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Taking the Gaming Approach in Education

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Abstract:

In the past decade several distance learning initiatives have been implemented in information technology curricula based upon the principles of natural learning. This paper examines the various ways in which distance learning may contribute to 'natural learning'. The main research question is how distance learning provides support to natural learning processes.

Our starting point is that students can learn with information systems instead of from the systems. The paper investigates the relationship between distance learning and natural learning. On this basis, the requirements for distance learning as well as the technologies that might make use of these requirements are identified and analyzed.

Keywords: Distance Learning, Technology, Education.

I. INTRODUCTION

Over the past few years, experience was acquired concerning the design of a new information systems curriculum that is based upon the natural learning principles (Abcouwer et al 2004, Abcouwer et al 2005). In that process, the use of a modern distance learning environment was proven to be a success factor (Chang and Cho, 2009).

In order to address the challenge, the concept of natural learning first needs closer examination. Defining the natural learning concept is by no means easy because there are only limited scientific foundations for this type of learning. According to some, it is based upon Gardner's theory of multiple intelligences (1985; 1999). Natural learning assumes that when a student is brought into a meaningful situation, the learning output is considerably higher than when the learning takes place in a meaningless situation (Durget and Smith, 2009). From the learning demand that is summoned, the student will next take courses and workshops. The theoretical foundation of natural learning will be further discussed below.

The constructivism states that people give meaning to experiences in their own way (Bartlett et al, 2001). One of the major founders of constructivism is Jean Piaget. Piaget takes his departure from the idea that a person absorbs certain experiences in his own unique way in his already existing knowledge. He calls this process assimilation (Cole et al, 2001). In addition, a person can rearrange his own concepts in such a manner that the new concept can be included. This is called accommodation. This knowledge construction process, consisting of assimilation and accommodation, can only take place when the experiences in some way connect to the existing concepts.

Lev Vygotski and Jerome Bruner added the social component to the constructivism. They assumed that communication represents a strong added value in the learning process. Vygotsky even states that the use of language itself influences a concept, whilst for Piaget language was only a means for communicating concepts (Bartlett et al, 2001).

Therefore, learning within the social constructivism is the creating and arranging of concepts in the brain. Therefore, this is not the learning by heart of fragmented knowledge but the development of meaningful concepts on the basis of experiences and a realistic context (Kolb, 1984). The task of the teacher within this view on learning is creation of a meaningful situation in which the individual student constructs his or her own knowledge (Bartlett et al, 2001). A student should be given the responsibility to design his or her own learning experience. Monitoring of one's own learning process plays an important part in this. This monitoring and checking of one's own learning process is known as metacognition. Cognitive processes are split into two levels: the object level and the meta level (Fang and Chan, 2009; Chang 2010). The meta level plays a monitoring and checking part with regard to the object level (Cox, 2005). Reflection and feedback are part of the meta level and are for that reason of crucial importance to the learning process.

All this makes learning into a social activity that is carried out together. By means of collaborating and communicating, the student is obliged to make his thoughts explicit and he is confronted with the weaknesses of his ideas. This principle also applies when a student explains a subject to himself.

II. LITERATURE REVIEW

Technology learning is an innovative method that uses technology to enhance learning. It is usually being used remotely where the learner and the instructor are not present at the same place (Sun and Chen, 2010). Many studies tried to examine the effects of technology learning. For example, see Ben-Zvi (2010) and Po and Deng (2010). Some studies show that students consider the technology learning method as superior to the traditional teaching methods and therefore, it bears several benefits for the students as it enhances the learning experience (for example, see Chen and Lin, 2009).

One important factor that makes technology learning so unique is that it allows learning to be an individual matter. That is, the learner learns in his or her own time, in his or her own pace, rather then following the instructor's dictated pace (Lei, 2009). As stated earlier, studies that explored technology learning show that this method is considered better than traditional methods because of the flexibility it allows to the learners. This outcome comes at lower costs to the students (all they need to have is a computer and a headset) and the institutions using the method, as they do not need to supply the students with campus services, such as classrooms (Smith, 2010).

