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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 (CSS) 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 Internet generation because of their pre-imposed for 'online' and being 'connected'. The CSS for the games students is designed within a context that encompasses a 'whole' system, as focusing on only one component to augment a person's creativity does not take into consideration the multitude of factors, for example social factors, that are pertinent on a person ability to grow their creative behaviours. This study will present a set of factors that each CSS 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

A Creativity Support System (CSS) is a tool used to build a person's creativity. A CSS can enhance creativity within people, or can be technology that is creative on its own accord (Artificial Intelligence). This study is concerned with the former, and how factors such as social and technology can be used to build a persons creativity. Elements from a person's surrounding environment are used to build and maintain creativity. Creativity occurs through an interaction of person, process, product and environment, however interestingly creativity and the influence from the surrounding environment has had little attention within the literature. The influence of the environment on creativity is becoming more significant particularly within younger generations, or specifically the Net Generation or Generation Y. Younger generation rely on technology and their social groups strongly to influence their

creativity, when compared to older generations (Heath 2006). 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). Therefore the games students need from the CSS were different to other cohorts. In this study the participants in the CSS were students from the Net Generation.

The aim of this study was to assess the factors that are needed in an environment to make a person creative. Other elements that need to be considered when trying to assess creativity included the type of person using the CSS, and also the context in which the CSS is situated.

2. 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 factors 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: trust and openness, tolerance for uncertainty and ambiguity, playfulness and humour, minimising conflict, leadership, energy, focus, direction and goals.
- 3. Exploration: Risk taking, debate, freedom, reflection.
- 4. Social: Supervisory arrangements, diversity and experience, work group supports, team work (collaboration), community.

It is the combination of these factors in an environment that creates a CSS. In this case the CSS 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)

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. The inclusion of technology and the Internet by Universities is subsequently a requirement of a CSS for students from the net generation. CSS and the factors that compose are discussed next.

4. CREATIVITY SUPPORT SYSTEMS

Creativity, in conjunction with the design and application of information technology (IT), is often referred to as a creativity support system (CSS) or sometimes creativity support tool. Within the realm of human computer interaction, the challenge is to understand the ways in which technology can enhance a person's creative potential (Candy et al. 2002). In a CSS the IT assists and augments creativity by supporting the user rather than attempting to emulate creativity (the domain of artificial intelligence as discussed) (Boden 2004; Hoorn 2002). As previously mentioned, the use of information technology to build creativity is becoming apparent to be needed to support people in social and cultural ways. In section 2 the factors that define creativity within the environment, and what compose a CSS, were listed. In this study it will be highlighted that a CSS has the overall aim of providing a system that supports students with resources, personal motivation, areas for exploration and avenue for social interaction. The social factors were previously not defined largely in the literature, and it is from studies such as this that social factors are becoming more apparent. The study of the games students has shown the need for social creativity.

4.1 Social Creativity

The next generation of learner requires creativity systems that support than socially, and promote the development of creativity (Dawson, Burnett & O'Donohue 2006). One significant

aspect of the social factor of a CSS 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 the games students get from interaction within their learning and CSS is of most importance, disjointed from the mechanisms in which they have achieved community. 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).

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 leaner centered teaching approaches that foster community development. In this study, such a learner centered approach called 'immersive learning pedagogy' was utilised.

4.2 Immersive Learning Pedagogy

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). This Immersive Learning pedagogy is devised by Blashki et al. (2007) and is premised upon studio based teaching and reflective practicum concepts (Schön 1987). As Kerr states "education in this approach provides the opportunity to participate in communities of practice" (Kerr 2006). Figure 1 outlines the pedagogical approached used within the teaching of the games students.



Figure 1. Immesive Learning: Student centered learning pedagogy of the games students

The Immersive Learning Pedagogy in Figure 1 can be defined as a distinctly learnercentred 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 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 CSS of the games students. A CSS 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 CSS, and are interrelated in their functioning and influence in the environment.

