

ADOPTING LEARNING DESIGN WITH LAMS: MULTI- DIMENSIONAL, SYNCHRONOUS LARGE-SCALE ADOPTION OF INNOVATION

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Abstract

Learning Activity Management System (LAMS) has been trialled and used by users from many countries around the globe, but despite the positive attitude towards its potential benefits to pedagogical processes its adoption in practice has been uneven, reflecting how difficult it is to make a new technology based concept an integral part of the education system. In order to investigate and determine the elements that block the adoption of learning design tools in general, the study will review research papers that have been published in recent years on this subject, especially LAMS. The study will discuss patterns of critical aspects related to adoption of learning design tools and derive a framework that can be used in follow-up studies aimed at collecting relevant empirical data from practitioners to identify key progress measures of the adoption process. These measures may be used later to devise strategies that will see increased adoption of online learning design tools such as LAMS in school systems and higher education institutions.

Keywords: learning design, LAMS, adoption life cycle, social network, information cognitive structures

Introduction

Learning design is a “descriptive framework of activity structures that are designed following many pedagogical methods” (Dalziel, 2010). The most important promise of learning design is the sharing of good teaching and learning ideas (Dalziel, 2010). The Learning Activity Management System (LAMS) implements a learning design framework using open source for product development. The framework, the product and the platform architecture are based on the fundamental belief that progress is achieved through social sharing and creative participation. As with any other innovation, LAMS has been initially adopted by pioneering users who tried the product and identified their own innovative ways in which they use it in the context of modern professional practice (Christensen, Horn, & Johnson, 2008).

Broad adoption of learning design framework with LAMS depends largely on the spread of relevant knowledge throughout the teaching community. This study will focus on reviewing the literature published on LAMS and learning design and then discuss the findings and propose a framework for understanding of what works best for accelerated diffusion and broad adoption of learning design tools.

Method

This study will review papers published at LAMS conferences or elsewhere in recent years trying to identify markers that provide clues about factors that influence the adoption of LAMS in practice. The study will use as its starting point Spence's (1994) description of the spreading of innovative solutions as a series of steps: awareness, interest, evaluation, trial and adoption. The awareness, interest, and evaluation are part of the diffusion process where ideas are being discussed and opinions changed before actual action is taken to invest more time in evaluating and trying the new product. These three steps are very social in nature and they play a crucial role in reaching across a large user base. The last two steps in Spence's definition are considered together as one step in the adoption process.

The study refers to adoption of innovation as a general term in which new concepts are accepted and implemented into current practices with no consideration for detailed processes that need to take place in adopting organisations; this is what change management typically studies and it is outside the scope of this paper. This review will look at the adoption of innovation in a broad social context, rather than examine the product features and detailed aspects of technical design. Following the review, the study will identify patterns of adoption challenges and examine ways of conducting further investigations to improve the understanding of various aspects of diffusion and adoption of LAMS and formulating strategies for accelerating its adoption.

Learning Design and LAMS literature review

The review included articles published at LAMS conferences in 2010 (Dalziel, Chris, & Krajka, 2010) and 2011 (Alexander, Dalziel, Krajka, & Kiely, 2011) in which the issue of adoption or factors that influence adoption are discussed. The approach adopted was to review the research papers published in chronological order because there were no ex-ante criteria for grouping them. This approach has a practical advantage in that it eliminates any bias towards conclusions of what the perceived common challenges are flagged across the research

activities conducted by the authors of the reviewed publications. The intent was to demonstrate that while individual research efforts are specialised on particular aspects of learning design they share common challenges in regards to adoption. The observations made during the review process are pertinent to the issue of successful adoption and they are grouped below under headings that indicate the original focus of the research activities. The following Discussion section will interpret the observations and identify the main themes for adoption challenges. The Analysis section will go a step further and propose a conceptual framework for adoption of learning design tools that can be used for designing data collection strategies in subsequent research.

Learning Design and LAMS

In a study conducted at the Faculty of Education, Edith Cowan University, Eva Dobozy raises the issue of the difficulty in motivating students (pre-service teachers) to engage in deep learning using online collaboration tools (Dobozy, 2009). The study found that although the majority of students participated in the learning design tasks with LAMS, their contribution was presented mostly in form of simple statements. More sophisticated contributions in the form of inquiry-based argument or evaluative, evidence-based position-taking were represented in much lower proportion of the student contributions.

