

Learning approaches and technology trends

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Authentic learning and simulations

Introduction

This wiki ^[1] explores some of the links between authentic learning and simulations.

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Authentic learning

Authentic learning is a student-centered form of learning where students solve ambiguous problems with real-world significance (Lombardi ^[2], 2007; Maina ^[3], 2004; Rule ^[4], 2006). According to Herrington ^[5] (2006), students participate in learning experiences, called authentic activities, which are close comparisons to the work of experts in real-life. Like the real-world, authentic activities involve collaboration on ambiguous problems which may have several acceptable solutions (Bennett ^[6], Harper ^[7], & Hedberg, 2002). Examples of authentic activities include role-playing, simulations, and case studies. Authentic activities take place in authentic learning environments. Authentic learning environments can be created in both digital and physical settings (Lombardi, 2007). According to Herrington, Oliver ^[8], and Reeves ^[9] (2003), learners who are accustomed to teacher-centered learning may have trouble engaging in authentic learning environments when first introduced to them. Before knowledge can be gained, a student must consider the authentic learning environment to be a suitable substitute for real-life. This phenomenon is referred to as the 'willing suspension of disbelief ^[10]', a term originally described in the 19th Century by poet, Samuel Taylor Coleridge ^[11] (Herrington, 2006; Herrington, Oliver, & Reeves, 2003). One of the earliest forms of authentic learning was apprenticeship, where students learned a trade from experts through hands-on training (Lombardi, 2007). Many schools and universities have instilled internship and apprenticeship programs to give students a chance to gain knowledge and workplace skills prior to graduation (Joyce, 2008). Providing students with the opportunity to work in actual work environments would be ideal, however, this opportunity may not always be possible due to limited access (Car-Chellman ^[12], Dyer, & Breman, 2000; Ferry et al., 2006). Also, placing students in a real-world environment may be dangerous or involve risk without adequate training (Ingram & Jackson, 2004; Lombardi, 2007).

Simulations and authentic learning

Digital simulations are often safer than real-life learning environments (Ferry et al., 2006), which is one reason why they may be appropriate for authentic learning contexts. According to Kirriemuir and McFarlane (2004), simulations are used for medical training to avoid injuring a real-life patient, for military training to safely practice for battle, and in business to ensure no money is lost. Students studying to become teachers can practice making difficult decisions with virtual children so their choices won't have a negative impact on real-life children (Ferry et al., 2006).

Ingram ^[13] and Jackson (2004) conducted a study evaluating the use of simulations in a physical environment for authentic learning. The students participated in mock job interviews, and events were simulated with actors who were students from the school's drama course. The students reported that the simulated interviews did indeed offer a learning experience with value in the real-world and were therefore authentic.

Authentic learning can also occur within mainstream simulation games, which are digital simulations intended to entertain (Kirriemuir & McFarlane ^[14], 2004). Examples of mainstream simulation games include *The Sims* ^[15] and *Sid Meier's Civilization* ^[16]. In *The Sims*, the player controls one or more characters through everyday activities, such as sleeping, eating, watching television, and interacting with other characters. The actions of the characters in the game resemble actions of people in real-life, and there is no single solution or proper way to play the game (Griebel ^[17], 2006). In the *Sid Meier's Civilization* series of games, the player uses real-world problem solving to

build, manage, and protect their empire from barbarians and competing players (Squire ^[18], 2005). Like in authentic activities, multiple solutions are acceptable in *Sid Meier's Civilization* as "students can win the game several different ways, roughly lining up with political, scientific, military, cultural, or economic victories" (Squire & Jenkins, 2003, p. 9).

Integrating simulation games into authentic learning

According to Oblinger ^[19] (2006), simulation games used as authentic activities must be incorporated into a course, and simply playing a game is not enough to facilitate learning. Squire and Jenkins (2003) suggest that students are motivated to seek out information from text books, maps, and other materials to assist their performance within a game environment. Ranalli ^[20] (2008) used *The Sims* paired with additional material as an authentic activity to teach English as a second language to the students playing the game. The students' responses to a questionnaire about the experience and the results from vocabulary quizzes demonstrated that *The Sims* can be used to teach English as a second language when used with supplementary material.

Not all simulation games would be suitable for teaching a second language, however, they may be effective at teaching other subjects or skills. Squire (2005) introduced the game *Sid Meier's Civilization III* into a junior-high social studies classroom to teach history, geography, and economics. Squire (2005) found that only seventy-five percent of the students were willing to accept the simulation game as a suitable activity for learning. The other twenty-five percent chose to enroll in a more traditional history course, instead of continuing with the simulation, supporting Oblinger's (2004) assertion that "not all games are good for all learners" (p. 4). Findings from Squire's (2005) study revealed that some students struggled with the complexity of the game play which distracted them from their learning. Other students in the study, however, used their failures within the game as learning experiences, and improved their problem solving in later attempts at the game. According to Kirriemuir and McFarlane (2004), time spent learning how to play the game is one of the major challenges with using mainstream simulation games for classroom learning. In order for mainstream simulation games to be fully accepted into class room learning, Kirriemuir and McFarlane (2004) believe that parents and teachers must recognize the skills that can be developed from them.

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Collaboration and wikis

Introduction

This Wiki explores Collaborative learning^[1] and Wikis^[2].

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Web 2.0 and Wikis

Web 2.0^[3] applications, specifically Wikis, are web-based^[4] media that have the characteristics that allow learners to meet in the virtual world^[5] and provide them opportunities to partake in authentic, collaborative tasks (Laurason & Alterman, 2009)^[6]. A Wiki is a Web 2.0 tool that allows users to create rich (Evans, 2006)^[7], collaborative learning^[1] environments where users, either in a private or public forum, can come together and collaborate on tasks assigned in educational contexts (Chao & Parker, 2007)^[8]. Collaborative learning, according to Smith and MacGregor (1992)^[9], is often linked to experiential learning^[10], in that students are allowed to explore topics on their own and within groups. In this way, knowledge is created and not simply absorbed based on information given by the instructor. Kahn (2009)^[11] posits that Wikis promote interaction between students and instructors. Therefore, instructors can provide guidance to help direct learning, not just relate information. Smith and MacGregor^[12] stress that traditional teaching methods^[13] may still exist in collaborative environments^[14]; however, these methods are used in tandem with discussions and group work, which are both widely associated with collaboration. Wikis allow learners to engage in collaborative tasks^[15], for example group discussions, in either a synchronous^[16] or an asynchronous^[17] manner (Peterson, 2009)^[18].

Collaborative learning in the classroom and Wikis

Smith and MacGregor (1992)^[9] identify four main reasons for the use of collaborative learning in classrooms^[19]. Firstly, learners must be able to integrate new material into their existing body of knowledge in an active way^[20]. Active approaches are considered to be a constructive process^[21], whereby learners are constructing, or building upon prior knowledge^[22] (Casey, 2008^[23]; Gijlers, Saab, Van Joolingen, De Jong, & Van Hout-Wolters, 2009)^[24]. Secondly, for information to be valuable to learners, it must be presented in authentic and believable contexts^[25], often linked to problem-based learning^[26] (Smith & MacGregor)^[9]. Once learners are in control of their learning, they can more easily adapt new knowledge to more varied contexts. Wikis allow students to engage in collaborative, and thus meaningful discussions^[27] with their peers (Schaffert, Gruber, & Westenthaler, 2006)^[28]. Therefore, learners learn from one another. Smith and MacGregor^[9] also found that student diversity^[29] and each learner's unique background help to increase the learning. To ensure that each student finds value in new material, teachers must allow learners to bring previous experiences^[30] into discussions and solutions (Smith & MacGregor)^[9]. Smith and MacGregor^[9] state that, without the collaborative approach, students who do not fit into traditional learning models would be greatly disadvantaged. However, Howe (2009)^[31] argues that collaborative work does not work well when individuals within a group have a more similar outlook on the problem. In areas where diversity of experience is not wide-ranging, the collaborative approach cannot reach its full potential (Howe)^[31]. Furthermore, Gijlers, Saab, Van Joolingen, De Jong and Van Hout-Wolters^[24] demonstrate the necessity of consensus building^[32] before students move on with the task. When there are different approaches to solving the problem, the group must agree on the path that will be taken, otherwise the task becomes frustrating.

An interesting aspect of Wikis is that, while they can be made private, if learners do have similar beliefs regarding a topic, Wikis can be made public. With a public wiki, students can connect with external users. These connections can lead the new, larger group to discover a greater variety of ideas, which will allow for the collaborative process to

reach its full potential (Alexander, 2006) ^[33]. Smith and MacGregor(1992) ^[9] posit that humans are social beings ^[34]; sharing knowledge and information is a bonding experience where the group is working towards a single ultimate goal. Group work necessitates that students work on several tasks that, when combined, lead to achieving the main goal. Similar to Smith and MacGregor's point about social connections, Lund (2008) ^[35] argues that Wikis facilitate social interactions of their users. In order to use a Wiki, students must connect with the other members who are participating in the online environment ^[36], encouraging the social connectedness of the group. Combining social interaction with this type of collaboration makes understanding of complex problems ^[37] more challenging, without being overwhelming, due to the support of the rest of the group.

