

Learning for Doing: Designing Instructional Games for the Workplace

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Abstract: While learning games have received a large amount of attention and research in the last few years, there is still a large gap with regard to workplace learning. Very little literature is available that aims to develop a set of design principles specific to a learning setting that differs significantly from traditional classrooms. Therefore, the goal of this work is to elicit discussion on the design of game-based learning for the workplace, as well to encourage research in this crucial, but often forgotten, learning setting. In this paper I first consider these differences and examine the joint media engagement (JME) framework as it applies to the workplace. I then examine existing literature on game design and use in the workplace. Based on this literature, I propose a set of design principles for workplace-based instructional games based on the joint media engagement (JME) framework.

Overview and purpose

Virtual worlds and digital games provide new opportunities for learning content in a wide variety of fields and experience levels. Although these tools provide great potential in classrooms and informal learning environments (such as museums), perhaps the greatest potential lies in workforce training. Simulation of workplace situations, regardless of level of fidelity, can provide suspension of disbelief for users, allowing them to be engaged in learning the skills necessary for their occupation (Bauman & Wolfenstein, 2012b). Despite the opportunities in workforce training, and some research on individual interventions, there is little in the research literature examining or seeking to develop a set of design principles for using digital games and virtual worlds as instruction in this type of setting. Therefore, this paper examines how to best design these tools for instruction in the workplace.

In this paper, I focus primarily on a review and synthesis of game/virtual world design literature, considering both principles developed in other learning environments and applications and needs within the workplace, with a particular focus on healthcare fields due to the amount of work already being done in clinical education. I first consider workplace learning as learning for doing within the situated cognition perspective before discussing the joint-media engagement model as it applies to workplace learning. The next two sections describe my review of the literature and the evidence gathered. I then argue for five instructional design principles for games in workplace learning based on the available literature and the JME perspective. These principles produce instruction that is: user-oriented, collaborative, easy-to-use, has specific goals and immediate feedback, and involves learning for doing. Finally, I discuss the importance of these principles, and future research needed.

Perspectives

Learning for doing in the workplace

In many ways, classroom and workplace learning are similar. Both include learning content that will be applied at some future point, often in relatively formal settings. However, there are distinct differences that necessitate a different focus for the workplace. First, the community involved in is often very different. Students in a school are engaged with typically equal-level peers also enrolled, while the workplace community has highly varied skill and experience levels. In a workplace environment, these highly varied community members are working toward a common goal, as opposed to the purely individual goals of each student in a classroom. Le Maistre and Paré (2004) further point out that work division is completely different. While schools may actively discourage collaboration as a form of cheating, collaboration in the workplace is absolutely necessary.

Perhaps more important, however, is the direct outcome or objective of the learning. In a school activity, students engage with texts and instructors to understand theories or methods, with the goal of learning being just that: learning. On the other hand, in a workplace environment, the focus of the learning is very different. The expectation is that learners already understand many of the theories and tools available to them (Le Maistre & Paré, 2004). Regardless of the field, the desired outcome of workplace learning is not knowledge of a theory, but the direct application of learning to that field, whether that means treating injuries or fixing a power line. As with classroom-based clinical education, workplace training aims to give learners “valuable experiences to build on” as they move forward (Bauman & Wolfenstein, 2012a, p. 7). Games and simulations in particular can provide this sort of lived experiences more effectively and consistently than existing tools (DeVane & Bauman, 2012). Further, although this type of learning is often a challenging to incorporate in schools (Collins & Halverson, 2010), learning in the workplace is inherently focused on learning skills, simplifying implementation.

Another aspect of workplace learning that particularly favors the use of digital games and other multimedia is the ability for flexible delivery. There is no need for everything to be learned within the confines of a particular classroom at a particular time of day. Instead, designers can, and should, take advantage of outside learning opportunities and methods of delivery that allow learners to engage with content when they are able (Smith, 2003). Digital games and virtual worlds may be accessed from a variety of locations at any time, widening the range of environments exposed to and potentially easing transfer.