The study revealed that there are two aspects that have a big impact on the students' level of intrinsic motivation: the online activities are non-assessed learning tasks and the effort required to create engaging tasks using the online tools is very high, lowering their motivation. The research found that merely providing flexible online collaborative tools is not sufficient for motivating students when the tasks are not assessable to test their understanding of pedagogy, confirming the findings of Goodyear & Ellis (2007). One student said that he could not contribute more because he could not find a reason as to why he should spend more time on this task rather than on his maths assignment which was worrying him a lot more. He did not need to use LAMS, so he didn't, despite the fact that he liked it. The student's feedback had an impact on what the teachers think of using LAMS as part of their pedagogical toolset. The fact that LAMS is not included in the institution's formal requirements it makes it very hard for teachers to believe that the idea of adopting LAMS is feasible, despite the positive opinion about the product.

Sharing across communities

Sharing takes place in communities. Simon Walker and Liz Masterman conducted a study to investigate how teachers apply in practice their intention to share and re-use others' materials (Walker & Masterman, 2010). The study affirms that community based sharing needs to meet three essential requirements: the learning design is based on sound pedagogical principles, it promotes sharing of expertise, and it supports the community through available support services. It was found that sharing works effectively in small communities of practice (as defined by Wenger (2009)), where members know each other very well and have many face-to-face interactions. In the context of large online communities (Hung and Nichani's 2002a "quasi-communities") where members are scattered around the globe it is difficult to instil a culture of effective sharing and reuse practices. To compensate for the low level of social ties between members of quasi-communities, Walker and Masterman propose the use of the CAMEL (Collaborative Approaches to the Management of E-Learning) model where teachers are offered "scaffolding" into the practice of sharing. The research indicates that teachers have a preference for using the models as an inspiration for creating learning designs that suit their own style and context rather than simply copying the shared samples.

Learning Design templates

Cameron (2010) discusses the use of generic learning design templates for sharing and reusing good practice. Although there is a strong argument for and expressed interest in reusing practice exemplars, teachers are often reluctant to use expert advice. Heathcote (2006) found that a major obstacle to teacher adoption of learning designs is an insufficient level of pedagogical understanding required to make use of resources. Although the value of sharing is well understood and accepted by users as a way of saving time and effort, "technical" barriers prevent it from happening at a larger scale (Philip & Cameron, 2008). The barriers include an inability to easily customise the learning designs and difficulty in searching and finding resources.

Research studies that were considered under this review confirm the view that reusability is effective when shared learning designs are well specified, have a good pedagogical scaffold and they can be re-used by adapting the resources (Boyle, 2006) or use them as design models (Philip, 2007). Laurillard & McAndrew (2002) suggest that learning designs are more transferable if they are not de-contextualised and have sufficient detailed information regarding the learning conditions. It was also found that sharing and reuse work better if users provide honest feedback attached to shared learning design not just positive commentary.

Cameron (2010) notes that the current expectations of teaching practice require teachers to master a variety of techniques and adapt them to a multitude of learning conditions in a challenging environment characterised by budgetary constraints and diversification of students' cultural background. This in turn demands the adoption of pedagogical guidelines in the production of shared learning designs through the use of planning tools, the production of generic templates that can be easily adapted, and quality content. While the use of generic templates increases productivity it may be difficult for educators to interpret the intent of the templates (Bennett, Lockyer, & Agostinho, 2004) and their excessive use runs the risk of students becoming bored because of repetition.

Adoption of LAMS

From its inception in 2003 LAMS has grown continuously and by April 2010 it had been used in over 80 countries, translated in 30 languages and its community had 5,753 members with over 500 shared designs (Dalziel, 2011). The idea of sharing ranks high on the wish list of many teachers as it is often revealed whenever during interviews or workshops they are asked what would be most helpful for them in learning how to make better use of technologies (Beetham & Sharpe, 2007). While the interest is high, LAMS is seen as a niche rather than a mainstream technological product and successful trials have not led to broad systematic adoption (Masterman & Lee, 2005). In the practitioner trial of LAMS conducted over 8 months, Masterman and Lee (2005) found that although the system is capable of supporting a range of pedagogical approaches, there are obstacles posed by the technical and cultural issues, particularly the increased work load associated with the adoption.