5. RESEARCH INQUIRY

In an attempt to assess the games students' CSS, research was undertaken into the ways in which the learning environment are conducive to creativity, based around the creativity 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 Research Situation

The learning environments that make up the CSS of the games students is compose of many interrelated parts. The CSS 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 CSS 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

This study into the CSS of the games students has produced a large amount of results. As the CSS is composed of the environments of the games lounge, online community and the lecture and practical classes much observations and influence has occurred, which produces results, and subsequent further avenues of study. The results presented in this next section are therefore only a subset of the results of the study into the CSS of the games students, however do assert the important and significance of the CSS as well as presentation of the significant results of this study, that being that social factors have a more significant implication on the creativity of the games students than any of the other factors.

Figure 3 a & b shows the results of a creativity potential test, undertaken with the games students to gauge their levels of creativity (Urban & Jellen 1996). The test is a psychological assessment, and was undertaken with the same cohort of games students within their first and third years. The results indicate that over the years of study, that the games students creative potential has been increased. This can be attributed to their immersion within the CSS. This is however, discussed further in section 7.



Figure 3. (a) & (b). Test for Creative Thinking – Drawing Production results first year students (a) and third year students (b)

Further to the results of the creative potential test, which in isolation does not assert the influence of the CSS on the games students, surveys, interviews and observation were also conducted with the game students. The results of interviews and observations are presented more extensively in the discussion. In 2006 and 2007 surveys with the games students were undertaken that focused on the creative factors. Figures 4 (a & b) and 5 (a & b) show the results from students participation within the environments of the games lounge and the online community from 2006 to 2007. The results were gathered from a survey undertaken in 2006 and again in 2007 with the same cohort of students into their use rates of the environments. As you can see, over the two years the usage of the environment increased in both the games lounge and the online community.





Figure 5. (a) & (b). Professed use of Games Lounge (Room) in 2006 (a) and 2007 9b)

In addition to usage levels of the game students as shown in Figures 4 and 5, the survey in 2006 asked the games students questions about the creativity factors (as highlighted in section 2). The survey asked the games students a question about each creativity factor. For example the survey in 2006 asked the games students whether "the environment surrounding you when you are doing university work should provide an aspect of supervisory arrangements (a leader or manager who sets up appropriate goals, values individual contributions, and serves as an intelligent enthusiastic role model)". Another example question asked to the games students includes "the environment surrounding you when you are doing university work should provide an element of work group support (communication with peers who are open, trusting and constructive)". The survey acquired responses from 36 games students on 16 of the creativity factors. The students were asked the answer the questions about the creative environment on a 5 point likert-type scale (strongly agree to strongly disagree). Based on the responses, the descriptive statistics in table 1 (a, b, and c) were produced. It should be noted that not all of the creativity factors were surveyed with the games students at this time of the 2006 survey. This was because of the nature of the study, which was to investigate creativity factors as well as uncover any new factors of significance in building a person's creativity. Therefore creative factors such as diversity and experience, and team work (collaboration) and community, leadership and energy were added after the administration of this survey.

	Work group supports	Sufficient resources (facilities)	Freedom	Supervisor	Challenge
N of Cases	36	36	36	36	36
Minimum	1.000	1.000	1.000	1.000	1.000
Maximum	4.000	5.000	5.000	5.000	5.000
Median	2.000	1.000	1.000	2.000	2.000
Arithmetic Mean	1.833	1.583	1.639	2.444	2.194
Standard Error of Arithmetic Mean	0.146	0.171	0.144	0.180	0.163
Standard Deviation	0.878	1.025	0.867	1.081	0.980

Table 1 (a). Descriptive Statistics from the 2006 survey with the Games Students

Table 1 (b). Descriptive Statistics from the 2006 survey with the Games Students

	Status quo	Political	Risk taking	Conflict	Debate	Idea support
N of Cases	36	36	36	36	36	36
Minimum	1.000	1.000	1.000	1.000	1.000	1.000
Maximum	5.000	5.000	5.000	5.000	3.000	4.000
Median	3.000	3.000	2.500	2.000	2.000	2.000
Arithmetic Mean	2.667	3.250	2.472	2.306	2.083	1.861
Standard Error of	0.164	0.201	0.167	0.238	0.128	0.155
Arithmetic Mean						
Standard	0.986	1.204	1.000	1.431	0.770	0.931
Deviation						

