification in an education environment currently exists, save for papers written in the course of this EngD project (Betts et al., 2013a, Betts et al., 2013b). Gamification offers a potential avenue of exploration to increase participation in collaborative learning. Further work and more practical applications are required to form a valid opinion in research.

2.11. Defining the Problem

The central criticism leveled at workplace E-learning could be said to boil down to its fascination with content as the sole means of instructing learners (Levy et al., 2009). This basis overlooks many underpinning epistemological and andragogic findings; that learners, especially adults, base their learning in experience not in didactic teaching. And whilst workplace e-learning delivery expands in ever more inventive ways of reshaping content, costs and time to develop will remain high and frequent failures will not be fully addressed (Lee, 2009; Lin, 2011). There exists a distinct lack of social interaction facilitated in workplace E-learning (Dalziel, 2003). If education is seen as an inherently social process then we must first and foremost imagine ways in which a more 'social' approach can be facilitated (Dewey, 1938).

This, it must be said, is already happening in every organisation. Informal learning theory suggests that most of the learning which individuals experience in the workplace is the result of informal circumstances – learning on the job or talking with colleagues – instead of formal learning (EDC, 1998). Despite this ubiquity, a study into the role of informal learning in a workplace (EDC, 1998) noted three distinct limitations:

1. The context of the company is a mediating factor in the effectiveness of informal learning – not all companies see themselves as 'learning organisations' and where the ability to facilitate learning is not central, so the availability of good informal learning practice is limited;
2. The variability that occurs with informal learning does not lend itself equally to all disciplines. For instance, areas that require a high degree of regulation or are high risk may benefit from formal training;
3. Those who undergo formal training are better able to assimilate informal experiences. They have a better grounding in the subject.

This study suggests that informal learning is by its nature 'constructivist' and therefore the greatest synergy between the formal and informal world is seen where a more active involvement in the construction of knowledge is undertaken (EDC, 1998). This approach is more useful for building skills such as problem solving than traditional 'absorption through instruction' techniques. Such skills are top of the priority list for companies today (Mourshed et al., 2012). Increasingly it would seem that the ability to build widgets faster, to achieve higher levels of quality or to maximise durability are not factors that businesses can rely on to differentiate themselves in a global marketplace. Instead it is in their human capital, the ability of their employees to problem solve and create novel solutions, that companies are turning to differentiate themselves in the marketplace. Here companies have a shortfall not just with existing employees, but also with newcomers to the workplace. Less than 50 per cent of employers rate young people as being competent when it comes to problem-solving or written communications (Mourshed et al., 2012).

Adopting a more social approach to workplace E-learning at the expense of content development is therefore a worthwhile notion. However, it has been recognised that fostering meaningful social interaction online is difficult (Salmon, 2000; Dillenbourg, 2002; Garrison & Cleveland-Innes, 2005). For educational settings it has often only been possible with the intervention of a teacher or moderator. This is not a scalable solution for the workplace. But simply leaving learners to their own devices would not systematically produce learning (Dillenbourg, 2002; Garrison & Cleveland-Innes, 2005). A method of scripting collaboration could be advocated, but the time and effort this would take to design would prohibit widespread workplace adoption (Dillenbourg, 2002).

There emerges a middle ground, where social interaction can be shaped by progressive sequences of content acting as 'scaffolding' to support the learner's advancement (Bruner, 1966). Scaffolding theory suggests that content becomes more advanced as the learner's abilities increase, gradually falling away in terms of support and direction as the learners'

confidence grows. By structuring collaboration around content, we automatically provide a context for conversation to take place. As this content becomes more advanced and involved, so we might expect conversation to progress and build in depth and quality. Latterly, the need for scripted conversations falls away, as learners reach higher levels of understanding within a subject area.

To encourage participation without the need for a hands-on e-moderator, our research has led us to consider a gamification system that might be employed to shape learners' behaviours in favour of participation (Deterding et al., 2011). Capturing lessons from andragogy and self-determination theory, this same system should allow for participants to be more autonomous in their behaviour; choosing their own path within the confines of the scaffolding. In an effort to minimise cost and time to build, the innovation should be able to reuse content previously created, as well as utilise other content from outside the confines of the organisation and its learning platforms. As the focus of learning moves towards the application of ideas, the need to create content somewhat declines in importance; constructivists value learners building over teachers teaching (Papert, 1993).

This approach may not be suitable for all organisations, all applications or all cultures. For example, where learning is orientated towards a 'tick-box' exercise for compliance requirements, there may be little need to implement a substantial 'social' system around what is essentially a requirement for rote retention. Where organisations are suspicious of the role of social media, social networks or 'games' there will almost certainly be hostility towards the Curatr approach. This attitude may well be warranted by the nature of the environment; if a company does not have an inherent culture of sharing and openness, it is perhaps naïve to think a software platform will change that.

**“Free collaboration does not
systematically produce learning.”**
Dillenbourg (2002, p.61)

3. Towards a New Methodology

We can capture our understanding of a new, more social approach to workplace E-learning with the creation of a theoretical model. Building on the evaluation work of Garrison et al (2001), which broadly aligns with the work of Kolb (1984), it is possible to construct a model of how a learner's interactions must advance in an online social learning experience in order to reach higher levels of critical thought. This advances Kolb's (1984) model by introducing the social context in which learners exist. Garrison et al (2001) suggests that first there is a trigger; an insight or idea that, for want of a better phrase, causes some form of cognitive dissonance in the learner's mind. This occurs when a pre-existing connection is challenged by a new insight. Either the new insight is rejected or the pre-existing connection is modified. Garrison et al (2001) suggest that this completed by socially mediated exploration; an investigation that is undertaken through the articulation of thoughts. In the case of an online asynchronous discussion type area, this creation is most often seen as a comment or reply. As this yields results for an individual, so an attempt to reconcile a new connection with previous experience is made; it is integrated.

Online discussion is not the only way in which this process may take place. Increasingly we are witnessing the use of social media as a significant channel for user contribution. Where this approach is successful it can lead to information overload. At this juncture it becomes necessary to re-order content for specific contexts, an act that is increasingly known as digital curation (Beagrie, 2006). This moves beyond Garrison et al's (2001) work and must be properly accounted for in a new, more up-to-date model that addresses the nature of online contribution a decade on from Cognitive Presence.

3.1. Connecting, Creating and Curating

We can summarise the Cognitive Presence stages as being the result of three key behaviours; the learner connecting with an idea; the learner creating a response to that idea and the learner curating both their responses and others in order to arrive at a conclusion. We can call these three behaviours Connecting, Creating and Curating.

1. **Connecting.** A learner must firstly connect to an idea as exhibited by either a learning object, the teacher or another user (Moore, 1989; Garrison & Cleveland-Innes, 2005). By 'connect' we refer to the cognitive process of deriving a personal opinion in response to something that is experienced – making a connection or having an experience (Kolb, 1984; Jarvis 1994). This is akin to 'triggering' and 'exploring' (Garrison et al., 2001);
2. **Creating.** In response to a connection or experience, the learner should next explicitly define his or her opinion – they write it down or otherwise record it as a part of the reflective process (Kolb, 1984; Johns, 2004). This stage is akin to 'exploring' (Garrison et al., 2001). Most typically in social learning experiences, this process is executed as learners reply to comments or answer discussion questions set in advance (Garrison and Cleveland-Innes, 2005). With the advent of social software allowing user generated content to progress beyond text-based contributions, it would not be surprising to see learners creating content in other forms; uploading videos or bookmarking 3rd party websites for example (Kamel Boulos & Wheeler, 2007). This phase also allows for other learners to experience new points of connection as they reflect on new opinions. This allows for exponential growth in the learning platform as new connections are made as the content grows;

3. Curating. Finally, the learner begins to assimilate new experiences into existing experiences in a more systematic manner, perhaps as a prelude to actively experimenting with a new idea in the real world (Kolb, 1984). This need not always be a positive process; it is equally valid for a learner to reject a new idea in this knowledge construction phase (Jarvis, 1987). Garrison et al (2001) label this stage integrating or, for more advanced cases, resolution. Kolb (1984) would refer to it as abstract conceptualisation. Here we refer to it as 'Curating'.

Due to the proliferation of user-generated content on the Internet, there is an increasing need to sort, maintain and dispose of digital content in a systematic manner (Beagrie, 2006). The field of 'digital curation' has emerged as a new term to encompass this process (Beagrie, 2006; Rosenbaum, 2011). Curation is a well-established practice of creating value from collection building, where the sum of the experiences and the context provided is greater than the parts alone (Beagrie, 2006). Indeed, remixing concepts in an educational context is an established pedagogical practice by its own right (Papert, 1993).

In our context, having made new connections and explored meaning in the light of experiences, a wide range of opinions and experiences will have now been documented – even a small group of learners will have generated a lot of content. Learners should therefore be actively encouraged to curate the best contributions and to 'remix' each other's work as a means of further demonstrating their understanding of the field. Typically this will involve learners storing the content they wish to curate, transforming it in some way to apply their own experience and understanding and then sharing this remixed collection with the wider group.

The model is cyclical because curation inevitably leads to connection; where we demonstrate a new behaviour in the real world we leave a path to others modelling that behaviour (Bandura, 1977). Where we curate information to share with others we inevitably lead others to make new connections. Because the collective undertakes the process at the same time, connections interweave between members of the collective; what is your curation is my connection, and vice versa (Thomas & Seely Brown, 2012).

Following Submission 5, the model was articulated and named after the software created to facilitate it; the Curatr Learning Cycle (CLC).

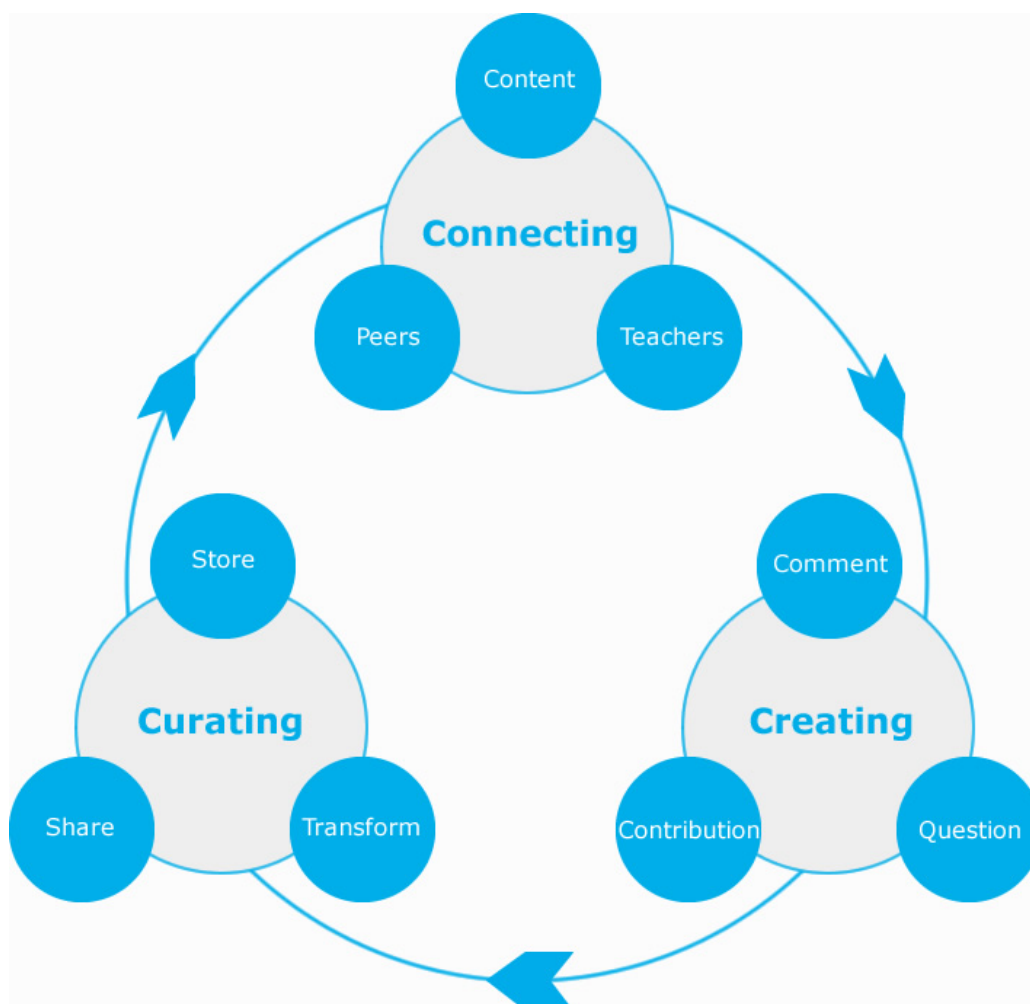


Figure 4: The Curatr Learning Cycle

Figure 4 shows the CLC we have created, along with some common aspects of Human-Computer Interaction (HCI) that may facilitate the cycle. In the first phase, Connecting, a platform is required that enables learners to connect with content, teachers and each other (Moore, 1989). In HCI terms this might include both methods to interact with digital materials, methods to find and contact other users and communication tools, such as email, sharing, instant messaging and friending / following.

In Creating, the platform should enable learners to contribute their reflections and ideas back to the environment. Answering discussion questions is perhaps the favoured method of facilitating this type of interaction in an online learning environment. Pre-scripted questions are triggered at certain points, to be answered in 'free text' form by learners. The marking of these questions can present issues for scalability and forward progress, especially when a learner relies on prompt marking from a teacher. A 'peer marking' system may be more suited to generating feedback on short-form answers; allowing other learners to vote and comment on each others responses to discussion questions. In addition, a range of other techniques might be implemented from the Web 2.0 world, including inline comments (for example, Facebook allows for comments directly underneath a photograph or file upload) and user-generated content upload. The latter may present issues for less advanced users; creating and uploading a web-ready video is not necessarily straightforward for all Internet users.

Finally, the Curation process should facilitate learners seeking the experiences of others, sorting them into a sequence or taxonomy of their own devising, and sharing that sequence with other users to demonstrate experience and understanding. Here we would expect to find a system such as bookmarking or archiving to allow users to store information in their own repository. This system would allow for stored information to be re-ordered and transformed, perhaps with the use of a taxonomy or categorisation system. Here users can remix the order in which content

is presented and add their own opinions and annotations to the material. This new remix would then be made public, potentially using a 'share' feature or by enabling the creation of a personal publishing space. This final feature is a crucial differentiator between merely bookmarking and curating content. In digital curation, the results are always shared publicly, usually allowing for the right of reply or further remixing to take place.

“Curatr has to be one of the most interesting platforms available on the market today.”

Clive Shepherd (2012).

4. Engineering Curatr

Further information as to the initial design process of the innovation can be found in submission 3: designing the innovation. What follows here is a summary of this submission.

Following the key principles outlined in literature and the methodology we have described (and acknowledging the commercial and practical limitations that any innovation would need to overcome to attain widespread adoption), five key objectives of a 'social' innovation in workplace E-learning were defined. The author's experiences in the E-learning industry were central to arriving at these principles. They do not follow any existing customer requirement, but are an articulation of what customers would conceivably require, given the desire to commercially implement a new piece of learning technology:

1. To allow a non-technical administrator (Teacher, Lecturer, Subject Matter Expert or similar) to create an online learning activity, using any web-addressable learning resource as a Learning Object;
2. To organise these Learning Objects in a 'non-course' structure, facilitating users' autonomous exploration of the Learning Objects;
3. To illustrate competence, contributions and advancement within the activity using a game-like mechanic;
4. To enable learners to interact with both each other and the administrator; and to add new Learning Objects to the activity;
5. To store relevant reporting information and to provide reporting facilities for administrators to analyse the progress of users through the learning activity.

Points 1 and 5 are essentially administrative abilities that would allow a piece of software to achieve the basic features demanded of a commercially viable online learning platform. These could be termed 'order qualifiers' (Slack et al., 2011); they are required for the product to be shortlisted as a potential solution. In addition, workplaces are also unlikely to wish to 'give up' their years of E-learning content production, therefore a method to mix content from sources both internal and external to the organisation becomes a requirement.

Points 2, 3 and 4 allow the innovation to be implemented as theorised. Most learning platforms necessitate a set order to a learning experience as part of compliance to the SCORM 1.2 or 2004 standard (ADL, 2011). Whilst instructionally sound in principle, this undermines the control and choices that we have determined to be essential in fostering intrinsic motivation within the learning activity. In addition, competence is usually derived as a function of progress through this linear order. It is not a personal measure of improvement but a measure of time until the end of the experience. This undermines the motivation of individuals by introducing a completion contingent goal, as opposed to a more direct measure of competence for the individual. Finally, enabling learners to interact virtually recognises the social context in which it occurs. By allowing learners to add content back to the system, we also facilitate another measure of self-determination and control.

4.1. Existing Software

As a part of Submission 3, a review of existing market-leading software solutions was undertaken to better ascertain if an existing solution might fulfill the five requirements set out for the innovation. Blackboard LMS, Moodle LMS, Litmos LMS, Facebook, Twitter and LinkedIn were examined in person by the Research Engineer to reach an evaluation of features available. CornerStone LMS, SocialText & Atlassian Confluence were examined at arms length, using publicly available literature to assess the features available. Finally, Microsoft Sharepoint was examined at some length by a Research Assistant working under the guidance of the Research Engineer. This analysis formed the basis of a successful MSc dissertation and the findings are summarized table 1, alongside other analysed software:

Table 1: Summary of Currently Available Software (as completed in 2011).

Software	Req. 1	Req. 2	Req. 3	Req. 4	Req. 5
Blackboard LMS	✓	X	X	Add-on	✓
CornerStone LMS	X	X	X	Add-on	✓
Moodle LMS	✓	X	X	Add-on	✓
Litmos LMS	✓	X	X	X	✓
SocialText	✓	✓	X	✓	X
Atlassian	✓	✓	X	✓	X
Confluence					
Microsoft	✓	✓	X	✓	X
Sharepoint					
Facebook	X	✓	X	✓	X
Twitter	X	✓	X	✓	X
LinkedIn	X	✓	X	✓	X

No existing market solution was found that met all five requirements for our innovation. The lack of features in existing software for requirements 2, 3 and 4 lend credence to the notion that a new software platform that allowed these features would be innovative within the learning technology industry. Perhaps most significant was the lack of gamification option available at the time of the original research in 2011. This research suggests that the gamification features of a new innovation would be a defining feature in its differentiation from existing software

4.2. Engineering Curatr

Having ascertained that no existing solution met the requirements specified by our research, a software engineering project was undertaken by HT2 to create an innovation that met the requirements. This work was documented in Submission 3 and is summarised here.

The platform was engineered following an MVC design pattern, executed in PHP. Data was stored in a MySQL database and an Application Programming Interface (API) defined to allow for RESTful transfer of data between the model and the view (Burbeck, 1992). These languages and techniques represent industry standard, open source approaches to development. By taking an open source approach, HT2 minimises the risk of over-reliance on a programmer working in his or her own protocols. The following layer diagram shows the underlying architecture of the Curatr platform:

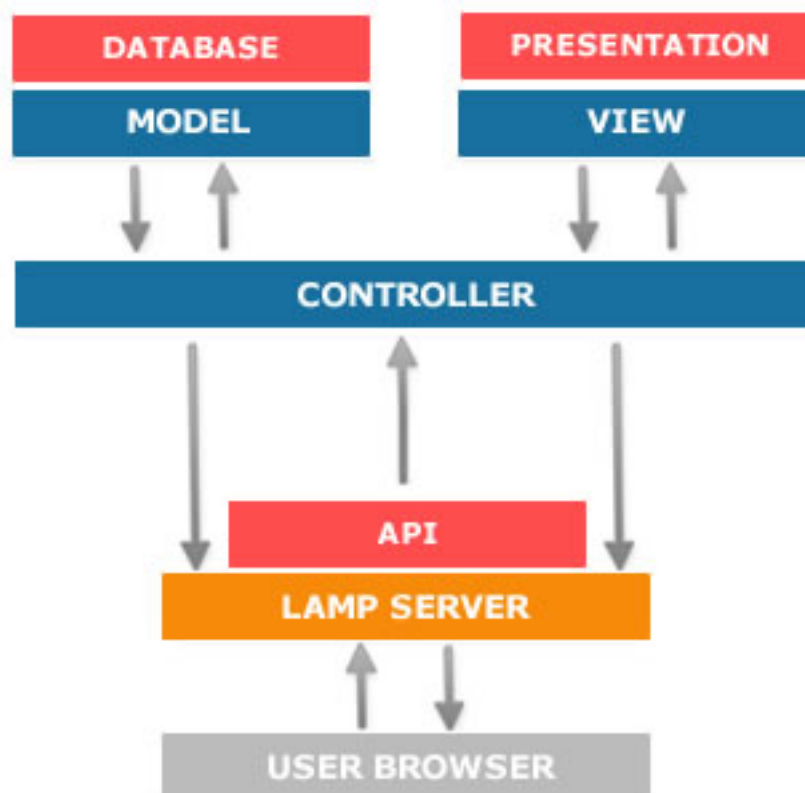


Figure 5: Curatr layer diagram

Our initial presentation layer was developed in Adobe Flash. Whilst elements of the user interface (UI) would be achievable with HTML & JavaScript, some more complex elements would be difficult to implement in a cross-browser compliant approach. At the time of build HTML5 and JavaScript combinations were in their infancy and did not yet represent a viable method of development. Flash offered a trade-off; it would only work where Flash was installed, but wherever that was the case, the user experience would be the same. With over 98 per cent of computers using the Flash plugin (Adobe, 2011), this option was thought to be most appropriate.

A drawback of the Flash approach was the lack of support on Apple devices such as the iPhone and iPad. In order to overcome this limitation, a 'native' application was developed for the iDevices, using Objective C. This application was limited in a number of ways, for example by not allowing a user to upload new objects from the device, but it would allow a user to login and view the learning experience using the device. Android devices could utilise Flash at the time of initial development, so no native application was required.

4.2.1. Platform Behaviour

Curatr generally acts as a portal to learning content. Following successful authentication, a user is presented with a range of information in a visual GUI. In this GUI, independent Learning Objects, which can be any web addressable asset, are represented as 'nodes on a canvas'. These nodes are organised into sequential 'levels', meaning that a user would first need to pass through "level 1" before accessing learning objects at "level 2". There are opportunities for users to comment on all Learning Objects, as well as the opportunity to bookmark or share with other classmates. This information is stored within Curatr. An iFrame is used to display the content of a Learning Object 'within' the Curatr interface. Curatr is agnostic to the content of a Learning Object, all that is logged is that the user has clicked to view an object. This record is used to differentiate

between content which has been viewed and that which hasn't. On some occasions a 'gate' will stop a user's progress through the levels. Gates are simple checks of knowledge; a question or series of questions to be answered. Answers are stored locally within Curatr.