Diffusion of Learning Design through professional social networks

In an attempt to encourage the sharing of ideas, designs and resources the Open University UK (with support from the Joint Information Systems Committee - JISC) have created a social networking web site called Cloudworks (Galley, Conole, Dalziel, & Ghiglione, 2010). One of the objectives of the web site was to promote sharing of learning designs.

Cloudworks has concentrated its development effort to address two issues that prevent productive sharing from occurring: allow LAMS sequences to be ported to external web pages and identify the best learning design "pedagogical wrapper" for providing contextual information to practitioners who want to re-use LAMS sequences. Research on Cloudworks has identified aspects that have an impact on the quality and ultimately on the likelihood of sharing to occur: matching the user's needs, usability, presentation friendliness, level of detail

(Conole & Culver, 2009; Conole & Culver, 2010), and the perceived sustainability of repositories.

Cloudworks has been built around Engeström's (2005) object-centred sociality concept which is based on the idea that objects are at the centre of developing new social networking services. In this case, the object is a "Cloud" defined as content related to learning and teaching. The social aspect is given by bookmarking, feedback, and tagging features which were designed using Bouman's (2007) framework and Conole & Culver's (2009) theoretical underpinnings.

The Cloudworks project team concluded that a LAMS "pedagogical wrapper" improves the experience of sharing case studies of good practice, networking and discussing ideas with others. The wrapper would include essential details describing the shared LAMS design: context, transferability, academic references, and reflections of the designer, links to other designs, supporting resources and to technical support and glossary of terms.

Pedagogical properties of Learning Design

The sharing of professional practice through learning design can be enhanced if it is based on patterns that encapsulate the critical pedagogical properties of the design (Ljubojevic & Laurillard, 2010). Without a pedagogical model it is very difficult to establish a common set of references needed in the dialogue of practice sharing. Ljubojevic & Laurillard (2010) created the Conversational Framework as a set of requirements of what it takes to learn and used it to build representations of pedagogical patterns for learning designs. Good learning design rules can be categorised by source: theoretical, practice or patterns of learning design or by contributing elements of design: epistemological, curricular or logistical (Koper & Tattersall, 2005).

Ljubojevic & Laurillard (2010) argue that the sharing professional practice needs to consider the fact that pedagogical approaches are influenced by theories of learning which are reflected in the classroom activities. There are differences between various theories of learning which could be grouped into categories such as natural learning (Theory of Learning) and instruction based learning (Instructional Design Theory) (Reigeluth, 1999), (Simon, 1996). The theories of learning need to be operationalised by expressing them in terms that not only help understanding the "how", but also in terms of "why", so that teachers can adapt models to particular conditions

A three year project titled "A Learning Design Support Environment (LDSE)" to create a pedagogical pattern template for design description called *learning score* that can be

used to encourage sharing by using 14 cognitive activities and a set of standard meta-data fields that promote a protocol for documenting design practices using online tools such as LAMS (Ljubojevic & Laurillard, 2010).

Adoption of innovation by institutions

Fresen (2010) found that the factors that influence the successful implementation of web-supported initiatives could be grouped in a taxonomy with six categories: institutional, technical, pedagogical, instructional design, lecturer, and student. A useful alternative view of how the lecturer views the adoption of technology in education in the context of personal attitudes is offered by placing the taxonomy in the context of the cognitive information retrieval theory (Fresen, 2010). The generation of information is based on institutional, instructional design and technology factors, while the reception of the information (and its use in the pedagogical process) is based on student, lecturer and socio-organisational environment factors (Ingwersen, 1996).

Learning Design tools usage patterns

A survey of 68 teacher education students showed that learning design is not uniformly understood, with perceptions ranging from misconstruction to highly developed understanding (Bower & Wittmann, 2010). The study discovered that pre-service teachers need technical training on how to use the tools but also they need training to help them understand how to use the tools to achieve pedagogical goals. The two hour lab-based tutorial was not sufficient to give the technical and pedagogical skills needed to create learning design for activity-based lessons and long term courses.

Learning Design for teacher education students

A study that looked into how pre-service students learned to use ICT tools for learning design by undertaking a course aimed at teaching technical skills in a pedagogical context found that the course has long-term value if it promotes generic technology skills and if the students are introduced to a broad range of related philosophical and pedagogical issues that arise from the integration of technology into the classroom teaching and learning processes (Campbell & Cameron, 2011; Oliver & Herrington, 2002). It was found that the lack of practicum experience has a negative effect on the learner's ability to connect the theory to the reality in the classroom (Loughran, 2007).