Asynchronous collaborative learning

According to Kumpulainen and Kaartinen (2003) ^[38], the ability to resolve conflicts in collaborative environments promotes more enhanced learning. The authors state that one type of collaborative learning, called Joint Construction, requires much less work than the consensus building method described above (Kumpulainen & Kaartinen) ^[39]. In the Joint Construction process, only one person needs to present a feasible solution and the rest of the group need only accept it (Howe, 2009) ^[31]. According to Howe ^[31], this is a much easier task, because comparison of different perspectives is not necessary to arrive at a solution. Wikis can potentially promote this type of interaction by allowing learners the opportunity to collaborate on a project where each learner's ideas are valued; however, it is in the process that learning occurs (Mac & Coninum 2008) ^[40]. Howe ^[31] states that students who work in collaborative settings are often able to provide solutions or responses far above what was achieved during the group task. This finding might indicate that collaborative environments stimulate something within learners that allows them to continue processing information ^[41] and adding to it based on their individual interpretation of the discussion (Chan, 2001) ^[42]. As Chao and Parker (2007) ^[8] posit, these discussions can broaden those that might occur in the classroom and lead to a deeper learning ^[43] experience. Wikis, when used effectively in conjunction with best practices ^[44], create learning environments ^[14] where learners work together with peers and instructors to facilitate learning through a collaborative approach (Chao & Parker) ^[8].

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Differentiated learning and electronic games

Introduction

This wiki explores some of the links between differentiated learning ^[1] and electronic games ^[2].

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Differentiated instruction

Differentiating relates to the popular saying that “one size does not fit all”. According to Anderson (2007), differentiated learning means students have different interests, preferences, learning styles ^[3], skills, talents, strengths, and previous knowledge. Differentiated instruction ^[4] refers to the strategies educators can use to meet many of the diverse needs within the classroom to help student’s learning and achievement (Levy ^[5], 2008). Similarly, Gregory ^[6] and Chapman ^[7] (2007) argued regarding differentiation that teachers need to intentionally plan to meet the needs of the diverse learners in their classroom.

Differentiating in the classroom

Through differentiating instruction, educators can try to meet the needs of all the students in the classroom, help them grow and experience greater feelings of success (Hall ^[8], 2007). Teachers are the classroom leaders and need to help children discover their best abilities, interests, dreams and goals (Tomlinson ^[9], 2004). Children are also part of the classroom community and as they get older they want more independence in reaching their goals. They also have a better understanding of what methods works best for their learning. By differentiating instruction, educators need to listen to the student’s ideas and thoughts (Tomlinson ^[9]). In order to use a differentiated approach in the classroom one must think of using different genres, including multiple levels of difficulty on materials, teaching in different ways, and offering choices (Gregory ^[6] and Chapman ^[7], 2007). Teachers who differentiate are including all children in a safe learning environment (Anderson, 2007).

Electronic games

Researchers have shown much interest in the link between games and their relevance to learning (Oliver & Carr, 2009). Electronic games have always been seen as prospective learning tools (Torrente et al., 2009). Gros ^[10] (2007) emphasizes that they are a useful tool for learning and acquiring new knowledge. Teachers play an important role in implementing electronic games ^[11] in the classroom (Gros ^[10]). Electronic games ^[11] offer choices of complexity and can relate to student interest, which according to Tobin ^[12] (2008) is critical in learning. According to Gros ^[10],

“Children and young people are introduced to the virtual world ^[5] via videogames ^[13], and the ways that they interact with technology may be changing ways of learning and the production of knowledge,” (p. 23).

Electronic games and the curricula

Electronic games are able to support abstract learning, co-operation, problem solving skills, and participation (*Tobin* ^[12], 2008). Sardone and Devlin-Scherer (2009) found that there are many benefits to using electronic games for learning. As well, students’ focus, visual-spatial, motor, mental and reasoning skills are developed through digital games (Sardone & Devlin-Scherer). Videogames can support problem-solving and simulate real-life situations (*McMichael* ^[14], 2007). They offer students challenges and rewards that increase student interest and result in further skill development (Sardone & Devlin-Scherer). Robertson and Good (2005) found that students can also create their own stories through virtual worlds and decide how they wish to respond to different situations. Videogames let students take risks and see the consequences without affecting their real-life (Sardone & Devlin-Scherer). Games such as Civilization III ^[15], Age of Empires III ^[16], and Caesar IV ^[17] are all history-based computer games that can be used for educational purposes and depending on how the player decides to play the game; there are different outcomes (*McMichael* ^[14]). History-based computer games let students control the actions and see what the outcomes would be if different actions were played out in history (*McMichael* ^[14]).

Differentiated learning and electronic games

Electronic games engage students in learning and can encourage positive attitudes, collaboration ^[18], and discussion (Sardone & Devlin-Scherer, 2009). Computers and technology are a part of many students’ lives (Tuzun, 2007). “Videogames play a daily part in the lives of almost every child,” (Simpson, 2005) and they are one way of making a connection between students and the classroom (Tuzun). Simpson (2005) argues that differentiation is built into the world of electronic games. Games have set rules and structure where the goal is always in reach while still being motivational and challenging for students (Simpson). In electronic games, students are able to judge for themselves their level of readiness because they know what areas they are having trouble with and what areas are their strengths (Anderson, 2007).

Gros ^[10] (2007) found that there many different types of games available such as; action ^[19], adventure ^[20], simulations ^[21], role-playing ^[22], strategy games ^[23], sports games ^[24], and more. Also, “most of the sports games ^[24] contain information to manage the team and combine simulation ^[21] with characteristics of the strategy games ^[23],” (p. 26). Hall ^[8] (2002) found that a characteristic of differentiated instruction is when the main focus/concept is kept steady (such as focusing on mathematics) but, there is much more elasticity surrounding it (such as the degree of difficulty and interests). For example, to meet mathematics’ outcomes using different genres of electronic games, one student might prefer to use his/her personalized avatar to kick down two barrels and three haystacks and another student might prefer to decorate a dress by adding five buttons and twenty-five centimetres of lace along the diameter of the base of the dress. Both scenarios can be addressing the outcomes, but focused on different interests and levels of learning.

Learning styles and electronic games

Knowing student learning styles are one strategy teachers can use towards differentiating instruction (*Gregory* ^[6] & *Chapman* ^[7], 2007). People learn in different ways. There are four different types of learners; auditory learners ^[25], visual learners ^[26], tactile learners, and kinaesthetic learners ^[27] (*Gregory* ^[6] & *Chapman* ^[7]). Gregory ^[6] and Chapman ^[7] present electronic examples that match each learning style, such as using video/tapes for auditory learners ^[25]; role-play/CD-ROM for kinaesthetic or tactile learners ^[27]; video/CD-ROM for visual learners ^[26]. Electronic games can offer these experiences and furthermore, they can offer an authentic learning experience through role-playing games ^[28] (*Gregory* ^[6] & *Chapman* ^[7]).

Issues with electronic games and learning

One issue with using electronic games in learning is that of funding. If teachers lack knowledge on how to use electronic games, they will most likely shy away from using them (Gros ^[10], 2007). Torrente, Moreno-Ger, Martínez-Ortiz and Fernandez-Manjon (2009) argue regarding teachers that schools “usually lack the staff preparation and/or the time required to organize educational gaming sessions,” (p. 631). Furthermore, schools might need to buy new equipment to support the games or keep the technology updated (Torrente et al.).

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Differentiated learning and web 2.0 technologies

Introduction

This wiki explores some of the links between Differentiated learning^[1] and Web 2.0^[3] technologies.

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Differentiated learning

Increased attention to students' different abilities, different talents, and different learning styles^[2] has become particularly relevant in today's education system (Tomlinson et al.,^[9] 2003). As Hall^[3](2009) explained, students come from different social backgrounds, cultures, and economies and are all different in their academic and linguistic ability. She argued that they need differentiating in learning content, in the learning process and the product of their learning. Many teachers struggle with this idea, and don't fully understand how they can differentiate learning for so many students (Tomlinson^[9], 2000). However as Hall stated, "Differentiated instruction^[1] does not change WHAT is taught; it changes HOW it is taught" (p.1).

Differentiated learning^[1] is at the forefront of many educational systems around the world as educators, researchers and administrators alike strive to meet the needs of individuals (Tomlinson^[9], Brimijoin^[4], and Narvaez^[5], 2008). Differentiating learning^[1] which is student centered; provides children with variety of different options to learn the same outcome (Tomlinson^[9], 2001). Tomlinson^[9] (2000) argues that by using Differentiated instruction^[1], a teacher has the opportunity to take action in order to reach each child's different learning style. Every child has its own unique learning style; this uniqueness does not make the child any more or less intelligent than the next person with a different type of learning style^[2] (Dunne^[6], Beaudry^[7], and Klavas, 2002). A learning style^[2] is simply the way a student learns best. Brualdi (1996)^[8] explained that teachers can refer to Gardner's^[9](1983) Theory of Multiple Intelligence^[10] to help guide them in recognizing student's different abilities and talents. She also identified that teachers should structure their instruction in such a way that it has the ability to appeal to a variety of students different intelligences.