Joint media engagement in the workplace

Thus far, three major ideas related to workplace learning considered have been collaboration, flexible delivery, and learning for doing. Within the framework of situated cognition lies the goal of learning through joint media engagement (JME). This viewpoint is particularly focused on learning through games and other multimedia tools, and seeks to engage learners with others in solving real problems in a wide variety of locations. As Takeuchi and Stevens (2011 p.7) described it, JME “refers to spontaneous and designed experiences of people using media together...anywhere and at any time.” Although much of the research focuses on informal learning environments, the JME goals fit very well with workplace learning. Many of the goals described by Takeuchi and Stevens (2011) are relevant regardless of the content or focus. Their goals indicate what the designer hopes to achieve, but do not necessarily indicate a particular design. These goals include mutual engagement (collaboration), dialogic inquiry, co-creation (working together to solve problems or create innovations), boundary crossing (including time and place), intention to develop (including a growing skill level), and an interface that allows a focus on the content (Takeuchi & Stevens, 2011). Mutual engagement and co-creation speak to the collaboration necessary in the workplace, while flexible delivery is discussed as part of the boundary crossing goal. Finally, developing and creating new skills directly correspond to learning for doing.

Methods

As this paper is primarily a synthesis of available literature, the methods focus almost entirely on the review of literature. In this case, I began with a situated cognition focus and used foundational instructional design literature as a theoretical base. Those articles with a focus on game-based learning were especially relevant, as well as those providing description of design, implementation, and evaluation of such tools. From there, I moved my search to workplace settings where such interventions had been used. Much of the available literature focuses on healthcare work in particular, but the overall design principles remain the same across fields. Using the JME engagement framework as a starting point, I considered what goals were especially important in the workplace and consistently met by successful interventions both in workplace and other learning environments.

Data sources

The evidence for this paper’s argument comes primarily from the research literature. Background references provide a foundational picture of digital instructional design, while additional sources primarily provide contexts in which games and simulations have been used in the workplace. By comparing the two sets of literature (foundational and contextual) it is possible to see what specific characteristics line up. In other words, where the goals and principles expressed in the foundational literature are seen consistently in successful cases (contexts), a new set of design principles forms.

Results

Perhaps the defining characteristic of workplace learning is the goal of learning for doing. In this section, I present five design principles for achieving that goal based on the literature considered. Many of the principles are applicable in varied learning environments. Each principle, however, has grounding in previous research and can be applied directly to the design of game-based instruction for workplace learning. These principles include: user-oriented learning, collaborative learning, specific learning goals, immediate feedback, and easy-to-use interfaces.

User-oriented learning

This first principle indicates a focus in design on the specific users involved. JME goals call explicitly for user-driven learning (Takeuchi & Stevens, 2011). Considering the varied goals between school and workplace learning, designers must consider the specific types of users that will engage with their tool. A focus on theoretical concepts in the workplace, while potentially helpful as a refresher, will do little to prepare learners for direct engagement in the tasks required of them (Le Maistre & Paré, 2004). Instead, workplace games should be focused on providing a consistent set of experiences directly related to the task(s) being learned (Bauman & Wolfenstein, 2012b). Among the user-specific characteristics to consider are a focus on doing some task after learning, a common goal for all

users, and a flexible learning/delivery schedule (Smith, 2003). Relevance to the actual workplace is also incredibly important. A virtual world or game, no matter how in-depth or useful, will not be used if learners cannot see ways in which it can be used (Luse, Mennecke, & Triplett, 2013).

The success of user-oriented learning can already be seen in workplace games. Existing workplace games that focus on the specific situations learners may find themselves in are especially powerful. These include such workforce games as GAMMA-EC (Stolk, Alexandrian, Gros, & Paggio, 2001), an environmental crisis management game developed to improve decision-making and communication in an emergency. GAMMA-EC, even with relatively low fidelity, allows learners to experience realistic problems that they may have to face throughout their career, such as wildfires or chemical spills. Similarly, successful experiences have been crafted within existing worlds like Second Life that model situations paramedics may find themselves in (Conradi et al., 2009), creating valuable and applicable learning.

