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EXPLORING CREATIVITY SUPPORT SYSTEMS FOR THE NE“X”T GENERATION

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ABSTRACT
This paper explores the implementation of a creativity support system for tertiary students studying games design and development at Deakin University, Victoria, Australia. The students at the centre of this study are the ‘next’ generation of learners and are often called the net generation because of their pre-imposed affinity for all things ‘online’. The creativity support system for the games students is designed within a ‘whole’ systems context. Focusing on only one tool to augment a person’s creativity does not take into consideration social factors that are pertinent on a person ability to grow their creative behaviours. This study will present a set of factors that each creativity support system should employ to facilitate creative abilities within people, with particular focus on how social activities help to enhance creativity.

KEYWORDS
Creativity, Learning, Social Systems, Action Research, Support, Information Curriculum Technologies

1. INTRODUCTION
Designing systems for the ‘next’ generation is not something that can be ignored anymore, particularly when it comes to the next generation’s systems for learning. The ‘Net’ Generation as they are often called (those born in the 1980s or currently aged 12 to 25) have very different interaction styles with technology, as well as different learning styles, compared to generations past such as the Baby Boomer generation (Heath 2006; McCrindle 2006). The next generation of students no longer see university as ‘school’. They see university as an institution required to provide a service to them as consumers (Dawson, Burnett & O'Donohue 2006). However, the students are also ‘pro-sumers’ within the university, wishing to give back to the university community. Dawson et al (2006) states that the development of technologies and teaching practices that promote community are seen to be provide an economic and educational imperative. To this end higher education is undergoing a pedagogical transition, advocating the inculcation of learner centred teaching approaches that foster community development. However, this study is not only concerned with community as a part of a student’s individual learning. This study is interested in community as a part of the students whole learning system, which is referred to as creativity support system. A creativity support system has the overall aim of providing a system that supports students with resources, personal motivation, areas for exploration and avenue for social interaction. In this study the creativity support system is embedded within a learning environment. In this learning and creativity support system for the games students establishment of community is an integral factor as it has been found from research (Katherine Blashki & Nichol 2005; Nichol & Blashki 2005) that in learning situations the net generation thrive on social interaction and community. The research presented in this paper is a component of a larger research project into creativity support systems in tertiary learning environments. The research question that this paper is attempting to address involves investigation of existing learning environments and how they are conducive to creativity, with particular reference to the four factors that make up a creativity support system: resources, personal motivation, exploration and social.
2. WHAT IS CREATIVITY?

Creativity has been widely regarded as a highly personal human attribute that potentially functions as a measure of success. It is however, innately difficult to evaluate a person’s creativity. Often we assess a person’s creativity premised on output. Creativity is facilitated however, via four elements; person, process, product and environment (Ripple 1989). Whilst these four elements are constantly interacting, much of the focus of research has been on how to better facilitate and nourish creativity within only three of the elements, person, process and product. However, it is argued that the environment (in particular with the combination of IT) is an equally, yet currently underrated, component of creativity. Blumenthal et al (2003 pg. 118) suggests that individuals and groups involved with information technology and creative practices (ITCP) benefit from participating in venues (environments) that support, motivate, and display this type of work (Blumenthal, Inouye & Mitchell 2003). The research presented in this paper supports environmental based creativity. To best support creativity the following four factors (that is composed of 17 elements) have been defined as necessary (Bruffee 1999; Ekvall 1999; Isaksen et al. 2001; Nichol & Blashki 2006a-2006b; Peterson 2001; Prather & Gundry 2003), and function interdependently within an environment:

1. **Resources:** Idea time, idea support, challenge and involvement, sufficient resources.
2. **Personal Motivation:** Interdependence, trust and openness, tolerance for uncertainty and ambiguity, playfulness and humour, conflict.
3. **Exploration:** Risk taking, debate, freedom, reflection.
4. **Social:** Supervisory arrangements, work group supports, team work (collaboration), community.

It is the combination of these four factors (and 17 elements) in an environment that creates a creativity support system. In this case the creativity support system is the learning environment of the tertiary games students at Deakin University. The games students are defined as the next generation or ‘net’ generation and a definition of the traits of this generation is given next to help understand their creativity and learning styles.

3. NE“X”T GENERATION

The current students at the centre of this study are enrolled at Deakin University and are specifically computer science students studying in the Games Design and Development stream. They are referred to as the ‘games students’, and are the next generation of learners to be entering the workforce. Often referred to in the media as Generation Y, the games students are best described as the ‘Net Generation’ because of their inbuilt need for all things ‘online’ (Oblinger & Oblinger 2005a).