Willoughby (2005)^[11] reported that teachers can differentiate instruction and reach multiple intelligences^[10] by providing several different learning options or paths and allowing for different levels of challenge for all students. Thousand^[12], Villa^[13], and Nevin^[14](2007) concur that multiple intelligences^[10] are very important for differentiated instruction^[1]. They also posited that it's very important to understand that the intelligences a student possesses are not fixed and can be strengthened.

Web 2.0 technologies and differentiated learning

Web 2.0 tools^[15] are very useful and innovative ways to collaborate (Criswell^[16], 2008). He argued that, instead of static content which only allowed viewing, students and teachers now have the power to change and create content. Hall^[3] (2009) and Dunne^[6] et al. (2002) maintained that the how of the instruction and learning is the most important aspect in a child's learning. With Web 2.0 tools^[15], teachers have more options for how they can present lectures, how students can complete their work, and how students can learn. Grant^[17] and Mims^[18] (2009) pointed out that Differentiation is a word that is essential and encompassed by both Web 2.0^[3] and education. They also found that Differentiated education needs to be modified around each student and their individual needs.

Web 2.0^[3] has many different applications and tools available to teachers and students. Shihab^[19] (2008) claimed that teachers perceived Web 2.0 tools^[15] such as blogs^[20], wikis^[2], podcasts^[21], and RSS feeds^[22] as efficient, useful, and powerful. According to Wiberg^[23](2007), these new technologies can be used for user-centered production, instead of teacher-centered content. Wiberg^[23] also found that blogs^[20], wikis^[2], video sharing

programs and social networking ^[24] tools allow for social interaction and creativity. They encourage students to have a more active and participatory role in what they are doing (Maloney ^[25], 2007). Kahiigi, Ekenberg, Hansson, Tusubira, and Danielson (2008) ^[26] noted that this technology allows teachers to take on more of a facilitative role while the students take control over their learning. According to Yan ^[27] (2008), "Teachers are amazed at how simple tools for sharing work and ideas can positively transform the classroom" (p.30). Yan ^[27] also established that students who wouldn't normally participate in the physical classroom were much more vocal in the class discussions online. Another benefit of these tools acknowledged by Agnello, White and Fryer, (2006) ^[28], is that they are free which is favorable for both students and teachers alike.

As with many new ideas and technologies, there are some limitations and challenges to Web 2.0 ^[15] and education that teachers may need to take into consideration when tailoring education for an individual's needs. Some of those limitations and challenges include issues such as the immaturity of applications, the longevity of the applications, and the vast number of applications that are available, unconsolidated services, and security and ethics (Grant ^[17] et al., 2009). Shihab ^[19] (2008) acknowledged similar concerns inferring that these technologies have a chance to be disruptive to learning. Trying to find a way to incorporate Web 2.0 ^[15] into teaching and learning may present another small hurdle for educators (Maloney ^[25], 2007). However both Grant ^[17] et al. (2009) and Shihab ^[19] (2008) argued that, even with these limitations or challenges, Web 2.0 tools ^[15] are valuable and will enhance teaching and learning.

Klamma et al.(2007) ^[29] argued that for learning to be effective, it has to be personalized and individualized. They also argued that learning needs to be centered on a learner's preference; things they are competent in and knowledge that is constantly growing. However in order to give Web 2.0 ^[15] an opportunity to improve education for students, teachers have to be willing to change and expand on their previously required technology skills (Alexander ^[30], 2008). They must also be willing to use a variety of instructional strategies, and to learn new ways of doing things (Tomlinson ^[9], 2000). Differentiated Instruction ^[1] begins with and requires that teachers present engaging instruction (Tomlinson ^[9], 1999). Web 2.0 tools ^[15] are engaging; they require creativity and higher-order thinking and are promising tools to enhance education (Shihab ^[19], 2008).

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Experiential learning and graphing calculators

Introduction

This wiki explores some of the links between experiential learning and graphing calculators.

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Experiential learning

Experiential learning is learning by experience throughout a person's everyday life (Neill ^[1], 2006). Experiencing what is being studied through a hands-on approach rather than learning about it through an indirect approach allows students to learn through experiential learning (Smith ^[2], 2001). Experiential learning can benefit teachers and students. It provides teachers with another view on how students think and learn. This enables teachers to further help students in learning and understanding the topic being studied (Reilly, 2009).

There are four categories of experiential learning styles. They include activist, someone who would rather experience learning by doing; reflector, someone who reflects on what they have learned through observation; theorist, someone who chooses to understand concepts, reasons, and relationships; and pragmatist, someone who experiments with things to see if they work (Atherton ^[3], 2009).

Graphing calculators

Graphing calculators are programmable calculators with a large display screen that can be used for graphing, solving equations, and many other tasks that involve variables ("Graphing Calculators" ^[4], n.d.). Teachers often incorporate the use of graphing calculators into their mathematics classrooms to help increase the opportunities for their students to learn topics that involve graphing and computing (Garofalo, Drier, Harper, Timmerman, & Shockey ^[5], 2000). Allowing students the opportunity to learn concepts through experience with the use of the graphing calculator enhances students' learning by allowing them to see a visual display of the results on the calculator screen. It also gives them the chance to explore concepts themselves through experience (Doerr & Zangor, 2000).

Experiential learning and graphing calculators

Experiential learning is gaining knowledge and understanding through experience (Kolb, Boyatzis, & Mainemelis ^[6], 1999). Using graphing calculators in teaching and learning mathematics gives students a chance to learn topics through experience by using a tool that gives them a hands-on learning opportunity (Harry ^[7], 2000).

Many educators, such as those in the Departments of Education and Mathematics, have used technology as an approach to learning and teaching mathematics and science. They have enhanced learning by allowing students to complete activities using a hands-on approach (Harry ^[7], 2000). If technology is used appropriately in the teaching and learning environment, it can increase learning opportunities for its participants (Hussain & Adeeb ^[8], 2009). Incorporating the use of graphing calculators in math classrooms also gives students a chance to increase their learning and understanding of topics through active engagement (Goos, Galbraith, Renshaw, & Geiger ^[9], 2001). Learning mathematics using a hands-on approach, such as with graphing calculators and other pieces of technology for graphing, produces higher success rates, especially in performance on visual and graphing tasks, than without the use of such tools (Hollar & Norwood ^[10], 1999).

Information from the internet can be programmed into graphing calculators. This can also help enhance the learning environment by helping to improve students' understanding. Students can therefore retain information longer through the hands-on approach involving web-based information on graphing calculators (Sabry & Barker ^[11], 2009).

Not all students learn the same. Visual learners can benefit from graphing calculators. Theories of multiple intelligences and learning styles support the idea that some students may develop a better understanding of concepts when given the chance to use graphing calculators to explore mathematics (Simundza, 1995). Graphing calculators also enable students to gain a better understanding of problems using graphs, equations, and tables (Hollar & Norwood^[10], 1999). The advantage of using the graphing calculator for these types of problems is that it provides a visual display of the data and students can personally experience exploring and analyzing the data with the graphing calculator which increases learning (Hollar & Norwood^[10], 1999).

Using interactive technology, such as graphing calculators, in the mathematics classroom allows students to receive immediate feedback on the problems they are exploring. Immediate feedback often makes students feel excited and increases their interest in the topic being studied. When students are allowed to use interactive technology it gives them the opportunity to explore their own ideas and make their own discoveries through experience (Maestro-Scherer, Rich, Scherer, & Michell^[12], 2002). As a result, the discoveries of students are more real and give them a better understanding of the concept being studied (Maestro-Scherer, Rich, Scherer, & Michell^[12], 2002).

From a constructivist's view point, graphing calculators are also very beneficial. They enable students to develop connections between concepts by providing many different representations (Reznichenko^[13], 2007). Allowing students to experience concepts using the graphing calculator also has benefits. It was found that students, who were given the chance to have an experiential learning experience by using the graphing calculator, felt more comfortable with data in real-world situations than the traditional students who did not use graphing calculators (Hollar & Norwood^[10], 1999). As well, allowing students to use graphing calculators does not affect the learning of traditional arithmetic and enables them to become better problem solvers (Hubbard^[14], 1998). The use of graphing calculators in the learning process gives students a personal experience with analyzing data and gives them the opportunity to explore the effects of different values on functions and their graphs (Brown^[15], 2004).

Graphing calculators also help struggling students develop better math skills by learning through experience with their graphing calculator. They use their graphing calculator as an aid for solving problems (Hubbard^[14], 1998). The experience gained when using graphing calculators give students a better understanding of the relationship between equations and graphs, and using graphing calculators also encourages students to explore concepts (Caldwell^[16], 1995).

Many students find it much easier to learn concepts in mathematics when they can see their findings as a graphical representation on the screen. Using the graphing calculator is also much easier and faster than figuring out on paper and then sketching. When students use this tool as an aid, they are experiencing the mathematical representations through the calculator which help them obtain a better understanding of the concept (Hubbard^[14], 1998). Discoveries and connections made by students when using graphing calculators helps improve the student's overall understanding (Hubbard^[14], 1998). Graphing calculators also make it easy for students to access and see results, both computational and graphical. The use of graphing calculators in the classroom, during instruction, also increases computational skills and understanding of concepts, as well as enhances results on non-calculator tests. As a result, there has been an increased use of graphing calculators and other technology in mathematics classrooms (Reznichenko^[13], 2007).