However, an investigation of the literature reveals that over flexibility may deter students from learning. Unlike traditional teaching methods, the instructor usually cannot follow student participation in virtual classes, as those can be easily manipulated using the available technology (Wu and Fang, 2009). Chang and Cho (2009) state that sometimes one may even find negative reaction to this method. This usually happens when the students are not technology savvy and have hard time operating in a virtual class.

In addition, in today's environment it is only natural that we desire to see our students becoming more ethical. Many argue that higher education institutions should increase their emphasis on ethics (e.g., Fang and Chan, 2009). However, usually educators fail to help students thoughtfully assess what goals are worthy of professional (and personal) aspirations, and aid and abet physical, psychological, spiritual pain for our students, the organizations they work for, and society at large (Lamas and Martinez, 2010). Lei (2009) agrees that we are failing as professionals. He argues that what is needed is a major change in education and they educators provide education and learning habits. That includes peoples' self conceptions. He further emphasizes that it is our duty as teachers to bring about a positive change in our students.

The argument to increase pedagogical emphasis on business concerns is supported by the observation that young people are susceptible to attitude change (e.g., Ben-Zvi, 2009; Chong and Kasemanandan, 2010). Kolb (1984) suggests that young adults are more open to learning and better deal with ethical issues. In further support of the idea are studies showing that ethical attitudes change with academic exposure or training (e.g., Hall and Hall, 2004).

In addition, studies also show that some decision makers are unaware of the implications of their decisions and others seem to believe that other concerns, such as beliefs, should not even be applied to their decisions (Venkatesh et al., 2003; Ben-Zvi, 2009). This means that business decision makers are either unaware or unwilling to believe that that business decisions have ethical consequences, that ethical issues should not be considered in their decisions, and college students as future decision makers are open to and capable of learning to incorporate ethics into their decision making . So it is fairly easy to argue that we ought to try to teach business ethics.

When considering experiential learning, the main model was published more than 20 years ago; yet, Kolb's theory (1984) on experiential learning is still considered a central theory in education. His model emphasizes the interaction between experience and learning by exploiting the subjective nature of the learning process and creating a transformation of experience that engenders knowledge (Durget and Smith, 2009). Business games relate to experiential learning as they present a method that epitomizes experiential learning (Ben-Zvi, 2010). They provide students the opportunity to become intimately involved in decisions faced by executives in real organizations, to test the understanding of theory, to connect theory with application, and to develop theoretical insights (Myburgh and Smith 2009).

The Kolb's model consists of four distinct elements: concrete experience, observation and reflection, the formation of abstract concepts and testing in new situations. The model is represented as a learning cycle. Furthermore, it is suggested that the learning cycle can begin at any one of the four points. However, they suggest that the learning process should begin with a person carrying out a particular action and then seeing the effect of the action in a situation. Generalizing may involve actions over a range of circumstances to gain experience beyond the particular instance and suggest the general principle. Understanding the general principle is the ability to see a connection between the actions and effects over a range of circumstances. This model represents a practical heuristic for exploring the interplay between teaching, learning, and ethical matters. Thus, we discuss multiple intelligence and natural learning in the context of a specific game course.

III. MULTIPLE INTELLIGENCE AND NATURAL LEARNING

The theory of multiple intelligence states that intelligence is not an isolated phenomenon but that it has to be viewed in the context of the individual. One of the founders of the theory of multiple intelligence is Howard Gardner (1985). Gardner states that intelligence is the ability to solve problems or for generating products that are of importance to the cultural setting or the community that the individual occurs in (Checkley, 1997). Within this definition of intelligence, Gardner distinguishes eight types of intelligence (Gardner, 1999).

