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Activity Theory As Analytical Tool: A Case Study Of Developing Student Teachers' Creativity In Design

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Abstract

Activity Theory has been found useful in providing insights into all aspects of interactions and contradictions. This is relevant to this study in comprehending the learning experiences of student teachers. A qualitative approach was utilized in addressing the question 'Does Activity Theory assist in highlighting challenges faced by the student teachers in developing design creativity and assist in representing what student teachers require from collaborating with professional designers?' I established the usefulness of Activity Theory in three areas: the need for managing students' cognitive and emotional aspects, viewing confrontation as valuable in stimulating design creativity, recognize the affective and confrontational roles played by the tutor and the designers in encouraging design improvement. I conclude that Activity Theory enables a more holistic approach to be taken in developing design creativity.

Keywords: Activity Theory, interface design, community of practitioners, contradiction

1. Introduction

The Government of Malaysia has been proactive in integrating the use of information and communication technology (ICT) within the educational system (Foong-Mae, 2002). The Ministry of Education in Malaysia (MOE, 2008) sees ICT as a tool to improve learning, enrich courses, develop pedagogy and learners' self-reliance. In meeting the expectations of the Malaysian Government, technology-based learning with multimedia components specifically interactive courseware and websites has been used as tools in classrooms to support teaching and learning; however, most of the technology-based learning applications have not achieved expected levels of success. Kamaruddin (2010) states that the Malaysia Ministry of Education identified a low uptake of technology-based

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learning in schools. According to researchers (Kamariah, 2006; Kamaruddin, 2010; MDC, 2005; MOE, 2004; Neo, 2005) this moderate level of success was caused by poor interfaces design. In addition, technology-based learning developers in Malaysia currently do not have enough experts specialised in both pedagogy and design. In attempting to solve the problem, they have either tried to make their team members multitask, or outsourced the work to third parties. Kamaruddin (2010) also notes that there were miscommunications between courseware developers and content experts. Content experts (usually teachers) mistakenly assume that interface designers in the development team already know the fundamental pedagogical concepts involved in producing technology-based learning applications. These conflicts resulted in the development of teacher-centred instructional software based on printed textbooks and content delivery approaches in schools (Muda & Mohamed, 2006).

Aware of these constraints, the Ministry of Higher Education in Malaysia introduced educational multimedia curriculum programmes that aim to produce teachers who are able to develop technology-based learning applications and integrate technology into education. These technology-literate teachers are recognised as 'teacher-developers' (CEMCA, 2003). Student teachers are trained to apply cognitive learning theory, motivation, colour principles, communication, usability, multimedia learning principles and instructional design to technology-based learning applications. Designing a technology-based learning application requires skills ranging from design to implementation. Thus, different kinds of understanding (from pedagogy to user interface) need to be applied in this field. Student teachers taking educational multimedia programmes are trained to master these skills; however they find it difficult to shift their thinking particularly into developing an interface design.

Designing for the interface involves problem solving and creativity. Researchers (Cross, 1997; Gero, 2000; Hsiao & Chou, 2004) recognise design as a creative activity because the exploration of design solutions requires creative skills. Hoadley and Cox (2009) recommend for students to work with a community of designers in order for design knowledge to be passed on and for students to initiate and develop their design skills. A number of design studies have emphasised the importance of feedback from experts as source to stimulate creativity (Amabile, 1996; Pringle, 2008; Wiley, 1998). However, the interaction techniques used by domain experts to stimulate creativity have received limited research attention (Kilgour & Koslow, 2009). It is essential to understand the nature of experts' interactions because the use of language within interactions is recognised as a powerful tool in fostering creativity (Rieber, 1998; Vygotsky, 1978). Through language, improvisation and innovation can be achieved (Barrett, 1999). These findings from the literature triggered further enquiry into the ways experts (designers) interact and function in developing design creativity.