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Experiential learning and virtual worlds

Introduction

This wiki explores some of the links between experiential learning and virtual worlds.

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Experiential learning

Experiential learning—making sense of the world through engagement (Beard & Wilson, 2006, p. 19)—has been firmly established in the field of education by several key theorists such as Kolb, Dewey ^[1], Jung ^[2] and Piaget ^[3] (Merriam, Caffarella & Baumgartner, 2007, p. 160; Miettinen, 2000). The focus of experiential learning is on the learner and their past and present experiences (Kolb, Boyatzis & Mainemelis, 2002). While some, like Kolb (1984), divide the learning activity into unique experiences such as active participation, reflection, conceptualizing and new idea generation, the focus is still on past experience positively affecting the learning opportunity. The learner also has more control over the learning situation and directs the experience (Beard & Wilson, 2006, p. 21-23). This individual experience can be more interesting to the learner as they are more directly involved in the experience applying their previous knowledge to the new experience. This oftentimes means that the learner achieves better results due to their involvement and enthusiasm (De Freitas, Rebolledo-Mendez, Liarokapis, Magoulas & Poulouvassilis, 2010). Teachers assume a facilitative role only as the learner is the main participant. The teacher's main role is to develop the potential learning opportunities that best suit the learning needs of the individual (Beard & Wilson, 2006, p. 48-49). These learning opportunities need to be engaging and relevant to the learner themselves (Beard & Wilson, 2002; Silberman, 2007). Teachers also provide that critical feedback on the learning experience so the learner is kept focussed. While this learning style has been firmly established in the education field, what is new is the relationship to virtual technologies such as Second Life ^[4].

Virtual worlds

Second Life (SL) is one example of a 3-D virtual world which is created by the “residents” of SL to be “entertaining, entrepreneurial, educating—whatever you want it to be” (Linden Labs, 2010). Linden Labs ^[5] first created SL in the late 1990s and it has grown significantly as both an entertaining product as well as a place to learn in the last decade. As an avatar ^[6], the participant can be what they want and participate in an unlimited number of activities including attending virtual classroom (Ramaswami, 2009; Falloon, 2010). Wagner (2008) argues that virtual world users learn new behaviours, repeat them, observe what they have learned and adjust their behaviours next time (p. 263). Hew and Cheung (2007) further argue the connections that virtual worlds like SL allow the student “to learn by doing, to observe the outcomes of their actions, to test their hypotheses about the world and to reflect further on their own understanding” (p. 37). Hew and Cheung (2010) also provide a thorough review of research on use of virtual worlds in K-12 and post-secondary settings.

Virtual worlds and experiential learning

Wagner (2008) used SL as a safe environment for business students to create virtual businesses as part of a formal course and evaluate their success in a virtual revenue generating environment. This safe environment allowed the group to be more adventurous in their projects than if they were creating them live. No actual monies were gained or lost. All of the students successfully completed the project and found the experience rewarding. [www.pepperdine.edu Pepperdine University] students created three-dimensional objects in SL to assist with character development in a novel studied in the classroom (Oishi, 2007). Vergara, Caudell, Goldsmith, and Alverson (2008) support the use of multiuser virtual environments (MUVes) with simulating sick patients for medical students to practice upon to make diagnoses and receive feedback on their decisions. Students found the simulation successful in that they could review and repeat the process to achieve better results.

Virtual games have also been developed to provide learning opportunities in courses related to computer science, economics, politics, health, environment and globalization (Sourin, Sourina, & Prasolova-Forland, 2006; Castranova, 2001; Cox, 1999; Cooper, 2007; Hofstede & Pedersen, 1999). All of these examples use simulation to get the students to apply the knowledge learned in class to a virtual life setting. The students learn from the virtual experience and develop better skill sets. Delwiche (2006) used the virtual world as an ethnographic study for his students. In Everquest ^[7], a fantasy themed massively multiplayer on-line (MMO) game, students actually studied the virtual inhabitants in the game to see how they had developed as a culture. From the experiences they witnessed and had, they learned the skills of an ethnographer.

Other educational institutions and training facilities have used the virtual world as a learning forum. Cabanero-Johnson and Berge (2009) investigated the use of microworlds as a corporate training ground. By creating “digital sandboxes” employees were able to train on new techniques in a learn-by-doing setting. Combining their previous on-the-job experience with the sandbox training improved employee negotiation skills and overall corporate fiscal performance (p. 296). Orfinger (1998) draws a parallel between touring interactive museum sites and live field trips at an elementary school level. By experiencing virtual environments, the students may be interested in finding out more about the topic and may learn more about it. Dickey (2005) investigated the use of virtual worlds for provision of distance education using Active Worlds, a similar virtual world setting as SL. Students were made comfortable in a setting that was similar to what they would encounter if they attended class on the physical campus. Findings indicated that this fostered a sense of community and better problem solving resulted in a business course. Also using Active Worlds ^[8], Holmes (2007) investigated the impact of this virtual world on a grade 5 ecosystem experiments.

Research both supports and negates the potential of virtual worlds as experiential learning tools. Foreman (2004) argues that students may not be able to apply the knowledge learned in their virtual situations and apply them to real life situations. Mason commented on her and Moutahir’s work in 2006, (2007) “that by utilizing the affordances of the Second Life platform to create experiences that are infeasible or impossible in the real world, educators can

create superior learning experiences to those which do not offer virtual components" (p. 14).

To date, much of the literature published is more anecdotal and descriptive in nature. Examples of this anecdotal literature are found in works by Castronova (2001), Cooper (2007), Cox (1999), Delwiche (2006), Weusijana, Svihla, Gawel and Bransford (2009) and Vergara (2008). As with any new technology, further empirical research (Cohen, 2007, p. 11) is required before an informed decision can be made linking virtual worlds and experiential learning. However the demand for more empirical research is growing (Jarmon, 2009). Hew (2010), Holmes (2007), Jarmon, Traphagan, Mayrath, and Trivedi (2009), Dalgarno and Lee (2010), and Sourin (2006) provide examples of empirical research completed recently.

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Inclusive Education and Social Software

Introduction

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This wiki explores some of the links between inclusion and social software.

Inclusion

For many years learners with special needs, and their teachers, were largely segregated from the rest of the school (Honey, Culp, & Spielvogel, 2005). Jimenez and Graf (2008)^[2] observed that all students belong in regular schools and classrooms, and that inclusive programs can benefit everyone. Honey et al.^[3] reported that schools today are becoming more inclusive. Inclusion, or inclusive education^[4], involves more than simply allowing children with special needs a place to sit inside the regular classroom (Corbett, 2001, p.58 as cited in Schneider, 2009, p.11^[5]). Students with special needs, regardless of the extent, or form, of their disability, should be welcomed, valued and encouraged (Brandon, 2006^[6]). The National Center on Educational Restructuring and Inclusion (FSU Center for Prevention & Early Intervention Policy, 2002^[7]), outlines the characteristics of inclusion as a situation where all students, including those with considerable disabilities, are offered equal opportunities to receive a meaningful education. In addition, instruction should occur in age suitable classrooms in local schools, with special needs students receiving the necessary additional aids and support services, in order to prepare them for productive lives as full members of society (FSU Center for Prevention & Early Intervention Policy^[7]).

Social software

Web 2.0, while not a complete reinvention of the internet, can be called the 'social Web'^[8], since its content can be more easily produced and posted by users, unlike Web 1.0 (Boulos, & Wheeler, 2007^[9]). Even though many Web 2.0 tools were not intended exclusively for use in education, they have many features that support their use in a range of learning environments (Hartshorne & Ajjan, 2009^[10]). Online social software offers an incomparable opportunity to incorporate numerous types of decidedly unique internet resources into educational settings, including media that can encourage the growth of decidedly hands-on and multisensory learning environments (Jakes, 2003 as cited in Solomon & Schrum, 2007^[11]). This sort of rich, multisensory approach allows students to take advantage of any strength to overcome disadvantages (Logsdon, 2010^[12]).

Appealing to the various strengths and interests of individuals and groups of students is a strategy for inclusion (Hay, & Courson, 2000^[13]). Differentiated instruction is also a fundamental characteristic of any classroom in today's schools, particularly those involved in Inclusive Education, if the needs of the many diverse learners are to be met (Pearce, 2009^[14]). Many of the unique features of social websites^[8] would allow students of varying abilities to find, develop, and discuss common interests. Futurelab^[15] reported in 2009 that, many online communities focused on particular hobbies such as photography which may engage the interest of particular groups of students (p.36).

Such sites allow for tagging, and commenting thereby providing methods of collaborating and exploring mutual interests. Web 2.0 applications offer an innovative array of opportunities for students to express their capabilities, in engaging and worthwhile activities, whatever talents and expertise they may possess (Crook, & Harrison, 2008^[16]).