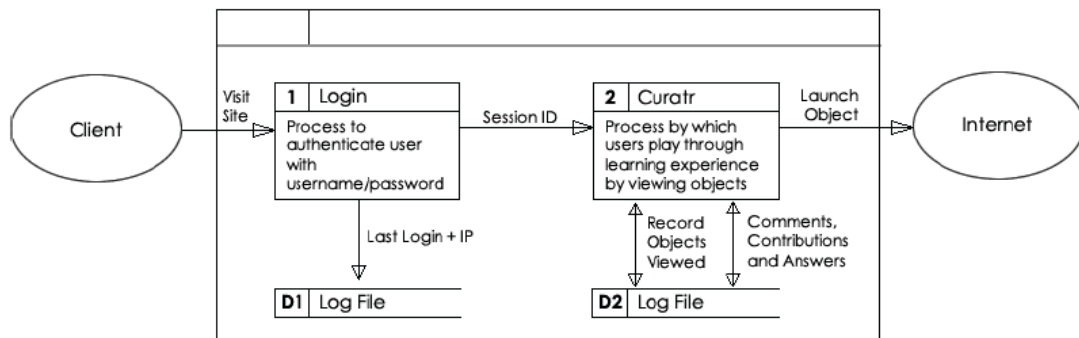


Figure 6: Level 1 Data Flow Diagram

4.2.2. Initial Testing

Following an initial three-month period of development and a series of in-house testing, over 100 third-party testers logged on to use our initial prototype. As a result of this input a range of modifications and additions were made, resulting in 'Curatr' version 1 launching in March 2011. The name was chosen in honour of the Natural History Museum; one of the RE's favourite places of learning and as a nod to the ability to 'curate' learning using the platform. Following ten months of use with a variety of clients (most notably the University of San Diego and Barclays bank), the development of Curatr version 2 commenced. This refined the original product, making few additions but tweaking every view within the product to create an enhanced user experience. Curatr version 2 launched in March 2012.

4.3. Overview of Curatr

Curatr is a software-as-a-service platform that allows learning and development professionals to create visually stunning, highly collaborative online courses for their organisations.

Following the principles of the CLC methodology, learners undertaking a course built in Curatr do so in the form of a social game. ‘Experience Points’ (or XP) form the basis of the game; in order to progress in the course, learners are rewarded with XP for viewing, commenting and contributing back to the course. Courses comprise of sequential levels of content; the XP are used as the basis to ‘level up’ and progress through the game. Learners are given autonomy to browse content and conversation within each level, contributing how and when they please. In some cases, the learner will need to complete an ‘end-of-level gate’ (a test or assessment) in order to ‘level up’ and progress. These gates may only be accessed once a pre-requisite number of XP has been earned for that level.

Organisations who use Curatr may appoint multiple administrators, who can create courses quickly and easily using a web-based administration system. These administrators follow a three-step process to create a new learning experience:

1. Creating a structure – this is where the scaffolding of an experience is laid out; the levels, objectives and assessments;
2. Adding content – using digital resources from any Internet addressable source;
3. Inviting users – enrolling learners and sending out email invitations to start the experience.

By providing a hybrid model of course authoring and course delivery software in a single platform, Curatr cuts down the time and complexity

required in creating and delivering an online course. Because the emphasis of the CLC methodology is on triggering user contribution instead of learning rote from content, a new method of authoring courses is envisaged. Instead of instructors focusing on the creation of content for delivery to learners, our approach advocates simply ‘curating’ content from wherever it already exists. Our software allows for this content to be linked to directly (avoiding the need to replicate or duplicate) and advocates the use of 3rd party sources. Curatr’s unique visual interface blends this mixture of content into a seamless journey, held together by the discussion points scripted by a course administrator. Simply put, by reusing existing content and triggering collaborative learning, you do not have to build all of the content yourself.

Industry figures (Chapman, 2010) suggest that the production of traditional E-learning content can take on average 184 hours ‘development time’ for every 1 hour of instructional content produced – about a working month. Whilst economies of scale doubtlessly exist, this model is uncompetitive for the delivery of a significant online learning component, as is the case in our example in Section 4.4, where in excess of 100 learner hours were required. Curatr negates this. Whilst subject matter expertise is still required, the use of skilled programmers, graphic designers, QA testers and project managers is not. This could cut the cost of developing E-learning by as much as half according to estimates (Chapman, 2010). We suspect the saving for courses of significant size and length would be even greater.

When organisations purchase licenses to use Curatr, they do so at the ‘Institution’ level. Within an institution, many courses can exist. Courses within Curatr are termed ‘museums’; a museum is a discrete learning experience, typically separate from one another by subject or cohort.

To give more detail as to the experience of learners and administrators, the following section will explore a case study example of Curatr in a real-world context.

4.4. Case Study Example: Service Operations Management at Warwick Business School

Warwick Business School at the University of Warwick identified market demand to create a new online course aimed at teaching team leaders and managers working in service organisations the principles of operations management. Customers felt that managerial employees would benefit from grounding in operations management theory as a part of the continuous improvement process. In order to progress through such a course it was thought necessary that participants readily apply the theories and models covered to their own situation. This was to be a social process; by constructing theories and ideas for workplace improvement alongside other students, the intention was to create a raft of implementable improvement solutions for each organisation.

The qualification was designed as an entirely online course comprising of four modules studied over a six-month period. Successful completion of the course would lead students to achieve 24 MCATs points and a postgraduate award in service operations management from the University of Warwick.

Curatr was selected as the platform to build and deliver the asynchronous online elements of the programme. In addition to this two webinars were held per module and each student encouraged to purchase a companion textbook to read in their spare time. Passing the qualification did not require participation in Curatr; a demonstration of having completed 240 hours study and the submission of four assignments of suitable quality (50 or greater score) were the requirements to be met.

Building the course took around a week. As the award comprised four modules, four different museums were created – users would move through the museums sequentially at the same rate as the course passed. This case study will identify in-depth the process of building the

first module, known as 'Direct'. The process was repeated for modules 2, 3 and 4.

The basic structure of the 'Direct' museum was as follows:

Table 2: Outline of the 'Direct' Museum

Level	Outline Content
Level 1	Introductions from the course leader, introducing himself, the platform and the course.
Level 2	Operations management in everyday work.
Level 3	Taking a 'process perspective' to business.
Level 4	Aligning processes with organisational strategy.
Level 5	Researching operations strategy in practice.
Level 6	Investigating your own operations strategy.
Level 7	End of module assignment briefing.

This case study is split into two sections; the 'learner experience' and 'building the course'. The learner experience covers the view and experience of a student undertaking the SOM course. Building the course details the administrative process that was undertaken to construct the experience in advance of students 'logging on'.

4.4.1. The Learner Experience

Submission 3 documents the first version of the learning experience using Curatr, including detail as to how design decisions were taken. Submission 5 builds upon this to evaluate customer feedback and refine the software to reach 'version 2'. This case study uses 'version 2' of Curatr. For a more detailed overview of all 'views' within Curatr, please see Appendix A in this report.

When a student first logs on to module 1 of the SOM course, they arrive at 'level 1'. For a student arriving at level 1 for the first time, the look and feel of Curatr is likely to be somewhat different to other learning platforms they might have previously experienced. Five aspects of the Curatr approach necessitate this unique graphical user interface:

1. **The ability for Learning Objects to be any sort of digital content.** An issue with gathering content from many sources is the lack of a unified 'look and feel'. We know from studies such as the Technology Acceptance Model (Davis, 1989) that aspects related to perceived ease of use have a strong relationship to an individual's intention to continue using the software. As such,

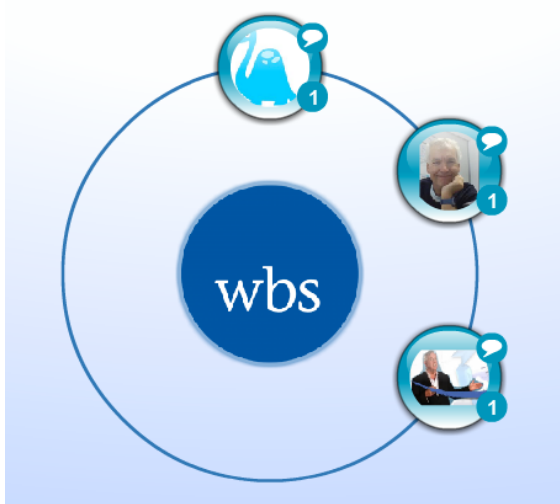


Figure 7: Three Nodes Representing Learning Objects.

Curatr uses stylised 'nodes' to represent each individual learning object, which can then be clicked on to fully open the learning object itself. These nodes look the same as each other, but are differentiated by an image of the object contained within (see Figure 5). Nodes can carry information such as the 'level' of the object and whether or not any comments have been made by other users. By differentiating the colours

of the nodes, it is possible to let the user visualise what they have viewed versus what is yet to be seen in the experience;

2. **The need to foster Self-Determination** (Deci & Ryan, 1985; Cordova & Lepper, 1996). SDT suggests that students should be given as much autonomy as possible in an activity. However, the 'scaffolding' requirements of a learning experience restrict this autonomy to create an optimal learning environment. As such, Curatr presents a middle ground, whereby learners must proceed in sequential levels, but within those levels they are encouraged to explore objects in any order they wish to proceed. As Figure 5 shows, all three learning objects at this level are accessible to the user for them to view in any order they choose;
3. **The desire to encourage exploration.** The autonomy requirement alone does not necessitate the use of circles instead of something more conventional, like a list of learning objects. However, the desire to encourage exploration does necessitate an interface that goes beyond merely listing out the learning objects on the screen. Note from Figure 5 that the nodes do not have text title associated with them – you cannot tell what an object actually is simply by looking at it. This represents a deliberate attempt to encourage exploration (Garrison et al., 2001);
4. **The need to signify progression and increasing competence.** As a part of the core gamification system (and to fulfill SDT requirements), it must be made obvious to the user that they are making progress within the experience. Curatr achieves this by adding additional content on new circles, pushing older content out from the centre (see Figure 6). In this manner, the content available 'grows' as progress is made and it is immediately obvious which level is the current level to be worked on;



Figure 7: Progression within Curatr; those objects on the outer ring are the same objects seen in Figure 5, only now they have moved 'out' as the user has made progress to level 2.

5. **The need to scale.** Given that Curatr experiences such as SOM contain 50 or more learning objects, the interface must be made to scale appropriately. The concentric circles approach works well in this regard, providing a large amount of 'screen real-estate'. In addition, the interface was created with a 'zoom' function, allowing an almost limitless amount of content to be displayed within a single screen (see Figure 7 for the complete view of content in 'Direct'; Module 1).



Figure 8: Curatr Interface at Scale in SOM, Showing the Whole of 'Direct'.

Around this core graphical user interface other elements of the platform are present at the top and bottom of the page (see Figure 8). This includes the XP counter for keeping track of XP, an 'objectives' tab, which can be used to show/hide the current objectives and a series of filters by which learning objects can be searched and sorted.



Figure 9: The Complete Curatr Interface.

This same interface is utilised again in what is known as the 'Peer View' (see Figure 9). This view shows all of the participants in a Curatr experience, represented in the same concentric circles. This time the position within the circles represents the users position on the 'leaderboard'; the user on the immediate right hand side of 'the Curatr' is the current 'leader' in the experience. This leaderboard is calculated as a combination of XP earned and activity over the last seven days. Those users with the most XP and a high level of recent activity will be seen highest on the leaderboard. This promotes not only progression, but also regular activity and greater time-on-task (Bloom, 1984).



Figure 10: The Peer View.

Each user within the Peer View is clickable, revealing the users 'gallery of objects'. This is the method by which users can curate information during the learning experience – learning objects that users add, share or bookmark are copied to their own 'gallery' of learning objects, which acts as a form of e-portfolio for future reference. Again, this looks similar to the other views; the exception being the users image is at the centre of the page (Figure 10).

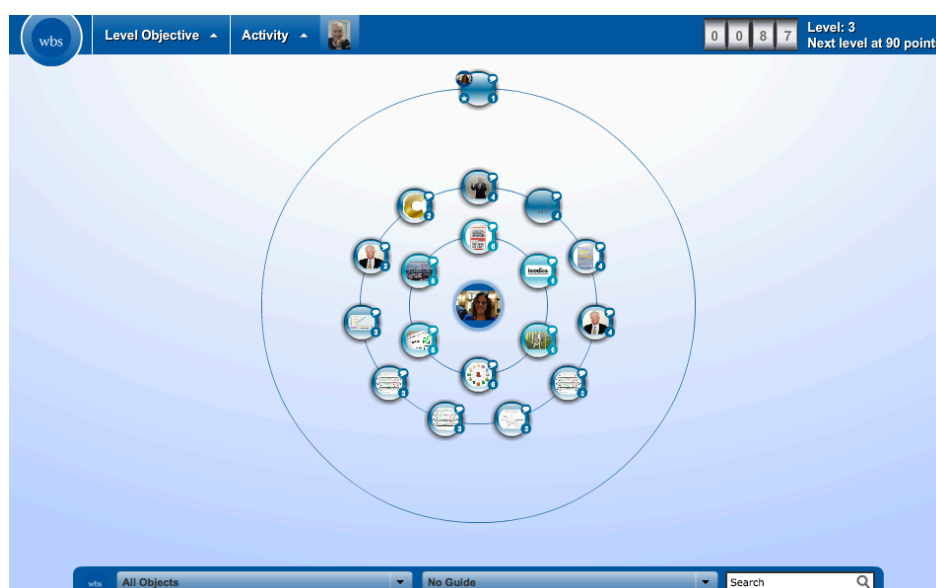


Figure 11: A User's 'Gallery' of Objects.

4.4.2. Course Content and Flow

The first level in Direct comprised of three video introductions from the course facilitator, introducing himself (Figure 11), the platform and the course to students. Progressing beyond Level 1 did not require passing a 'gate' (as per our earlier notions of giving a simple introduction to the experience) however, students were encouraged to introduce themselves as a response to the facilitator. This process helped to give students some notion of social presence (Garrison et al., 2001); the concept of whom else is taking part in this experience at the same time.



Figure 12: Course Introduction Video with User Comment Underneath.

Level 2 sought to create connections around the concept of operations management and everyday work with a series of six learning objects, most of which were videos. Operations Management as a subject has a long history in manufacturing, but this course was focused instead on the service industry. As such it was important to introduce the idea that everybody could be an operations manager, regardless of the sector they worked in. At this level students were encouraged to make the links

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Autonomous Social E-learning for Adult Learners | Benjamin W. Betts

between learning material and their own roles and impressions of what operations management meant to them (see Figure 12). Having made these connections, students were challenged to set some goals for themselves, what they would like to achieve and learn more about, given this introduction and the scope of the subject.

valid perspective for any

The process perspective

The process perspective exposes the mechanisms that the organization has for adding value.

Adding value is the fundamental reason for the organization's existence.

But it is a simplification!

Processes and Process Management
1 / 2 points - make a comment to get full points

Hide Comments ▾ [Return to Museum](#)

Objet Description: [Reply](#)

A comprehensive overview of Processes and Process Management with world leading expert and WBS professor, Nigel Slack.

?

I'm interested to see that Prof. Slack argues that customers are a transformed resource in process. Can they not also be a transforming resource too as they are instrumental in certain processes. Using this course as a case in point, are we, as its customers, not transforming resources for each other as well as a transformed resource in having our existent knowledge, skills, experience and learning needs.

Am I barking up the wrong tree?

Figure 13: Student Reacting to the Lesson.

Level 3 sought to reaffirm the ‘process perspective’ that students would be expected to adopt as a lense to content and concepts throughout the course. Seven objects were made available, introducing concepts such as the “Four V’s” (Slack et al., 2011), “Performance Objectives” and the strategic role of operations. These connection points asked the students to diagnose their own operations in strategic terms and encouraged debate and dialogue around the findings. By sharing the interpretations of diagnosis, students were better able to assess their own experiences and their own processes. These discussions were brought to a head in the end-of-level gate, which asked students to assess their organisation critically.

Level 4 asked students to now start applying the principles of process management to the strategic vision of the company. One of the central lessons of the experience was the notion of alignment between an organisations processes and its strategy. At this level eleven objects were set, ranging from videos to links out to blog articles and books.

The level ended with students being asked to share an experience of a time when they witnessed a company whose processes and services were particularly well aligned (Figure 13). This question can solicit more examples than the Subject Matter Expert who wrote the course knows, thus the best relevant examples add to the richness and depth of the material on offer (and can be captured for use in future iterations of the experience).

The best example I can think of that I have come across is that of Telford Utd Football Club. As a club they used to be owned by a wealthy backer who ultimately didn't have the funds to finance the club and as a result they reformed as a fan owned and backed enterprise. At the forefront was the new Chairman, naturally a Telford Utd fan. His approach to his chairmanship has been one of complete inclusiveness from both the core customer base but also from the people who are employed by the club in its various guises (players, physios, stewards, retail outlet staff, volunteers, secretary, board of Directors etc). As a player at the time I, among all the other players and staff, were sought out to contribute to the direction that the club would take which ranged from ambitions on the field (as you'd expect) through to the approach to community programmes, development of the stadia and surrounding land and the customer experience. This allowed them to draw upon a wide range of experience and ultimately developed a stronger bond between all parties linked to the club.

Figure 14: A User's Response to the End-of-Level Question.

Level 5 comprised almost entirely of links to third-party websites that featured a variety of case studies on companies such as Zara, 3M and Toyota (Figure 14). The intention was to move students towards a point of integration whereby they were able to make a judgment for themselves as to which aspects of operations strategy were most important to their businesses (Garrison et al., 2001).

The screenshot displays a learning object interface. At the top, there is a large image of a woman's face on the left and the text "retail @the speed of fashion" on the right. Below the image, the author "By Devangshu Dutta" is listed. The main text of the article reads: "The middle-aged mother buys clothes at the Zara chain because they are cheap, while her daughter". Below the article, there is a blue navigation bar with "Zara case study part 1" and "2 / 2 points" on the left, and "Hide Comments" and "Return to Museum" on the right. Underneath, there is an "Objet Description:" section with a small thumbnail image and a text description: "Detailed case study about the fast fashion success story". The main content area contains a blacked-out redacted section followed by a text block: "What Zara have done is exceptional; they have created their own market based on speaking to their customers, understanding what they want and then delivering on that, but quickly. They are able to foresee and possibly dictate change and ensure that they are in a position to positively react to any detraction from the market place. The key decision makers are not only reduced but they are in closer working environment."

Figure 15: Linking to a Third-Party Website as a Learning Object.

Level 6 sought to move participants towards curating the insights and knowledge they had already worked with during the module to start resolving their thinking (Garrison et al., 2001). This was achieved by asking students to 'create a guide' on a subject of their choice within the platform. The creation of guides allows a student to transform the 'non-linear' interface of Curatr into a linear 'guide' covering a particular topic or subject. This undertaking relates to stage three of the CLC methodology; curating.

For example, Figure 15 shows the 'gallery' of objects that a student on the SOM course, Sarah, had collected during the process of moving through Levels 1 – 5. Sarah's gallery of objects comprised of objects she found interesting and had bookmarked alongside information that she had added back into the experience herself.



Figure 16: Student 'Sarah's' Gallery of Objects.

Sarah created a number of guides out of this information, including the one shown in Figure 16 that illustrated her understanding of the Hayes and Wheelwright model (Slack et al., 2011).



Figure 17: Sarah's Guide to Hayes and Wheelwright.

Level 7 was a simple wrap-up level that told the students about the end of module assessment that they would be completing; an offline essay assignment. Completion was not mandatory; it was possible to answer the end of module assignment without completing the Curatr experience.

In total material representing 30 hours of learning time was included in the 'Direct' museum. Some of this time allocation is made up by the conversations occurring in object-orientated discussion, gate questions or further independent study.

4.4.3. Building the Course

The creation of a Curatr course is facilitated by an online administration system in accordance with the first requirement of the innovation. Within this administration system, the course creation process is broken down into three parts; Building the structure, adding objects and inviting users. Having created a new 'museum' for the first SOM module, 'Direct', the course administrator proceeds to step 1, building the structure.

The screenshot displays the 'Levels' configuration interface. At the top, there is a 'Levels' header. Below it, two levels are listed: 'Level 1' with an upward arrow and 'Level 2' with a downward arrow. The 'Level 2' section is expanded, showing an 'Objective: (2000 chars max)' field with the following text: 'Introduction to Service Operations Management. Operations are everywhere. You might not know it, but operations and processes really do run the world. This level sets the scene as to the importance of operations and processes. At this level you will find videos from our course faculty and you will have the opportunity to start playing with Curatr. If you come across objects you really like, bookmark them to keep them. If you aren't sure about a lesson, then make a comment to voice your opinion. In order to "level up" you will need to answer a question on your priorities for the coming months.' Below the objective is a 'Difficulty:' dropdown menu set to 'Medium - (1 point(s)/object)'. A 'Response Gate' window is open, showing a 'Gate Name:' field with 'Level 2' and a 'Response question:' field with the text: 'So the first question... And a very easy one to ease you into the course. What is your number one priority for the next 6 months ahead of you?'. A 'Save Level' button is located at the bottom of the interface.

Figure 18: Building the Structure of the SOM Course.

'Building a structure' means to define the scaffolding (Bruner, 1966) for the learning experience. In the Curatr context, scaffolding is created using a system of levels, difficulty settings and assessments (known as 'gates'), in keeping with our gamification methodology (Deterding et al., 2011).

There is tension in the approach at this point. Our intrinsic motivation methodology calls for autonomous exploration, allowing learners to explore as they see fit. But constructivist principles such as Vygotsky's ZPD and Bruner's Scaffolding theory (Wood et al., 1976; Zenios, 2011) suggest that learners must be paced through a learning experience, not simply allowed to explore as they wish.

Csikszentmihalyi (1990) illustrated that participants in a task can quickly become 'stressed' if the task at hand is too far beyond their current level of ability. So it is with this in mind that levels are thought to be an appropriate 'middle-ground' between granting complete autonomy and providing sufficient scaffolding to successfully complete the activity. Levels are sequential and must be completed one after the other; however the activity that takes place within a level is non-linear (the learner is free to browse content and interact as they see fit). In this way the platform keeps to a principle of bounded flexibility, allowing learners autonomy within the scaffolding of the levels.

Within the SOM course each of the four museums were broken down in to seven levels, representing the weeks of study within the course. The initial level served as an introduction to the learning experience and a welcome from the academic faculty. Level 2 started introducing more focus on the role of operations and processes management in day-to-day working life. Level 3 introduced the notion of process diagnosis and Level 4, operations strategy. Levels 5 and 6 were used to help learners apply the principles of process diagnosis and operations strategy to the real world. Finally, Level 7 introduced the project-based learning task that each student would need to complete in order to finish module 1. This curriculum was designed in advance by Warwick Business School faculty and implemented using the 'structure' builder in the Curatr administration area.

Implementing this structure is quite straightforward. Each level is comprised of an objective, a difficulty setting and, if required, an assessment. The level objective is used to convey the goal of a given level.

The number of experience points a learner requires in order to progress from one level to the next is derived from a formula that takes into account the number of content objects at that level and the difficulty setting of the level. The difficulty setting has three options; easy, medium or hard. At 'easy', less than 1 experience point per object available will be needed to progress beyond this level. For example, if there were five objects within a level and it was set to 'easy', the user would need to acquire 4 points to level up (points are rounded up). This would allow the user to level up without viewing every object at the level – in fact they could only view two objects and make a comment on each in order to achieve this number of points. At the medium setting there is a 1:1 relationship between experience points required and objects available. The same example level (with five objects) would require 5 experience points in order to progress beyond. Finally, the 'hard' difficulty setting gives a 2:1 ration between experience points required and objects available. It essentially makes the 'level-up' contingent on the user commenting at every opportunity.