The first type of intelligence is linguistic intelligence. This is the sensitivity of the individual to the meaning and order of word, for the sound and the rhythm of words and for the various different functions of language. It is the ability to express thoughts in words and for understanding other people that do the same (Gardner, 1985).

The second type of intelligence is logical mathematical intelligence. That is the ability to abstract as a result of an observation, link up facts and understand underlying principles, basing the interconnections on logic instead of empiric observations (Gardner, 1985).

The third type of intelligence is naturalistic intelligence. This type of intelligence refers to the ability to classify artificial and natural objects. In order to be able to do this, an individual has to be able to see into the nature of an object and distinguish patterns (Checkley, 1997; Fang, 2009).

The fourth type of intelligence is spatial intelligence. These are the qualities to see things in images, to represent the spatial world inside one's head. (Gardner, 1985).

The fifth type of intelligence is musical intelligence. This is the ability of the individual for understanding the meaning of rhythmic combinations of sounds, to recognize and remember these and for producing these combinations himself (Gardner, 1985).

The sixth type of intelligence is bodily-kinaesthetic intelligence. This type of intelligence is a physical one. It is the ability to use the body for achieving a certain goal and for automating actions (Gardner, 1985).

The seventh type of intelligence is the interpersonal intelligence. This is the ability to be able to get on with other people. It is the ability to perceive others and to adapt oneself to other people (Gardner, 1985).

The eighth type of intelligence is the intrapersonal intelligence. This type of intelligence includes the ability to know oneself. It is the ability to understand one's own emotions and to include thing in one's own thinking (Gardner, 1985).

All these intelligences are more or less represented in an individual. However, there are differences in the extent to which the intelligences are developed. When a specific intelligence is strongly developed, the knowledge and skills that use this intelligence are easy to learn. Therefore, the ideal learning situation is that a problem is looked at from a certain angle, which links in with the intelligence that is optimally developed. When several different lines of approach are used, there is more chance that a connection is found with the better-developed intelligence of the student.

One could therefore say that multiple intelligence states that every individual has a unique combination of more and less developed intelligences at his or her disposal. It has this in common with social constructivism. Converting experiences into knowledge in a personal way is, among other things, a result of the unique intelligence profile of that particular individual (Geller and Smith, 2009; Lei, 2009).

IV. DISTANCE LEARNING CHARACTERISTICS

As one of the founders of natural learning, there is a distinction between about twenty characteristics of natural learning. These characteristics are classified in categories. These categories are based upon the theory of social constructivism and that of multiple intelligence, as described in the following paragraph. The following paragraphs describe the characteristics of the categories: knowledge construction, communication and feedback, meaningful situation, own responsibility and reflection, and multiple intelligence.

Within natural learning the interaction between knowledge construction and communication takes central stage (Grisham and Smith, 2009). In his own unique way, the student puts a meaning on his or her experiences. In addition, this attachment of a meaning is accentuated by the communication of the student with his fellow students and his teachers. The fact that the student in his own unique way attaches a meaning to his experiences, results in a group of students looking at a subject from different lines of view. These lines of view are for example different from student to student because the students look at things with a different intelligence profile. Apart from the interaction between knowledge construction and communication, there is also an interaction between knowledge construction and reflection. In this interaction, the meaning an individual puts on experiences is brought up for discussion (Smith, 2010).

The concept of distance learning is a very broad concept. It is a collective noun for the designing of learning situation utilizing the possibilities of ICT. As this definition of distance learning already proves, there are many forms of distance learning. Examples of these forms are computer-based training, the virtual classroom, the learning-content management system and the learning management system (Grisham and Smith, 2009).

A learning content management system (LCMS) is a special content management system (CMS) that is designed especially for making and managing of learning content. Important matters concerning this are: support of the development and collaboration process; storage of contents in the smallest possible meaningful unit; separating of content and form; storing contents such that it can be found easily and meaningfully and distributed to size.