Social websites^[8] are already used by millions of people every day and user numbers are continuing to grow, with active users increasing by tens of millions each month, and monthly postings and uploads numbering in the billions (News Editor, 2010^[17]). These numbers indicate that for many people around the world, "the most significant news is what you and those you have reason to care about, did yesterday, are doing today, and plan to do tomorrow" (Klamma et al., 2007 p.73^[18]). This familiarity can aid in the introduction of social software as learning tools, since many students are actively participating in the use of the service(s) there are no impediments to their implementation into classrooms (Pitner et al., 2007 p.55^[19]). Pitner et al. found that the boundary separating education and the real, private world of users essentially disappears, producing a sense of comfort and security. Comfort and security are desirable features in inclusive learning environments (Government of Newfoundland and Labrador, 2009^[20]).

Accessibility to course material, projects, teachers, and even the school itself, may be an issue for some students. One distinctive advantage of the online setting has been the capacity to overcome time/place restrictions on instruction and learning (Donoghue, 2006 p.83)^[21]. Hocking (2008)^[22] found that absenteeism and drop-out rates were particularly significant for special needs students. Missing out on substantial amounts of school time, or failing to graduate, can be an educationally and socially damaging issue for students according to Hocking^[22]. Affordable hardware and free social software provide viable alternatives for overcoming these barriers; this technology also allows parents and teachers many more options and opportunities for staying in touch with students and each other. As Hardman and Carpenter (2007)^[23] observe, teachers are only a mouse click away from communication with not only parents but other school stakeholders as well.

According to Jukes and Dosaj (2004)^[24], the amount of time that recent college graduates spent using electronics such as video games, televisions, telephones and computers is more than triple the combined number of hours they spent reading and attending school. In light of these numbers it seems logical to integrate the technology, to which students have grown so accustomed, into the classroom. Meanwhile, even though social software may have a lot to offer students and teachers attempting to achieve learning goals in inclusive classrooms, Walker and Creanor (2009)^[25] point out, that online social software such as wikis or social networks accomplish very little by themselves; it is the system of people, web sites and activities which creates something of value (p.314).

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Learner-centered learning and blogging

Introduction

This wiki explores the relationship between learner-centered learning ^[1] and blogging ^[20].

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Learning-centered learning

Learner-centered learning advocates a student-focused teaching and learning environment (Bosch et al., 2008). Developed by the American Psychological Association ^[2] in the 1990s, the learner-centered framework ^[3] is based on 14 principles about learners and learning that “provide an integrated perspective on factors influencing learning for all learners” (McCombs, ^[4] 2005, p.5). The 14 principles are grouped into four domains or dimensions as follows;

1. cognitive and metacognitive;
2. motivational and affective;
3. developmental and social;
4. individual differences (APA, 1997, Learner Centered Psychological Principles ^[1] section, ¶2).

McCombs, ^[4](2005) proposes that the learner-centered framework implies active involvement by the student in addition to the integration of academics within the student’s total development. She argues that this view of learner-centered learning “is a research-validated paradigm shift that transforms education - including how to best use technology to support the new vision” (p.7).

Social software and blogging

Social software ^[5] can potentially support this vision, as Bryant ^[6] (2006) explains, by providing new ways for students to collaborate in communicate, both in class and around the world (p.61). Social software ^[5] tools are “increasingly a part of the fabric of an e-learning ^[7] environment” (Dron ^[8], 2006, Introduction section, ¶1). McLoughlin ^[9] and Lee ^[10] (2008), found that social software tools facilitate user-controlled, peer-to-peer knowledge creation, and network-based enquiry (p. 19). With respect to social software, these authors also found that by working cooperatively and sharing ideas, communities ^[11] can be much more productive than individuals working in isolation (p.10). Blogging ^[12] is among the most popular of the social software tools (Bryant ^[6], 2006, p.61).

Blogging and learner-centeredness

The first principle in the learner-centered framework addresses the nature of the learning process. It states that learning is most effective “when it is an intentional process of constructing meaning from information and experience” (APA ^[13], 1997, Cognitive and Metacognitive Factors section, ¶1). As Farmer ^[14] (2008) argues, using blogging as an educational tool assists in the process of learning by vitally contributing to a re-conceptualization of students as critical, collaborative, and creative participants in the social construction of knowledge ^[15] (Literature Review section, ¶3). Personal reflections are also a vital part of blogs. As the first principle suggests, constructing meaning from the learner's own beliefs and experiences is an essential part of the learner-centered framework. As Oravec ^[16] (2003)explains, constructing meaning through one's own experiences provides a “human-scale perspective on the problem of information acquisition and analysis” (The Growing Value of Simplicity section, ¶4).

A central theme of the APA's learner-centered framework is that students should be active participants in their own learning. This theme is most specifically reiterated in the third principle, the construction of knowledge. "The successful learner can link new information with existing knowledge in meaningful ways" (APA, 1997, Cognitive and Metacognitive Factors section, ¶3). This principal is supported by blogging in that keeping a blog requires students to actively construct meaning and organize their thoughts (Du ^[17] & Wagner ^[18], 2007, p.4). Also, blogging allows them to build their knowledge over time (Godwin-Jones ^[19], 2005, p.13). Blogging can help motivate students to write and do research over an extended period of time (as well as share their efforts), and can give them a platform from which to analyze various Internet materials (Oravec ^[16], 2003, Introduction section, ¶2).

As the sixth principle of learner-centered learning states, "Technologies and instructional practices must be appropriate for learners' level of prior knowledge, cognitive abilities ^[20], and their learning and thinking strategies" (APA, 1997, Cognitive and Metacognitive Factors section, ¶6). The fact that, as Godwin-Jones ^[19] (2005) observed, blogging requires no knowledge of HTML (or web-authoring ^[21] in general) means that blogging can potentially be appropriate for students regardless of their technology level. Additionally, content in a blog is usually fairly short. Therefore, as Mosel (2005) argues, blogs can be more focused than longer, more complex articles because "small units of knowledge are much easier to discuss and deconstruct on a peer-to-peer basis" (Personal Publishing section, ¶ 4). For both teacher and student, blogs have great potential to be accessible, affordable and learner-centered (McGee ^[22] & Diaz ^[23], 2005, p.31).

The eighth principle of learner-centeredness concerns the learner's intrinsic motivation ^[24] to learn. Intrinsic motivation ^[24] is facilitated by tasks that learners perceive as interesting and personally relevant and meaningful (APA, 1997, Motivational and Affective Factors, ¶4). Blogs can motivate by increasing student interest and ownership in learning. Kadjer ^[25] and Bull (2004) assert that blogs have led to a resurgence in journaling, through their accessibility, their audience, and their immediacy (p.33). As Farmer ^[14] (2008) argues, the use of blogging helps restore a vital sense of individual empowerment and valorization, lost in many other tools such as discussion boards ^[26] and wikis ^[2] where the focus is often on the abstract shared communication space rather than the individual (p.127). Blogs, Farmer asserts, foster 'centered communication' in which the individual is recognized and valued as part of a more equitable community of empowered learners (p. 129). Likewise, Glogoff ^[27] (2005) notes that because learners are able to advance their own perspectives and experiences, they make an investment in what they post to their blogs (Blogging as an E-learning Tool section, ¶4).

E-learning ^[7] advocates have long argued that the pedagogical impact of technology goes beyond the delivery of information and lies instead in the power to create collaborative, learner-centered educational spaces (Dietering ^[28], 2005, Introduction section, ¶ 1). Blogging facilitates collaboration ^[29] as both learners and educators can comment on each others' blogs, or collectively contribute to a shared blog, and acknowledges the important attributes of learners as individuals and as a group ([Glogoff ^[27], 2005, Blogging as an E-learning Tool section, ¶ 3). The collaborative aspect of blogging relates to the eleventh principle of the learner-centered framework which states that "Learning is influenced by social interactions, interpersonal relations, and communication with others" (APA, 1997, Developmental and Social Factors, ¶2). This principle also emphasizes that learning can be enhanced when the learner has an opportunity to interact and to collaborate with others on instructional tasks. Conversation and discourse foster collaboration ^[29] and support social negotiation in learning (Dickey ^[30], 2004, p.281). Dietering ^[28] (2005) describes blogs as a "middle space" between fully online and traditional courses. This "middle space" encourages student-to-student interaction, provides a dynamic context for dialogue and feedback, and is particularly exciting in its potential for teaching with writing (Introduction section, ¶ 1). Additionally, through blogging, students may feel more confident about contributing, and establishing stronger relationships with other students and faculty through dialogue and feedback (Godwin-Jones ^[19], 2003, p.12), and, as a result, developing their understanding of class material collaboratively and collectively.

Blogs offer educators promising opportunities to employ an adaptive ^[31] instructional approach, and to facilitate student-centered active learning ^[20] through continuous practice and reinforcement (Du ^[17] & Wagner ^[18], 2007,

p.12). All learning must include strategies that support diverse learner needs and perspectives, provide time for critical reflection^[32], and opportunities for teachers to co-create practices with their students that enhance learning, motivation and achievement (McCombs, 2005, p.7). As McCombs^[4] (2005) states, "When power is shared by students and teachers, teaching technologies are a means to an end rather than an end in themselves" (p.5).