For the first museum in the SOM course, levels were set to either 'easy' or 'medium'. By alternating between these two settings, the course creator can demand more or less of participants as the subject matter becomes more developed. Again, this principle is built upon the 'flow' notion; that users can benefit from being pushed to achieve something beyond their current level of ability, but pushing too far, for too long can result in stress (or, in the opposite situation, boredom) (Csikszentmihalyi, 1990). Early in the experience it is preferable to reward the user with a level up as early as possible; it rewards the learner for performing the correct actions and illustrates how the experience will unfold in the future

(Schell, 2008). As such, starting off a museum with an easy level becomes preferable.

Finally, an 'end-of-level gate' can be specified for each level. End of level gates prevent a user from 'levelling up' until they have been completed, even if the user has the prerequisite number of experience points for that level. Gates only become available to users when the experience point requirement for a level has been hit. Users can continue to use Curatr and to earn more experience points than are required for a given level without completing the gate, but they will not progress to the next level until they do. As such, gates represent the end of level 'boss' that must be conquered by learners in order to progress further in the experience (Schell, 2008).

Assessment is an important part of any online learning experience; it helps to ascertain the learner's current level of knowledge and to assess suitability to move on to the next stage in the learning process. Where assessment might be built in to activities within a traditional Courseware E-learning environment, in Curatr these assessment opportunities are built into the framework of levels.

Three types of assessment gate exist within Curatr; Multiple Choice Questions, Social Responses and Contribution Questions.

Multiple Choice Questions (MCQs) allow an administrator to pose an unlimited number of questions to users, which can be answered by ticking one or more answer options. This type of quiz is created using a simple form on the webpage. An overall pass mark is established and, given that the user can reach this threshold, they will be assigned a 'pass' on the gate and 'levelled up' to the next level. MCQ's are commonplace in most forms of E-learning and might well be considered the most frequently used form of online assessment (Clark & Mayer, 2011). They are highly quantifiable in terms of assessing learning outcomes; students

either meet a threshold pass mark, or they don't. Those who don't pass are often asked to carry out remedial work and to try again. However, this form of questioning is limited in terms of the knowledge it tests; some consider the MCQ to simply be a test of retention, not learning. Often they can be abused in an online learning situation, with the learner simply attempting each answer in turn in order to pass the assessment by brute force.

MCQ's remain a key tool for the producers of E-learning and their inclusion was a requirement of creating a viable programme for widespread use. However, they are not used on the SOM course, which generally solicits more 'social' questioning techniques, such as the social response question.

A social response question is a type of class discussion question in which the administrator poses an open-ended question to students. In the case of level 2 of the SOM course, the question was "What is your number one priority for the next 6 months ahead of you?" Answers written by students are visible to the rest of the cohort. This creates a degree of social pressure on students – the response they submit will be visible to everyone else. However, before a student can see other responses they must first submit their own answer. In this way we prevent students from simply copying or modelling the answers of another student (Bandura, 1977) whilst encouraging social comparison (Aronson, 1997).

Free text responses to questions help to move students beyond the realms of information recall (as we were potentially testing with MCQs) and towards the path of a more reflective, double-loop style of learning (Arguris, 1977; Johns, 2004). Johns (2004, p.3) defines reflection as the act of "learning through experience toward gaining new insights of changed perceptions of self and practice". The reflection process is often facilitated by encouraging students to document their thoughts and feelings of an experience; the social discussion question can achieve this

aim. Garrison et al (2001) suggest that critical discourse can only be arrived at through a process of 'integration', that is, reflecting on new insights in order to construct a personal concept of how new information integrates with previous experience. Finally, our own model, the CLC, suggests that in order to progress learners through the learning cycle they must at some point come towards 'creating' content; explicitly writing their thoughts and opinions.

Normally, this sort of question would result in a large amount of marking for a facilitator or course moderator. However, Curatr employs a peer-marking system to overcome this limitation; students vote on each other's responses in order to assess the quality of each contribution. However, administrators play no further part in assessing the 'correctness' of these answers; all users pass to the next level regardless of the quality of their response. This is a potential limitation of the social response question type, but it was deemed inappropriate to 'hold' students at a level until an administrator had assessed their answer – it would stop the flow of the experience (Csikszentmihalyi, 1990).

The final question type is the 'Contribution Question'. This is similar to the social response, in that users must respond to an open question with a contribution that is later voted upon by their peers. The question is posed in the same manner, however students must respond by uploading or otherwise linking to content that they have created or curated, instead of typing out their response.

It is not necessary for an end-of-level gate to be set at all. Where no gate is set, users reaching the experience point requirement for the level will automatically pass on to the next level.

For SOM, social response questions were used throughout the museum. As users would complete the module by creating an essay, it was deemed inappropriate to get students creating objects (using a

contribution gate) as they progressed through the material – it could have overworked them. Social response questions are also somewhat easier to assess post-hoc; understanding the motivation of a student ‘adding’ a link to another website is difficult to ascertain in hindsight.

Having set the objective, difficulty and end-of-level gate question, administrators can add further levels or move on to ‘step 2’; adding the objects.

4.4.4. Adding Objects

Within each level, one or more ‘learning objects’ will appear. Learning objects provide the fundamental ‘connection’ points within the CLC model – these pieces of content represent the lessons to be learned, viewpoints to be heard, case studies to be examined and so on. Unlike most LMSs, learning objects within Curatr do not have to be complete courses of learning material; in fact they are much more likely to be a short video, a piece of text or a diagram. Learning objects covers a broad definition but can essentially be taken to mean any Internet addressable digital content in the context of Curatr.

In broad terms the objects that appear at a given level should provide sufficient instruction and / or insight for a student to meet the objective set for that level in step 1 and pass the end-of-level gate (if one appears). Each object, when viewed by a student in Curatr, appears with a ‘comment’ box adjacent to it. It is in this box that a student can leave a comment or respond to another students comment, in response to the learning object (thus progressing to the second stage of the CLC, Creating).

This style of discussion can be dubbed ‘object-orientated discussion’, in that a new comment ‘stream’ is directly associated with each piece of content included in the experience. This is as opposed to a typical discussion forum, where discussions take place in response to an initial

question posed by students or the teacher (Prinsen et al., 2007). Whilst both methods are valid as far as the CLC is concerned (a connection can be with an idea, a person, a message and so on...), Curatr promotes a more object-orientated style of discussion by automatically associating a new comment thread with every object.

Level 2 - 6 objects

Introduction to Service Operations Management. Operations are everywhere. You might not know it, but operations and processes really do run the world. This level sets the scene as to the importance of operations and processes. At this level you will find videos from our course faculty and you will have the opportunity to start playing with Curatr. If you come across objects you really like, bookmark them to keep them. If you aren't sure about a lesson, then make a comment to voice your opinion. In order to "level up" you will need to answer a question on your priorities for the coming months.

Show 10 objects Filter objects:

Title	Type	Action
Economists prove that operations management matters!	Website	Edit Remove
Introduction to Operations Management	Website	Edit Remove
Processes and Process Management	Website	Edit Remove
Toyota Kyushu: The Manufacturing Ballet	Website	Edit Remove
What can we learn from the Toyota Production System?	Embedded Media	Edit Remove
Why is Process Management Important	Website	Edit Remove

Showing 1 to 6 of 6 entries

[First](#) [Previous](#) [1](#) [Next](#) [Last](#)

[Web URL](#) [Embedded Object](#) [New Blank Page](#) [Upload an Object](#)

Figure 19: Learning Objects Added to Level 2 of the SOM Course.

Learning objects can be any form of Internet addressable digital content and are added using one of four 'add' functions:

1. **Web URL:** This function allows for a learning object to be linked to using an Internet or Intranet URL. Most often it is used when a web page, or series of web pages, forms the basis of a learning object. A distinct advantage of the Curatr approach is the ability to link to content objects from a variety of resources within a unified user interface; there is no need for separate Web URL objects to appear from the same domain. A distinct drawback to this approach is that any hyperlinks appearing on the webpage will take the learner further away from the specified content and

potentially, out of the Curatr platform completely. This can be mitigated by designers using Learning Objects that they control the source code too – thereby potentially eliminating unnecessary links from the page;

2. **Embedded Object.** This function is used when another software platform makes an ‘embed’ code available to users. Platforms such as YouTube or Slideshare use this function to allow videos or presentations that are hosted on the third-party platform to be viewed as a part of a webpage elsewhere on the Internet. This creates a more ‘seamless’ integration, and means that the user is less likely to navigate away from Curatr using an internal link than they might be using the Web URL option;
3. **New Blank Page.** This function allows the administrator to create an HTML page within Curatr using a What You See Is What You Get (WYSIWYG) style editor. Administrators can write text, import pictures and embed other objects in to this type of page;
4. **Upload an Object.** This final function allows for administrators to upload files directly on to the Curatr platform for use in a museum. For security purposes this feature prevents potentially harmful file-types from being uploaded. However this does not prohibit files such as Videos, Audio or Word documents from being uploaded to the platform, all of which are commonly used.

When adding learning objects, administrators can set the length of time within which a user must view the learning object in order to score an experience point for having ‘viewed’ that object. For example, if a video of one minute duration is added, then it is not unreasonable for the administrator to set the ‘view timer’ to be 60 seconds. In this manner it is possible to ascertain that a user had an object open long enough to view its contents (although of course it does not mean they paid attention!).

Administrators can also add in a description pertaining to the conversation and reflection they hope to gain from students viewing the object – a discussion point. This, together with the points made available for commenting, often triggers users to explicitly document an opinion when they come to view the learning object (Garrison et al., 2001).

Building 120 hours of learning material from scratch would have presented an impenetrable barrier to entry for WBS; a conservative estimate would suggest a cost of at least £100,000 (Kapp and Defelice, 2009). However, by curating information from a variety of sources and applying the CLC methodology, a huge cost saving was produced; the complete course (all four museums) was built at a cost of £250 per user; £8,250 total.

4.4.5. Reporting

A key feature of any workplace E-learning platform is the ability to issue reports to administrative staff on the progress of learners (Clark & Mayer, 2011). Curatr has a number of reporting features available, all of which were utilised during the SOM course.

4.4.5.1. Overview Graphs

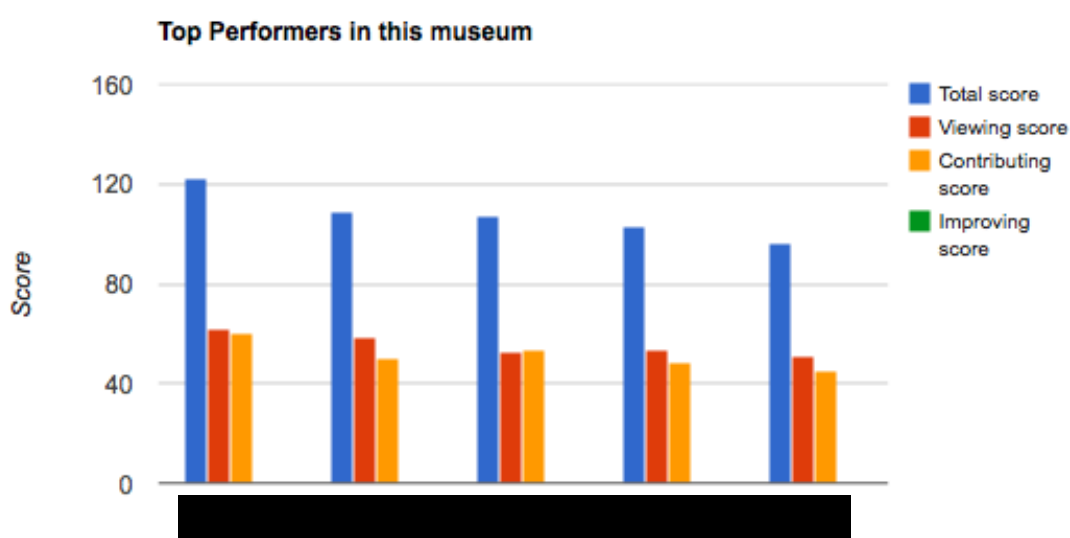


Figure 20: The Overview Graph for 'Direct', SOM.

Overview graphs provide a 'dashboard' of quick information to administrators. As seen in Figure 19, data such as the 'top performers' can be seen quickly and at a glance, alongside a breakdown of how a user has achieved that score. In the SOM example, Figure 19 shows a broadly even split between points being earned by 'viewing' content and by 'contributing' comments.

4.4.5.2. Level Completion Reports

For a more detailed report of how users are progressing, level completion reports provide data as to which enrolled users have (or have not) completed a given level within a museum (see Figure 20).

Warwick SOM - 1 Direct > Reports > Users that have completed Level 7

Show users Filter users:

Username	First Name	Last Name	Pass date
SOM11AA			March 14, 2012, 9:50 am
SOM11AH			April 9, 2012, 12:36 pm
SOM11AH1			March 23, 2012, 4:09 pm
SOM11AJ			March 12, 2012, 9:46 pm
SOM11CD			March 30, 2012, 12:22 pm

Figure 21: Level Completion Report, Level 7 SOM.

For the SOM course, 30 out of 33 enrolled students completed the entire experience, reaching and completing Level 7. One student left the course; two others submitted assignments but did not reach Level 7.

4.4.5.3. Leaderboards

A more detailed overview of how learners performed is available from the museum leaderboard (see Table 3). This data table displays users ranked by order of how many experience points they have achieved within the museum. This table can then be re-ordered by other factors such as 'maximum level reached', 'comments made' or 'objects added'.

Table 3: Leaderboard at the End of SOM Module 1 (names redacted).

Username	Added Objects	Comments	Points	Level
SOM11AA	1	61	122	8
SOM11VV	0	48	109	8
SOM11LS	0	50	107	8
SOM11AJ	3	49	103	8
SOM11MW	1	47	96	8
SOM11CD	1	42	95	8
SOM11KJ	1	32	93	8
SOM11SG	2	38	92	8

SOM11MJ	0	43	92	8
SOM11DW	3	31	81	8
SOM11AH	0	25	75	8
SOM11VP	2	36	75	8
SOM11GL	0	24	73	8
SOM11SR	0	25	73	8
SOM11SB	0	20	70	8
SOM11EC	0	15	70	8
SOM11FS	0	18	70	8
SOM11CP	0	33	69	8
SOM11PK	0	16	68	8
SOM11CS1	0	27	68	8
SOM11NR	0	20	67	8
SOM11JE	0	24	65	8
SOM11CS	0	12	65	8
SOM11GJ	0	14	64	8
SOM11AH1	0	18	63	8
SOM11RW	0	10	60	8
SOM11HS	4	17	60	8
SOM11SF	0	9	58	8
SOM11TW	0	11	58	8
SOM11JM	0	3	57	8
SOM11PM	0	20	63	6
SOM11TT	0	9	38	5
SOM11IG	0	2	31	5

4.4.5.4. Playercards


Finally, should an administrator wish to view more specifics as to a particular user's participation, they can view that user's playercard. This serves as a 'record of achievement' and lists not only experience points earned and gate questions answered, but also awards that have been earned by the user during the course (see Figure 21). A set of fifty 'awards' are a standard part of the Curatr software and are allocated automatically to users when they fulfill the award criteria. Some are obvious; for example the '50 XP' award is given when a user reaches 50 XP. Others are less obvious; the example the 'Busy Bee' award is given to a user who passes three levels in one day. Awards are database driven and customisable based on customer requirements. Awards are also used to recognise quality contributions, for example, when a user adds a new object back to the experience that is then bookmarked by many other users or the Curatr. This quality recognition is not possible with XP alone.

Warwick SOM - 1 Direct
XP Points: 87
Level: 3


Level 3

Diagnosing processes. Understand the key diagnostic tools that you can use to get to the root of how to manage the operation


Awards [redacted] has achieved the following recognition awards in the Museum:




First guide
You have made your first guide




10 bookmarks
You have made 10 bookmarks




50 XP
You have reached 50 experience points




25 objects viewed
You have viewed 25 objects




25 comments
You have made 25 comments



First bookmark
You have made your first bookmark



10 comments
You have made 10 comments



10 objects viewed
You have viewed 10 objects

[View all 21 awards..](#)

Gate Responses Reflect on responses to end-of-level Gates and see other responses:

Show entries

Name	Level	Type	Done/Passed
Level 2	2	Response	Yes
Level 3	3	Response	No
Level 4	4	Response	No
Level 5	5	Response	No

Figure 22: A User's 'Playercard'.

“Curatr combines some of the best elements of instructional design and social media.”

Kristina Schneider (2010), Brandon Hall Research.

5. Evaluating the Innovation

This section is concerned with the evaluation of our work. First, we seek to ascertain exactly how this research represents an innovation. Following this we go on to evaluate the software platform by means of a mixed-methods analysis. Finally, we seek to demonstrate the impact our innovation has had on the industry, the sponsoring company and on wider academic thinking.

5.1. Defining Innovation

There are a number of methods to classify the nature of a new product or service in terms of its innovation. Popular distinctions include sustaining/disruptive innovations (Christensen, 1997) and TRIZ, a Russian approach that classifies innovations in terms of complexity (Altshuller & Shulyak, 2002).

Sustaining innovations are said to be those that help to maintain an incumbent organisation's competitive advantage within a marketplace (Christensen, 1997). Sustaining innovations often come in a steady stream of expected product developments (for example, we have come to expect that next year's laptop computer will be faster than last year's laptop computer). In contrast, disruptive innovations often underperform existing competitors, in favour of valuing a different set of technologies or market attributes (Christensen, 1997). Disruptive innovations need not be technical breakthroughs; they can be as simple as using known components in a different configuration which creates a different value chain (Kim & Mauborgne, 2005).

TRIZ is a Russian-language acronym, coined in 1946 by Altshuller, who suggested that contradictions lie at the heart of all technical problem solving and that there are always trade-offs in the way two technical solutions work together (Altshuller & Shulyak, 2002). For example, to

make a car go faster you require a larger engine, but a larger engine makes the car slower and thus contradicts the first requirement. Where these contradictions exist, innovations are required to solve them. Altshuller and Shulyak classified all innovations into one of five categories in terms of the solutions they derived to these contradictions, from those which are very minor innovations (Level 1), to those which are newly discovered phenomena (Level 5).

5.1.1. Classifying Curatr

Curatr is innovative from both a technical and market perspective. To use previous classifications, we would suggest that Curatr is a disruptive innovation, created to disrupt the current market for E-learning Courseware and Learning Management Systems (LMS) by valuing different attributes.

Technically speaking, there are two key innovations in Curatr:

1. The application of game-like mechanics in a non-game environment for online learning. This has never been done before in the industry;
2. The highly visual user interface, which is used to meet the challenges set forth in the approach. This interface style has never been used before anywhere, to the best of our knowledge.

Whilst both of these innovations required degrees of technical insight, they did not necessitate the invention of a new technology or a breakthrough invention (Tushman and Anderson, 1986). In TRIZ terms they would probably be classified as 'Level 3', borrowing technology from other industries (Altshuller and Shulyak, 2002). Whilst they represent a challenge to the perceived competencies of existing software providers, the technical challenges are not so far removed from existing practices that competitors could not adjust and catch-up relatively quickly.

This would normally make our technical innovations ripe for plagiarism; technical advances that can be replicated and integrated into existing products often are. However, the CLC methodology that accompanies our technical innovations presents a different problem to competitors.

From this market perspective, the CLC method suggests a disruptive innovation, one that destroys the value created by incumbent competitors (Christensen, 1997). Most workplace E-learning environments consist of two systems working together; an LMS being used to provide access to E-learning 'Courseware'. A shared standard exists between these two systems, known as SCORM. This standard allows for the interoperability of E-learning Courseware with various LMS's, allowing an organisation to change their LMS without needing to change their content. It is perhaps in Curatr's lack of support for this standard that we see the starkest differentiation; organisations do not need to be 'SCORM compliant' to use Curatr, as Curatr can use content from anywhere.

Curatr negates the need to author or procure Courseware as any digital content can be used. It therefore also negates the need to deliver Courseware using an LMS. It is instead a combined LMS/Courseware alternative, in which the platform itself provides the framework for learning to take place in the context of content that already exists elsewhere. The CLC model suggests using content from any location because it values context over content (Dalziel, 2003), enabling organisations to create learning experiences at low or zero cost. Our suggestion is that there is no such thing as the perfect piece of learning content, nor such a thing as perfect knowledge transfer. We see learning as a process of knowledge construction, in which learners have individual needs (Knowles, 1970). Therefore placing excessive value on content is un-necessary; it will never be right for everyone. This distinction is perhaps most stark in the lack of SCORM support for E-learning content in Curatr – a quality usually valued highly by customers. SCORM ensures compatibility of

Courseware with the LMS. But where no Courseware exists, no SCORM conformance is required. Curatr offers a fundamentally different value proposition, suggesting that a single 'social' system takes the place of the current two-party system.

5.2. Software Evaluation

Evaluation of Curatr and the Curatr Learning Cycle has taken place in four ways using mixed-method case studies including qualitative and quantitative primary research and an extensive content analysis piece:

1. Qualitative: User reactions (Kirkpatrick, 2006);
2. Quantitative: User participation
3. Quantitative: The attainment of learning outcomes;
4. Content Analysis: The quality of users contributions (Garrison et al., 2001).

5.2.1. User Reactions

Kirkpatrick (2006) suggested four levels of evaluating training programmes. The first of these levels examined user reactions. On its own it represents a facile understanding of the impact a learning experience has had on a participant; nevertheless, it remains a popular tool of measurement to demonstrate the effectiveness of an intervention in workplace learning (Kirkpatrick, 2006).

The reactions of workplace learners undertaking a programme of learning as delivered by Curatr were evaluated at the University of San Diego (USD) as a part of a company sponsored formal learning initiative. Two surveys were completed, one with a cohort of learners using the first version of Curatr and the second one a year later, with a different cohort using Curatr version 2. Both cohorts were undertaking an eight-week, 'Operations Processes' module, as part of a wider Supply Chain Management course. All participants were adults in full-time work, studying as a result of a directive from their organisation. The full methodology and results can be read in Portfolio Submission 5.

Seventeen users from the first cohort who used Curatr version 1 were invited to answer a survey based on their experiences. Eleven users responded. Generally speaking, users reported spending the same amount of time using Curatr as they had spent online using other technology in other modules. Overall users found it a little difficult to navigate through learning content using Curatr. Participation was lower than had been hoped; the median number of comments made by a user during the course was just twelve, despite 144 learning objects being available for comment at the start of the module. Users reported some positive comments, but also highlighted areas for improvement:

- “Curatr complimented the learning in this course perfectly.”
- “This tool definitely grabs users because it is different from the norm.”
- “I think it was a great way to gain information from your peers that you would not typically receive.”
- “I didn’t understand how you gained points.”
- “Weakness: ability to easily navigate and ability to directly notify or see comments on shared objects.”
- “It was a bit difficult at first to understand the concept of it and the navigation.”

When questioned as to whether or not they would prefer to use Curatr or the Blackboard LMS (which is used for other modules at USD), participants were split 45.50 per cent for Curatr, 54.50 per cent for Blackboard.

Following this feedback, a range of improvements were made to Curatr, resulting in version 2 (this is described in full in Submission 5). The survey was again issued to participants who were of a similar demographic profile to cohort 1; eleven students were invited to take the survey and ten responded. When surveyed after completing study, 70 per cent of these participants suggested they spent more time studying online using Curatr than they had in other modules. Self-reported time spent online during the module increased from 16-20 hours to 21-25 hours on

average. 90 per cent of students felt that Curatr provided a better interface for navigating and contributing content than a normal website. 90 per cent of students felt the game-like elements added to the learning experience. And when asked to compare their experiences using Curatr to another system used at the university, 100 per cent said they would rather use Curatr than Blackboard for future modules at the university.