It is important to note that this study attempts to highlight two communities: (1) a community of practitioners from the creative industries involving designers who place a major focus on sharing experiences and insights in the context of professional practice (Lave & Wenger, 1991; McConnell, 2006), while (2) a learning community from the higher education/learning institutions refers to learners and tutors who share ownership in defining and addressing learning problems together (Rogoff, Matusov, & White, 1996; Wells, Chang, & Maher, 1990).

Researchers (Bryan Lawson & Dorst, 2009; Watkins, 2003) identify that design practitioners are able to facilitate learning by sparking students' curiosity, increasing their disposition to learn, offering new directions for approaching design and helping to develop students' ideas beyond the project requirements. Kvan (2001) reports that designers from the creative industries are also invited to participate in studio-based learning as visiting experts or juries who act as clients. Their involvement is valuable due to their extensive and varied experience in producing commercial designs. Their profession requires them to understand the physiological, psychological and emotional aspects of society as end users (Seitamaa-Hakkarainen, Lahti, & Hakkarainen, 2004), and to keep up with changes and current demands (Kaptelinin & Nardi, 2006). Involving designers in students learning helps increase 'up-to-date experiences instead of out-of-date documentation' (Sutton & Kelley, 1997, p. 85).

Learning collaboratively to develop interface design with the designers is considered an important skill for student teachers to acquire, but it remains under-promoted. This is probably due to several findings indicate that the interaction techniques used by designers can be problematic as students can be affected by 'vicious critiques' (Cox,

Harrison, & Hoadley, 2009, p. 150) with 'sadistic overtones' (Stead, 2003, p. 10) directed at their work. Designers appointed as visiting experts or tutors who teach part-time and are also in practice can unconsciously treat the students in the same way that they treat their junior staff in the design office. This can distract them from recognising the learning needs of, and the support required by the students.

Vicious critique can have unconstructive impacts, such as losing face (Smith & Berg, 1997), discouraging creativity (Pajares & Graham, 1998), harming self-esteem (Bernichon, Cook, & Brown, 2003) and causing interpersonal and organisational conflict (R. A. Baron, 1984; Pruitt & Rubin, 1986). Such critiques are often referred to as negative feedback (Stahl, 2006), the type of feedback given by a person to another to inform the recipient(s) that they are not performing in an adequate or appropriate manner (R.A. Baron, 1988; R. A. Baron, 1990; Graen & Scandura, 1987). Research in educational psychology indicates such feedback to be harsh in nature and likely to violate several basic principles of effective feedback (Ilgen, Fisher, & Taylor, 1979). The accepted practice of feedback in higher education is that it should always be constructive, kind and helpful (Edmondson, 1999; Flowerdew, 1998; Montuori & Purser, 1999; Schein, 1993; Wiley, 1998). Krogh et al.(2000) recommend that attention should be given to the way people treat each other to encourage creativity. They clarify that the concept of care has a positive impact on the creation of knowledge.

In contrast, several other researchers have identified negative feedback that is actually useful for enhancing creativity (Anderson & Rodin, 1989; Campion & Lord, 1982; Podsakoff & Farh, 1989). Negative feedback derived from critique can potentially bring about a cognitive conflict which enhances learning; cognitive conflict here refers to the production of arguments that put individuals at the centre of conflict that structures intellectual awareness (Collins, 2002).

According to Johnson et al., (2000), who address conflict as controversy, conflict increases students' efforts in solving problems by reading more library materials, reviewing more classroom materials, more frequently watching optional movies and more frequently referring to others for information. Students who survive conflicts will become more critical and more prepared to accept failure, and will learn to think in new ways (Bryan Lawson & Dorst, 2009); these are the criteria needed for the development of creativity. Designers' critiques have proven valuable, and lacking the normal curriculum constraints within courses, designers can adopt creative and experimental pedagogical modes to support the learning process. Nevertheless, in-depth study is required to understand the value that exists through designers' critiques.