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Mobile computing and student-centered learning

Introduction

This wiki explores some of the links between mobile computing ^[1] and student-centered learning ^[2].

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Mobile computing

Mobile computing is defined as the application of small, portable, and wireless computing and communication devices (e.g. I-Pods ^[4], MP3 Player ^[5], PDAs ^[6], USB Drives ^[7], E-Book Readers ^[8], Smart Phones ^[9], Ultra-Mobile PCs ^[10], Laptop PCs ^[11]) (Corbell & Corbell, 2007). Mobile devices are personal, portable and multi-functional] (Norris and Soloway, 2008). Mobile technologies provide a more cost effective alternative to one to one laptop ratios or even computer labs and are being suggested as a way of getting past economic constraints and the structural barriers of computer labs (Norris and Soloway, 2008).

Student-centered learning

Student-centered learning is defined as learning that is social, engaging and student owned; where students play an active role in directing their own learning (Bender, 2003). Through curiosity students establish personal connections with their learning which makes them active participants rather than passive observers (Willis ^[12], 2007). Furthermore, Willis (p.36) states that instruction ^[13] that includes student initiated questioning offers a balance of emotional and intellectual opportunities that can motivate students and engage them in higher order functions. Student-centered learning environments allow students to monitor their own progress and determine when their learning objectives ^[14] have been satisfied (Hannafin et al., 2009). In order to successfully establish a student-centered learning environment educators must acknowledge that students have personal learning goals and support students in achieving their goals (Bender, 2003).

Mobile computing and learning

In order for optimal learning to occur, learning environments need to provide students with tools and experiences that can connect them to the real world (Burns et al., 1999). According to Haynes and Boyle (as cited in Churchill, 2008) mobile devices increase flexibility and accessibility to learning. Through the use of mobile computing, teachers and students are able to employ computing power without time or location constraints (Liu, 2007). Some mobile devices can act as mobile classrooms (Vess, 2006) and allow learning to be taken out of the traditional classroom and into a variety of alternate settings (Corbell and Valdes-Corbell, 2007). In doing so, these technologies support learning experiences that are collaborative, accessible and integrated with the world (Corbell and Valdes-Corbell, 2007). Students learn to apply skills taught in school to setting that reflect real life experiences. School curriculum gains value as learning becomes useful.

According to Tucker (as cited in French, 2006) current students are master multi-taskers and like to do things on the move. Students' desire to have anytime and anywhere access to entertainment and education makes the use of mobile technologies in learning a worthwhile consideration (Vess, 2006). Students can often be found using mobile devices ^[15] in educational context while simultaneously participating in leisure activities (French, 2006). Vess maintains that many mobile technologies do have educational uses in addition to their entertainment applications which can increase their appeal to students.

Mobile computing and student-centered learning

While mobile technologies^[16] present many positive implications for learning they do not come without challenges. According to Fang (as cited in Liu, 2007), the introduction of innovative technologies into the classroom increases the complexity and unpredictability of instructional and learning situations. Teachers very often have to adjust their usual practices in order to effectively integrate technology (Liu, 2007). Teachers must embrace and learn to use various types of technology in order to maximize student learning (Corbell and Valdes-Corbell, 2007). According to a comparative case study by Liu (2007), despite implementation of mobile technologies, instructional practices tended to be teacher-centered rather than learner-centered in both the ordinary classroom and when in the wireless environment. Furthermore, Liu suggests that only when teachers have a positive outlook on the use of mobile computing and re-focus their instruction toward being student-centered will implementing mobile technologies act to establish a genuinely student-centered learning environment.

Challenges for mobile computing and student-centered learning

Norris and Soloway (2008)^[17] suggest that the use of mobile devices enabled learners to establish autonomy^[17], take greater ownership in their learning and subsequently can act to support and enhance student-centered learning environments. Mobile devices allow students to participate in more student-centered activities which can include recording interviews, producing reports and sharing products with other students (French, 2006). Students show higher levels of engagement and demonstrate greater acquired knowledge when using interactive technologies to complete activities (Schrand, 2008). Norris and Soloway (2004) suggest that mobile computing environments are student-centered because they increase independence, responsibility and accountability and result in students establishing a greater sense of ownership in their learning.

The use of mobile computing has the ability to empower students and engage previously disengaged learners. According to a study by Vess (2006), students who used iPods to perfect oral presentations before presenting them to their classmates indicated increased confidence and success. The results of a study by Klopfer et al. (2005) suggest that the use of handheld devices to complete interactive activities will increase student motivation as well as student-directed learning. The use of mobile devices can facilitate more comfortable student-teacher interaction, providing students with opportunity to ask questions and provide feedback without being face to face (Churchill^[18], 2008). Swan et al. (2005) revealed that mobile devices are readily embraced by students and will use them to not only explore personal learning interest but also to overcome personal challenges.

Hawkes and Hategekimana(2009) contend that beyond possible intrinsic benefits, mobile computing also generates greater extrinsic rewards as a result of increased interest and participation by students in learning. A limited quantitative study^[19] by Hawkes and Hategekimana suggested that integration of mobile devices for university math students led to improved results compared to their counterparts.

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Personal learning networks supporting authentic learning

Introduction

This wiki article explores some of the links between personal learning networks and authentic learning.

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Authentic learning

Authentic learning ^[1] intentionally aligns traditional classroom experiences to 'real world' activities (Lombardi ^[2], 2007, p.2). Grounded in connectivism ^[3], authentic learning draws upon the learners' past experiences, challenges the learners' current belief system and assists in the building of new knowledge through experimentation, simulations, and connections to the real world (Siemens ^[4], 2005). Lambert ^[5] (2001) identifies 21st century learners as independent learners with the capacity to create, manage and sustain authentic learning environments whereby collaboration and learning have no boundaries.

Research led by Herrington, Oliver, and Reeves ^[6] (2003) focused on defining essential characteristics of authentic learning. Authentic learning is defined as being aligned to the real world, problem-based, open to multiple scenarios, collaborative, reflective, and evaluative, and utilizes a variety of resources and sources (Herrington et al. ^[6]). These characteristics further provide the criteria to identify authentic learning activities and environments.

Personal learning networks

Personal learning networks (PLN) ^[7] are the connections and communications made with others to question, reflect and evaluate information in order to create new knowledge (Attwell ^[8]) (2007). Research by Dlab and Hoić-Božić ^[9] (2009) explored web-based learning environments and Web 2.0 applications. Dlab and Hoić-Božić ^[9] concluded that learners create, develop and connect a network of resources to meet their personal and academic interests and needs thus creating PLN. Similarly, Žubrinčić and Kalpić ^[10] (2008) define personal learning environments as a system whereby learners direct and manage their own learning with the assistance of web resources. Collaboration and social networking tools offer learners the opportunity to access and personalize new sources of information in resourceful and motivating ways (Hall ^[11], 2009; Žubrinčić & Kalpić ^[10]). However, Dalsgaard ^[12] (2006) argues that learning can be facilitated not managed by personal tools and social networks. The combination of tools and networks support independent self-directed collaboration and learning.

Netvibes ^[13], NING ^[14], Pageflakes ^[15], My Yahoo! ^[16], iGoogle ^[17] are some examples of free tools available on the World Wide Web that can be used to create PLN (Ivanova ^[18], 2009). PLN tools can facilitate the management of online information sources (Dalsgaard ^[12], 2006; Herrington & Oliver ^[19], 2000). This environment can harness the power of the Web 2.0 tools and the global community to generate new meaning (Dlab & Hoić-Božić ^[9], 2009). The connection created through online collaboration using PLN tools between professionals and global citizens can foster and sustain intellectual growth critical to PLN and authentic learning experiences (Herrington et al. ^[6]).

PLN are not a series of software applications (Attwell ^[8], 2007). PLN are an attempt to connect and use new technologies for the creation, validation and acquisition of new knowledge (Attwell ^[8]; Herrington & Oliver ^[19], 2000; Žubrinčić & Kalpić ^[10], 2008). PLN organize Web 2.0 tools for little or no cost into one environment to create and support authentic learning experiences tailored to meet the learner's needs (Žubrinčić & Kalpić ^[10]).

Personal learning networks supporting authentic learning

Authentic learning occurs when activities parallel real-life practices with multiple solutions, require collaboration and support from a variety of sources and resources, and are multidisciplinary (Herrington & Oliver^[19], 2000). Žubrinić and Kalpić^[10] (2008) identify PLN and the use of Web 2.0 tools as essential elements in the development of a repository of knowledge created and managed by the learner. In creating authentic learning opportunities through the use of PLN, the learner communicates, collaborates and self-directs the acquisition of knowledge to make new meaning (Hoffman^[20], 2008).

The three main types of PLN in support of authentic learning are synchronous, semi-synchronous and asynchronous (Dlab & Hoić-Božić^[9], 2009; Downes^[21], 2007). These networks provide for the development of unique authentic learning opportunities tailored to the diverse needs and styles of the learner. Similarly, each type of network can harness a multitude of tools to align the specific learning style to the learner's needs and interests (Dlab & Hoić-Božić^[9]). For example, PLN offer authentic learning to utilize blogs^[20], wikis^[2], RSS^[22] feeds, links to sources of information and authentic resources, and peer collaboration. These communication and social networking tools support authentic learning through collaboration, resource distribution and the construction of new knowledge (Lombari^[2], 2007). Furthermore, the criterion for authentic learning is met through the creation of PLN (Herrington et al.^[6], 2003).