Overall, users spent more time working with Curatr than they did with other online learning software. This is significant according to Bloom (1984) who postulated that time-on-task was directly correlated to learning performance.

In addition to the results gathered from researching version 2 of Curatr at the University of San Diego, another survey was undertaken to gather further views at the University of Warwick.

Based on Roca et al's (2006) survey of user opinions in using E-Learning software, a series of six questions were replicated for use in the evaluation of Curatr. The questions chosen were a combination of the most significant (in terms Roca et al's 2006 findings) and most appropriate, given the nature of the software.

An online survey was created using the SurveyMonkey software and distributed to learners using a Curatr as a part of a workplace training initiative facilitated by the University of Warwick. Twenty-five responses were received from fifty invitations sent, a response rate of 50 per cent. Using a 1-5 likert scale, where 1 represents 'Strongly Disagree' and 5 represents 'Strongly Agree', the following scores were recorded:

1. Using Curatr can increase my learning effectiveness: **4.40 / 5.00**
2. I find Curatr to be useful to me: **4.48 / 5.00**
3. Curatr provides relevant information for my job: **4.40 / 5.00**
4. Learning to operate Curatr was easy for me: **4.36 / 5.00**

5. My experience using Curatr was better than I expected: **4.28 / 5.00**
6. I am pleased with the experience of using Curatr: **4.36 / 5.00**

Answers to all six questions had results between 'Agree' and 'Strongly Agree', suggesting that participants in this Curatr experience were satisfied with their use of the product. This is significant because "satisfied users form intentions to use the system in the future" (Roca et al., 2006, p.696).

Our users were generally happy with the performance of the learning experience, an indication that they would advocate the approach and potentially undertake a similar experience again.

5.2.2. User Participation

The central reason for including gamification features in Curatr was in order to create participation without the need for a hands-on e-moderator. User participation has been shown to correlate highly with the attainment of learning outcomes in multiple studies (Cho, 2005; Palmer et al., 2008; Michinov et al., 2011; Cheng, 2011). The following table details the amount of participation seen in five example uses of Curatr in comparison to the amount of moderator contribution. The examples are taken from a range of in-company training courses, externally coordinated workplace training and academic courses aimed at workplace professionals.

Table 4: Participation versus Moderation.

Use	Length of training	Number of users	User contributions	Moderator contributions
Operations management (1)	6 months	32	6152	124
Operations management (2)	4 months	52	4,477	45
Employee induction	10 weeks	100	2,867	0
Anatomy	10 weeks	9	752	9
MBA*	6 weeks	37	741	6

* indicates participation required for course credit.

Relatively speaking, moderator participation is very low in Curatr experiences. No relationship appears to exist between the amounts a moderator contributes and the amount participants contribute in the examples shown above. In all cases documented, the moderator contributes significantly less than the average participant (if they choose to participate at all). It would appear that Curatr's gamification mechanism is successful in gaining participation without the need for a

moderator to encourage and facilitate participation. The level of contribution seen in the gamified environment is significantly higher than that reported in comparison studies using human moderators to motivate – for example, our ‘Training in Operations Management’ case study (4,477 contributions) yielded six times more contributions than the next highest known comparison study (Kanuka et al., 2007).

We take these figures of participation as a sign of success in our model and our platform. We set out to achieve high levels of user participation and have achieved this.

Whilst usage is an indicator of success, this metric alone cannot be used to evaluate the overall effectiveness of Curatr. Mediating factors exist; many workplace training initiatives demand attendance and compliance from employees and as such, usage alone might not be sufficient to evaluate a piece of learning technology. In two of the above examples, participation was a requirement of completing a course of academic study.

5.2.3. Attainment of Learning Outcomes

Full information on the case study described in this section can be found in Betts et al (2013a), 'Gamification as a tool for increasing the depth of student understanding using a collaborative e-learning environment'.

To move beyond user reactions and usage statistics, it is necessary to attempt to evaluate learning in terms of learning outcome; the achievement of a rigorous benchmark as assessed academically. This work was completed as part of a case study carried out at the University of Warwick (Betts et al., 2013a). Participant marks achieved in end of module essay assignments were compared with the number of Experience Points (XP) earned through participation in the Curatr learning environment.

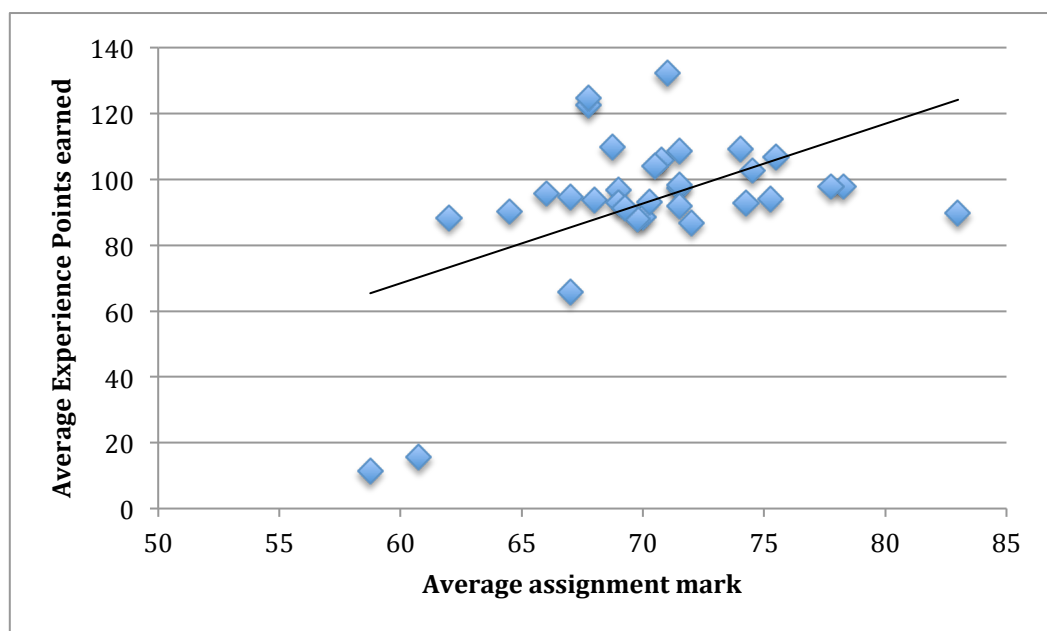


Figure 23: A graph to show the average of experience points earned vs the average final assignment mark (Betts et al, 2013a, p.10).

A null hypotheses; that experience points earned would not be related to end of module assignment marks was disproved with high degrees of confidence, the 0.01 and 0.02 confidence levels respectively (Betts et al., 2013). Even when outliers were removed from the data, this relationship was maintained (although not as strongly).

These results lead us to suggest that there is a relationship between the amount a learner participates in a Curatr learning experience and the learning outcome they can expect to achieve.

A second experiment was conceived to investigate if the amount a user wrote, in terms of 'characters contributed', was related to the overall learning outcome. Again, a null hypothesis was stated; that there is no relationship between the amount contributed and the end of module assignment mark achieved.

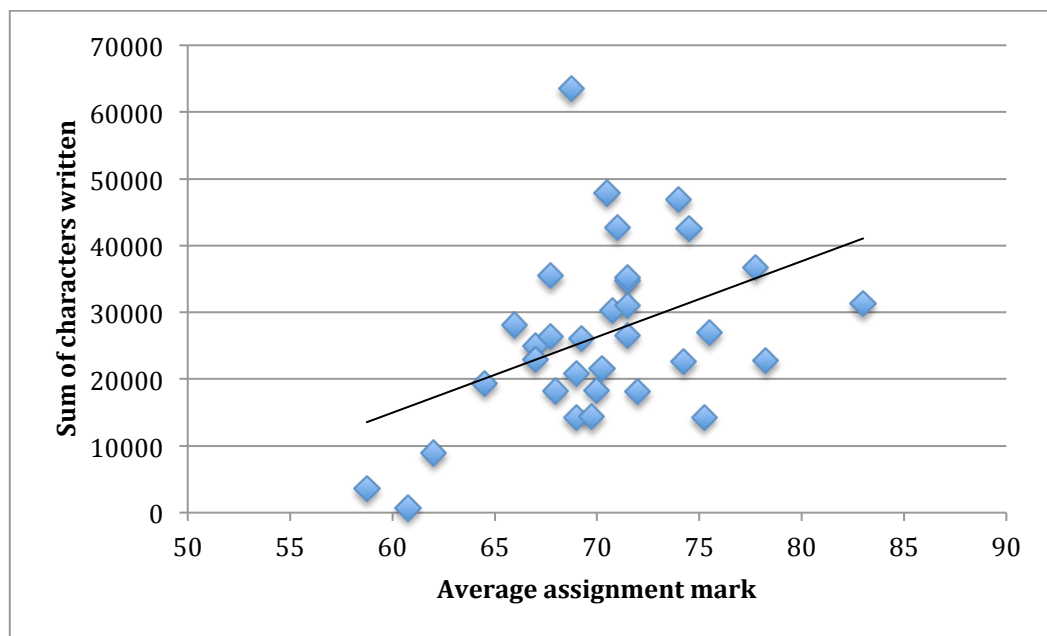


Figure 24: A graph to show the total number of characters in comments vs the average final assignment mark (Betts et al, 2013a, p12).

Again, this null hypothesis was strongly rejected. This corroborates previous research (Bloom, 1984; Cho, 2005; Palmer et al., 2008; Michinov et al., 2011; Cheng, 2011) and is a significant result for the evaluation of our approach.

5.2.4. Content Analysis: Evaluating the Quality of Contributions

Whilst our experiments on learning outcomes suggested that a relationship existed between contribution and academic achievement, the results were not straightforward. Instances of some learners participating more but achieving less than their counterparts were observed. Betts et al (2013a) recommended the use of a tool such as Cognitive Presence (Garrison et al., 2001; Kanuka et al., 2007; Park, 2009) to evaluate the quality of contributions in such an environment in an attempt to better understand the relationship between participation and achievement. This work was completed as a part of Betts et al's (2013b) study in to the effect of gamification on contribution quality.

Using the SOM course described earlier as a case study, the course structure was modified slightly to provide a rising scale of difficulty as the course progressed. The following table demonstrates the rise in difficulty through the modules and also documents the number of contributions made at each module by the 33 participant students:

Table 5: Participation Statistics for Betts et al. Study (2013b, p.12).

Module	Difficulty level	Number of objects available	Number of comments made	Average comments per object	Average comments per student
Module 1	Easy/Medium	61	859	14.08	26.03
Module 2	Medium	48	734	15.29	22.24
Module 3	Medium/Hard	70	1627	23.23	50.84
Module 4	Hard	89	2239	25.17	67.85

In total 6,152 individual statements were analysed in the Betts et al (2013b) study, using the Garrison et al (2001) Cognitive Presence framework to allocate each contribution to 'Level 1 – 4' on the Cognitive Presence scale. Overall, 59.44 per cent of contributions failed to make the classification scale, however this figure falls significantly to 17.89 per

cent if only those comments made in 'structured discussion' (that is, as a response to a preset question) are included in the classification.

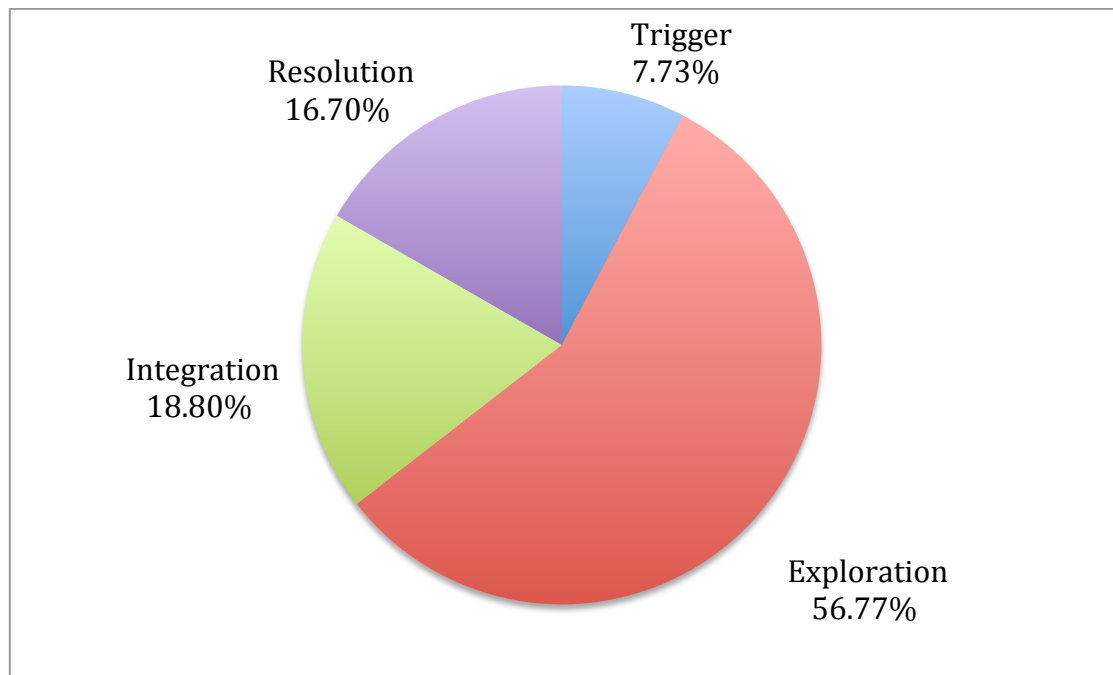


Figure 25: Classification of Structured Discussion as Facilitated by Curatr (Betts et al., 2013b).

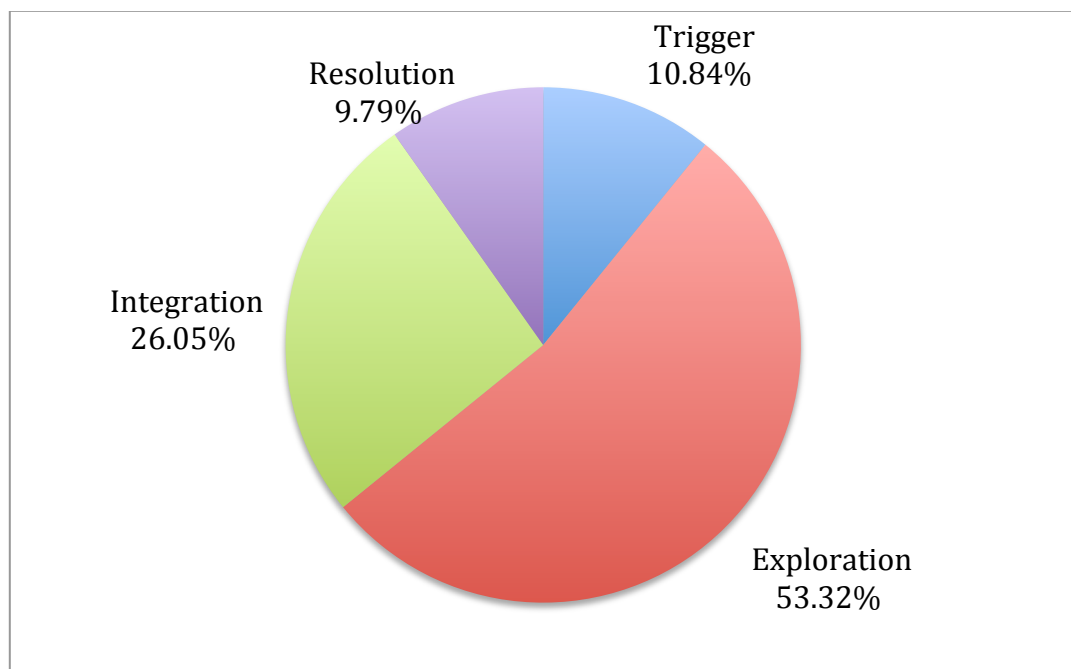


Figure 26: Classification of Structured Discussion as Facilitated by an e-Moderator (Kanuka et al., 2007).

Overall, structured discussion results revealed similar trends to those seen in non-gamified collaborative learning environments (Figure 24, Betts et al., 2013; Figure 25, Kanuka et al., 2007). The best quality of contribution was made when a user responded to a structured discussion question in a game setup that rewarded participation but did not require it in order to complete the experience (Betts et al., 2013b). This reinforces the notion that gamification is no different to moderator-led motivation in certain circumstances. The moderator can be replaced with an automated incentive system, if it is applied correctly.

Unstructured discussion appeared to be a poor alternative to structured questioning when soliciting critical thought. In one instance, no comments in unstructured discussion reached Level 4 of cognitive presence and the majority (77.85 per cent) didn't reach the classification scale at all (Betts et al., 2013b). However, unstructured discussion may bring other benefits, such as Social Presence (Garrison et al., 2001) and community cohesion.

Our most significant finding was the negative impact of requiring participation in discussion. Here, the answers to structured discussion questions which were given at the end of each level were significantly poorer than in previous experiments where participation was encouraged, but not required. This result reinforces previous research (Deci & Ryan, 1985; Roca & Gagne, 2008).

Three recommendations were made as a result of the study:

1. "Critical thought can be encouraged by game mechanics in a pre-defined, structured environment just as it can be done by an e-moderator in a structured environment;
2. Participation should be encouraged by game mechanics, but not required;
3. "A games success cannot be measured by the number of contributions made" (Betts et al., 2013b, p19).

“The course website is fantastic. I was concerned about how I would learn, but the format of a game-like site is excellent and helps to motivate.”

Maria McKeown, course participant.

6. Impact of the Innovation

The innovation is one of just a few EngD projects at Warwick University to have a commercial impact during the lifetime of the project. This section details the impact the innovation has had on three key areas:

1. Commercial impact: How third-party organisations have benefitted from using Curatr;
2. Company impact: How HT2 has benefitted from the creation of Curatr;
3. Academic impact: How Curatr has helped to contribute to knowledge.

Not only have third-party organisations benefitted from the innovation, but also the sponsor's company has seen a real Return On Investment (ROI) within the lifetime of the project. In addition, a series of academic research papers have been written to explore the application of gamification for online social learning purposes, including one of the largest known qualitative studies on the quality of online contributions to a social discussion environment.

6.1. Commercial Impact

The success of the innovation can be in part measured in terms of its adoption in the commercial world. Sales demonstrate the inherent appetite of the marketplace for an innovation like Curatr. The following table lists those organizations who have commercial arrangements in place with HT2 for the continued use of Curatr.

Table 4: Commercial Adopters of Curatr.

Organisation	Purpose of training	Number of users
AugustaWestland	Hydraulics training	100
Barclays Bank PLC	Inducting new employees	600
Debate Co, Israel	Communications	1000

Desjardins	Customer service training	600, up to 4000
DukeCE	Various	50
dunnhumby	Data insights training	100
Epic Learning Group	Various	250
European Safety Bureau	Health and safety	1000
First Friday	Retail training	
Folens	Learning guides	150
HP, Germany	Sales training	50
Kogan Page	Study guide	500
KPMG LLC	Audit training	500
Lecoli Education	Management training	1000
ORT Strasbourg	Healthcare	500
ProfitAbility	Business soft-skills	100
Roche	Sales training	60
Routledge	Study guide	500
Stratford University	Healthcare	250
The Timken Company	Leadership academy	50
Topshop	Customer Service Training	600
University of San Diego	MSc Modules	1000
University of Warwick	Post-graduate enterprise education	1700
Warwick Business School	SOM Courses	150
Wipro Retail	Knowledge transfer	50

Curatr has gained widespread commercial usage. At the time of writing over 10,000 individual users currently have access to Curatr in some form or another.

6.2. Commercial Implementations

The following short case studies highlight the manner in which Curatr has been commercially implemented and the benefits felt by adopters. Where possible, tangible ROI figures have been presented. ROI is said to represent level 4 of Kirkpatrick's (2006) model of training evaluation; the highest level of evaluation possible.

Changing the Model of Workplace E-learning: A Platform to Facilitate Autonomous Social E-learning for Adult Learners | Benjamin W. Betts

6.2.1. Certificate in Service Operations Management at Warwick Business School

As described earlier in this research, Curatr was used extensively as a part of an accredited online learning programme at the University of Warwick. The Curatr approach allowed Warwick Business School (WBS) to achieve a lower price point than had previously been possible for a certificate Masters-level course; just £1495 to provide for six-months of study time. The product build time was just a week; a fraction of the time it would take to bring such a product to market normally.

The initial course ran with twenty-five students; subsequently another four cohorts totaling over 150 students have taken the course and a second, follow-up course has been devised using the same methodology and approach. Customer organisations have reported strong returns on their investment, including one reported cost saving of £1m per annum as a result of a student using Curatr and successfully applying the principles back to the workplace. WBS itself has seen a strong return on its investment in the programme; a profit margin of 30% is attained on all full-fee paying students. There is very little variability in this cost and the scalability of the approach means that a second course has now been added to the list of open programmes available to executive education students. This will represent a new line of business worth in excess of £100,000 per annum to WBS.

By demonstrating how an effective course could be built in less than a week, the course won WBS the 'Best Academic Course' category at the DevLearn 2012 conference, Las Vegas.

Quotes from users:

Maria McKeown, Office Depot.

"The course website is fantastic. I was concerned about how I would learn, but the format of a game-like site is excellent and helps to motivate."

The content has been great and I'm now putting it into practice within my work environment."

Elizabeth Clouder, NFU Mutual.

"I'm learning loads and feeling so much more confident when discussing strategy and process improvements as a result of doing this course. Found myself using terms like 'standardisation' and 'variability' in a meeting this week!"

6.2.2. Supply Chain Management Institute: University of San Diego

The University of San Diego has used Curatr for classes on Operational Processes, its MBA programme and to build the first Massive Open Online Course (MOOC) authorised by the university. Over 700 participants joined the MOOC, including representatives of Raytheon, Northrop Grunman, Boeing, US Navy, Solar Turbines and many more. The experience was developed during a three-day workshop with two subject matter experts curating content into the system for participants to progress through the model.

The MOOC has given USD a new product line, offering certifications of completion worth 2.5 credits at a value of \$250 per student. In addition, the profile of the university has been raised and a number of key clients are expressing interest in running a 'custom' version of the course.

In 2011 USD won the 'Best Academic Course' award for its use of Curatr at the DevLearn conference.

6.2.3. The European Safety Bureau (ESB)

ESB creates accredited Health & Safety training courses for organisations throughout the UK and Europe. Traditionally these courses have been facilitated face-to-face, but commercial demand has dictated that such essential training would be better facilitate at regular intervals

online. ESB chose Curatr ahead of the Litmos LMS due to the in-built game-like engagement features of Curatr. They are now able to deliver training to organisations throughout the UK and Europe from as little as 50 pence per user, per month.

Business has increased significantly at ESB as a result of using Curatr. Several key new clients have been won with a profit margin that is significantly improved over the previous face-to-face training courses ESB held. With Curatr integrated with an e-commerce shopping cart, ESB can now sell and deliver training in a completely automated manner, opening new product lines and returning high profit margins.