Discussion

The review of research studies on learning design framework and adoption of learning design technology shows patterns of overlapping adoption challenges themes that broadly identify major areas of concern. Many studies on this topic considered in this review confirm the existence of a consensus among teachers that sharing of practice exemplars with online tools is very useful in becoming more productive. The productivity increase would be achieved by being able to reuse learning designs, lesson plans and new pedagogical methods from a vast pool of shared resources. Each reviewed study reveals particular aspects of successful implementation, but they also highlight specific issues that have prevented a full adoption of LAMS. These studies complement each other and they can be used in combination to create a more comprehensive image of the overall adoption life cycle.

Previous work by Moore (2002) demonstrates that a very small proportion of the population (2.5%) are innovators who will experiment using new technologies, followed by early adopters (13.5%) who will use the new technologies with little or no support. Newton (2003) conducted extensive research in UK confirming that “developments are often led by the enthusiasm of individuals with little extrinsic reward structure to encourage these innovations”. The adoption of technology by the majority customers requires substantial support in form of end-user support groups, guides, consultation sessions, and demonstrations (Moore, 2002).

In general, adoption is accelerated when the users perceive there is a clear long term benefit from using the innovative product and when the network effect is occurring (Teece, 1986). Wider adoption of online learning design tools will be reached when the overwhelming majority of teachers can access online a large number of learning design resources, understand the conditions in which they have been created and applied, easily reuse them as-is or modify them to suit specific pedagogical conditions, and share their experience using broadly accepted pedagogical terminology and data structures.

The act of sharing and the adoption of online tools that facilitate sharing involve several aspects which were considered by various research studies. If we group these aspects by distinct discipline domains, we would be able to simultaneously investigate what works within each domain using specific frameworks and explore the relationships between the domains that impact the adoption as an overarching process. We could use domain specific research tools to answer narrower research questions in further studies aimed at producing strategies that can be used concurrently for achieving full adoption. In this way we can avoid the temptation of trying to accelerate the adoption through the lens of one discipline. For

instance, perfecting the pedagogical framework in isolation will not be sufficient to trigger full adoption.

As a result of the review described above, this research identified four domains that cover the major areas of the adoption of online learning design sharing tools: innovation adoption life cycle, social sharing, cognitive structures, and professional development.

Innovation adoption cycle

Moore's theory of adoption life cycle of disruptive innovations built on earlier work of Rogers (1995), is based on statistical analysis of data collected from many industries that describes the process of adoption solely from a quantitative perspective: time and number of users adopting a particular innovation, regardless of the industry in which the innovation occurs. He suggested that a critical stage in adoption of innovation, which he calls 'the Chasm,' is the transition from first two adopter groups and the early majority (Moore, 2002). This is an excellent tool that allows us to objectively evaluate the adoption stage of LAMS, however it doesn't tell us what methods we should use to accelerate the adoption or what are the reasons why adoption follows a certain path. Based on same historical data, Christensen proposes the use of an additional tool, 'the Substitution Curve,' which indicates if a particular innovation is on the right adoption track (Christensen, et al., 2008).

Social dimension

Adoption of online learning design tools takes place in a social context. The role of social interactions is even more important when a new field is rising, as in the case of learning design, and when the practice hasn't reached yet the level of broad consensus. This domain uses tools that are specialised in understanding social interactions, organisation and behaviour of communities, digital network structures and group behaviour in large digital communities. The social models and tools are very useful in understanding the diffusion and ultimately adoption of innovation embracing lessons learned from other domains of human activities and apply them in the context of teaching and learning design.

Cognitive dimension

The vast opportunities for sharing, the participation of community members in the role of content creators and content users, diversity of contexts in which learning designs are applied, the variety of institutions, policies and socio-economic and cultural backgrounds, all of this poses significant challenges from the point of view of the organisation of knowledge, access,

discoverability, presentation and processing. To respond to this challenge we need to define a model for cognitive structures that support the generation of information, creation of a clear communication interface and the effective use of information in the socio-economic, cultural and institutional context in which the user operates. The work of Ingwersen on the cognitive and information retrieval theory (Ingwersen, 1996) could be applied to create methods and tools that help address challenges specific to this dimension.