Table 1 (c). Descriptive Statistics from the 2006 survey with the Games Students

	Idea time	Trust	Sufficient	Playfulness	Tolerance
			resources	and	
			(Info)	humour	
N of Cases	36	36	36	36	36
Minimum	1.000	1.000	1.000	1.000	1.000
Maximum	4.000	5.000	3.000	3.000	4.000
Median	2.500	2.000	1.500	1.000	2.000
Arithmetic Mean	2.417	2.139	1.639	1.556	2.250
Standard Error of	0.122	0.174	0.121	0.122	0.146
Arithmetic Mean					
Standard	0.732	1.046	0.723	0.735	0.874
Deviation					

The descriptive statistics focus on the creative factors. As highlighted so far in this paper social factors are deemed significant components of the games students creativity, therefore the descriptive statistics of the social factors of: supervisory arrangements, diversity and experience, work group supports, team work (collaboration), and community, will be highlighted in more depth. Furthermore, the apparent need of the games students of social

factors upon their creativity will be asserted strongly within the discussion to follow. The results serve to compliment the importance of creative factors within an environment.

Table 1 (a) indicates the results for supervisory arrangements in the survey. For the question about supervisory arrangements in the survey the median response was 2.000. In the count analysis which is not shown here supervisory arrangements were deemed as significant by results from the survey (53% agreement). In addition, the proportion of people that responded to either strongly agree (19%) or somewhat agree (33%) reflects that there was a higher proportion of people who agreed than disagreed. Furthermore, the P-value was 0.012 for supervisory arrangements, indicating that there was statistically significant difference between the five categories.

Table 1 (a) indicates the result for work group supports in the survey. For the question about work group supports in the survey the median response was 2.000. In the count analysis which is not shown here supervisory arrangements were deemed as significant by results from the survey (75% agreement). In addition, the proportion of people that responded to either strongly agree (44%) or somewhat agree (31%) reflects that there was a higher proportion of people who agreed than disagreed. Furthermore, the P-value was 0.004 for work group supports, indicating that there was statistically significant difference between the five categories.

The social factors of diversity and experience, and team work (collaboration) and community were not included as a part of the 2006 survey, as they were not considered as a part of a CSS in any previous literature. They developed as integral parts of the CSS after the 2006 survey. Importantly, it is because of the social factors, particularly community, that within the 2007 survey that a 'sense of community' index was undertaken. The sense of community survey is dedicated to understanding community within the games students CSS. The 'sense of community index' was employed in the second survey in an attempt to explore and understand teamwork and community in the environment, and how they impact on the creativity of the games students. The results of the sense of community is achieved within the games students CSS. All of these results contribute to the games students increase in creative potential (as shown in Figure 3 a & b).

7. DISCUSSION

The results presented in the previous section begin to assert the importance of creativity factors in establishment and maintenance of creativity within the games students. However, in addition to these gathered results, interviews and observations were also conducted with the games students about their CSS, and in this section these results in conjunction with the already presented results, will help to paint the picture of creativity more completely.

The results suggest that students agreed that supervisory arrangements and work group supports were important to harness creativity within their environment as the medium responses for these questions was 2.000. Furthermore, students strongly agreed that sufficient resources (people and information, and materials and facilities), freedom, and playfulness and humour where important to harness creativity, as the medium response was 1.000. It seemed, from these results and observation that connections between people that facilitated discussion and investigation within a supportive and friendly environment, was conducive to the games

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students creativity. As mentioned, the notion of community was introduced as a significant part of the facilitation of creativity for the games students as the notion of debate and trust appeared as important creative factors, with the median response for this result being 1.000 'strongly agree'. Therefore the following discussion will focus on social aspects of creativity, particularly community, and will draw upon observations and survey results.

Garcia (2004) suggests, community is established through good communication and also the accessibility of the community to members (Garcia et al. 1999, Gilchirst 2004). A community is typically based around common ground, in this case, the design and development of video games (Anderson 2004, Chang et al 2006). The establishment of a 'common interest' is regarded highly in the literature as integral to community (Dawson et al 2006, Rovai 2002a, 2002b, Martins 2006). In a learning situation, such as the one of the games students CSS "community members both staff and student have the opportunity and the responsibility to learn from and help teach each other" (Volpentesta & Frega 2006 pg 6). The idea of community was highly regarded by the games students and is reflected in many of the responses in the surveys:

"An interesting community of gamers from Deakin."