6.2.4. Onboarding at Barclays

The Global Audit function within Barclays Retail and Commercial Bank employs around 1000 audit professionals on a global basis. Co-ordinated from Barclays headquarters in London, the function has grown significantly in recent years, recruiting around 300 new starters annually. Previously these new starters were flown to the London HQ for the start of their employment. However, starting in 2011, this was no longer deemed to be a cost effective approach to 'onboarding' new recruits. Barclays instead sought an online solution which would allow for new starters to access relevant materials and interact with each other socially during a ten-week onboarding 'journey'. Curatr was selected as the software to facilitate this solution following an industry-wide search for an appropriate tool.

The core 'museum' from which all experiences would be based was built in a one-day workshop held onsite at Barclays HQ. What used to be a costly exercise in inducting new employees now costs Barclays just £15 per user - savings running to at over £2,000 per person have been reported as a result of the switch. The experience has now been in place for over eighteen months and the number of user licenses purchased has more than doubled. In a recent internal survey conducted by Barclays,

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Autonomous Social E-learning for Adult Learners | Benjamin W. Betts

100% of participants suggested that Curatr was the best platform to facilitate the online component of the onboarding process.

6.2.5. Customer Service Training for Desjardins

Desjardins is the largest credit union in Canada. With more than 50,000 employees it is one of Canada's largest financial institutions, specialising in credit and insurance products. Desjardins approached Curatr with a view to implementing the platform as a part of the learning support function within the organisation. Due to strict legislation in Quebec, however, it would be necessary to create a 'localised' version of the platform which users could take advantage of to view the platform in the French language, as well as English. With this change in place, Desjardins has gone on to use Curatr widely. Cost savings of over 50 per cent have been reported by the project manager.

6.2.6. Employability Skills at University of Warwick

The University of Warwick's Careers and Skills department has been challenged by the university to help bridge the gap between employment and education by creating a new suite of online learning tools to be used by current students as a means to help increase their competence in the skills required by employers, but not generally taught elsewhere in the university. The Careers and Skills department selected Curatr as its software of choice to help deliver this new training approach to all undergraduates and postgraduate researchers at the University. Curatr's social learning approach and in-built engagement mechanisms appealed to the sort of training Careers and Skills are looking to facilitate; that which replicates learning in the real-world as closely as possible. The initiative is being brought to students significantly under budget because of Curatr's low-cost approach to development.

6.2.7. Schools and Colleges

In addition to the companies and universities so far mentioned in this report, a large number of Schools and Colleges have used Curatr as a part of their teaching programmes. Curatr is offered free of charge to teachers who demonstrate they will use the software with a school or college audience. At the time of writing, over 300 schools and colleges had taken advantage of this offer, with classes being facilitated on Curatr in Australia, America, Canada and the UK.

6.3. Company Impact

The launch of the Curatr software service has had a profound impact on HT2. Revenue has increased almost three-fold since Curatr's initial launch, with profits set to increase from £2,000 in 2011, to £100,000 in 2013. This time span represents the commercial lifetime of Curatr – no other products have been launched and marketed in this time period. This growth has fueled job growth, with the HT2 team tripling from 3 FTE in 2011 to 9 FTE in 2013.

To further advance the development of the Curatr platform, a round of external funding was sought in 2012/2013. Following interest from a range of angel investors, venture capital houses and partners, £200,000 funding was secured with Profitability Business Simulations electing to invest in HT2. This funding secures the immediate future of HT2 and allows for further expansion and recruitment activity to take place.

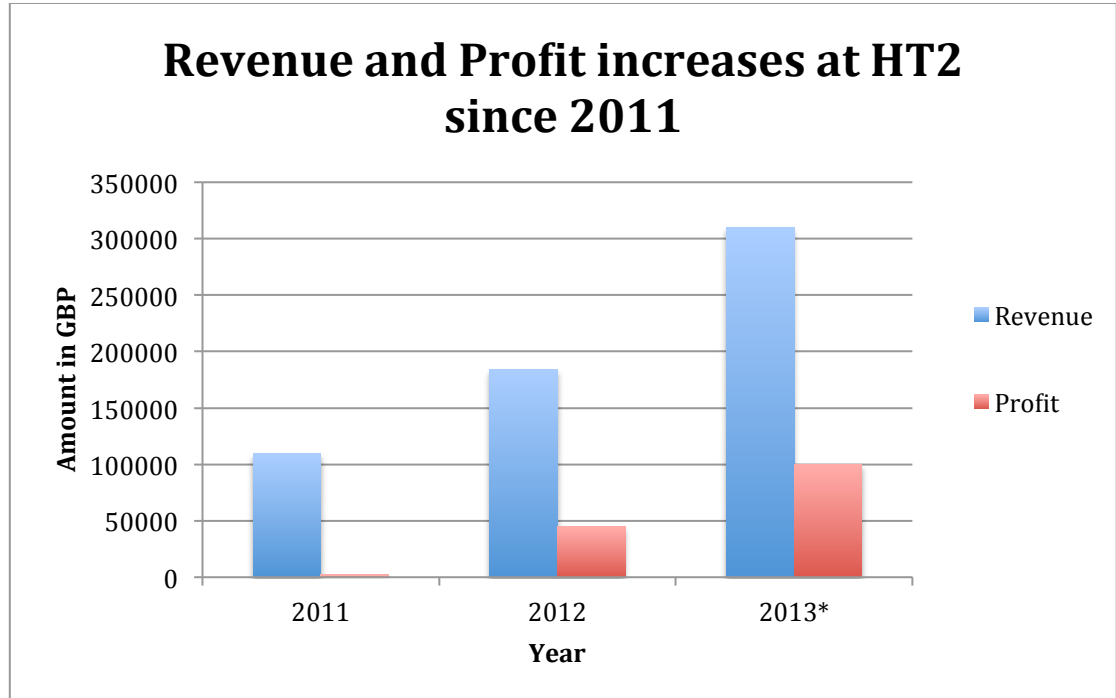


Figure 27: Revenue and Profit Increases at HT2 since 2011.

*indicates prediction.

6.3.1. Industry Recognition

Curatr has been recognised by the training and development industry as a disruptive innovation. The E-learning Guild of America has twice voted Curatr the solution behind the winner of their 'Best Academic Course' award (for Supply Chain Management at the University of San Diego Business School and Operations Management at the University of Warwick Business School). The Learning and Performance Institute (UK) awarded Curatr the silver award for Best Innovation in Learning Technology (2011) and E-learning Age Awards gave Curatr Bronze for Best Innovation (2011).

The fields of social learning, gamification and curation in workplace E-learning have all seen a rise in popularity during the time span of this project. In no small part this is due to the impact of the innovation and wider work by the RE in the industry. For example, the RE wrote a 10,000-word report on 'Social Learning' for the E-Learning Guild of America (Betts, 2012), has spoken internationally on the application of gamification for learning purposes and is recognised as one of the foremost experts in Curation for learning in the UK by the Learning & Skills Group. See the personal profile submission for more details.

This recognition has benefitted HT2 significantly; both in pure revenue terms and in terms of industry profile.

6.4. Academic Impact

As a result of working at the forefront of an emerging genre, the development of this innovation has led to a number of insights that have helped further our understanding of E-learning on a research level. Most of this work revolves around the use of gamification techniques in online education. Two key areas were addressed; first, that gamification can be linked to participation and learning outcomes and secondly, work on the effect of gamification on the quality of contribution to a social learning environment.

6.4.1. Gamification as a Means of Facilitating Online Collaborative Learning

Betts et al (2013a) were able to summarise that, following the use of the Curatr platform for a programme of formal learning, the amount a learner participated in the experience was related to the academic grades that were achieved in marked assignments. This confirmed what past researchers had shown; that participation in online social learning activities correlates with final grades.

The relationship was most prominent amongst those who participated the least in the online experience – these learners consistently achieved lower marks than their peers. For others who used the platform consistently the relationship was less clear. There were examples of some users having used the platform extensively, but having not gone on to achieve the best grades. This discrepancy could be due to a number of issues, including the participant's previous experience with the field and the quality of the contributions that participant made to discussion. In its current incarnation, Curatr does not award extra points based on quality of discussion. As such, further investigation as to the quality of contributions and gamification was recommended.

6.4.2. The Effect of Gamification on the Quality of Learning

To investigate further the quality of contributions made to our online social learning environment, an extensive content analysis was performed (Betts et al., 2013b). Using the Garrison et al (2001) Cognitive Presence model as a benchmark, learner contributions were analysed to see at what 'level' contributions were made. The Cognitive Presence model suggests that the quality of online discussion can be inspected using four levels; Triggering, Exploring, Integrating and Resolution. Triggering is akin to the first level of Cognitive Presence and suggests the beginnings of critical thought emerging. Resolution represents the pinnacle of the model; an original, critical thought that can be (or already has been) put into practice in the real world. The results of this analysis were cross-referenced with the difficulty of the gamification prevalent at the time the contribution was made.

Findings suggest that contributions are most well articulated when the gamification encourages participation, but does not require it (in Curatr terms, when the difficulty is set to 'medium'). In these circumstances, learners' responses to structured questions (as set at end-of-level gates for example) are directly comparable to results from earlier studies where participation is coordinated by an e-moderator (Kanuka et al., 2007). Here, gamification did not detract from what might be considered the 'normal' quality of discussion, as facilitated by an e-moderator. Participation was of slightly higher quality in the 'medium' setting than when the game was set to 'easy'. However, in both circumstances learners' informal comments in response to learning objects infrequently made it beyond the 'exploration' level of Cognitive Presence (Garrison et al., 2001) – conversation needed to be directed by a pre-scripted question to bring out the best in users.

Results were very different when the game setting required users' participation at all times (in Curatr terms, when the difficulty was set to 'hard'). In these circumstances no discussions were found to represent a

'resolution' level of critical thought, despite a level of contribution that was many times higher than had previously been experienced.

It could be hypothesised that with the difficulty level set to medium, the reward of experience points is task non-contingent. With the game set to hard, the task becomes contingent. This difference, according to Deci & Ryan (1985), could be the difference between learners being motivated intrinsically for the task and not. Three key recommendations are made as a result of this research:

1. That any gamification be made task non-contingent;
2. That social interaction is given structure as to the direction of the conversation (that is, it should be scripted by an instructional designer in advance) in order to maximise the output from discussion;
3. That the success of a gamification should not be measured in terms of quantity, but in terms of the quality of output.

6.4.2.1. A note about Content Analysis

The scale of the Betts et al (2013b) content analysis highlighted the difficulty in applying the Garrison et al (2001) model of Cognitive Presence. Over 6,000 statements made during an online learning experience was analysed retrospectively and coded subjectively according to the coder's understanding of the model and the content to be analysed. Previous attempts (such as Kanuka, 2007) have expressed the difficulty in applying this method. Methods to check the reliability of rater's analysis, such as Cohen's Kappa (Kanuka 2007; Park, 2009), have proved inconsistent. The results of various Cognitive Presence analyses appear to be consistent between studies, giving a degree of rigour to the results and the model itself. However, unless the coding process can be automated or improved, it seems unlikely to experience widespread adoption as a tool for evaluating the value of workplace social E-learning.

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“We estimate cost savings of 50% using Curatr.”

Francois Ronai, Project Manager,
Desjardins.

7. Conclusion

This innovation report advocates a new method for E-learning in the workplace. Current models rely on the need for instructional content to be authored in third-party systems and to be delivered via a Learning Management System as 'Courseware' (Clark & Mayer, 2011). We would suggest there are inevitable limitations to this approach; there is a time and cost associated with developing the Courseware and users undertaking the experience often report low levels of satisfaction with the end product.

At the start of this report we documented four key objectives:

1. To understand the social factors that may influence the learning process;
2. To develop a new theoretical model for E-learning, encouraging learners to adopt a more 'social' approach;
3. To develop an innovation in E-learning software to meet the requirements of the new model;
4. To evaluate the effectiveness of the innovation.

We believe this innovation report has met these objectives, leading to the creation of the CLC model and the Curatr learning platform.

7.1 The Curatr Learning Cycle

The CLC as a new model of facilitating online learning has experienced successful implementations as a part of this research project (for example, the Warwick Business School SOM course). Evidence exists (Betts et al., 2013a and Betts et al., 2013b) to suggest that it is possible to create a quality learning experience from this approach whilst saving time and money when compared to traditional approaches to workplace E-learning. Our model is multi-faceted; recognising that learning is a social process that may emerge from many different experiences or

practices. Whilst Curatr is the platform that most readily facilitates the CLC, there is no reason to presume that it should be the only platform capable of doing so.

The CLC is not a breakthrough academically speaking, nor is it intended to be. Being derivative of academic models such as Kolb (1984) and Garrison et al (2001), it seeks a basis in research to offer a transformative approach to the practices of implementing workplace E-learning.

7.2. The Curatr Platform

Curatr's innovation lies in the application of 'social' features to a workplace E-learning environment, as per the CLC model. At the development stage, five criteria were laid out for the creation of a suitable piece of software to facilitate our new approach:

1. To allow a non-technical administrator (Teacher, Lecturer, Subject Matter Expert or similar) to create an online learning activity, using any web-addressable learning resource as a Learning Object;
2. To organise these Learning Objects in a 'non-course' structure, facilitating users' autonomous exploration of the Learning Objects;
3. To illustrate competence, contributions and advancement within the activity using a game-like mechanic;
4. To enable learners to interact with both each other and the administrator; and to add new Learning Objects to the activity;
5. To store relevant reporting information and to provide reporting facilities for administrators to analyse the progress of users through the learning activity.

We believe that Curatr readily meets all five of these requirements.

By allowing users to explore a range of content and to reflect on their findings using a novel user interface, we encourage users to construct their understanding as part of the learning journey. Importance is taken away from any particular piece of learning content and shifted to the user. Whilst we allow for a degree of autonomy in the experience, Curatr reinforces the notion of scaffolding at the same time. This scaffolding is analogous to 'mental hooks', by which learners can 'hang' new experiences from to grasp new ideas. The leveling system allows administrators to setup the hooks, such that users can grasp new information even when they are browsing with autonomy.

The adoption and use of this approach is encouraged by a series of game-like measures that form a key part of the innovation. By using gamification tools like levels, experience points and badges, participation in our social learning approach is encouraged without the need for external moderators to cajole learners into action. This novel approach allows for the benefits of a collaborative learning environment to be realised in a scalable manner, reducing the costs of E-learning whilst maintaining a level of effectiveness that is comparable with existing, moderator-led, solutions.

Curatr also benefits content aggregation and classification. It encourages participants to submit relevant content, which is implicitly rated by fellow participants usage of that content and thus organically grows the course and increases its relevance. This may lead to significant savings in keeping courses updated and maintained. This flexibility allows course content to grow with its audience; whilst we may start out with the same framework and base content, a course can evolve with its participant's needs and trends over time. In this way, Curatr courses stay relevant and personalised without significant centralised effort.

Empirical evidence gathered from various implementations in real-world circumstances suggests that the Curatr approach is well liked and

successful in meeting its objectives. It leaves users with the impression that they will gladly use the software again. Perhaps just as importantly for industry, the method of constructing these experiences has been shown to be fast and cost effective – more so than other available solutions. Thus it is in improvements to time, cost and quality that Curatr's impact is shown.

7.3. The Right Way to ‘Gamify’ a Social Learning Environment

Our research has shown that the gamification of an online social learning environment can encourage participation that is of the same level of quality as e-moderator led experiences. However, it has also shown us circumstances where quality is impaired. The safeguard to quality appears to lie in the creation of task non-contingent gamification (i.e. users don't have to do it) and in the measurement of quality, not quantity of output. With this knowledge in mind, this innovation report opens the way for future innovations in workplace E-learning to adopt gamification as a method of improving participation.

7.4. Further Work

Many avenues for further work have been created by this innovation report. For the purposes of ready application, these potential workstreams have been broken down into four areas; Adoption of the CLC, improving the classification of contributions, applications to education and improvements to Curatr.

7.4.1. Adoption of the Curatr Learning Cycle

In order to experience widespread adoption in the workplace E-learning industry, the CLC needs further application examples and wider acceptance testing. Whilst there is an obvious place for academic research to further investigate the model, just as important is its acceptance by the E-learning industry as a method of facilitating E-learning. The model suggests a shift away from the instructivist approach of existing Courseware models and towards a constructivist, social learning model. How readily this can be accepted by workplace learning departments (and the workers themselves) remains to be seen. The CLC suggests that learners should take control of their own learning, to be autonomous and playful in their approach. However, given a lifetime of more controlling experiences having proceeded this, it could be that the 'expectation' of what workplace learning and development should be (given previous models) turns learners off from this more active and involved approach.

7.4.2. Improving the Classification of Contributions to a Social Learning Environment.

A key criticism of the Garrison et al (2001) approach is the subjectivity and intense activity that is required in applying the model (Betts et al., 2013b). Automation is desirable. By utilising behavioural measures (such as awarding points for commenting) and seeking to use peer marking and other crowdsourcing techniques as a part of the learning process, some

elements of a Cognitive Presence analysis might be automated. Further work is required to identify those behaviours that most readily translate to the model. Simply allowing users to 'vote' on each other's contributions might not be enough to derive a view as to the critical nature of comments. However, asking users to state why they would choose to vote a contribution 'up' or 'down' and aligning the possible responses to known critical thought factors would be a good starting point. For example, a user might be able to vote a comment 'up' because the contribution demonstrated the real-world application of a theory – a contribution we know to be of use in furthering critical discussion (Garrison et al., 2001; Park et al 2009).

An experiment testing this concept would be relatively straightforward to setup; asking peers to crowd source the quality marking whilst the online experience is running and then comparing these results to those derived by offline coding after the experience has ended, as was performed by Betts et al (2013b).

7.4.3. Applications to Education

Whilst the focus of this research has been workplace E-learning initiatives, there is a mandate to address wider educational issues with innovations such as Curatr (Mourshed et al., 2012). Perhaps the most obvious place to start is at the next demographic down; working with young people to bridge the gap between education and employment.

Increasingly, employers are reporting that students come to them ill-equipped for the world of work. 30 per cent of UK employers report that young people coming in to the workforce lack the basic skills necessary to work (Mourshed et al., 2012). Globally, 58 per cent of companies believe that the education of their new graduate hires has not prepared them adequately for the world of work (Mourshed et al., 2012). And yet education has never been more expensive, rising 84 per cent since 2000 (IBIS Capital, 2012). In a recent survey 31 per cent of high school

graduates indicated they did not go on to post-secondary education because of the expense (Mourshed et al., 2012). More than 1 million UK 17-24 year-olds are today classed as NEET – Not in Employment, Education or Training (Burns, 2012). Estimates suggest that there will be a global shortfall of 85 million high-skilled and middle-skilled workers by 2020 (Mourshed et al., 2012).

Creating effective, scalable and affordable learning opportunities to address this requirement is a clear need of industry in the immediate future. Investigating the application of the Curatr software and / or the CLC method to help bridge this gap could provide part of the solution to this problem.

7.4.4. Improvements to Curatr

Because Curatr has been successful in gaining the participation of learners, a new issue has emerged to be tackled by the software; how to bring order and analysis to large amounts of user-generated content. Transforming this qualitative data into quantitative metrics is useful both for organisations and the individual. For the organisation such information could be used to highlight more detail as to the talents and insights of the people employed. For the individual, the information could be used to show only the best quality contributions, as well as to shape further contribution to be of a higher quality.

In order to achieve this, a new system of ‘user rating’ is proposed. For each comment and contribution given by a user, this system would allow others to vote as to the quality of the contribution. Each user would be given a single vote on each piece of content and could choose to vote both up (for good content) or down (for poor content). However, as a twist to help better define content, we would suggest that in order to count towards the overall tally, a vote must be accompanied by a reason for that vote, as per our earlier recommended improvement to the Cognitive Presence analysis process.

A number of other necessary modifications to Curatr have also become apparent with extended use of the platform. For example, database changes must be made to some core elements to allow for faster loading times. In addition, the continued lack of support for Adobe Flash on mobile and tablet devices suggests that other cross-platform development techniques should be investigated for potential application, specifically the use of HTML5 as the new standard emerges.

7.5. Concluding Remarks

This innovation report describes a new, innovative model by which to facilitate workplace E-learning and a new, innovative piece of software designed to apply that model in the commercial world. It is in the focus on user-generated content, as opposed to centrally created content, that we see the biggest differences between our new approach and existing systems. Our model and software have been applied in the real world with success. Organisations applying the approach have benefitted from shorter times to market and lower costs in building learning experiences than had been previously possible. The resulting experiences have been well liked by users and proven effective in the facilitation of online learning. Evidence has been generated to suggest that those who use our platform are more likely to succeed in meeting learning outcomes than those who don't. We have made significant contributions to new research in the field of gamification for education, an emerging field much in need of rigorous academic research.

It is the Research Engineer's hope that this research can pave the way to a more accessible, widely adopted method of facilitating learning online. Classroom training may well have had its day. But for E-learning to fulfill its promise of a learning revolution much needs to change. We believe our innovation could signal the end of the beginning, as far as workplace E-learning is concerned.

References

ADL – Advanced Distributed Learning (2011) “Frequently Asked Questions.” [Online] available from: <http://www.adlnet.gov/capabilities/scorm#tab-learn> [accessed, 21st August, 2011].

Adobe (2011). “Flash Player Version Penetration.” [Online] available from: http://www.adobe.com/products/player_census/flashplayer/version_penetration.html [accessed 21st August, 2011].

Adobe (2013) “Captivate, 6th edition.” [Online] available from: <http://www.adobe.com/uk/products/captivate.html> [accessed 3rd March, 2013].

Altshuller, G. Shulyak, L.S.R. (2002) 40 principles: TRIZ keys to innovation 3rd ed, Worcester, MA: Technical Innovation Center Inc.

Anderson, S. (2001) “E-learning developments and experiences.” Education Training, Vol. 43, No. 4/5, pp. 240-248.

Arguris, C. (1977) “Double Loop Learning in Organisations.” Harvard Business Review, September, 1977. [Online] available from: <http://hbr.org/1977/09/double-loop-learning-in-organisations/ar/1> [accessed 23rd February, 2013].

Aronson, E. (1997) “Review: Back to the Future: Retrospective Review of Leon Festinger's A Theory of Cognitive Dissonance.” The American Journal of Psychology, Vol. 110, No. 1, pp. 127-137.

Badgeville. (2012) “Case Study: Universal Music.” [Online] available from: www.badgeville.com [accessed October 23rd, 2012].

Bagozzi, R.P. (2008). "The Legacy of the Technology Acceptance Model and a Proposal for a Paradigm Shift". Journal of the Association for Information Systems, Vol. 8, Issue 4, pp. 244-254.

Bandura, A. (1977) Social learning theory. Englewood Cliffs, N.J: Prentice-Hall.

Beagrie, N. (2006) "Digital Curation for Science, Digital Libraries, and Individuals." The International Journal of Digital Curation, Vol. 1, No. 1, pp. 3-16.

Bennett, S. Maton, K. & Kervin, L. (2008) "The digital natives debate: A critical review of the evidence." British Journal of Educational Technology, Vol. 39, No. 5, pp. 775-786.

Betts, B.W. (2012) "Social Learning: Answers to eight crucial questions." The E-learning Guild. [Online] available from: <http://www.elearningguild.com/research/archives/index.cfm?id=160&action=viewonly> [accessed on March 3rd, 2013].

Betts, B.W. (2013) "Towards a Method of Improving Participation in Online Collaborative Learning: Curatr." In: B. Sutton & A. Basiel: Teaching and Learning Online. 2nd ed. London: Routledge.