2. Activity Theory as An Analytical Tool

Researchers (Barab, Barnett, Yamagata-Lynch, Squire, & Keating, 2004; Blin, 2004, 2005; Brine & Franken, 2006; Issroff & Scanlon, 2002) have used Activity Theory to study the design and implementation of learning supported by technology in various communities of practice (Cobb, McClain, Lamberg, & Dean, 2003). Activity Theory therefore seemed suitable to explore as a potential analytical framework, given that part of the learning collaboration for this study involves web-based learning and two different communities: a community of practitioners (designers) and a learning community (students, peers and tutors). Scanlon and Issroff (2002) also used Activity Theory as an analytical tool in their study to comprehend the learning experiences of students and teachers in higher education when using technology. They found Activity Theory useful in providing insights into all aspects of interactions and contradictions, and this is again relevant to this study.

3. Data Collection

Student teachers had to post their interface designs on Facebook (closed group) in three submissions according to a set of dates. Their compositions of design were viewed and reviewed through a series of discussions with fellow colleagues, tutors and designers. A total of 57 third-year undergraduate students agreed to participate in the study. They were divided into fifteen groups. 13 designers with no less than ten years of work experience agreed to participate in this study. The designers' participation was voluntary; no payment was involved. They were willing to

participate in the study as a means of raising awareness of the importance of design to students. Two tutors (A and B) participated in the study. Tutors A and B from the same course but different classes (cohorts 02 and 03) participated as observers. Their participation remained as 'outsiders' who simply observed the events being studied on Facebook. Their responses were essential to confirm the nature of the learning process; the contradictions that occurred during the field study; and the design improvement made by the students. This helps to reinforce the trustworthiness (Guba, 1981) of the findings.

I used the instruments of field documentation on Facebook, online semi-structured questionnaires, face-to-face interviews, and Facebook chat. Five weeks of field documentation on Facebook was scrutinised while a set of online semi-structured questionnaire was distributed to all participants in order to explore the impact of collaborating in Facebook. Further assessment proceeded from the online questionnaire, when I initiated face-to-face interviews with the participants who gave their consent. I also managed to stay in contact with some of the participants through Facebook chat for data verification.

4. Data Analysis

The process of analysis is divided into two parts: initial analysis and substantive analysis. In the initial analysis, I examine all the data from fifteen groups of students, designers and tutors. I used a thematic approach (Braun & Clarke, 2006) and comprehensive data treatment (Silverman, 2010) to analyse the initial data which includes the whole corpus of exchange from both sides of the partnership (the learning community and community of practitioners). The process of generating codes and themes involved the six phases of thematic analysis, consisting of data familiarisation, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and reporting. This produced initial findings using key themes and sub-themes. In the substantive analysis, I focused on only four groups of students out of fifteen groups as case studies (case study A, B, C and D). The selection was made as a result of the comprehensive data treatment and the thematic approach from the initial analysis. I then employed activity systems analysis (Engeström, 1999) to examine the four selected cases in more depth in order to answer the research questions which were:

'Does Activity Theory assist in highlighting challenges faced by the student teachers in developing design creativity and assist in representing what student teachers require from collaborating with professional designers?'

4.1. Activity system analysis for research questions

Activity Theory assists in highlighting challenges faced by the student teachers. Students emphasised the designers' feedback as out of the ordinary. Students expressed that they felt uneasy with the designers' feedback for confrontation at the beginning, but as the collaboration progressed they felt more at ease. They also felt that feedback for confrontation should be delivered at the final stage not at the beginning. Nonetheless, students found that the designers' feedback for confrontation useful, although the feedback was delivered in a harsh manner. A group of students in case study B chose not to fully acknowledge designers' feedback as they felt that most of the feedback was not relevant to their design motive.

Activity Theory sees contradictions as sources of learning and development (Engeström, 1987) therefore it is important to identify contradictions that occurred in this study. All of the case studies described feedback for confrontation - the tool - as the primary contradiction (I). They were shocked at the beginning of the collaboration and felt the feedback for confrontation was delivered in a very harsh manner. The secondary contradiction (II) was related to the timing of the feedback for confrontation - the rule. Critical reflection such as feedback for confrontation is commonly delivered as early as possible in a studio-based assessment and has become part of the practice (see section 2.4). Although the majority of the student teachers acknowledged the value of feedback for confrontation, they were not used to receiving feedback for confrontation at the beginning of learning and instead felt that feedback for confrontation should be delivered towards the end of the collaboration. Tertiary contradiction (III) was related to the rule of the activity, which implied that students are expected to make use of designers' feedback through the process of scaffolding. However, students in case study B did not view designers' feedback as

being from an authoritative source. Figure 1 indicates three contradictions (I, II, and III) that occurred within the activity system.