Professional dimension

This dimension is deeply anchored in pedagogy. This is the core that represents the interest, the problem and the solution for the end-user as a teacher, as a principal, as a learning consultant, everyone that wants to use the online learning design tool for the purpose of solving a teaching and learning problem. The challenge of this dimension is that it needs to respond to the users' needs in a specific pedagogical context, while at the same time it needs to present the contribution of the many practitioners in a generic pedagogical frame that can be easily understood and adapted for local use. The pedagogical aspect has been widely considered in the research reviewed in this study and it is identified as a critical element in the adoption of learning design tools. The professional dimension is about supporting teacher's desire to improve the professional performance and use the learning design tools in alignment with formal pedagogical requirements. This brings the confidence that the effort invested in adopting the tools are also beneficial for personal career as they are for the institution in which teachers operate.

Analysis

Among the four identified domains, the innovation adoption life cycle is fundamental; it describes the process of broad learning design adoption – the key goal of this field. The other three domains describe specific conditions that need to be met in order to successfully take the learning design tools, such as LAMS, from innovators stage to complete adoption. Based on the literature reviewed, most of the past effort has been channelled in discussing the adoption process without addressing holistically the issues specific to each of the other domains.

This study proposes an adoption framework based on the view that that adoption takes place in stages where milestones are achieved in the context of individual domains in a quasi-synchronised manner across all four domains: innovation, social, cognitive, and professional (see Figure 1).

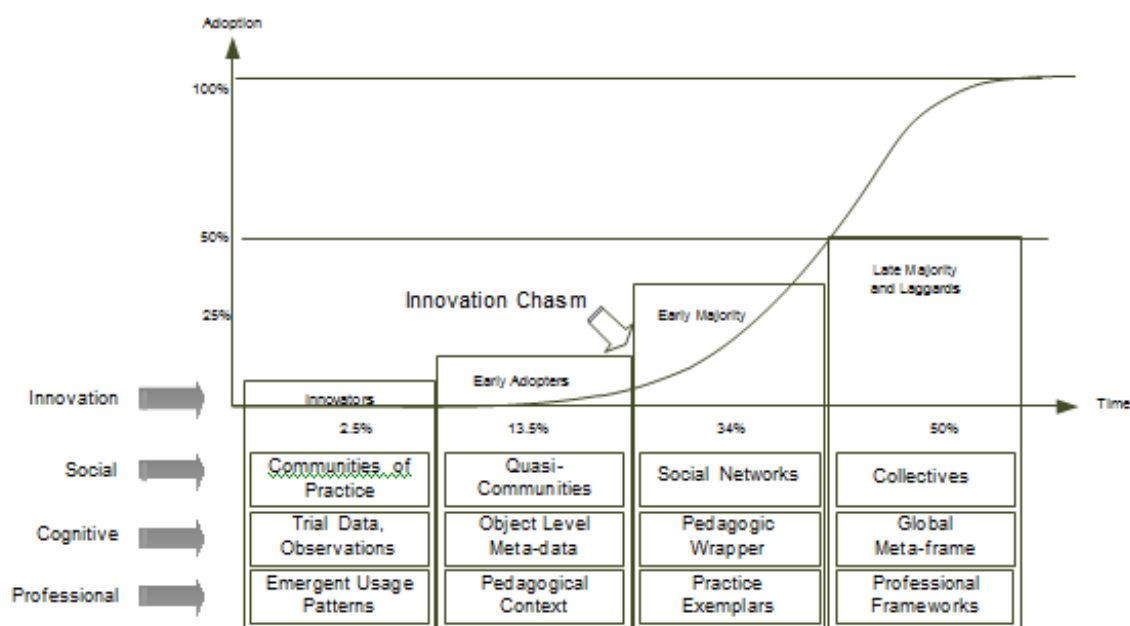


Figure 1

The synchronisation reflects the interdependence between the domains. Thus innovation cannot advance to the next level of adoption and impact if the ideas are not diffused in social networks at required depth, if the generation of information and the use of information don't have the appropriate cognitive structures and if the innovation is not reflected in an adequate pedagogical form.

Innovators stage

The earliest stage occurs in a community of practice, as defined by Wenger (2009), where the focus of its members is innovation related activities involving a very intense process of collaboration, face-to-face interaction and execution of tasks aimed at reaching a high risk innovation goal. The innovators try new products, services and concepts transforming the current practice.