Betts, B.W. Bal, D. J. & Betts, A. W. (2013a) "Gamification as a tool for increasing the depth of student understanding using a collaborative e-learning environment." International Journal of Continuing Engineering Education and Life-Long Learning. Accepted for publication, March 2013.

Betts, B.W. Bal, D. J. & Betts, A. W. (2013b) "The effect of Gamification on the quality of contribution in a Computer Supported Collaborative Learning environment." International Journal of Computer Supported Collaborative Learning. In review, May 2013.

Blackboard. (2013) "Blackboard Learn 10." [Online] available from: <http://www.blackboard.com/sites/sp10/index.html> [accessed 3rd March, 2012].

Blondy, L.C. (2007) "Evaluation and Application of Andragogical Assumptions to the Adult Online Learning Environment." Journal of Interactive Online Learning, Vol. 6, No, 2, pp. 116-130.

Bloom, B.S. (1956) Taxonomy of Educational Objectives, the classification of educational goals – Handbook I: Cognitive Domain. New York: McKay.

Bloom, B.S. (1984) "The 2 Sigma Problem: The Search for Methods of Group Instruction as Effective as One-to-One Tutoring." Educational Researcher, Vol. 13, No. 6, pp. 4-16.

Bogost, I. (2011) "Persuasive Games: Exploitationware." Gamasutra. [Online] available from: http://www.gamasutra.com/view/feature/134735/persuasive_games_exploitationware.php?page=1 [accessed February 9th, 2013].

Bruner, J. (1966) Toward a theory of instruction. Cambridge, MA: Belknap Press of Harvard University.

Burbeck, S. (1992) "Applications Programming in Smalltalk-80(TM): How to use Model-View-Controller (MVC)." UIUC Smalltalk Archive [Blog] available from: <http://st-www.cs.illinois.edu/users/smarch/st-docs/mvc.html> [accessed 21st August, 2011].

Burns, J. (2012) "Young jobless Neets still top one million." BBC News, 22nd November, 2012. [Online] available from: <http://www.bbc.co.uk/news/education-20444524> [accessed 28th April, 2013].

Chapman, B. (2010). "How Long Does it Take to Create Learning?" Chapman Alliance, September 2010. [Online] available from http://www.slideshare.net/bchapman_utah/how-long-does-it-take-to-create-learning [accessed 22nd September, 2013].

Cheng, C.K., Pare, D.E., Collimore, L. & Joordens, S. (2011) "Assessing the effectiveness of a voluntary online discussion forum on improving students' course performance." Computers & Education, Vol. 56, No. 1, pp. 253-261.

Cho, H., Gay, G., Davidson, B. & Ingraffea, A. (2005) "Social networks, communication styles, and learning performance in a CSCL community." Computers & Education, Vol. 49, No. 2, pp. 309-329.

Chomsky, N. (1971). "The Case Against B. F. Skinner." New York Review of Books, Vol. 30, pp. 18–24.

Christensen, C. (1997) The innovator's dilemma: when new technologies cause great firms to fail. Boston, MA: Harvard Business School Press.

CIPD - Chartered Institute of Personnel and Development (2011) "Learning and talent development survey." [Online] available from: <http://www.cipd.co.uk/hr-resources/survey-reports/focus-e-learning.aspx> [accessed 10th February, 2013].

Clark, R.C. & Mayer, R.E. (2011) E-learning and the Science of Instruction. 3rd Ed. San Francisco: Pfeiffer.

Cole, M. & Wertsch, J.V. (1996) "Beyond the individual-social antinomy in discussions of Piaget and Vygotsky." Human development, Vol. 39, pp. 250–256.

Cordova, D. I. & Lepper, M. R. (1996) "Intrinsic motivation and the process of learning: Beneficial effects of contextualization,

personalization, and choice.” Journal of Educational Psychology, Vol. 88, pp. 715-730.

Csikszentmihalyi, M. (1990) Flow: The Psychology of Optimal Experience. New York, NY: HarperCollins.

Darabi, A., Arrastia, M.C., Nelson, D.W., Cornille, T. & Liang, X. (2011) “Cognitive presence in asynchronous online learning: a comparison of four discussion strategies.” Journal of Computer Assisted Learning, Vol. 27, No. 3, pp. 216-227.

Dalziel, J. (2003) “Implementing Learning Design: The Learning Activity Management System (LAMS).” Proceedings of the 20th Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education (ASCILITE), pp. 593-596.

Davis, F. D. (1989) “Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology.” MIS Quarterly, Vol. 13, No. 3, pp. 319-340.

Deci, E. L. & Ryan, R. M. (1985) Intrinsic motivation and self-determination in human behaviour. New York, NY: Plenum Press.

Deci, E. L., Koestner, R. & Ryan, R. M. (1999) “A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation.” Psychological bulletin, Vol. 125, No.6, pp. 627-668.

de Freitas, S. (2006) “Learning in Immersive Worlds: A review of game based learning.” JISC Research Report. [Online] available from: http://www.jisc.ac.uk/media/documents/programmes/elearninginnovation/gamingreport_v3.pdf [accessed 28th April, 2013].

de Freitas, S. & Jarvis, S. (2006) “A Framework for developing serious games to meet learner needs.” The Interservice Industry Training Simulation Education Conference (IITSEC), 2006. [Online] available from:

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<http://ntsa.metapress.com/index/8C0WLMJV4UHQ1WVH.pdf> [accessed 28th April, 2013].

Deterding, S., Dixon, D., Khaled, R. & Nacke, L. (2011) "From Game Design Elements to Gamefulness: Defining 'Gamification'." Mindtrek '11, September 28-30, 2011. [Online] available from: http://85.214.46.140/niklas/bach/MindTrek_Gamification_PrinterReady_110806_SDE_accepted_LEN_changes_1.pdf [accessed 28th April, 2013].

Dewey, J. (1938) Experience and Education. New York, NY: Touchstone.

Dillenbourg, P. (2002) "Over-scripting CSCL: The risks of blending collaborative learning with instructional design." In: P.A. Kirschener, ed. (2002) Three worlds of CSCL. Can we support CSCL. Heerlen: Open University, Nederland, pp. 61-91.

EDC - Education Development Center. (1998). "The teaching firm: where productive work and learning converge: report on research findings and implications." Cornell University. [Online] available from: <http://bit.ly/ozkfxk> [accessed 13th July, 2011].

Egenfeldt-Nielsen, S. (2006) "Overview of research on the educational use of video games." Digital Kompetanse, Vol. 1, No. 3, pp. 184-213.

Facebook (2013). "Usage statistics." [Online] available from: www.facebook.com/statistics, [accessed 17th February, 2013].

Garris, R. Ahlers, R. & Driskell, J.E. (2002) "Games, Motivation, and Learning: A Research and Practice Model." Simulation & Gaming, Vol. 33, No. 4, pp.441- 467.

Garrison, D.R. Anderson, T. & Archer, W. (2001) "Critical thinking, cognitive presence and computer conferencing in distance education." The American Journal of Distance Education. Vol, 15, No. 1, pp. 7-23.

Garrison, D. R. & Cleveland-Innes, M. (2005) "Facilitating cognitive presence in online learning: Interaction is not enough." The American Journal of Distance Education. Vol, 19, No. 1, pp. 1-12.
 Changing the Model of Workplace E-learning: A Platform to Facilitate Autonomous Social E-learning for Adult Learners | Benjamin W. Betts

Journal of Distance Education, Volume 19, No. 3, pp. 133-148.

Gartner (2011). "Gartner Says By 2015, More Than 50 Percent of Organisations That Manage Innovation Processes Will Gamify Those Processes." [Online] available from: <http://www.gartner.com/it/page.jsp?id=1629214> [accessed on 1st September, 2012].

Glassman, M. & Kang, M.J. (2011) "The logic of wikis: The possibilities of the Web 2.0 classroom." International Journal of Computer-Supported Collaborative Learning Vol. 6, No. 1, pp. 93-112.

Gonzalez-Pereira, B., Guerrero-Bote, V.P. & Moya-Anegon, F. (2010) "A new approach to the metric of journals' scientific prestige: The SJR indicator." Journal of Informetrics, Vol. 4, No. 3, pp. 379-391.

IBIS Capital (2012). "Global e-Learning Investment Review". London: IBIS Capital.

Jarvis, P. (1987) Adult Learning in the Social Context. London: Croom Helm.

Johns, C. (2004) Becoming a reflection practitioner. 2nd ed. Oxford: Blackwell Publishing.

Kamel Boulos, M.N. & Wheeler, S. (2007) "The emerging Web 2.0 social software: an enabling suite of sociable technologies in health and health care education." Health Information & Libraries Journal, Vol. 24, No. 1, pp. 2-23.

Kanuka, H. Rourke, L. & Laflamme, E. (2007) "The influence of instructional methods on the quality of online discussion." British Journal of Educational Technology, Vol. 38, No. 2, pp. 260–271.

Kapp, K.M. & Defelice, R.A. (2009) "Time to develop one hour of training." American Society for Training & Development. [Online] available from: <http://www.astd.org/Publications/Newsletters/Learning->

[Circuits/Learning-Circuits-Archives/2009/08/Time-to-Develop-One-Hour-of-Training](#) [accessed 10th February, 2013].

Kapp, K. M. (2012) The Gamification of Learning and Instruction: Game-based Methods and Strategies for Training and Education. San Francisco, CA: Pfeiffer.

Kim, K-J., Bonk, C.J., & Zeng, T. (2005) "Surveying the future of workplace e-learning; the rise of blending, interactivity and authentic learning." eLearning magazine, June 2005. [Online] available from: <http://elearnmag.acm.org/featured.cfm?aid=1073202#R2> [accessed 10th February, 2013].

Kim, W.C., & Mauborgne, R. (2005) Blue ocean strategy: how to create uncontested market space and make the competition irrelevant. Boston, MA: Harvard Business Press.

Kirkpatrick, D. L. (2006) Evaluating Training Programs. 3rd ed. San Francisco, CA: Berrett-Koehler.

Kitchenham, B. (2004) "Procedures for Performing Systematic Reviews." Keele University Technical Report, TR/SE-0401. [Online] available from: http://tests-zingarelli.googlecode.com/svn-history/r336/trunk/2-Disciplinas/MethodPesquisa/kitchenham_2004.pdf [accessed 28th April, 2013].

Knowles, M. S. (1970) The modern practice of adult education; From pedagogy to andragogy. Chicago: Follett.

Kolb, D. A. (1984) Experiential Learning. Englewood Cliffs, NJ: Prentice Hall.

Lave, J. & Wenger, E. (1991) Situated Learning: Legitimate Peripheral Participation. Cambridge, UK: Cambridge University Press.

Lee, M.C. (2010) "Explaining and predicting users' continuance intention toward e-learning: An extension of the expectation–confirmation model." Computers & Education, Vol. 54, No. 2, pp. 506-516.

Levy, P., Aiyegbayo, O., & Little, S. (2009) "Designing for inquiry-based learning with the Learning Activity Management System." Journal of Computer Assisted Learning, Vol. 25, No. 3, pp. 238-251.

Lin, K.-M. (2011) "e-Learning continuance intention: Moderating effects of user e-learning experience." Computers & Education, Vol. 56, No. 2, pp. 515-526.

Malone, T. (1981) "Toward a theory of intrinsically motivating instruction." Cognitive science, Vol. 4, No. 5, pp. 333-369.

Marn, N., Benarroch, A. & Jimnez Gmez, E. (2000) "What is the relationship between social constructivism and Piagetian constructivism? An analysis of the characteristics of the ideas within both theories." International Journal of Science Education, Vol. 22, No. 3, pp. 225-238.

McClure, S.M. Laibson, D.I. Loewenstein, G. & Cohen, J.D. (2004) "Separate Neural Systems Value Immediate and Delayed Monetary Rewards." Science, Vol. 306, No. 5695, pp. 503-507.

McFarlane, A., Sparrowhawk, A. & Heald, Y. (2002) "Report on the educational use of games: An exploration by TEEM on the contribution which games can make to the educational process." Cambridge, UK: Department for Education and Skills.

McGonigal, J. (2011) Reality is Broken: Why Games Make Us Better and How They Can Change the World. London, UK: Jonathan Cape.

Meyer, K. A. (2004) "Evaluating online discussions: four different frames of analysis." Journal of Asynchronous Learning Networks, Vol. 8, No. 2, pp. 101-114.

Michinov, N., Brunot, S., Le Bohec, O., Juhel, J. & Delaval, M. (2011) "Procrastination, participation, and performance in online learning environments." Computers & Education, Vol. 56, No. 1, pp. 243-252.

Minocha, S. (2009) "Role of social software tools in education: a literature review." Education Training, Vol. 51, No. 5/6, pp.353-369.

Moore, M.G. (1989) "Three types of interaction." The American Journal of Distance Education, Vol. 3, No. 2, pp. 1-6.

Mourshed, M., Farrell, D. & Barton, D. (2012) "From Education to Employment: Designing a System that Works." McKinsey & Company [Online] available from: http://mckinseysociety.com/downloads/reports/Education/Education-to-Employment_FINAL.pdf [accessed 28th April, 2013].

Nielson, J. (2006) "Participation inequality: Encouraging more users to contribute." Nielson Norman Group. [Online] available from: <http://www.nngroup.com/articles/participation-inequality/> [accessed on 10th February, 2013].

O'Leonard, K. (2013) "The Corporate Learning Factbook 2013." [PDF] Bersin by Deloitte available from: <http://www.bersin.com/clf-us> [accessed 28th April, 2013].

O'Reilly, T. (2005) "What is Web 2.0: Design Patterns and Business Models for the Next Generation of Software." O'Reilly. [Online] available from: <http://www.oreillynet.com/lpt/a/6228> [accessed 3rd February 2013].

Okoli, C. & Schabram, K. (2010) "A Guide to Conducting a Systematic Literature Review of Information Systems Research." Sprouts Working Papers on Information Systems, Vol. 10, No. 26, pp. 1-49.

Ong, C.-S., Lai, J.-Y. & Wang, Y.-S. (2004) "Factors affecting engineers' acceptance of asynchronous e-learning systems in high-tech companies." Information & Management, Vol. 41, No. 6, pp. 795-804.

Palmer, S. Holt, D. & Bray, S. (2008) "Does the discussion help? The impact of a formally assessed online discussion on final student results." British Journal of Educational Technology, Vol. 39, No. 5, pp. 847-858.

Papert, S. (1993) Mindstorms: Children, Computers and Powerful Ideas. New York, NY: BackBooks.

Park, C. L. (2009) "Replicating the Use of a Cognitive Presence Measurement Tool." Journal of Interactive Online Learning, Vol. 8, No. 2, pp. 140-155.

Parker, L. E. & Lepper, M. R. (1992) "Effects of fantasy contexts on children's learning and motivation: Making learning more fun." Journal of Personality and Social Psychology, Vol. 62, No. 4, pp. 625-633.

Parr, C. (2013). "Not Staying the Course". Times Higher Education.

[Online] available from:

<http://www.insidehighered.com/news/2013/05/10/new-study-low-mooc-completion-rates> accessed 18th May, 2013.

Prensky, M. (2001) "Digital Natives, digital immigrants." On the Horizon, Vol. 9, No. 5, pp. 1-6.

Prinsen, F., Volman, M. L. L. & Terwel, J. (2007) "The influence of learner characteristics on degree and type of participation in a CSCL environment." British Journal of Educational Technology, Vol. 38, No. 6, pp. 1037-1055.

Przybylski, A.K. Rigby, C.S. & Ryan, R.M. (2010) "A motivational model of video game engagement." Review of General Psychology, Vol. 14, No. 2, pp. 154-166.

Ricci, K. Salas, E. & Cannon-Bowers, J. A. (1996) "Do computer-based games facilitate knowledge acquisition and retention?" Military Psychology, Vol. 8, No. 4, pp. 295-307.

Robertson, M. (2010) "Can't play, won't play." Hide&Seek Blog [Blog] available from: <http://hideandseek.net/2010/10/06/cant-play-wont-play/> [accessed February 9th, 2013].

Roca, J.C., Chiu, C. & Martinez, F.J. (2006) "Understanding e-learning continuance intention: An extension of the Technology Acceptance Model." International Journal of Human-Computer Studies, Vol. 64, No. 6, pp. 683-696.

Roca, J. & Gagne, M. (2008) "Understanding e-learning continuance intention in the workplace: A self-determination theory perspective." Computers in Human Behaviour, Vol. 24, No. 4, pp. 1585-1604.

Rosenbaum, S. C. (2011) Curation Nation: how to win in a world where consumers are creators. USA: McGraw-Hill.

Saadé, R. G., Nebebe, F. & Tan, W. (2007) "Viability of the Technology Acceptance Model in Multimedia Learning Environments: A Comparative Study Research Model and Hypotheses." Interdisciplinary Journal of E-Learning and Learning Objects, Vol. 3, No. 1, pp. 175-184.

Salmon, G. (2000) E-moderating: the key to teaching and learning online. London, UK: Kogan Page.

Schell, J. (2008) The Art of Game Design: A Book of Lenses. Burlington, MA: Morgan Kaufmann.

Schneider, K. (2010) "Curatr: A New Platform for Social Learning Goes Live Today." Brandon Hall Research [Blog] available from: <http://www.brandonhall.com/blogs/curatr-a-new-platform-for-social-learning-goes-live-today/> [accessed 28th April, 2013].

Shepherd, C. (2012) "Exploring social learning with Ben Betts." Clive on Learning [Blog] available from: <http://clive-shepherd.blogspot.co.uk/2012/03/exploring-social-learning-with-ben.html> [accessed 28th April, 2013].

Siemens, G. (2005) "A learning theory for the digital age." Instructional Technology and Distance Education, Vol. 2, No. 1, pp. 3–10.

Simmons, D. E. (2002) "The forum report: E-learning adoption rates and barriers." FT Knowledge. [Online] available from: <http://www.internetttime.com/itimegroup/FrmRep1.pdf> [accessed February 10th, 2013].

Sitzmann, T. (2011) "A Meta-Analytical Examination of the Instructional Effectiveness of Computer-Based Simulation Games." Personnel Psychology, Vol. 64, No. 2, pp. 489-528.

Skinner, B. F. (1953) Science and Human Behaviour. New York, NY: Macmillan.

Skinner, B.F. (1977) "Why I am not a Cognitive Psychologist." Behaviourism, Vol. 5, No.1, pp. 1–10.

Slack, N., Johnson, B., Brandon-Jones, A. & Betts, A. (2011) Operations and Process Management. 2nd ed. Harlow, UK: Prentice Hall.

Slavin, R. E. (1980) "Cooperative Learning." Review of Educational Research, Vol. 50, No. 2, pp. 315-342.

Smith, M. K. (2001) "'David A. Kolb on experiential learning', the encyclopedia of informal education." Infed.org [Online] available from: <http://infed.org/mobi/david-a-kolb-on-experiential-learning/> [accessed 17th February, 2013].

Squire, K., Barnett, M., Grant, J. M. & Higginbotham, T. (2004) "Electromagnetism supercharged!: Learning physics with digital simulation games." In: Proceedings of the 6th international conference on Learning sciences, pp. 513-520. International Society of the Learning Sciences.

Sun, P., Tsai, R., Finger, G., Chen, Y. & Yeh, D. (2008) "What drives a successful e-Learning? An empirical investigation of the critical factors influencing learner satisfaction". Computers & Education, Vol. 50, No. 4, pp. 1183-1202.

Thaler, R.H. & Sunstein, C.R. (2009) Nudge: Improving decisions about health, wealth and happiness. UK: Penguin Books.

Thomas, D. & Seely Brown, J. (2011) A New Culture of Learning: Cultivating the Imagination for a World of Constant Change. s.l.:s.n.

Towards Maturity (2013) "Bridging the gap: 2012 benchmark report". [Online] available from: <http://towardsmaturity.org/article/2012/05/14/2012-13-towards-maturity-benchmark/> [accessed 10th February, 2013].

Tushman, M.L. & Anderson, P. (1986) "Technological Discontinuities and Organizational Environments." Administrative Science Quarterly, Vol. 31, No. 3, pp. 439-465.

Vaughan, K. & MacVicar, A. (2004) "Employees' pre-implementation attitudes and perceptions to e-learning: A banking case study analysis." Journal of European Industrial Training, Vol. 28, No. 5, pp. 400–413.

Wang, Y., Wang, H. & Shee, D. (2007) "Measuring e-learning systems success in an organisational context: Scale development and validation." Computers in Human Behaviour, Vol. 23, No. 4, pp. 1792-1808.

White, D. S. & Le Cornu, A. (2011) "Visitors and Residents: A new typology for online engagement." First Monday, Vol. 16, No. 9, pp. 1-9.

Wikipedia (2013). "About Wikipedia." [Online] available from: www.wikipedia.com/wikipedia [accessed 17th February, 2013].

Woo, Y. & Reeves, T. (2007) "Meaningful interaction in web-based learning: A social constructivist interpretation." The Internet and Higher

Education, Vol. 10, No. 1, pp. 15-25.

Wood, D. Bruner, J. S. & Ross, G. (1976) "The Role of Tutoring in Problem Solving." Journal of Child Psychology and Psychiatry, Vol. 17, No. 1, pp. 89–100.

Xie, K. (2012) "What do the numbers say? The influence of motivation and peer feedback on students' behaviour in online discussions." British Journal of Educational Technology, Vol. 44, No. 2, pp. 288-301.

YouTube (2013) "Usage statistics." [Online] available from: www.youtube.com [accessed 17th February, 2013].

Zenios, M. (2011) "Epistemic activities and collaborative learning: towards an analytical model for studying knowledge construction in networked learning settings." Journal of Computer Assisted Learning, Vol. 27, No. 3, pp. 259-268.

Glossary of Terms

API – Application Programming Interface. A standard to allow two computer systems to interact with each.

ASTD – The American Society for Training & Development.

CLC – Curatr Learning Cycle. The methodology generated by this research.

CSCL – Computer Supported Collaborative Learning. An existing method of facilitating peer to peer learning in an online learning environment.

HCI – Human-Computer Interaction. The study and subsequent methods used by humans to interact with the many affordances of computing devices.

LMS – Learning Management System. An enterprise software platform and database used to deliver online courses to learners in the workplace and track results.

MCAT – Credit Accumulation and Transfer, level M. A measure of progress used by UK based higher education to allow for transferable credit between universities. Level M refers to ‘Masters’ level qualifications.

MCQ – Multiple Choice Question. A frequently used assessment tool in online learning.

MOOC – Massive Open Online Courses. A new form of online course, whereby thousands of students partake in an asynchronous instructional experience, free of charge.

MVC – Model, View, Controller. A pattern used in software engineering designed to separate out parts of a system in a logical and reusable manner.

PHP – Hypertext Preprocessor. A common programming language for the web.

SCORM – Shareable Content Object Reference Model. A standard developed by the US Department of Defense to enable the

interoperability of online learning course content with Learning Management Systems.

SDT – Self Determination Theory. A theory of intrinsic motivation, as developed by Deci & Ryan (1985).

SOM – Service Operations Management. An accredited online course run by Warwick Business School for workplace professionals.

UI – User Interface. The visual part of a computer program or webpage with which the user interacts.

USD – University of San Diego, CA.

WBS – Warwick Business School at the University of Warwick, UK.

XP – Experience Points. A measure of progress often used in games and gamification.