“Net Gen students are social and team oriented, comfortable with multitasking, and generally positive in their outlook, and have a hands-on, “let’s build it” approach - all encouraged by the IT resources at their disposal” (Brown 2005 pg. 12.2)

However labels such as net generation are used as a means to describe the overriding characteristics that people of this age exhibit, that is a desire for the need to be ‘connected’ all the time to one another, either by mobile phone or internet technologies (Guest 2005). Other generic traits that could be attributed to the net generation include: flexibility, spontaneity, experiential, engagement and experience, immediacies, sociality, team work, structure, and visual and kinesthetic representations of information (Heath 2006; Oblinger & Oblinger 2005a). In addition, the net generation is considered to be a product of the contemporary environment. As Oblinger and Oblinger (2005b) suggest, “our experiences and the environment around us shape how we think, behave, and act”. For the net generation, technology such as the Internet was an increasing part of their environment as they grew up. These traits affect all aspects of a net generation student’s life, particularly their learning style. Universities need to adhere to the traits of this learning style and consequently as Dawson et al (2006) argues, universities are attempting to provide a competitive, quality educative experience to an increasingly culturally educationally, and economically diverse student cohort. These four factors are facilitated within the learning environment of the games students at Deakin University, in the attempt not only to increase their creativity, but also improve their process of learning.
4. SUPPORT SYSTEMS FOR SOCIAL CREATIVITY

The next generation of learner requires creativity systems that support them socially, and promote the development of creativity (Dawson, Burnett & O'Donohue 2006). As mentioned, one significant aspect of the social factor of a creativity support system is the element of community. Community can be defined: locality and sharing of common interests (Dawson, Burnett & O'Donohue 2006). This definition is particularly relevant in regards to the game students of this study, as locality can be defined in the online medium, as well as face to face. With this view, it is believed that the sense of community that the game students get from interaction within their learning and creativity support system is of most importance, disjointed from the mechanisms in which they have achieved community. As Dawson et al (2006) states a sense of community is comprised of four inter-related elements: membership, influence, fulfillment of needs and shared emotional connection.

In this study, it is viewed that technologies such as online communities can foster community and subsequently creativity, unlike some of the literature that states otherwise (Wellman & Gulia 1999). In addition, online technologies such as email, instant chat and message boards are central to the development of community and creativity. The focus of community practices has therefore been viewed as a strategy to cater to external and internal demands of the tertiary education environment while advocating socio-constructivist approaches to learning. The requirement of education institutions to afford community within their subjects is a relatively new subject with minimal literature available, particularly in when it comes to appropriate evaluative measures to guide practitioners in the design and integration of appropriate learning and teaching practices (Dawson, Burnett & O'Donohue 2006).

Current pedagogic strategies in computer science are failing to engage students and sustain their interest. Retention rates of students entering computer science and information technology are at an all-time low (70.5% at 2005 based on Deakin statistics). The learning and creativity support system for the game students is premised upon a social and situational educational philosophy (Buckingham & Sefton-green 2003). Social and situational learning takes place within a group context and is dependent upon the relationship between people and the learning environment. (Kerr 2006). As Kerr states “education in this approach provides the opportunity to participate in communities of practice” (Kerr 2006). Figure 1 outlines the pedagogical approach used within the teaching of the games students.

![Figure 1. Immersive Learning: Student centered learning pedagogy of the games students](image)

This Immersive Learning pedagogy is devised by Blashki (Kathy Blashki et al. 2007) and is premised upon studio based teaching and reflective practicum concepts (Schön 1987). It can be defined as a distinctly learner-centred approach, where the learners participate, direct and implement engaging and immersive learning activities both for their own use and the use of students who follow in their footsteps. The pedagogy has influences of the social and situational educational philosophy. The four learning elements of: **Immersion, Engagement, Agency and Risk/Creativity** occur within each learner. The elements of **context, facilitating agents, and the rest of the world** represent both physical and social influences on the learner. This learning pedagogy is a part of the creativity support system of the games students. A creativity support system can be facilitated in many different types of environments, with this study focusing on a learning environment. The elements of the pedagogy have similarities to elements of the creativity support system, and are interrelated in their functioning and influence in the environment.
5. RESEARCH INQUIRY

In an attempt to assess the games students’ creativity support system, research was undertaken into the ways in which the learning environment are conducive to creativity, based around the four factors. Traditional mechanisms used to gather data such as surveys and interviews were employed. However the overall methodological process was built around action research methodology, were the main premise is for participation of the researchers into the communities that they are researching, in this case the game students.

5.1 Action Research

Action research is premised on context based human activity, and applied to real life problems (Levin & Greenwood 2001). Both the researchers and the participants of the study contribute to the results drawn. As Levin and Greenwood state:

“Action research is inquiry where participants and researchers co-generate knowledge through collaborative communicative processes in which all participants contributions are taken seriously” (Levin & Greenwood 2001 pg. 105).