The explicit cognitive structures are not fully developed at this stage as the generated information is shared based on trust and implicit rules borne out of a long history of cooperation, face-to-face interaction and ad-hoc creative activities. Trial data and related observations are generated and presented in pedagogical terms and other minimal cognitive items to be shared through mostly informal conversations among members of community of practice.

Professional practice relies on the knowledge and skills of members of community of practice who learn by doing and participating in the innovation process. The innovators may

share the acquired knowledge and experience with the broader professional community and interact with others interested in the new development.

Early Adopters

Walker and Masterman (2010) found that small communities of practice are early adopters of innovation. It is important to make the distinction between the communities of practice of innovators and early adopters. The early adopters are part of a network of distributed communities that are loosely connected aiming at adopting new tools and processes made available by the original innovators. The networks are referred to by Hung and Nichani as quasi-communities characterised by loosely-knit relationships, bound by indirect explicit flow of information, with members largely unknown to each other and in general exhibiting low organisational trust (Hung & Nichani, 2002a). The online quasi-communities are built ad-hoc in spaces created by a hosting public infrastructure, which could be generic (wikis, Yahoo, Facebook) or more specialised (LAMS communities, CloudWorks).

The characterisation of learning in a community of practice by Hung and Nichani: learning is demand driven, it is social, and it is identity forming. These characteristics may be used to differentiate between formal school learning communities and “real-life” communities, as Hung and Nichani refer to (Hung & Nichani, 2002b). Teachers join the quasi-communities because of their intrinsic motivation, seeking to learn and be inspired by what they find, cultivate relationships with other members based on common interests and needs, and in the process share their own experience.

The artefacts generated by innovators need to be gradually organised distinctly as an information source made available to others through an interface that communicates messages in a linguistic form with lower semantic levels (Ingwersen, 1996). This loss of meaning is a barrier to adoption which requires attention because this is where teachers need to invest effort in using cognitive structures based on their perception and interpretation of their current cognitive state to access information necessary to perform their pedagogically contextualised work-tasks. Early adopters in quasi-communities need to have cognitive structures to help them access effectively the information that matches their needs and use it for problem solving purpose.

Social cognitive structures raise the level of trust in quasi-communities through an open and transparent feedback system that participants can use to rank learning design objects, providing commentary and making recommendations (Cohen & Prusak, 2001). Over time these cognitive structures will build implicit trust similar to organisational trust that

binds together members of communities of practice (Hung & Nichani, 2002a). Based on previous observations, the study recommends that the architecture of the learning design tools embeds cognitive structures for learning design information and social interaction in the product and into the product platform, because this will lead to increased adoption. If the cognitive support is low, early adopters will use the learning design tools and attempt to integrate them in their practice, but they will find it is difficult and time consuming to discover the appropriate resources and re-use them effectively and they are more likely to discontinue their effort of adoption.

Shared learning designs need to be based on sound pedagogical principles (Walker & Masterman, 2010) which should be supported by the learning design tools. As the online tools are adopted by an increasing number of users, a professional framework needs to be put in place for two purposes: 1) to educate users about learning design based on pedagogical principles, 2) to facilitate adoption in alignment with pedagogical goals set at institutional level. Pedagogical techniques need to be shared online and linked to learning design objects to enhance the sharing and re-use experience (Cameron, 2010). Where clusters of users are formed resembling communities of practice within the larger quasi-community, focused professional support can be provided through face-to-face meetings lead by leading innovators and experienced users. These demand driven problem-solving educational sessions can be organised using an approach such as CAMEL (Masterman, Manton, & Balch, 2008) that offers scaffolding of the practice of learning design, sharing and reuse.

Early Majority

The critical moment in the innovation adoption life cycle occurs when the innovation has been trialled, tested and it is successfully used by early adopters with positive results and an increasing number of users are attracted by the benefits that result from the implementation of the innovation (Moore, 2002). The gap between the two stages of adoption, which Moore calls Innovation Chasm, represents a jump in the adoption rate from 16% to 50% with transformational impact on the professional practice.

The social context in which large-scale adoption occurs in an online world undergoes some significant changes. The term quasi-community gradually becomes an inaccurate description of the user base because the participants have higher expectations from their interaction with the community in the sense that the community needs to be richer and offer more opportunities for learning and for easily finding resources needed to solve their problems. We use the term “social network” based on the term “network” from Dron and

Anderson (Dron & Anderson, 2007) to describe the social nature of this type of online community, but add a professional element to it as we are referring to a community built around the use of learning design tools in particular and pedagogy in general.