Appendix A: Description of Curatr Software

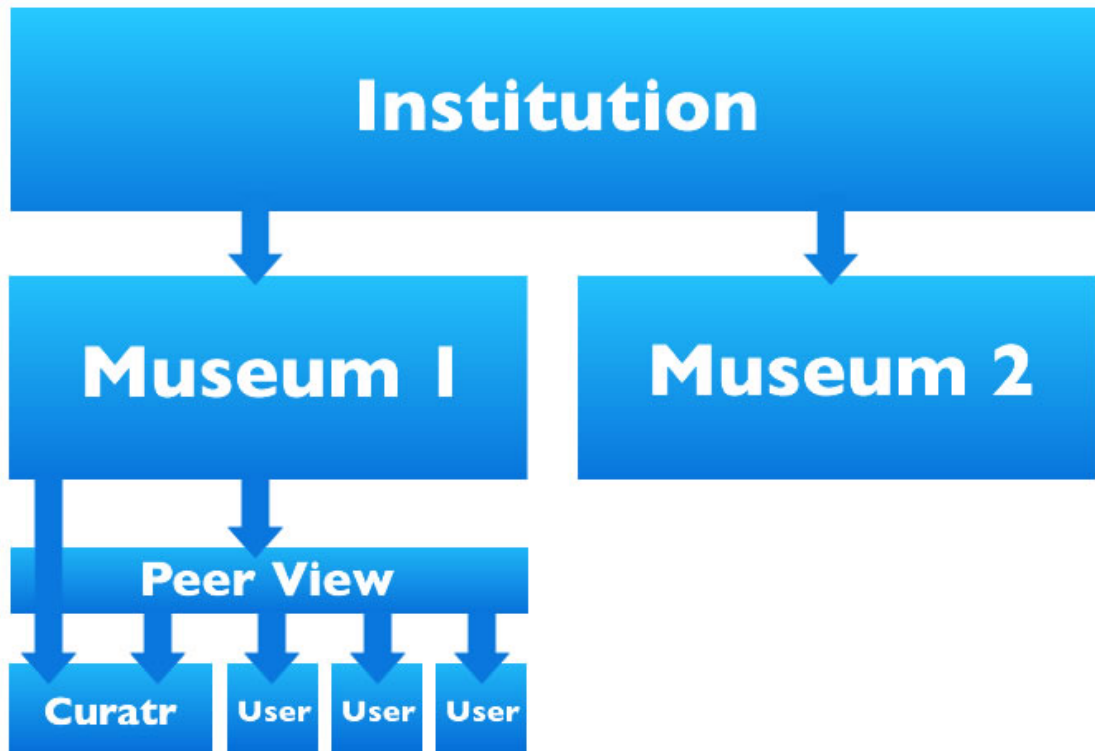


Figure 28 The taxonomy of a Curatr learning experience

The Taxonomy of Curatr

Each user within a museum starts on what is called the 'Peer View'. This is a visualisation of every user within a museum, ranked by experience. The most prominent peer is always the 'Curatr'. This is the name given to the teacher or leader of a museum. Users progress in the museum by viewing objects within the Curatr's gallery. These can be shared with other peers and added too as a part of the learning process. The peer view itself can be circumvented, jumping the user directly to the 'Curatr's Gallery' from the museum overview screen.

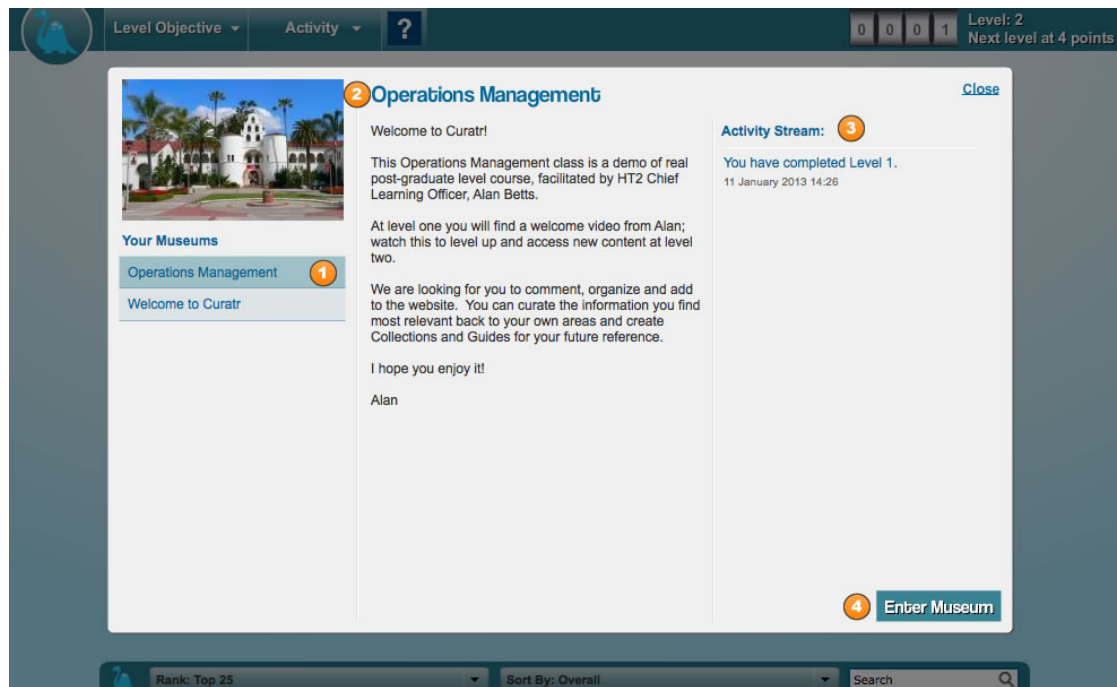


Figure 29: Museum Overview

The museum overview screen is shown in Figure 28. This is the first screen an authenticated user sees when they login to their institution. The orange circles with numbers on them are not a part of the user view, they are shown here as an aid to help clarify elements within the view. Each number in an orange circle on Figure 28 corresponds to the feature listed below:

1. Museum select area. On the left hand side is a list of all museums the user is enrolled. Figure 28 shows the museum 'Operations Management' selected.
2. When a museum is selected its title is displayed at the top of the page, along with an image and a short piece of introduction text.
3. For the museum selected, an activity stream is shown on the right-hand side. This lists any 'social' user activity that has taken place within this museum in the last 7 days. This includes any comments made or any objects added. Clicking on an activity in this area will hyperlink the user to that comment and / or object. This area is also used to show the user personal messages of progress, such as the 'level completion' notification shown here.

4. When a user has selected a museum and wishes to 'enter' the experience, they do so by pressing the 'Enter Museum' button in the bottom right-hand corner. This closes the museum overview screen and takes the user to the Curatr's gallery for that museum.

Playing the Game



Figure 30: Curatr's Gallery

Figure 29 shows the Curatr's gallery view. This is the screen users must access in order to score points and progress on their learning journey through the levels of a museum. This view is typical of the screen layout used with the Curatr platform. The faded blue background area in the centre of the screen is known as the 'canvas'. It is on the 'canvas' that much of the users' interaction with the system occurs:

1. At the top of the page a notification is shown to the user to let them know where in the application they are – in this case 'Now viewing: Curatr's gallery'.
 2. Learning objects in Curatr are represented by 'nodes'. Each node is coloured and may carry an image denoting more information about the learning object contained within. The colour of the node changes dependent on whether or not the user has 'viewed' the object related to it. In addition, nodes 'pulse' with a red background whilst they are unread and at the current level the user is viewing – prompting a user to concentrate on those objects most pertinent to their current objective. By default learning objects do
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not carry labels or titles, which are immediately visible to the user. However, several icons may appear on top of the node. The comment icon is used to denote objects that have comments on them. The level icon is used to denote to which level the object belongs. The bookmark icon is used to denote those learning objects which the user has bookmarked. And finally, the author icon is used to display a picture of the author of that learning object when it is authored by someone other than the 'Curatr'.

3. Nodes are arranged in concentric circles, growing out from the centre of the screen. Those nodes closest to the centre are at the users' current level; those further out are at levels previously completed by the user.
4. An avatar exists at the centre of the screen to signify whose gallery of objects is being viewed. In this case the avatar is the default 'Curatr' avatar.

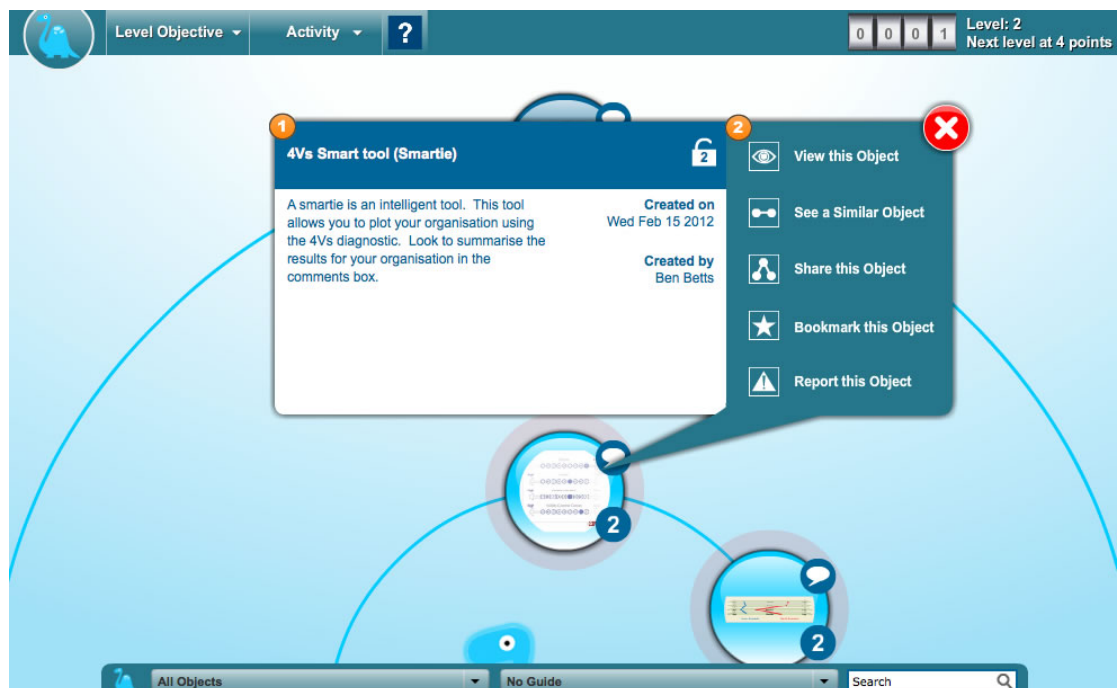


Figure 31: Object Dialog Box.

Clicking on a node will present the user with the 'Object dialog' box (Figure 30). This gives more information about the learning object contained within the node;

1. To the left of the object dialog box information such as the objects title, an extended description and information as to the authorship of the object appears.
2. To the right of the object dialog box a series of 5 buttons appear. The first button, 'View this object' allows the users to view the object contained within a node in full. The second button, 'See a Similar Object' triggers a script to run which finds objects similar to the current one within the museum. This script runs an algorithm which compares the keywords, title and description of the current object with others in the museum. If a threshold of 'likeness' is passed, then the user is taken at random to the next most 'similar' object in the museum. The randomise function ensures that the user is not stuck in a loop between the current object and the next most similar object. 'Share this Object' allows the users to send a notification to other users alerting them to the presence of this object. 'Bookmark this Object' allows the user to create a bookmark for this object within their own gallery of objects. This has the effect of 'copying' the object from this gallery into the users own gallery. Finally, 'Report this Object' allows the user to send a message to the museum administrator alerting them to some issue with the object.



Figure 32: Viewing an Object

Viewing an object is one of the core functions within Curatr. Accessed from the Object Dialog box, Figure 31 shows the user viewing a learning object within Curatr:

1. At the top half of screen the learning object itself is embedded. The method used to show the learning object depends on the type of content material that has been linked. In circumstances such as that shown above an 'embed code' has been used to place the content in a HTML template. This is the most common way in which videos, such as those from YouTube, are linked to within Curatr. In addition, Curatr also has a built in player for video and audio files. Webpages are linked to via an 'iFrame', which shows a second webpage within the first webpage. Finally, some files cannot be shown directly and users are prompted to click a link to open those resources in a 2nd browser window.
 2. Below the object itself is a menu bar. The left hand side shows the object title and its points status. In order to earn an experience point for viewing an object, this window must be kept open for a specified period of time (as specified by the administrator). As soon as the view object window is opened, the view timer starts. When the view timer hits the 'view time' required for a point to
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register, this point's status area changes its notification. The following statuses are available, dependent on the object state:
 0 / 2 points – view the object and make a comment to get full points

1 / 2 points – make a comment to get full points

1 / 2 points – view the object to get full points

2 / 2 points.

Additionally, on the right hand side of this menu bar, two buttons appear. The first is the 'Hide Comments' toggle, which allows the comment area to be hidden from view (thus maximising the screen space for viewing the object) and the second button is the 'Return to Museum' button, which allows the user to return to the gallery view that they selected the object.

3. The Object Description also appears within each object being viewed. This alignment on the left-hand side next to the comments area allows for an administrator to pose a question or otherwise to direct the comments they are seeking from users using this field.
4. The comments area. This is where comments made by students appear in date order (oldest first). The users' picture, name, comment text and the time it was posted appear. Other users may post a reply to another users comment or begin their own thread by creating a new comment. Either of these actions will gain the user the necessary point to achieve full points on viewing this object.



Figure 33: Curatr Interface

Returning to the gallery view, there are a number of other pertinent areas to mention. Above the canvas is the main navigation bar (Figure 32). Below the canvas is what is referred to as the 'filter bar'.

1. On the left-hand side of the navigation bar are four buttons. The far left button, signified with the Curatr avatar is the 'menu' button. Pressing this reveals a series of menu options for the user. Next to this is the 'level objective' button, which reveals the objective for the current level when clicked. The 'Activity' button reveals the latest activity within the museum (the same function as previously described in Figure 28). Finally, the '?' image denotes the playercard button – when a user has uploaded a picture of themselves, this question mark is replaced with that image. Clicking on this button takes the user to their playercard.
2. On the right-hand side of the navigation bar is the experience points counter. This shows the running total of experience points earned by the user in this museum, including all points gained through views and comments. Next to this information as to the users current level is displayed, alongside a message informing the user how many experience points are required to reach the next level. Where an end-of-level gate is a part of a level, this area

changes to alert users to its presence when the experience points requirement is fulfilled. Users may continue to earn experience points beyond the limit required to reach the next level when a gate is in place. In this case the points counter continues to accumulate and the next level will be calculated as being in addition to any and all points already earned.

3. The filter bar has another Curatr avatar icon on it. This button resets the view to the Curatr's view, resetting any previously selected filters. Filters come in the form of Collections or Guides (see Figure 33). The left hand selection box allows the user to select a particular collection of objects to view on the current canvas. The right hand selection box allows the user to select a particular guide through a series of objects on the current canvas.
4. Finally, there is a search function on the right-hand side of the filter bar, allowing a user to quickly search the objects on the current canvas.



Figure 34: Filter Bar

Filters include collections and guides as shown on Figure 33. Collections are a number of learning objects grouped together under a common category. Selecting a collection has the effect of removing some learning

objects from the canvas (those that are not in the collection), but the concentric circle view remains. This non-linear view of learning objects is only altered by guides, the second field available in the filter bar.

1. Figure 33 shows the guide selection box open. In this case only one guide is available: 'Guide: Demo guide'. Selecting the guide has the effect of re-ordering the learning objects as specified by the guide and shown in Figure 34:

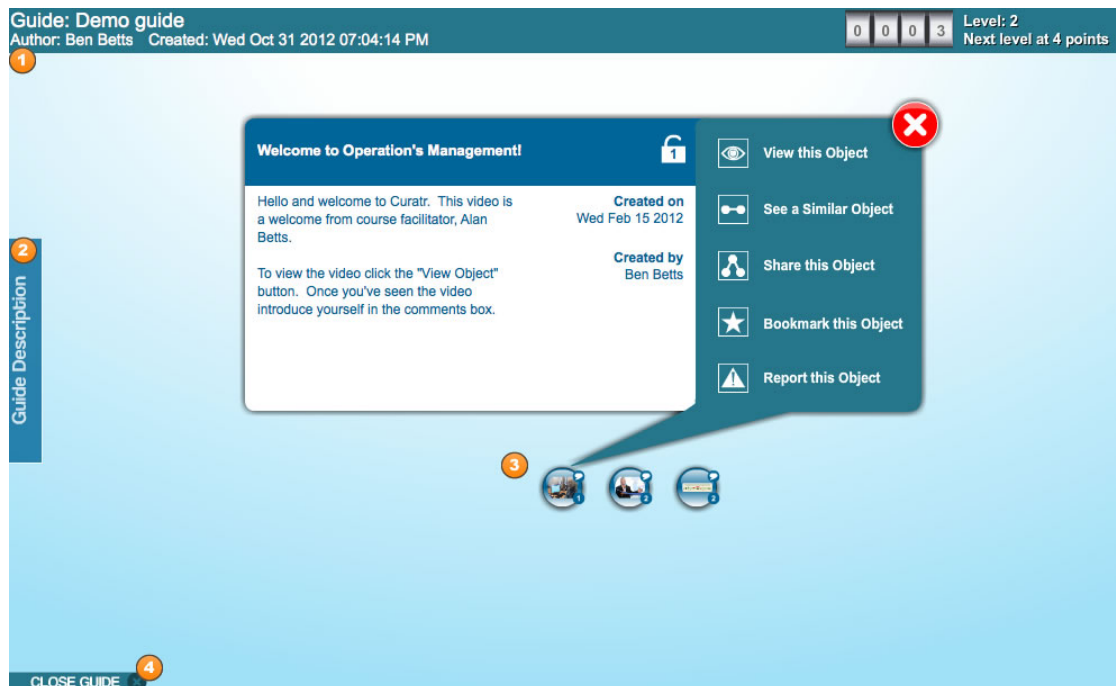


Figure 35: Viewing a Guide

In Figure 34 the Guide 'Demo guide' is shown. This guide view alters the canvas view significantly to show a selection of objects in a specified order.

1. The Guide title, its author and the time it was created is displayed in the top left hand corner, replacing the navigation bar that previously appeared here.
2. Each guide has a 'description' tab, which folds out on click. In this tab the user who created the guide can describe the purpose for which they created the guide in the first place.
3. The objects in the guide are shown in the order specified by the user. Guides can have an unlimited number of objects in them, but can only include objects that the creating user has either added or bookmarked to their own gallery.

4. To exit this view, users click the 'Close Guide' button in the bottom left hand corner.

Having accumulated enough points to 'level up', sometimes it is necessary for the user to take an 'end of level gate' question in order to progress to the next level (Figure 35).

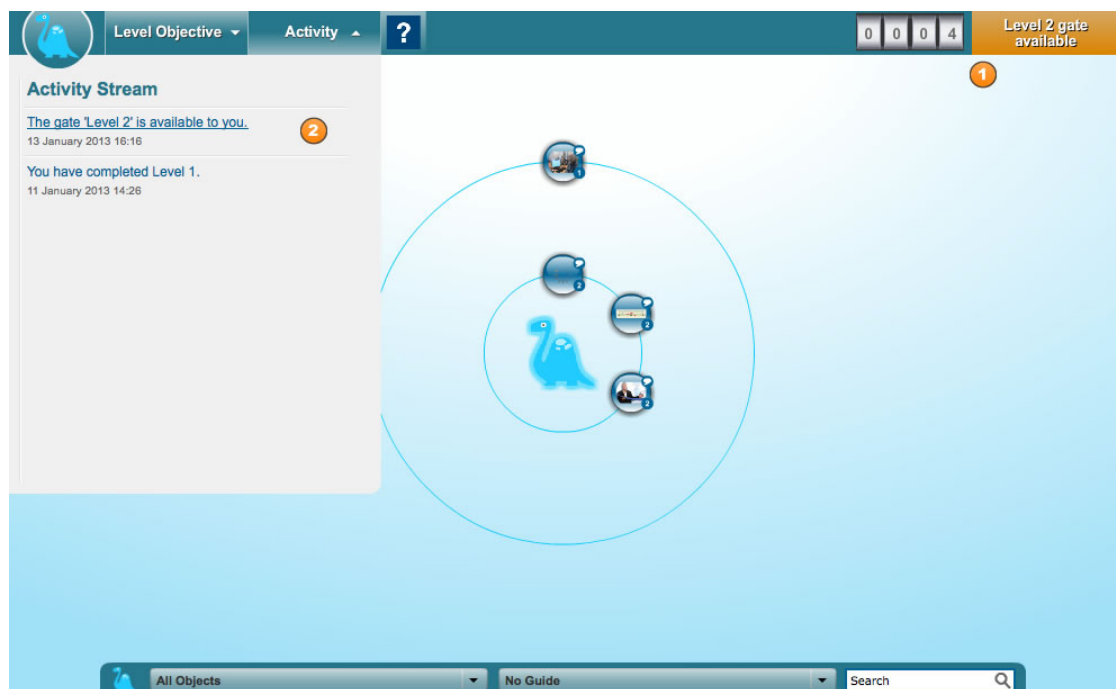


Figure 36: Seeing the latest activity.

1. The end of level gate prompt is shown in the top right hand corner, flashing orange.
2. It is also shown in the activity stream. To progress to the next level the user will need to click on either of these notifications to take the end of level gate.

1 Level 2

2 If you had a fairy wand and you could improve just one process at work (or failing that somewhere else) what would it be? Write a few lines about the process that you are going to sprinkle with your fairy dust!

3

4 13 Response(s) have been made to this question already.

End of Level 2 Test Return to Museum

Figure 37: Answering a Question.

End of level gates can be 1 of 3 types of question; A Multiple Choice Quiz (MCQ), a social response question or a contribution question. MCQ's consist of a series of questions with multiple answer options. The user must correctly answer the questions to a pass rate (set by the administrator) in order to mark the gate as complete and move to the next level. For contribution questions, the user must submit an object back to the museum, in the form of a link to a website, an uploaded file or a text file of their own creation. Having submitted their object, users are then shown other users answers and are allowed to 'vote up' the responses they feel are the best. Social response questions, as shown in the example Figure 36, pose the user a question which must be answered with a free-text response. Having saved their answer, the user is then forwarded to see all other users' answers and is again allowed to vote up the best responses.

1. The social response question is given a title, which is by default the name of the level to which it pertains.
2. The question is then posed at the left hand side of the page. Typically administrators will set a short essay question, requiring the user to write a paragraph or two in response.

3. The user then fills out their answer in this free text box before hitting the 'save' button to submit the answer.
4. Before saving their answer, the user can only see that a number of other users have already responded. They cannot see what these responses are until they have saved their own response.

The screenshot shows a web interface for a peer marking activity. At the top, it says "Your Playercard > Operations Management". Below this is a blue box with the question: "If you had a fairy wand and you could improve just one process at work (or failing that somewhere else) what would it be? Write a few lines about the process that you are going to sprinkle with your fairy dust!". To the right of the question is a text input field containing the answer: "I'd improve the heating process. Frankly it is too cold to work in these conditions." Below the answer is a counter that says "0 people appreciate your response." and a small orange circle with the number "1".