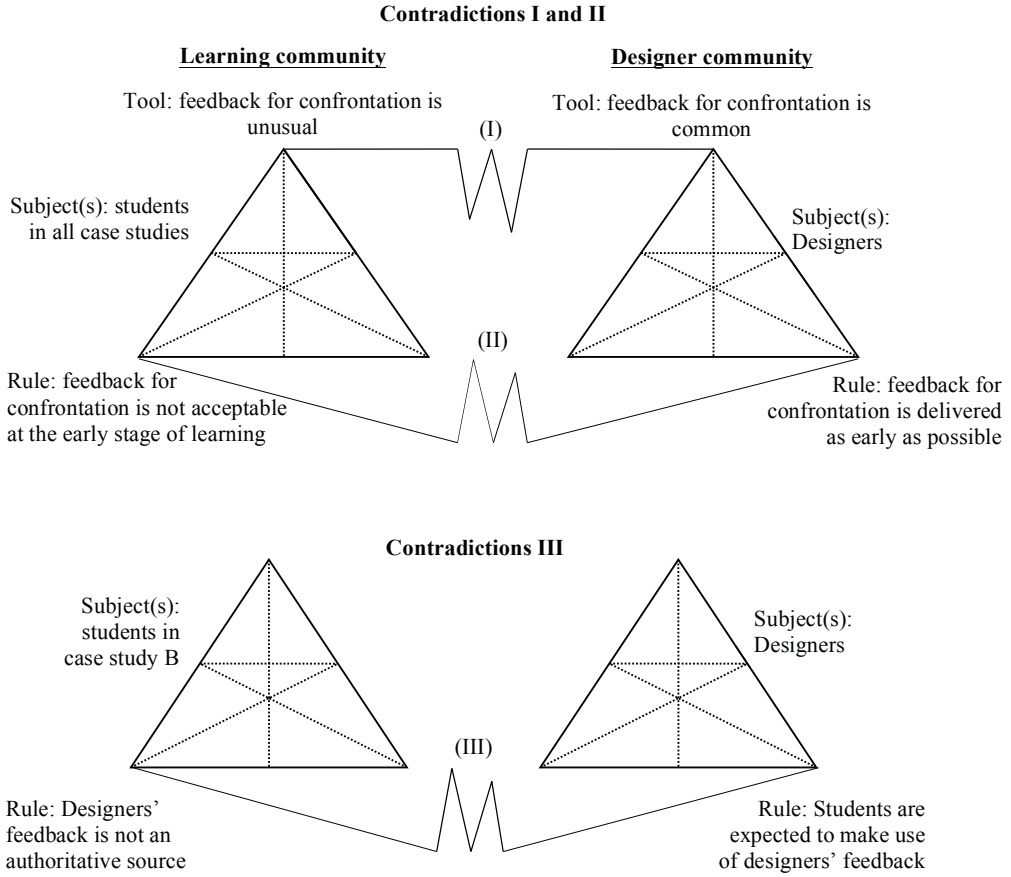

Fig. 1. Contradictions in the Facebook-based course activity system

The three contradictions occurred due to the adaptation of feedback delivery by designers; the approach used by designers collided with the students' previous way of learning and this caused conflicts (Engeström, 2001). Students struggled to understand and accept the new style of feedback for confrontation at the early stage of learning and for one case (case study B), the contradictions caused students to change the activity: students in case study B sought help from another community instead of relying on the existing online community of tutor, peers and designers. All three contradictions (I, II and III) as showed in figure 1 have affected students and managed to somehow facilitate change (Nardi, 1996) in their learning activity.