A social network is a system that emerges from quasi-communities of successful early adopters with new members joining in according to their professional interest, need, and desire to learn from and meet new colleagues. The formation of the social network is borne out of necessity because it is one of the fastest platforms for sharing objects of interests, knowledge and skills and learning through the experience of others. It is assumed that by now the tools (products) have reached a higher level of maturity based on the feedback and experience accumulated at earlier stages. The social network encourages the participation of its members through reward mechanisms with multiple benefits: peer review/ranking and recognition of both formal and informal contribution, learning, and identification of professional opportunities (Dron & Anderson, 2007).

The embedded reward mechanisms encourage further the sharing and re-user of learning designs and templates. The identity formation through social acts lead to formation of ad-hoc groups based on affiliations helping users learn “about” (how do I do this task) and “to be” (who am I, who do I want to become and interact with) influencing their personal formation and professional development (Brown & Duguid, 2002). This thinking takes the social network beyond Engeström’s object-centred sociality concept (Engeström, 2005) because it highlights the importance of the social element that motivates the individuals to join a community. The networks with identity-centred sociality have better opportunities in maintaining vibrant communities where members converse about new ideas and share not only objects but their experiences as well. The success of adoption through a social network depends largely on the level of trust that forms as social capital accumulated over time (Cohen & Prusak, 2001).

Despite advances in technology, human interaction in a social context is still needed to learn complex knowledge, especially implicit knowledge that cannot be fully described and stored explicitly in digital form (Polanyi, 1962). Consequently, this makes even more important the role of the deep diffusion in highly trusted social communities where discussions of issues and sharing of information can help address problems that escape even the most careful system design.

Large scale adoption of learning design tools requires sound pedagogical principles as a foundation for sharing of learning designs (Ljubojevic & Laurillard, 2010). The development of the pedagogical framework needs time and involvement of participants from

various educational jurisdictions to create rich general pedagogical structures that can be used as a starting point for localised adaptation and as support for professional development programs. Further research is needed to investigate acceptable forms of pedagogical structures to accompany learning designs representations (e.g. the application of the Conversational Framework to patterns described in the LDSE project).

Late Majority and Laggards

Adoption at this stage is a continuation of the adoption process in the Early Majority stage. Depending on the size of the social network, its evolution creates historical data and behaviours that may lead gradually to the formation of Collectives, which are aggregates based on actions taken by individual members (Dron & Anderson, 2007). This could be referred to as collective intelligence and it manifests as emergent behaviour. At this level the social interaction between members is rich and fluent and strong relationships are formed between members based on interest, likes, professional affiliation, location and type of institution. It is too early to say how a network of teachers sharing learning designs could evolve, and if it will evolve in a fashion similar to Facebook, Google +, Quora or other current networks.

Deep penetration of innovation requires substantial professional and technical support (Moore, 2002). If experience of any other products and services with large scale adoption can be used as an indication, support needs to have centres of dedicated human resources who will ensure the efficient operation of the learning design platform within educational organisations.

Conclusion

This study reviewed published literature on learning design tools in general and LAMS in particular to identify issues that affect the adoption of online learning design tools in pedagogical practice.

The study proposes an adoption framework in which the adoption life cycle is considered in the context of three dimensions: social, cognitive and professional. Using Moore's (2002) definition of innovation adoption life cycle as a guiding map, advancing from one stage to another occurs when conditions evolve synchronously within each of the three dimensions.

The study emphasizes the importance of placing the product development and adoption of new ideas in the right social context. Each stage of adoption occurs in the context

of certain types of community structures. Products and online platforms should have embedded social features that match the community type of the audience they are addressing. The notion of trust and identity formation also needs to be considered in further research.

Using LAMS as a case study, a potential research path would be to conduct follow-up studies with enquiry strategies customised for each stage of adoption by carefully designing surveys and questionnaires aimed at collecting data in each of the three dimensions in the proposed adoption framework (Figure 1).

The collected data will be used to refine the framework and create instruments that can be used to evaluate the adoption process and issue strategic recommendations for product development and support initiatives. The same instruments could be used by end-users to evaluate the quality of adoption in which they have an interest and make decisions regarding the timing and the size of the effort they intend to invest in adopting a particular innovation.

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