The action researcher cannot be not taken out of context of the research process as in other methodologies, but plays a real part in the formation and influence of human activity in the research group being studied. In the games students’ environment, the researchers comprise of postgraduate students and staff, however these formal terms define only our employment position, and not the roles we play within the community. Action research builds results not only from surveys and interviews with participants, but also via observations made during participation in the community. In our case, the facilitation of the web community results in ease of access to content that was used in the community. The results and discussions were formed via these techniques. The data collection techniques in this study comprise both qualitative and quantitative. A good combination of both methods will result in a thorough progression through each stage of the action research process. The environments’ in which the data was collected is presented next.

5.2 Environments in the Students Learning and Creativity Support System

The learning environments that make up the creativity support system of the games students is compose of many interrelated parts. The creativity support system design was premised much on system thinking theories, and it attempt to incorporate many ‘real world’ components to represent a more ‘real’ system approach (Flood 2001). The components of the learning and creativity support system include: Traditional teaching facilities such as lectures and practical classes, as well as a games lounge and a web community.

The Games lounge as shown in figure 2 allows the students to utilize an environment for more informal educational means, specifically ‘play’. It incorporates a number of desktop computers running windows to play PC based games, plasma TV’s with Xbox and Playstation consoles attached and 10 different console games.

Figure 2. Games Lounge

The web community is a discussion forum hosted for the games students within Deakin Studio Online/DSO (Blackboard learning system) tool. DSO allows threaded chat between staff and students, with each discussion area being exclusive to those enrolled in that particular unit. Boud et al. (2001) describe threaded discussions as a system where “there is a record of which contributions have been read and responses can be made as easily as clicking to reply and simply typing a contribution” (pg. 13). In the games degree the units
on DSO have a strong student focus, with students encourage to moderate and create new discussions throughout the semester. The combination of traditional forms of teaching, lectures and practical’s, in addition to new perspectives of the games web community and games lounge, all facilitate the learning and creativity support system required by the games students to enable them to successfully engage with their learning content. Results from the game student’s learning environments, with specific focus on the web community and the games lounge, are presented next.

6. RESULTS

To understand the learning and creativity support system of the games students, we surveyed 36 students regarding their use of the environments, and what they would like to see. For example:

I use the environments because: “The fact that there are others like me out there” and “It’s good to see that I’m not the only one who loves games. There’s a lot of good web links and insights that fellow gamers can give”.

The survey also showed that the games lounge provided something different to the net generation students as shown in Figure 3. The results point to the games lounge as providing a positive experience with ‘play games’, ‘fun’ and ‘to pass the time’ rating the highest. 1. Play Games, 2. Fun, 3. Meet up with friends, 4. Social factors, 5. Good equipment, 6. Collaborate with other students, 7. Meeting place to do assignments, 8. Place to brainstorm ideas, 9. Has a good atmosphere, 10. To pass the time.

Additional to the survey results figure 4 is an example of a project complemented as a part of the formal assessment in the games design and development units. The skills the students learn within the lectures and practical’s is complemented by the other learning tools found in the games lounge and the web community.

Statistic gathered from the web community and survey show that 41% of students used the games lounge with 64% participating in the web community. For the purposes of this study, participation is defined as posting a comment in the web community. All games students are automatic ‘members’ of the community due to their enrolment in the games units, so all members can view the online discussion. The higher percentage of use in the web community may be attributed to many factors such as the availability of the games lounge in comparison to the web community, however the researchers feel that the use of the web community is driven by the games students’ cohort being majority composed of those from the net generation. One student noted in regards to their non-participation in the web community that:

'I have not submitted to any discussions on DSO because I am shy. I have found discussions on student talk very helpful /interesting throughout my studies at Deakin’ (student comment).

Figure 6 through 9 displays results that show the creativity and learning of students was affected by their immersion within the environments. Figure 6 and 7 show the assessment results for students studying the unit ‘games fundamentals’ at Deakin University. The graphs show a change in the symmetry of the bell curve from being centered in 2005 to skewing to the left (percentage of higher grades) in 2006. Figures 8 and 9 show the results from a ‘Test for Creative Thinking – Drawing Production’ conducted with the 1st and 3rd year games students at Deakin University. The test measured their creative potential on the scale of: A = far below average, B = below average, C = average, D = above average, E = far above average, F = extremely high above average, G = phenomenal. The results show that the creative potential of third years is higher with 69% of students classified as C = average and 31% as D = above average. Compared to the first year students of 58% as C = average and 25% as D = above average. These results are drawn from a sample of 30 students who are studying games.
7. DISCUSSION

The results presented above are only a subset of the data gathering about the games students’ learning and creativity support system. Probably the most critical components of the study was that the researchers regularly and actively participated in the games students community to become apart of the learning environment. This involvement instigated influence in the environment, and helped in facilitation of the factors needed to support creativity. The following section discusses the learning and creativity support system factors with particular reference to how the social factor of supervisory arrangements, work group supports, team work (collaboration), and community.