"A community is being able to share opinions with other students, especially students at other campuses."

Garcia et al. (1999) suggests that people in a community acknowledge and recognise that they are a member of that community, and will therefore harness community values, such as support, and acknowledgement in the negotiation and mediation of relationships. As Foth (2006) argues, "realising the idea of networking community members has to start with offering ways for community members to find out about each other and to raise awareness of the informal networks as well as skills and experiences that are present across the community" (Foth 2006 pg 218). In this study, the augmentation of the face-to-face community with that of the online community helps to uncover the 'common interest', skills and experience of those within the community, and in particular with the games students, allows cross campus collaboration and sharing of skills. In addition, as Volpentesta and Frega (2006) discuss, the integration of face-to-face learning with online learning allows for richer collaborative learning experiences and the strengthening of relationships between learners. Volpentesta and Frega (2006) further discuss, that this integration allows for dialogue, critical debate, and agreement.

As the CSS of this study resides within a learning environment, often the exchanges between community members were assessment-related. This assessment-related collaboration however was not facilitated successfully unless there was the establishment of community (Sheard and Carbone 2004, pg 293, Rovai 2002). As Rovai (2002) suggests a strong sense of community not only increases persistence in study, it also increases commitment to group goals, cooperation amongst members, satisfaction with group efforts and a motivation to learn (Rovai 2002, Bruffee 1999). The comments derived from the online survey indicate that students also support:

"I believe communicating with fellow students is a very important aspect of studying, the forum is awesome for anyone that has small problems finding files or little problems like that, it's much easier than ringing someone up to find information".

Governance in communities can either be consigned to leaders or comprise a more democratic process (Martins 2006). In the community of the games students, a democratic process was established, with members of the community playing many roles within the community. For example, members would often transform their contributions to the role of a

leader or a founder of information within the community. The teaching staff were the predominant moderators, regularly attempting to engage the students in the moderation process by asking them for feedback and input on what changes could be implemented within the community. In a study of communities through network action research within a community-housing establishment, Foth (2006) describes that community members feel more strongly about the social networks they actively creative and maintain themselves which includes social ties to others who may not be part of the neighbourhood community. In the environment of the games students the social ties that are created are important to the students. For example in the online survey the students commented that:

"Nothing better than discussing games with fellow gamers (people get passionate about their favourite games/genres)".

Enthusiasm and passion assist in maintaining and driving a community. Martins (2006) refers to this as 'a reason to communicate'.

The difficulty of providing a community that suits all its members is not easily resolved as it is the differences in opinion and values that ensures that a community is interesting. For example one student commented in the online survey:

"All discussions in student talk are about `pop` games, I can't learn much about them as they are talked about everywhere and are all basically the same. Plus my interests lie in abstract, unique games that few people have heard of".

However the use of technologies such as an online community allows these differences to be explored and harnessed. As Sheard and Carbone (2004) state "for an online community to be successful it must promote ongoing interaction, members must have information about each other and members must be able to identify each other" (Sheard and Carbone 2004, pg 293). Furthermore, as Rovai states "online learners who have a stronger sense of community and perceive greater cognitive learning should feel less isolated and have greater satisfaction with their academic programs" (Rovai 2002 pg 328). The online community of the games students exhibits attributes, which make it both unique and successful.

Ongoing participation within the games students' online community has been observed in this study, with participation continuing to grow throughout each semester. In addition, members in the games students' online community often know each other in the face to face medium. Overall, as one student noted in the online survey about the online discussions:

"I'm interested in games, it was a place to chat about topics that I'm interested in".

The ability of the online community to be accessed at anytime, anyplace makes it's a useful medium that needs to be built to service students needs. As Brown (2005) suggests, virtual space has taken its place alongside physical space. As Weakley and Edmonds continue, the web aids in providing to the games students "a mental proximity of some sort rather than a physical one" (Weakley & Edmonds 2004 pg 240). Students will refer to the online environment as often as they participate in a face-to-face setting (Coenen 2005).