A learning management system (LMS) is an application that supports the administrative and logistic processes concerning learning. An LMS is in fact an electronic catalogue of courses that may assist the student in finding the right course. It also registers which courses the student has finished and for which course he has registered. In practice applies to almost all learning management systems that the course is the smallest identifiable unit in the system. Increasingly more often, no clear distinction can be made between an LCMS and an LMS because functionality from one system is implemented in the other one and vice versa (Hall et al, 2004).

Distance Learning is taking up an increasingly important place within universities. A study amongst 19 universities spread across the world, shows that all these universities expect that the importance of distance learning within their organization will increase over the next few years (Wu and Fang, 2009). These universities were asked how they would describe their current online distance learning activities and how they expect these activities to develop. Moreover, a distinction is made between the various categories of courses as offered online. The categories run from not or trivially online to fully online. Table 1 provides an example of the a study comparing the number of programs between different educational institutions. In case of 'not or trivially online' distance learning performs too small a part to have any real influence on the learning process and in case of 'fully online' the possibility of face-to-face communication is excluded. This limits the possibilities for being able to communicate about very complex subjects.

Table 1. A Comparison between Programs in Universities and Colleges

Institutions	No. of Programs	No. of Distance Learning Programs
Universities	3545	1256
Private Colleges	1252	254
State Colleges	731	235
Community Colleges	985	120

V. REQUIREMENTS FOR DISTANCE LEARNING

In this section, the requirements with regard to distance learning are specified by means of the natural learning principles. The distance learning that takes centre stage in this study is the LMS/LCMS-system.

When formulating these requirements one should exercise some caution with regard to the degree to which these findings are applicable. For that purpose, too many differences existing between the individuals and other processes such as adaptation and acceptance also play a part (Venkatesh, et al, 2003).

For support of the various lines of view from which the student looks at a subject, a type of content management is required, that both the student as well as the teacher can manage. Because the student constructs his knowledge in his or her own unique way, use of primary source can be of added value in the learning process.

The characteristic that natural learning involves question-driven learning instead of instruction means that it is better to work with small flexible teaching modules in specific situations. When a knowledge query arises with a student, the student should however be assisted in finding the course module that will deal best with his knowledge query.

The characteristic that knowledge without context does not exist, means that knowledge always has a link with other knowledge and with an entity in the real world. A learn content management

system (LCMS) may be suitable for this because the learning content in this is stored in the smallest possible identifiable unit with for instance the objective to enable reuse. Because every student in his own unique way puts a meaning on and interprets experiences, the web will take different shapes for different individuals. Semantic modelling tools such as semantic networks and databases may provide support when making these networks more explicit.

The last characteristic in this category is that the achievements of the student are compared to the previous achievements. In judging on progress, the change in knowledge level is examined. Because this involves relative developments, the teacher of a course module or achievement needs to be able to see the previous achievements of a student. The first role is that of supervisor. A teacher in this role is an expert on the subject. The second role is that of taskmaster. A teacher in this part is an expert in the field of didactics and learning psychology. This teacher is attached to the student for a longer period, which enables him to better monitor this student's progress Summarizing, we see that the characteristics from the knowledge construction category predominantly make demands on the content management of the distance learning environment. Apart from these content management facilities we see that the search engines and the possibility for interactively link different parts, may provide added value. In addition to this, it should be possible to personalize the distance learning environment for the student.

The first characteristic in this category is the point of departure that you learn more together with others than on your own. A possibility for asynchronous and synchronous communication should have to be available in a learning environment in order to support the communication as necessary for natural learning.

The second characteristic in this category is that the achievements of the student are compared with previous achievements. The resulting communication and feedback between the student and the teacher should also be supported by the system.

The third characteristic in this category is the fact that natural learning is based upon acquiring experiences and explaining these. This entails students working together on an achievement in groups. This should eventually result in the group delivering a product. The collaboration between students in groups can be supported in various different ways. Examples of technologies that may support this collaboration process are: shared window systems, shared editor systems and co-authoring systems (Dix, 1997). Apart from communication *within* the groups, communication *between* the groups may also add value. Communication systems such as discussion groups, chat rooms and messaging systems provide added value in this case.