Every group had its own way of comprehending the contradictions. There were similarities as well as differences in the approaches they used. Students in case study A (Group 1) sought face-to-face and online support from their tutor. The tutor's role was seen more as a mediator or a second advisor to them. Students also noticed that designers were taking turns to deliver different styles of feedback. This gave them some comfort. For example, when one designer delivered critiques, another designer made an effort to offer motivation. Students in case study B (Group 2) gained support from their personal and professional networks. Students in case study C (Group 3) sought face-to-

face support from the tutor. They learnt to cope with their disequilibrium stage by acknowledging the fact that every group was criticised and received similar treatment from the designers. Students also focused on their objective of producing purposeful designs rather than on their feelings. Towards the end of the collaboration, they learnt to accept designers' confrontation as part of the learning process. Students in case study D (Group 4) sought support from their tutor for a second opinion.

Activity Theory incorporates strong notions of mediation as it has important implications for learning (Nardi, 1996). Designers' feedback have mediated students in all case studies; although feedback for confrontation can be threatening for students, e.g., case study C, it has somehow stimulated students' awareness to produce appropriate design for their target audience. In addition, students in every case study had their own different as well as similar way of reconciling the contradictions.

In summary, the analysis of this study has identified contradictions that occurred as a result of the implementation of new components (rule, role, communities and tool) in an activity system of design learning among student teachers. Activity Theory facilitated the understanding of how students were affected by the contradictions and how they reconciled them. The contradictions brought about some benefits and also drawbacks to the development of students' understanding of website design. The contradictions identified were feedback for confrontation, the timing of the feedback for confrontation, and the establishment of designers' feedback as being from an authoritative source.

5. Discussion of Findings

There occurred three categories of contradiction (contradictions I, II and III). Contradiction I represents feedback for confrontation delivered by designers, while contradiction II is the result of the timing of the feedback for confrontation. Another contradiction (contradiction III) was found for students in case study B that related to the establishment of designers' feedback as being from an authoritative source. In Activity Theory terms, contradiction occurred when a new practice, in this case Facebook-based learning with designers was introduced into the students' activity system that clashed with an old element (Murphy & Manzanares, 2008b). I now discuss these three contradictions.

Students emphasised feedback for confrontation (contradiction I). The feedback for confrontation used by designers was direct, filled with emotions and lacked empathy. Students had never encountered such feedback in their previous learning. Designers' interactions involved critical reflection which ranged from casual comments to formal critiques (Oak, 2000). Lawson (1997) describes the fact that designers adopt character roles while discussing design ideas: the roles of leader, clown, critic, lawyer and dunce. Feedback for confrontation identified in the findings of this study has revealed the nature of interactions played by the role of a lawyer, also known as the devil's advocate (Charlan Jeanne Nemeth, Connell, Rogers, & Brown, 2001; C. J. Nemeth, Personnaz, Personnaz, & Goncalo, 2003). Louro et al. (2007) explain that the role of a lawyer helps eliminate bias, makes designers question their own judgements more critically, help them discover and explore alternative ideas and reframe design problems. Although students in all case studies described the designers' feedback for confrontation as harsh, they mentioned that useful messages were contained in the feedback. Tutors A and B even described designers' feedback for confrontation as a real life lesson for students to get exposure to the world of work. This indicates that the designers' feedback was not entirely negative (Stahl, 2006).

Unlike previous research, I chose not to classify the feedback for confrontation as negative or positive (Guzzo, Wagner, Maguire, Herr, & Hawley, 1986; Pino & Edwin, 2003), or constructive or destructive (R.A. Baron, 1988; R. A. Baron, 1990; London, 1995) because the feedback could potentially function as both. Due to this I decided to borrow the term 'confrontation' from clinical psychology studies (Knight, 1966) to replace the word 'negative'. Knight suggests that confrontation helps increase an individuals' self-consciousness, which can be generated by an inner desire (internal force) or an external challenge. Knight adds that confrontation brings an individuals' emotional assimilation to a more professional level. The shock of the confrontation can 'cause a state of disequilibrium that