As this study is in action research setting the researchers were regarded as actors within the games students community (Levin & Greenwood 2001, Pasmore 2006, Herr 2005). The researcher's active participation within the CSS of the games students held symmetry with the participation of the teaching staff. The researchers and teaching staff were not moderators, but more facilitators and social contributors within the CSS. Grant (2007) argues that in action research projects the abilities of actors, such as the teaching staff, needs to be recognised in terms of the influence of their actions. Being a 'contributor' rather than an 'observer' in the research process resulted in the researchers having influence which affected the CSS. In addition perceptions of power can be at risk of being accepted uncritically within a community

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where students and staff collaborate; therefore it was imperative for the teaching staff to regulate their interactions to become members, rather than leaders, within the community. The teaching staff and researchers assumed the important role of supervisory arrangements within the CSS of the games students, and this helped to build playfulness and humour and trust within the community. For example in the online forum the students enjoyed playfully critiquing the lecturers about their choices of game play. The students use their learned freedom to critique a game that the lecturer is perceived as endorsing. A student starts a post in the discussion forum entitled 'Myst is the worst game ever':

"the start of Myst I nearly fell asleep, then I had no idea what I was suppose to do, then that guy spoke for ages so I used the 3 magic buttons (ctrl + alt + del) and I was saved" (student comment).

"Mmmm, i'm sure you're going to get the flogging of a lifetime come our next lecture. I wouldn't be dissin' no Myst y'all. Whilst - agreeably, it is a very difficult game to play, I think the main reason we've been instructed to endure it's meek linear timeline and degrading graphics is something to do with the definition of gameplay" (student comment).

"....if I could stop crying for just a moment I would reply to these malicious and unfounded comments ... however the keyboard is just too wet with tears..." (lecturer comment)

"I may not get to the lecture at this rate your cruel comments have destroyed my confidence...:-(You may have to come looking for me ... I'll be in the library ... still trying to find my way out (what was that you said ctrl + alt + del ?????)" (lecturer comment)

The students thoroughly enjoyed this playful discussion with the lecturer. It was this supportive casual discourse that gives students the confidence to approach other topics of study with their peers and teachers in the online community. The nature of the activity within the community is highly influenced, particularly initially, by the teaching staff as they assume there supervisory arrangements (Turvey 2006). Similar to community, it was observed that supervisory arrangements were a facilitating factor when it comes to supporting other factors in the environment such as: work group supports, tolerance for uncertainty and ambiguity, status quo, risk taking, debate and importantly personal motivation.

In this study peers or work group supports was surveyed and observed as important for the games students to build creativity. In addition to supervisory arrangements being present in the CSS, the social interactions with peers was found to build creativity and community within the games students CSS. The desire to have work group supports over supervisory arrangements is also directly related to a characteristic of the Net Generation who prefer feedback and critique from peers rather than those in power (Guest 2005, Heath 2006; Oblinger & Oblinger 2005a). That is why is was important for supervisors to build their role as a facilitator and friend to the games students. In the survey with the games students, the median response was to strongly agree that work group supports were important within the CSS. Examples from the online community illustrate, to show the interactions and reliance upon their peers:

"Anyone heard of guild wars? Its an MMORPG that is soon to be released that is similar to WoW"....(Another student continues the discussion) "Can you post the link here? I would like to see it. Sounds interesting".

"Anyone heard of Grim Fandango (spell check). I heard it's a pretty good game, weird but a good addition to an adventure games fans collection".

Discussion between the students such as these not only builds their knowledge, but also assists to build relationships within the community.

8. CONCLUSION

This study has explored factors that have been deemed to make an environment creative. Through a combination of creative factors and information technology the term Creativity Support System (CSS) was explored, and presented as an effective tool to incorporate into a person's working or learning environment to build their creativity. The group under investigation in this paper was students studying Games Design and Development at Deakin University in Australia. Through a process of action research investigation it was found that social factors are particularly pertinent on developing a person's creativity. From these results, the current factors that make an environment creative have been developed to include important social aspects. So far in the literature, social implications on creativity have not been discussed in depth.

This study investigated the creativity and CSS of the games students, therefore the results are inclusive of the games students' situation. However, it is hoped that the definition and demonstrated application of the creative factors within the games students' situation, can be expanded to other contexts such as schools and organisations where creativity needs to be nourished.

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