7.1 Supervisory Arrangements

Supervisory arrangements are very important in the learning environment, not because of a need for authority, but more for moderation of the community and also to provide a degree of motivation amongst the students, particular in the initial stages of the community. Supervisory arrangements help strongly in facilitating personal motivation within each student because they build interdependence, trust and openness, tolerance for uncertainty and ambiguity, and playfulness and humour from dealing with supervisors in a supportive environment. In addition supervisors of a community are often more adapt at dealing with conflict.

Playfulness and humour is a factor highly distinguished within the games student learning and creativity support system, and is evoked by the researchers, staff and students on many occasions. On one occasion a student started a thread parodying academic titles, including a gentle ‘dig’ at one of the lecturers, during semester two, beginning with, ‘Dr > Professor’.

“Imagine this... your [sic] sitting in a theatre enjoying your favourite opera...and then the leading lady drops...and someone yells out...Is there a Doctor in the house. Dr * rushes to the stage and performs his magic and she is saved. Now imagine a scenario where they call for a doctor and Prof * runs on the stage...The woman dies...Professors should not perform surgery” (Student Comment).

In addition to these moments of playfulness and humor with the supervisor the students also thrived on the playful moments with their peers. It is important for the supervisor to encourage playfulness and humor...
as it is a key to having an happy and conducive to creativity community. As shown in the survey results (Figure 3) according to the students ‘fun’ is an important characteristic in the environments.

7.2 Work Group Supports

Work group support (a.k.a. peer support) in the creativity support system of the games students is seminal to its longevity. Work group support help to encourage, in particular, exploration. This includes the elements of: risk taking, debate, freedom, and reflection. In the survey many students commented on the fact they appreciated communicating with people who understand their community:

“It’s good to see that I’m not the only one who loves games. There’s a lot of good web links and insights that fellow gamers can give” (student comment).

In addition to this the students not only want to nurture and support their own education and that of their peers, but also the future of others’ education, with their comments. For example:

The games lounge needs….“All the next-generation game consoles when they come out, maybe some tables and chairs for tabletop RPGs, a few more computers, ...some virtual reality headsets, some robots, some couches, and much, much more games for the consoles (perhaps if the budget is right we could compile a list and as a group vote for the most wanted console games)” (Student Comment).

The net generation not only thrives on having friends and peers in their learning environment, they also thrive on peer review. In addition, the chance to reviews others work helps to build interdependence within students.

7.3 Team Work (Collaboration) and Community

The games students’ collaboration within the games lounge and web community helps to provide sufficient resources within the learning environment. Deakin University provides the technical resources required, such as the games lounge computers and web community software, with the games students providing knowledge and information resources. As Rovai (2002) states “in a classroom community, one requires both social and intellectual interactions to accomplish learning goals, supported through various interactive media”. Information resources are more seminal than technological resources to sustain the community. Without it the community becomes stale. Change in the community is brought about by information, however in the games students learning environment the students know that they essentially ‘own’ the environment and can change its conditions. This agency allows students to feel comfortable in the environment, which also encourages constructive criticism, challenge, involvement and debate, from the students. For example:

In the games lounge….“I think the inclusion of more seating would be greatly appreciated, the current chairs are horrible, maybe a couch could be added. Also I think a whiteboard would be beneficial for students using the room as a meeting place to discuss projects or assignments” (Student Comment).

These comments, in addition to the data gathered in the survey, indicate that the students appreciate the learning environment on offer and see the space as their own. In addition students thrive on peer review therefore they enjoy communication and collaboration with their fellow students, in their environment. Idea time and idea support factors are more easily facilitated in an environment that embodies peer review. The participation level of 64% of students in the web community indicates the disposition towards collaboration and building of community.

8. CONCLUSION

The results presented that highlight the assessment of the games students creativity (figures 6 through to 9) are the result of successful implementation of the creativity support system four factors into the learning environment. This study investigated the creativity support system of tertiary students studying games design and development at Deakin University with particular focus on the social factor. The construction of knowledge within the games student relies on strong social interactions within the learning environment. Further research into creativity support systems needs to be conducted into how other environments function and support the creativity support system four factors of: resources, personal motivation, exploration and social.
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