results in the construction of new knowledge in order to reach a state of equilibrium again' (Gijlers, 2005, p. 10). Confrontation has been accepted as a form of social support and feedback (Miller, Benefield, & Tonigan, 1993; Douglas L. Polcin, 2003). Confrontation used in defeating substance abuse is defined as an individual being told about the terrible impact affecting them if they do not make changes (Douglas L. Polcin, 2003; D. L. Polcin, Galloway, & Greenfield, 2006). A similar approach was used by designers in my study to create awareness about the importance of design to students in higher education. Students were challenged to develop their interests, abilities, and make design improvements.

As for the contradiction with the timing of the feedback for confrontation (contradiction II), students were again not familiar with the idea of receiving critique at the early stages of learning. Students thought that feedback for confrontation should only be delivered towards the end of learning. Designers however felt the procedure was appropriate and, the designers believed the prompt delivery of feedback for confrontation could provoke change in attitude where students can be encouraged to work harder, and became more focus and vigilant in producing purposeful design.

As the saying goes 'it's not creative unless it sells'; this is a common expression used by designers, which can also be used to reflect the gap between education and the creative industries. This means that, compared to students who have to deal with task completion, designers in the creative industries have to work closely with the client and strive to satisfy them (Cross, 2008) in order to gain recognition. This explains why feedback for confrontation is more accepted by the community of designers than by the student teachers in the School of Education. Furthermore, the accepted academic position in higher education is that feedback to students should always be constructive, kind and helpful (Edmondson, 1999; Flowerdew, 1998; Montuori & Purser, 1999; Schein, 1993; Wiley, 1998). Confrontational feedback can appear, but in summative assessment which takes place upon completion of the learning activities (Barnett, 2007). Within university culture, formative feedback is generally structured to be supportive and constructive (Irons, 2008). Formative feedback is the type of feedback that is continuously carried out as the learning activities progress (Inoue, 2005). Contradiction II arose when students received formative feedback that uses confrontational at the very beginning of collaboration.

There has been a large amount of research on the timing of feedback that focuses on immediate and delayed feedback. The results in the literature however are conflicting and show no consistency. Some researchers (Corbett & Anderson, 2001; Dihoff, Brosvic, Epstein, & Cook, 2003) have argued that immediate feedback is more effective than delayed feedback, while some others (Schroth, 1992) reveal the situation to be more complex. These researchers claim that delayed feedback was found beneficial if the task is easy but if the task is difficult, immediate feedback may be preferable. Other researchers (Mathan & Koedinger, 2002; Narciss & Huth, 2004) argue that the effectiveness of feedback is not supposed to rely only on its timing but also the other aspects such as the nature of the feedback, the task, and the learner's capability. These aspects can potentially cause either positive or negative effects on learning (Shute, 2008). In agreement with the researchers (Mathan & Koedinger, 2002; Narciss & Huth, 2004; Shute, 2008), this study has shown that immediate feedback can caused disequilibrium that has the potential to support learning but can also lead to a negative effect if not properly managed. It seems important to receive immediate feedback on comprehension of the design task; yet immediate feedback that is confrontational in nature was not in favoured by the student teachers. Figure 2 summarises and illustrates the contradictions in feedback practice that occurred between the communities in the School of Education and the creative industries.