Technology can provide the tools to enhance authentic learning by providing learners access to resources and sources in a global community (Lombari^[2], 2007). In support of authentic learning, the establishment of PLN allows the learner to control the pace of learning, explore connections, question the global community, and analyze multiple solutions to problems to make responsible decisions (Dlab & Hoić-Božić^[9], 2009; Lombari^[2]; Žubrinić & Kalpić^[10], 2008).

While the establishment of PLN to support authentic learning is favourable, Herrington et al.^[6] (2003) identify the learners' reluctance to readily accept the online simulated learning activities and their perception of disbelief that these learning opportunities are worthwhile as problems to authentic learning environments. Similarly, Downes^[21] (2007) acknowledges the learners' potential to solely solicit resources and collaborative partnerships with communities in agreement with existing perspectives. Therefore learners' thinking and learning possibilities could be stalemated. Attwell^[8] (2007) affirms PLN provide learners with greater independence and autonomy in directing personal learning. However, Attwell^[8] further cautions as to how these learning networks are monitored to ensure that the learning is authentic, real, and credible.

The process of designing and creating PLN encourage learners to think for themselves, explore and question existing knowledge within global communities, and foster higher level thinking through authentic learning experiences (Herrington & Oliver^[19], 2000). The PLN contributes to the establishment of authentic learning communities by "supporting peer-to-peer learning, enhancing reflective learning and fostering social engagement" (Hoffman^[20], 2008, p. 6). According to Pozgaj^[23] (2008), informal learning through conversations, social networks and group work is essential for life-long learning. Therefore, authentic learning activities and PLN contribute to the development of life long learners (Herrington et al.^[6], 2003). Similarly, Parker^[24] (2007) ascertains that learning environments are critical to supporting authentic learner inquiries. PLN contribute to the development of deeper personal and social significances as well as an increased shared learning in interesting, relevant, authentic ways (Parker^[24]).

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Problem-based learning and electronic games

Introduction

This entry examines how electronic games ^[1] can provide support for Problem-Based Learning (PBL) ^[2].

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Problem-based learning

PBL is a learning approach grounded in the constructivist theory of learning ^[3] (Savery ^[4] & Duffy ^[5], 1995). Mills (n.d.) explains that learners develop skills in team-work, problem solving, and independent thinking through learning that is “active, task-oriented, and self-directed” (Background, para. 1). In PBL, the learner is the focus and knowledge is created rather than disseminated (Putnam, 2001; Savery ^[4] & Duffy ^[5]). Students collaborate with each other to form knowledge that can be used to solve problems (Ottenbreit-Leftwich ^[6], Ertmer ^[7], & Simons ^[8], 2006). According to Hmelo-Silver ^[9] (2004), PBL “is well suited to helping students become active learners because it situates learning in real-world problems and makes students responsible for their learning” (p. 236). The teacher, as facilitator, provides relevant experiences that catch the interest of the learner and foster collaboration (Hmelo-Silver ^[9]; Newman et al., 2003; Putnam, 2001).

In a historical analysis, Januszewski ^[10] and Pearson (1999) reveal six key features of the PBL approach. They are as follows:

1. the problem is introduced before any dissemination of knowledge
 2. knowledge should be developed on an as-needed basis
 3. intrinsic motivation in which the learner takes ownership is key
-

4. there has to be a connection to the real world
5. learning is promoted
6. working as individuals or in groups

Through PBL, learners can identify knowledge deficiencies, reflect, and be flexible in their thinking (Hmelo-Silver^[9], 2004).

Electronic games

Students of the 21st century have grown up in a world where use of computers, cell phones, and gaming consoles are second nature (Sancho^[11], Moreno-Ger^[12], Fuentes-Fernandez, and Fernandez-Manjon^[13], 2009). Wikipedia defines electronic games as “a game that employs electronics to create an interactive system with which a player can play” and can include items such as computer games, handhelds, arcade-style standalone machines, and non-visual products (“Electronic games,” n.d.).

Electronic games have been in existence for over thirty years and have become very pervasive and influential. This pervasive influence has led to an increased interest in their effect on learners and their learning (Squire^[14], 2003). However, James Paul Gee^[15] clearly states that games are not meant to replace teachers and books (Stoerger^[16], 2007). A good video game is challenging yet not too difficult and must guide the learner towards action (Stoerger^[16]). Kiili (2007) further clarifies the vision of an effective video game as one that has authenticity, collaboration, learning by doing, and time for reflection.

The challenge then presented to the designer is maintaining the entertainment value while providing an educational product (Royle^[17], 2008). Game designers such as Smith^[18] and Mann^[18] (2002) often see the focus on facilitation of learning as a risk in that it may remove the idea of enjoyment and thus remove the notion of a game.

Electronic games and problem-based learning

Electronic games can be used effectively in the PBL approach and still maintain authenticity and relevance (Royle^[17], 2008). This connection between video games and problem-based learning has been well established by researchers such as Barrows (1996) (as cited in Ma^[19], Williams^[20], Prejean, & Richard^[21], 2006). Royle^[17] explains that “real learning does happen in games, and the learning engaged by gamers shares many attributes with the pedagogy of problem-based learning” (The Killer Application Section, para. 6). Prensky^[22] (2000) also indicates that a learner’s critical thinking and problem solving skills can be enhanced through the use of electronic games (as cited in Yoo & Zellner^[23], 2006). According to Kiili (2007), “educational games may offer a viable strategy for developing students’ problem solving skills” (p. 394). These games force the learner to become an active participant in obtaining necessary knowledge in order to further their progress in the task. The Problem-Based Gaming model presented by Kiili demonstrates this idea of developing problem solving skills. Learners test hypotheses and reflect on results in a cyclical manner which leads to the development on knowledge and learning. The reflection stage is seen as the most important as this is where the learner critiques and internalizes the knowledge used to solve the presented problems (Kiili).

A key form of games known as adaptive role playing games can provide a source of learning from a problem-based approach. According to Sancho^[11] et al.(2009), role playing games “offer immersive and realistic scenarios with engaging narratives that challenge the user to solve problems embedded in the game” (Motivation, Narrative, and Role playing Games Section, para. 2). The challenges push the limit of the player, information is in context and on time, and collaboration is encouraged to allow for problem solving (Sancho^[11] et al.).

Chuang and Chen^[24] (2009) explored the effects of video games on children’s cognitive learning. The study involved 108 third-grade students from a middle/high socio-economic background. A control group was given instruction on a topic through computer-assisted instruction that was text-based. The experimental group received instruction on the same topic through a computer-based video game. In both cases, the presence of a teacher was

removed. Based on that study, Chuang and Chen ^[24] found that computer video games can promote problem solving by making the players recognize “multiple solutions for problems” (p. 7). These games can also improve “critical thinking”, “higher-level cognition”, and “higher-order thinking” (Chuang & Chen, p. 8). Likewise, Kiili (2007) found that learners test various strategies throughout the game to expand their knowledge base and develop “creative problem solving” skills (p.398).

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Problem-based learning and social software

Introduction

This wiki explores some of the links between problem-based learning and social software.

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Problem-based learning

Problem-based learning (PBL) is an innovative educational approach that transforms passive learners into active participants who construct knowledge by building upon previously gained knowledge and experiences (Luppincini ^[1], 2003; Major ^[2] & Palmer ^[3], 2001). PBL ^[4] reflects certain principals of constructivism such as understanding deriving from interactions with the environment, the need for the learner to focus on a stimulus or goal, and the evolution of knowledge through the social environment (Savory & Duffy ^[5], 2001).

PBL ^[4] is utilized in many disciplines to help students develop advanced cognitive abilities including critical thinking, problem-solving, and communication skills (Major ^[2] & Palmer ^[3], 2001). It is often used in medical education. The PBL ^[4] approach presents a realistic case that students work collaboratively to solve. The problem solving process requires students to clarify terms and concepts, define and analyze the problem, formulate and synthesize ideas, and present and reflect upon their solution (Woltering, Herrier, Spitzer & Spreckelsen ^[6], 2009). PBL ^[4] stimulates students by providing practical problems, cooperative work environments, and the chance to organize the learning process. Cognitive science research about the nature of learning has shown that students benefit from working together, and they learn best by teaching or solving problems, therefore, a paradigm shift towards PBL ^[4] is necessary to develop an approach to instruction that is consistent with research (Major ^[2] & Palmer ^[3]).