Collaborative learning

Included in this set of principles must be a consideration of collaboration with other community members. Simply put, collaborating with others improves our learning, and their experiences and interpretations can provide us with new ways to examine and solve problems (Gee, 2008; Takeuchi & Stevens, 2011). Existing games already take advantage of collaborative designs in order to strengthen learning, build communities, and aid transfer. Games like Futura (Antle et al., 2011) and GAMMA-EC (Stolk, Alexandrian, Gros, & Paggio, 2001) allow learners to not only learn content, but engage with each other in order to develop specific skills related to the problem being faced. In healthcare learning, collaborative games (such as in Conradi et al., 2009) produce more valuable learning gains than single-player experiences (such as Cook, McAloon, O'Neill, & Beggs, 2012). Considering the workplace environment as part of the learning indicates a need for collaboration, particularly among community members of varying expertise (Le Maistre & Paré, 2004). In the workplace, learners collaborating with more experienced community members allows for joint interpretation as well as a cognitive apprenticeship of sorts, allowing the new learner to become more and more involved in the workplace (Smith, 2003) through creating innovative solutions with their peer.

Specific learning goals

Specific learning goals in any type of instructional design allows for the designer to focus on what needs to be learned. Good game design also requires specific goals within the game (what should be accomplished in the world). Specific goals set from the beginning allow for interactions to be designed with those goals in mind (Gee, 2008). Although learning goals do not need to be explicitly presented to the learner in every case, specific goals within the game itself help engage learners more (Shute & Ke, 2012). In a workplace game, these learning goals might include particular behavioral/procedural skills, time management skills, or interpersonal skills. These could then be met through achievement of in-game goals, such as completing a quest within a particular time frame.

Immediate feedback

As Gee (2008) pointed out, we learn best when we are provided with immediate feedback regarding our performance. This applies in any learning environment, but when focused on learning for some workplace task, this is especially important (Smith, 2003). Immediate feedback allows for adjustment of processes to better reflect what is needed to succeed, and collection of such data allows for formative assessment of learners' abilities (Shute & Ke, 2012). In the workplace, this allows for trainers or peers to work more closely with learners needing additional help in a way that does not require long or expensive assessments. Games are particularly well-suited to provide this immediate feedback, with well-designed game systems able to respond in real-time to user input.

Easy-to use interface

Although it may appear as an obvious goal, creating an interface that is easy for learners to use is incredibly important, and often a problem. As Takeuchi and Stevens (2011) point out, we want our learners to be focused on the content, rather than on how to control the system itself to ensure that they will be able to achieve the learning goals rather than simply learning the mechanics. Regardless of the particular environment, when it is difficult to learn to use a virtual world or game (whether because of the physical interface or one on the game), the potential benefits are often lost (Antle et al., 2011; Conradi et al., 2009; Luse, Mennecke, & Triplett, 2013).

Significance

There is a large body of research examining the design of games and virtual worlds in both formal and informal learning environments. In workplace learning, these types of tools have perhaps even more potential due to the

unique environment the workplace creates. Despite this potential, and the current use of games and virtual worlds in healthcare and some other fields, very little work has been done to adapt the games-based learning literature to workplace training. This project seeks to contribute to this effort, while also sparking ideas for further research.

This paper presents five design principles for the goal of learning for doing in the workplace from a joint media engagement perspective. These principles provide a set of considerations for the design of learning games and virtual in the workplace. They do not, however, form a set of prescriptions, as every workplace will have different needs. The use of these principles in instructional design should improve learning outcomes, both in the workplace and in technical training programs. Future research should consider these principles and verify their appropriateness in workplace learning, as well as evaluate other design perspectives for use in the workplace. Existing university- and workplace-based efforts should also be continued going forward.

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