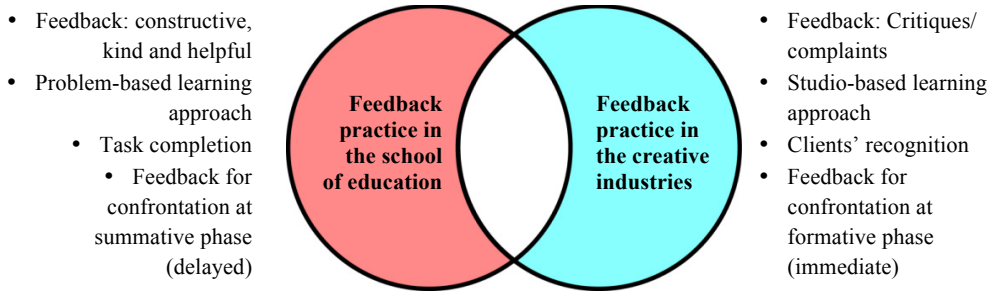

Fig. 2. Gap in feedback practice

As for the tertiary contradiction III, students in case study B emphasise the issue of establishing the designers' feedback as being from an authoritative source: a source that 'dominates, that holds weight' (Millard & Kingfisher, 1998, p. 450). Students in case study B acknowledged other sources as more authoritative than the designers' feedback, e.g., advice from their friend who was a designer and the use of design samples. Researchers (Zhang, Scardamalia, Lamon, Messina, & Reeve, 2007) suggest there requires a level of trust or legitimisation for a source to be established as authoritative. The authoritative source has to also be produced and used repeatedly and regularly until it becomes recognised as authoritative (Gee, 1999). In this study, students had more trust in a designer who was a friend to the group than the designers who were assigned to participate in the collaboration as their designer friend had the expertise that the group required: a design for children. This study has indicated that just because other students, e.g., in case study A, C and D accepted the designers' feedback as authoritative, it does not mean that this is the case for all, e.g., students in case study B. This also raises the importance of the need to involve designers with a broad range of appropriate skills and also to allow students paths to reach help from other experts.

Although the designers' feedback was not recognised as authoritative by students in case study B, it somehow encouraged them to make the decision to find other sources to solve the design problem. The learning approach and setting that was structured in this study led students in case study B to create an alternative way of knowing. Students should be given the freedom to exercise their own judgements and make their own decisions in order to respond to a changing and challenging world. This will help them become more motivated (Bassey, 2001).

There were number of approaches used by the students to deal with their state of disequilibrium, i.e., a new experience conflicting with previous experience (Piaget, 1964). Students in all case studies recognised the importance of emotional and cognitive support in reconciling their disequilibrium. This also means that emotional and cognitive support plays a crucial role in a students' Zone of Proximal Development (ZPD). The notion of support which emphasises empathic communication as introduced here was not made clear in Vygotsky's discussion of the ZPD, and this seems important in creativity design as well as more widely. As suggested by Reiman (1999), learning should not only be built on challenge but also on trust, caring, respect, sensitivity and responsiveness. Support in the form of empathic communication from educators can allow students to have positive attitudes and a determination to succeed regardless of receiving negative feedback (Kilgour & Koslow, 2009). Empathy is recognised as the ability to understand and respond to another person's affective experiences (Heckman & Snyder, 2008). Empathetic communication helps restore students' confidence (Vygotsky, 1981), enhances students' motivation (Barrett, 1999), develops students' coping mechanisms (Kilgour & Koslow, 2009), promotes better thinking and strengthens individual ability, enhances memory and concentration, reinforces moral and ethical minds, and helps individuals adapt to the social environment (Goldin, 2008). Cognitive support additionally 'consists of those elements which serve to support the students in building their understandings of, and competence in, the subject matter' (Reigeluth & Moore, 1999, p. 64).

In this study, as noted in the literature (Chen & Javeri, 2005) notes that cognitive support through brainstorming, discussion and information sharing can stimulate creativity and this study has provided further evidence for this.

As well as receiving cognitive and emotional support from the tutor, students in case study A acknowledged that designers essentially took turns to provide different styles of feedback to their group, e.g., when one designer delivered feedback for confrontation, another designer offered mediating feedback (feedback for empathy). This helped to alleviate their stage of disequilibrium. Students in Case Studies B and D on the other hand used their previous experiences: students in case study B utilised their previous experience of attending an elective graphic design course, while students in case study D made full use of their teaching practice experiences. Students in case study C reconciled their stage of disequilibrium by acknowledging the fact that they were not the only group to have received feedback for confrontation: by witnessing other groups being criticised the same way, students in case study C later learnt to accept feedback for confrontation as part of the learning process.