Below the question and answer is a section titled "Other Responses" with a counter of "2". It lists three responses:

- George Bailey** (2012-10-29 11:37:04): "I would improve the standardisation of our products and processes - we've got too much variety. This was shown to be true in the 4 V's analysis which we did at level 2. It is hard for us to process such high volumes of product whilst variety remains high. I want to work on a method that allows us to be flexible to customer demand, but allows a standard method." This response has 3 upvotes and 0 downvotes.
- Warwick Demo2** (2013-01-11 14:29:34): "IT procurement!" This response has 0 upvotes and 0 downvotes.
- Amanda Graham** (2013-01-04 15:43:29): "Use of skype with clients" This response has 0 upvotes and 0 downvotes.

At the bottom of the interface, there is a blue bar with the text "End of Level 2 Test" and an orange button labeled "Return to Museum".

Figure 38: Peer Marking.

Having submitted the answer, the user is taken to see others' responses (Figure 37).

1. Their own answer is shown at the top of the page, along with any votes they have received (at first this will be none, but users can re-visit this page in the future).
2. Other responses are then listed in vote order (from most votes to least).
3. Answers can be 'voted up' by using the up arrow. Answers cannot be voted down.
4. When the user is done reading and voting on other's answers, they click the 'Return to Museum' button to go back to the Curatr's Gallery.

Having earned the necessary experience points and passed the end of level gate, the game proceeds to the next level.

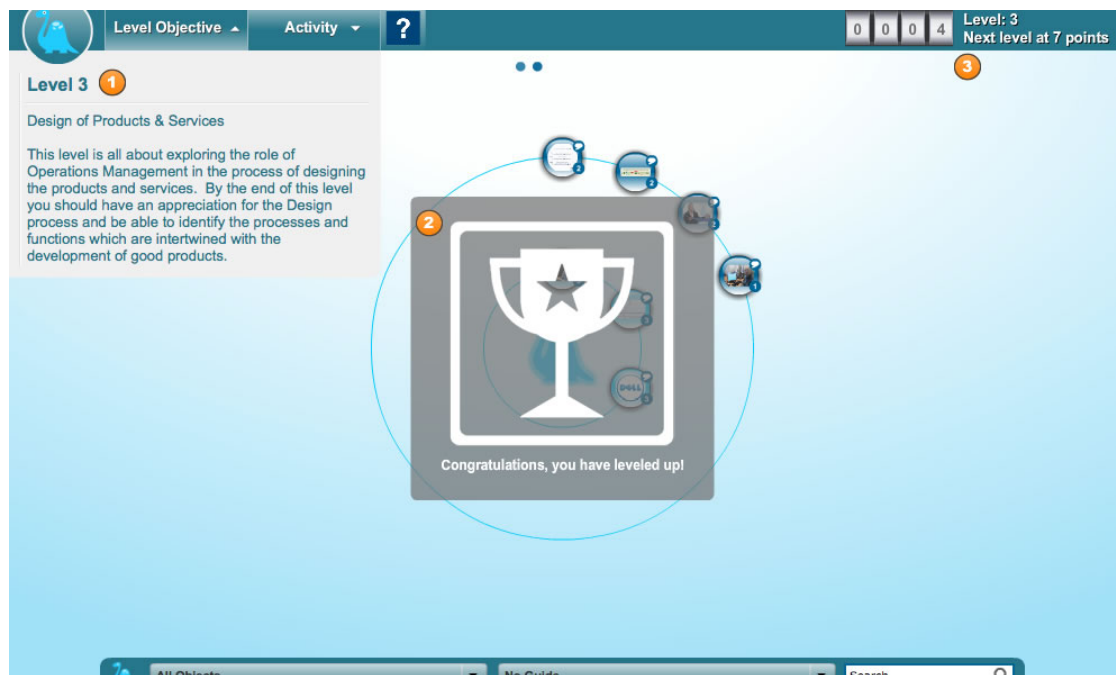


Figure 39: Level up!

As the next level begins a series of changes are seen on the screen (Figure 38).

1. The new level objective drops down automatically, informing the user of their task at the next level.
2. An award is displayed, telling the user they have leveled up.
3. The experience points counter now displays the number of experience points required to reach the end of the new level.

The Curatr's Gallery is also altered by the move up to the next level (Figure 39).

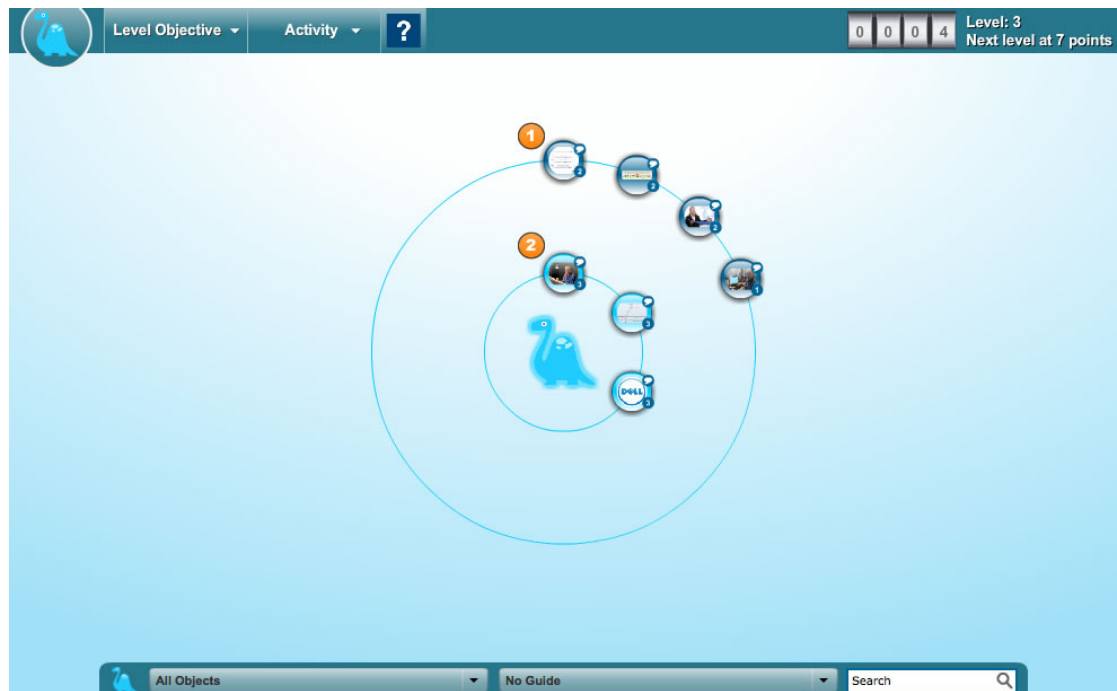


Figure 40: Visualising Levels.

1. Those objects at level 2 (the previous level) move out to join the level 1 objects in the outer concentric circle.
2. New objects at the now unlocked level 3 appear in the circle closest to the centre. The user will need to view and comment on these objects to earn the experience points necessary to reach level 4.

A users' progress within Curatr is logged on what is known as the 'playercard'. This can be accessed either through the menu options or from the playercard button in the top navigation bar.

George Bailey - Operations Management

George Bailey
XP Points: 19
Level: 6

Level 6

Awards George has achieved the following recognition awards in the Museum:

- First guide**: You have made your first guide
- First bookmark**: You have made your first bookmark
- 10 comments**: You have made 10 comments
- Top object**: One of your objects reached the top position in this museum
- Top 5 object**: One of your objects reached the top 5 in this museum
- Top 10 object**: One of your objects reached the top 10 in this museum
- 2 gates in a day**: You passed 2 gates in one day
- First object added**: You have added your first object

[View all 13 awards..](#)

Gate Responses Reflect on responses to end-of-level Gates and see other responses:

Show 10 entries

Name	Level	Type	Done/Passed
Level 2	2	Response	Yes
Level 3	3	Add Object	Yes

Showing 1 to 2 of 2 entries

Playercard [Return to Museum](#)

Figure 41: The Playercard.

Figure 40 shows the playercard for the user 'George Bailey'. Within the museum, this information is public to all other users.

1. A playercard is created for each museum the user is enrolled. In this case we are viewing George Bailey's playercard for the Operations Management museum.
 2. Information as to the number of points the user has earned and the current level they have reached is displayed.
 3. Awards that have been won through participation are displayed here. 50 awards are a part of Curatr by default and all are awarded automatically based on user activity and actions. Some are simple to achieve, such as adding your first comment. Others are much harder, for example, getting to rank #1 within a museum. Objects added by the user can also bring awards given that they are popular with other users. Each object added by a user is ranked according to how many views and bookmarks it has received. In George Bailey's case, he has added an object which at one point reached the 'most popular' spot in the museum – the 'Top Object' award.
 4. Responses to end of level gate questions are also viewable from the playercard. This can be a record of a pass in the case of an
- Changing the Model of Workplace E-learning: A Platform to Facilitate Autonomous Social E-learning for Adult Learners | Benjamin W. Betts

MCQ, or a link to view the answer given in the case of a social response or contribution question. These links allow players to go back and view the voting that has taken place on these types of questions.

Viewing others work in Curatr



Figure 42: The Peer View.

In order to directly view and collaborate with peers, users can access the 'peer view' (Figure 41). This visualises the complete cohort of a given museum. It is accessed either through an option in the menu button or by clicking the 'Curatr' avatar in the centre of the Curatr's Gallery.

1. The location notification shows 'Peers view'.
2. Peers are shown in concentric circles spiraling outwards from the Curatr, who is always positioned at 12 O'clock in the centre circle. Clicking on the Curatr's avatar from this location takes the user back to the Curatr's Gallery.
3. After the Curatr, other users in the museum are shown in a ranked order, starting in the 1 o'clock position. If the user has uploaded a picture to their profile, this is displayed here. If not, the users' initials are displayed. The position of a given user is based on their rank within the museum. Rank is assigned based on the amount of experience points a user has accumulated within a museum and how active they have been in the last 7 days. By default, the top 25 users in the museum are shown using this algorithm.

- The amount of users to display and the ranking in which they are available can be manipulated by the filter bar. Showing the top 10, top 25, top 50 or all of the users in a museum is possible based on the left-hand filter. The right hand filter allows the view to be changed from overall rank, to experience only (doesn't count activity) to activity only (doesn't count experience). Like objects, peers can also be searched.



Figure 43: Peer Dialog Box.

Clicking on a particular user shows the dialog box with more information (Figure 42).

- The users name, profile, picture and rank are shown on the left hand side of the box.
- Three options are available on the right hand side of the dialog box; view objects, view playercard and view profile. View objects changes the view to the Users Gallery (as described in Figure 43). The playercard and profile are summaries of the users' performance in the museum and further profile details.



Figure 44: Viewing a Peer's Gallery.

Figure 43 shows a user's gallery, George Bailey. This has been accessed by selected 'View Objects' on George Bailey's profile in the peer view.

1. The location notification reads 'Now viewing: George Bailey's Gallery.'
2. The objects available here are those bookmarked or added by the user George Bailey. They are again organised by level order in concentric circles. For those objects that have been bookmarked (not added), the same conversations will be present upon viewing the object as are available from the Curatr's gallery. The object has not been duplicated, merely referenced in to George Bailey's Gallery.
3. George Bailey's profile picture is at the centre of this view, much like the Curatr's was when viewing the Curatr's Gallery. Clicking on this picture will return the user to the Peer view.

Each user can create their own collections and guides independent of the Curatr.

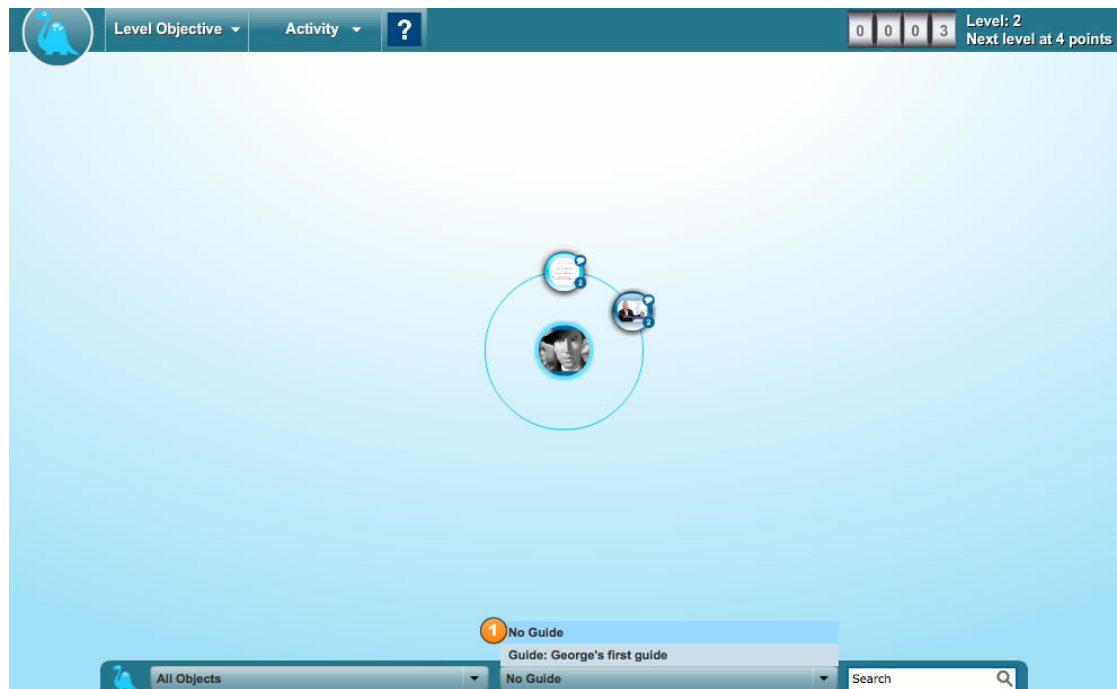


Figure 45: Peer-added Filters.

1. For instance, in Figure 44, the user George Bailey has created a guide of his own named 'George's first guide'.

Users can add objects at any time whilst using Curatr. This does not have to be in response to a gate question, it can just be a case of a user wanting to share a particular object with the rest of the cohort.

warwick demo - Operations Management - Objects Admin

warwick demo (edit) ?
XP Points: 4
Level: 3

1 Add Object

You can add objects to your gallery by clicking the relevant button below.

If you want to add a webpage, use the **URL** button. If you want to use a video or slideshow from another website (such as YouTube) you can use the **Embed Code** that these websites provide. If you want to upload a file from your computer, then select the **Upload File** button. Alternatively, you can make a page within Curatr by clicking on the **New Page** button.

2 URL Embed Code Upload File New Page

3 Your Objects

Objects that you have added (or bookmarked) to your gallery appear in the list below.

Show 15 entries

Level	Image	Name	Owner	Actions
No data available in table				

Showing 0 to 0 of 0 entries

My Gallery Admin [Return to Museum](#)

Figure 46: Managing User Contribution.

When adding a new object back to the museum, the user visits the 'Objects Admin' screen from the menu (Figure 45).

1. Adding an object allows a new piece of content to be added by URL, Embed Code, Uploading a file or creating a New Page.
2. Pressing the relevant button takes the user to the form which executes this request.
3. Previously added objects (including those added to a users' gallery by bookmarking) are listed in the 'Your Objects' table.

warwick demo - Operations Management - Objects Admin warwick demo (edit)
XP Points: 4
Level: 3 ?

Add Object

Add URL

Title (?) **Add object by URL** (3)

1

Description (?)

URL

2

Keywords (?)

Image (max 2MB)

(4)

Adding an object by URL allows you to enter a website address.

Your Objects

Objects that you have added (or bookmarked) to your gallery appear in the list below.

My Gallery Admin [Return to Museum](#)

Figure 47: Adding a Contribution

For instance, when choosing to add an object by URL (i.e. you wish to create a new node which links to a website hosted somewhere else on either the Internet or an Intranet) the form in Figure 46 is used:

1. A title and description is given to the object
2. Its URL is listed, along with at least 1 keyword. The image is optional.
3. At each step of the form, hint text is available from the right hand side, helping the user to understand what needs to be done.
4. When the form is complete, pressing the 'Add' button creates the object on the users' gallery. It is then accessible by other Curatr users within that museum.



Figure 48: Showing User Contributions on the Curatr's Gallery.

One of the best ways to publicise user added content is for the Curatr themselves to 'bookmark' that object. Just as occurs when a user bookmarks an object on the Curatr's gallery, when the Curatr does the same that object appears on their gallery. This gives a much higher level of visibility to user added objects as they become a part of the core content of that museum, as is shown by Figure 47.

1. Objects that have been bookmarked by the Curatr sit on a concentric circle outside that of other content to differentiate the user generated content from the original design.

Using Curatr on a tablet device

As the browser presentation layer of Curatr is deployed using Adobe Flash technology, the interface is not available for certain types of devices; specifically those manufactured by Apple such as the iPad. Because of this restriction it was necessary to create a second presentation layer that was fully compatible with such a device. Developed specifically for iPad, the iOS presentation layer is very close to the desktop browser experience. Because Curatr represents a novel interface and approach to online learning, it was thought unwise to ask participants to learn another iteration of the interface just for use on the tablet device. Some changes were necessary as Apple restricts the design of some components to those which are standard to the operating system, however, the look and feel remains close, as is demonstrated by Figure's 48 and 49.

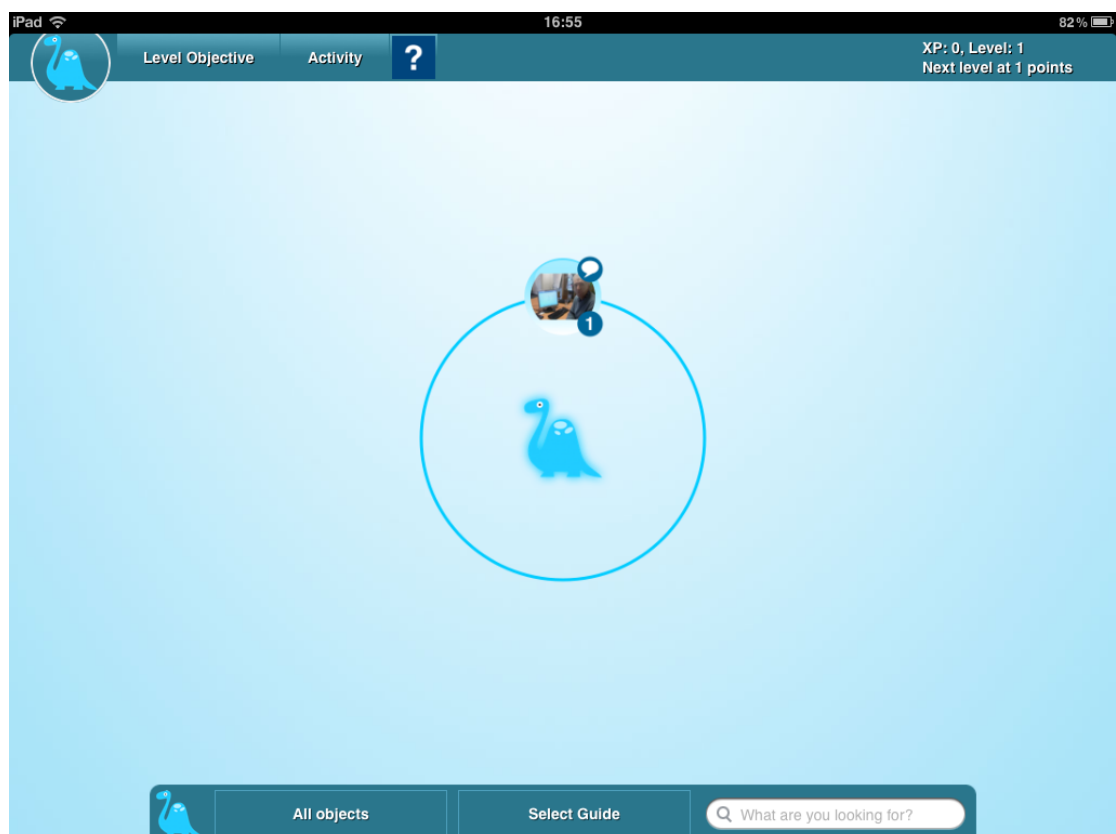


Figure 49: The iPad view of the Curatr's Gallery.

Figure 48 shows the Curatr's Gallery as it appears on the iPad. The concentric circles interface works well in a 'pinch and zoom' environment, where the user can directly manipulate the screen via touch. Only

cosmetic differences are seen in this screen; for instance, the experience points counter is now just a number instead of a counter.

Figure 49 shows the object view. Here the only noticeable difference is that the comments and description are now aligned to the left of the object itself. This view is common practice for the iPad and is known as a 'split-screen' view.

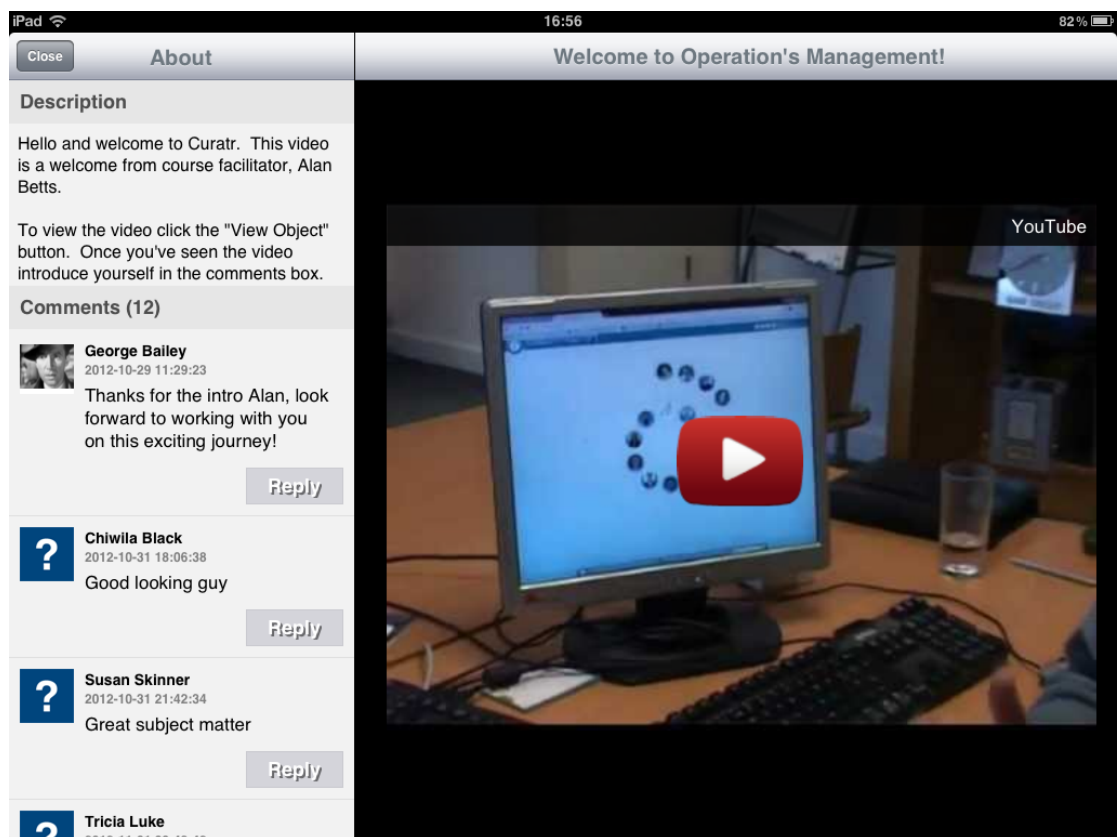


Figure 50: Viewing an Object on an iPad.