During the learning process, communication between students and teachers also takes place. In principle, the teacher does not 'help write' the work of the students but only provides feedback to this work.

Apart from communication that involves students, communication between teachers should also be possible. Within natural learning, the student is coached by various different teachers that all from their own expertise can contribute to the learning process of the student.

In conclusion, it may add value when the communication is stored in the distance learning environment. First of all, this enables the students to make connections to parts of this communication, just like they also find connections between different content. Besides, the students can look back on their learning process during the reflection process and see what they communicated about.

Meaningfulness is achieved by allowing the student to choose his task, by formulating tasks that are 'drawn from real life' and by keeping tasks broad and not dividing these into fragments. Besides, a close target needs to be created for learning, which during learning is clearly present for the student.

In order to be able to support a learning situation such as this, the distance learning environment has to comply with a number of requirements. because the tasks or achievements that the students deliver are drawn from life, these should also be accessible from life. However, this

requires that the distance learning environment can also be accessed 'any time, any place'. Because, a knowledge query may occur at any given moment during the learning process, it is important that the student can start a course module at any given moment. This also proves, that a standard division into courses that run for a certain period, does not suit support of the natural learning process. Moreover, it should be possible to personalize the distance learning environment for each student. Every student make within his or her learning process different connections and puts a meaning to experiences in a different manner. Viewed from the student's perspective, he or she is just involved in an achievement and is initially only involved in one single content web. However, as seen from the system there are many students with many different meaningful situations and different content webs, each evoking different knowledge queries.

Apart from the essential meaningful situation in the 'real world', a meaningful situation can be created in a virtual world. Because individuals overcome certain situations in the virtual world or carry out certain tasks, this may lead to a better understanding of the underlying concepts.

Within the natural learning process, a student is given responsibility for designing his own learning process. By means of further stimulating students to make more explicit in the distance learning environment what they are doing, why they are doing this, what their strategies are and what answers they have found, they are encouraged to reflect upon their own learning process, which helps them to develop better understanding and are better equipped to apply their knowledge.

Natural learning takes its departure from the idea that in learning an appeal has to be made to several intelligences. In western education the emphasis lies on the linguistic and logical mathematical intelligence (Gardner, 1985). Nonetheless, the quality of the learning process increases as other intelligences are also drawn on. Distance learning systems should offer opportunities to do so. We discuss these briefly below.

VI. CONCLUSIONS

Starting from the view that we developed on natural learning, we have identified requirements for distance learning. Our analysis has resulted in the identification of a number of useful technologies.

First of all, a form of content management is needed to accommodate the various different lines of approach. These lines of approach are partly caused by the intelligence profile that the student has at his disposal. In order to be able to support the various different intelligences, the system should have more to offer more than just text. With regard to this, it is important that the student can manage his own content and is able to make his own connections between different content. Being able to find connections to parts of the communication may also mean added value.

The second important part of the natural learning process is the communication that takes place during the learning process. When the distance learning environment includes communication parts then this may contribute to this part of the natural learning process. In this process, both synchronous as well as asynchronous channels may contribute. However, one should bear in mind that this communication can never replace direct face-to-face contact. In addition, the student can be supported by means of co-authoring and other collaboration systems.

A third important part of the natural learning process is the reflection of the student on his own learning process. In this reflection, the student looks at his progress and associates this for himself with a value judgment. The distance learning system can contribute to this process by enabling the student to follow his achievements through time and by looking back. It may also be of added value, when the student can track his achievements in his content web and can retrace how this came to be.

Finally, natural learning takes place in a meaningful situation. In this lies the last chance for the natural learning process. By offering the student tools that may support his understanding of the

meaningful situation, the system can support the student in gaining better understanding. With regard to this, the starting point should be that the student learns *with* the system instead of *from* the system.

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