Upon examination of the empirical and theoretical evidence reported in three PBL ^[4] reviews, Colliver ^[7] (2000) found PBL ^[4] ineffective in fostering the acquisition of basic knowledge and clinical skills (p. 259). However, Albanese ^[8] (2000) conducted a more comprehensive review and found that PBL ^[4] is a worthwhile strategy because of its effectiveness in information processing, cooperative learning, and improving the learning environment for students and faculty. Colliver ^[7] summarized the advantages of PBL ^[4] to the learning environment and noted that it, "may provide a more challenging, motivating and enjoyable approach..." (p. 266). Camp ^[9] (1996) supports the use of PBL ^[4] in medical schools. She found that medical students taught in a PBL ^[4] environment retain knowledge for longer periods, provide better causal explanations and are more motivated than students taught conventionally.

Social software and PBL

Robertson^[10] (2008) found that using social software tools (SSTs) can aid constructivist^[11] and PBL^[4] by supporting team knowledge building through communication and collaboration among peers. In general, McLoughlin^[12] and Lee^[10] (2007) argue that Web 2.0 technologies, such as (SSTs^[13]), have a foothold in lifelong effective learning and have considerable potential to address the diverse needs of students. Web 2.0 is an umbrella term for Internet technologies such as blogs^[14], wikis^[1], social bookmarking applications, social software and networking^[15] tools, and media sharing sites (McLoughlin^[12] & Lee^[10]). McLoughlin^[12] and Lee^[10] claim that these technologies are opening doors to more effective learning and competence development through visual and verbal connectivity. Ninety-six percent of students with online access report that they use social networking technologies, (NSBA^[16], 2007). The Internet can be used as a readily accessible platform to promote team and peer group communication, collaboration and construction of knowledge rather than just as a source of content (Robertson^[10], 2008).

SSTs^[8] are not created specifically for educational purposes but they can support learning in problem-based^[4] activities (Dalsgaard^[17], 2006). These tools are useful when learning is a self-governed, problem-based, collaborative process because they strengthen relationships between students. The PBL^[4] approach requires students to work in groups in an open-ended environment. SSTs^[8] make student work visible to others and allow users access to similar networks of people and references. Through the sharing of work and engagement in discussions social software tools facilitate closer relationships and more frequent interaction between students and teachers (Dalsgaard^[17]).

The PBL^[4] approach also requires that knowledge develop through the social and cultural environment (Savory & Duffy^[5], 2001). According to Luppigini^[1] (2003), the social aspect of constructivist^[11] learning is rooted in argument, discussion and debate, therefore, students need to continually communicate and make decisions together. SSTs^[8] support continuous interaction by giving students the opportunity to create their own learning environments, by allowing flexible work hours, and by providing global access to individuals (Brodie^[18], 2009) thus, increasing awareness and appreciation of different cultures and societies. The two-way nature of social software make it possible for students to share experiences and lessons when gathering knowledge and ideas on a wide variety of case studies (Alexander^[19], 2008). SSTs^[8] also allow individuals to be exposed to a diverse range of interpretations and points-of-view that can be integrated into learning activities (Luppigini^[1]). For example, wikis can be used to support discussion, group case studies, as a journal of completed work, and as a forum for product development, publishing, and reflection (Robertson^[10], 2008).

SSTs^[8] enable user customization and allow learners to make decisions about which tools best suit their goals and needs (McLoughlin^[12] & Lee^[10], 2007). In a PBL^[4] situation the learner has control over and responsibility for learning, by using SSTs^[8] learners receive scaffolding through the help of others. SSTs^[8] enable multiple forms of support as they allow people to connect, interact and share ideas in a fluid way (McLoughlin^[12] & Lee^[10]).

SSTs^[8] help students develop a positive attitude towards using technology, and allow them to edit and customize the content (developing creativity skills) they are sharing online (University of Minnesota^[20], 2008). Reflection upon work created and construction of a solution to a real world problem are important in PBL^[4] environments; discussion forums, chat rooms and email are complimentary to these steps (Donnelly^[21], 2006).

Griffith^[22], Liyanag^[23] and Hansen^[24] (2008) advise that, because social networking sites have increased in popularity, students are using them academically for group work but the use of SSTs^[8] should be monitored due to vulnerabilities related to privacy and security. However, when used correctly, SSTs^[8] can support PBL^[4] by providing a medium to share information with others, work collaboratively, present and publish individual work, as well as the opportunity to generate new ideas and transform understanding through reflection.

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Social software and collaborative learning

Introduction

This wiki explores the relationship between social software social software and collaborative learning ^[1].

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Social Software

Social software, known more popularly as Web 2.0 consists of an array of online tools and technologies that allows users to interact and share information, files, and resources with one another (Minocha ^[1],2009). Social software includes tools such as: Wikis, video-sharing websites (e.g.,YouTube ^[2]), blogs, social networking sites (e.g. Facebook ^[3]), and instant messaging. These tools and services have added increased possibilities for online learning opportunities (Capurco ^[4] & Capretz ^[5], 2009). Social software and Web 2.0 sites have marked a movement away from the initial function of the Internet as a one-way, static business tool to a rich experience made 'by the people for the people', allowing two-way communication and sharing (Selwyn ^[6] & Grant ^[7], 2009). Learning and educating using social software and Web 2.0 technology have moved in a direction that fosters a single student's work, but also group and partner collaboration, in a new learning atmosphere (Dorninger & Schrack ^[8], 2008). Hughes (2009 ^[9]) states that compared to simple communication tools such as e-mail, Web 2.0 has an intrinsic networking effect that allows individuals to connect and share with other like-minded people quickly and effectively. Furthermore, it invites a user to create or extend a whole new identity online (Hughes ^[9]).

Learning using social software

Learning using social software and Web 2.0 technology have moved in a direction that fosters a single student's work, but also group and partner collaboration, in a new learning atmosphere (Dorninger & Schrack ^[8], 2008). Hughes (2009) found that, compared to simple communication tools such as e-mail, Web 2.0 has an intrinsic networking effect that allows individuals to connect and share with other like-minded people quickly and effectively. Furthermore, it invites a user to create or extend a whole new identity online (Hughes ^[9]).

Collaborative learning

Collaborative learning has proven to lead to higher grades than learners achieve in other conditions and the means by which they learn is more constructive (Dewiyanti, Brand-Gruwel, Jochems & Broers ^[10] 2007). [Li, Dong and Huang (2009 ^[11]) argued that collaborative learning leads to higher student performance and improved retention of the learned information for longer periods. According to Johnson, Johnson and Smith (1998 ^[12]), several different criteria must exist for collaborative learning to be occurring: Students must know their individual success rests on the success of the group as a whole; individual effort within the group is assessed, holding them more accountable; students teach and learn from one another while employing leadership skills; and the group must work as a cohesive unit being both critical and constructive to help achieve the greatest good for the group.

Social software and collaborative learning

Crichton and Kopp (2008^[13]) argue that social software provides the opportunity for sustained collaborative learning, expression, reflection, and a rich community of practice. In addition, Web 2.0 applications have the potential to enhance students' future careers and can be used by teachers to supplement effective classroom practices. (Crichton & Kopp^[13]). The capacity for social software and Web 2.0 applications to result in collaborative learning depends upon how the technology is used (Thorpe^[14], 2002). Kok (2009^[15]) posits that one of the most representative tools of the Web 2.0 is the Wiki. Frydenberg (2008^[16]) states that because students and faculty can both post information to the Wiki, the role of the instructor changes from being the single authority to being a partner with the students in their own learning. This social software is an enabler of social interaction, collaboration and information sharing, promoting the growth of communities as user groups (Kok^[15]).

Cautionary uses of social software and web 2.0

Koh and Hill (2009^[17]) argue that there are several areas which need to be further researched with regards to students using online environments for successful learning: students need help and assistance with communicating feelings and opinions honestly; time and effort must be put forth in helping students forge communities online which have a rich dialogue and are supportive; and teacher planning must be focused on group work. Finally, teachers must be adept at catching problems with group communication early and have a process to deal with it. As Hughes states, it is also erroneous for educators to assume that social software alone will close the divide and disparity which exists between struggling and excelled learners (2009). Teachers need to improve their practice and expand their knowledge regarding what students find challenging, as well as beneficial, about group work in online settings (Koh & Hill^[17], 2009). A large part of the predicament with the technological advancements is the desire to adopt them immediately without critical analysis (Lozano-Nieto, Guijarro & Berjano^[18], 2006). When using social software for educational ends, it must be acknowledged that it has not been developed specifically for learning (Dalsgaard & Mathiasen^[19], 2008). According to Henry and Meadows (2008^[20]), to ensure student success, the use and further development of software and technology must be handled wisely and coupled with a sense of a collaborative community. Technology, in itself, is not a solution to educational woes nor is the investment in technology (Abrami, et al.^[21], 2006); research and training have to be a large part of an overall reforming of how technology is implemented in teaching.

Dron (2007^[22]) argues that self-organizing communities do not necessarily lead to learning environments which are valuable or effective. Educators challenge themselves to create "pedagogically sound" learning environments online (2007^[22]). When using Web 2.0 applications for educational purposes, as Abrami et al. (2006^[21]) argue, teachers must keep several things in mind in order to make the learning meaningful ; instructional practices must differ online from that of face-to-face instruction; when deployed in an appropriate way, technology may be helpful in the analytical and higher-order thinking skills of students; the teacher should present the technology to the students as a challenge and allow them to be the ones who make and alter the technology, in a hands-on approach to learning.

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