The findings show that developing creativity is not only about developing students' cognitive skills but also about managing the emotional aspects, which are often neglected. Developing control over fear and giving the students personal authority to decide how to act in response to confrontation partly helps to generate better understandings of the field of work.

6. The significance of this study

The value of this study is that it addresses several gaps identified in the literature. First, it provides an in-depth analysis and understanding of the role of design practitioners' confrontational interactions with students in developing design creativity on Facebook. This has not been attempted before. Secondly, it contributes to the existing body of literature by applying activity system analysis to understanding contradictions in developing design creativity in higher education. Although activity system analysis has been applied to different learning settings, to date no research was found to have applied it in this context. In addition, the findings of this study are centred on contradictions unlike other related studies (Barab, Barnett, Yamagata-Lynch, Squire, & Keating, 2002; Basharina, 2007; Dippe, 2006; Fåhræus, 2004; Hardman, 2005; Murphy & Manzanares, 2008a; Peruski, 2003; Russell & Schneiderheinze, 2005).

The value of this study is not limited to research but it also contributes to practice; in particular, it highlights some of the challenges in integrating designers' confrontational feedback during collaborative learning activities. This is important as the trend in higher education is for the student experience to involve an increasing engagement with the workplace as a means of addressing the employability agenda in higher education (Yorke, 2006).

7. Research limitations

This study was undertaken with purposeful sampling from a single learning institution and was limited to a single course environment. It is also important to note that this study was conducted in a particular cultural setting. However, the findings may serve to alert fellow practitioners and researchers to some of the issues involved in incorporating online collaboration with a community of designers into formal teaching and learning.

8. Recommendations for future research

The findings of the present study lend support for the integration of feedback for confrontation in developing design creativity. More research studies will be beneficial in exploring the effectiveness of this feedback; for example, future research of this nature conducted with larger groups of participants across other educational contexts with tools other than Facebook would help determine if the results of this study can be replicated and how far they can be generalised and are applicable to other learners. Design discussion requires a different set of tools and

approaches, e.g., video conferencing, image editing and pointing options. These were limitations identified in Facebook at the time when this study was conducted and call for the need to explore further online tools to support the design learning process.

In addition, longitudinal studies are clearly needed that may provide better opportunity to nurture a sense of community (Alexander, 2000) among participants. Online communities often require time to develop: the tutor/moderator could provide the members with the time and encouragement to build a sense of trust and openness (Goodyear, Banks, Hodgson, & McConnell, 2004) towards each other. Also, it is important to note that time could facilitate the process of adapting to the use of different language of expression; jargon and colloquial language. As found in this research, the issue with expression of language is likely to occur in informal interactions on social network sites such as Facebook, particularly when it involves different communities. This study suggests that it is important for students to cope with different expression of language use by another community in order to achieve an effective collaboration.

9. Conclusion

Instead of placing students in a workplace environment or inviting experts from the creative industries to give lectures at the university, this study organised for both groups of participants to collaborate on Facebook as an online community. The community of designers, however, was found to use a different discourse, which was more confrontational than the discourse used by the learning community in the School of Education. This had an impact on students' understanding of design. The cognitive and emotional disequilibrium that resulted led to the students realising that producing a design was not all about completing a task or achieving good grades but about producing appropriate designs that had credibility within the design community and their target audience. Nevertheless, this study proposes that the designers' and tutor's role in mediating conflicts so they are perceived as constructive is essential and needs to be actively engaged in as part of the teaching process.

Other than that, this study has identified differences in feedback practices between the communities involved. The difference in the nature of feedback, i.e., the use of feedback for confrontation appeared to have a strong interrelationship with the quality of design creativity fostered. Nevertheless, the contradictions highlighted in this study suggests that a careful analysis of the nature of the practitioner community and its modes of discourse in particular feedback needs to be undertaken and accommodated within the learning design.

Activity Theory as an analytical tool has assisted to emphasis that dialogue across different communities has the potential to expand awareness in ways that can help increase creative thought processes.

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