THE PEDAGOGICAL AFFORDANCES OF SOCIAL NETWORK TECHNOLOGY

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ABSTRACT_ *This study explored the use of social networking web technology for educational purposes. A social networking site, The Hive, made use of this technology in an ICT Futures course at the School of Education, Exeter University, UK. The views of a sample of undergraduate students and their teachers participating in this course were investigated during the spring term. The study adopted an interpretative approach with a mixed-method research design. Data were collected through observing and analyzing posted messages on The Hive website and through semi-structured interviews with teachers and students at the end of the course. Stimulated recall was used in the interviews as a method of studying online activities. The data analysis and discussion resulted in recommendations for design of course activity for any course.*
KEYWORDS*: Higher education, pedagogical affordances, qualitative research, social networking technology, web 2.0.*

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I. INTRODUCTION

The aim of this study is to explore and understand how British students and teachers use social networking web technology and to explore the real pedagogical affordances of this technology. The introduction of social networking sites in education is a new discipline with few studies about it in the education field; no studies to date, to my knowledge, explore the pedagogical affordances of social networking sites.

The word "affordance" was presented in the ecological psychology field by the perceptual psychologist J. J. Gibson [7]. He defines the affordances of the environment as "what it offers the animal, what is provides or furnishes, either for good or ill. An affordance refers to both the environment and the animal and implies the complementarity of the animal and the environment" [7]. According to Gibson, affordances refer to the actionable properties between the environment and an object (a person or animal). Norman [13], in contrast, uses this term to refer to "the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used" [13]. According to this theory, our interaction with the environment is based upon our perception of what it affords to us.

Corresponding to Norman's concept of affordance, there are real affordances and perceived affordances; in designing an object there is an intended use built in while the user perceives some of these intended affordances but might not see them all or might see them differently from the designer's intended 'real affordances' (Norman, 1988 cited in [15]. Some times in a designed object the designer intended affordances which differ from the user's perceived affordances: the 'affordances gap'. This gap occurs when the user does not understand the intended actions of the designed object. As Norman describes "Affordances specify the range of possible activities, but affordances are of little use if they are not visible to the users. Hence, the art of the designer is to ensure that the desired, relevant actions are readily perceivable" [12].

II. LITERATURE REVIEW

Affordance theory has been applied in many disciplines. Norman [13] first introduced the term in the areas of graphic design and human computer interaction. ICT education was one of the fields that introduced affordance theory. Conole and Dyke [5] argue that to use the technologies effectively to support learning and teaching we should have a clear definition of ICT affordances. According to Kirschner (2002, cited in [11]):

Educational affordances can be defined as the relationships between the properties of an educational intervention and the characteristics of the learner that enable certain kinds of learning to take place.

This study defines an affordance of education ICT as an action that the learner can/ cannot perform based on the properties of the ICT environment and his/her prior knowledge, needs and the situation in which learning takes place. However, I strongly argue, as do Lai et al. [10], that it is "not the technology itself but the interaction between technology and pedagogical practice that affords possibilities for better learning". I assume that the pedagogical affordances of the technology are not fixed; they emerge while the learning takes place with appropriate tasks that support the pedagogy. Beetham and Sharpe [3] claimed that designers for learning should:

Take account both of how they [technologies] support the learning task and of how they will be experienced by individual learners - the different 'possible relationships' between tasks and learner that they might mediate. (p.34)

Recently many studies have focused on the affordances of computer environments and explored the pedagogical affordances of computers. For example, Wijekumar et al. [21] studied the affordances of computers, deviating from Gibson's definition. They carried out two studies. The first study was in K-12, where a system called Intelligent Tutoring for the Structure Strategy (ITSS) was designed to teach a reading strategy. The findings show that the students perceived the affordances of gaming and communication. The second study was undertaken with undergraduate students. Students enrolled in three online classes. The results from this study indicate the same affordances as the first study; also they added resources for completing homework affordances. Finally the paper of Wijekumar et al. concluded by presenting two techniques to change the students' perceived affordance of computers from gaming to learning [21].

Most ICT researchers focus on the design of the affordances according to Norman's definition. In the next paragraph I will present some of these studies. The mobile technology affordances have also been researched. A study was conducted on two classes at an elementary school using mobile technology. Pedagogy using Personal Digital Assistants (PDAs) was introduced to one class. The findings show that the class using PDAs improved in knowledge creation. The study concludes with some of the educational affordances of mobile technology: "First, mobile technologies 'afford' real-time information whenever and wherever learners need it. Second, mobile technologies 'afford' a rapid access interface for note taking, such as photo taking and sound and video recording" [10].

Weller, Pegler and Mason [18] examined how four innovative internet technologies (blogging, audio conferencing, instant messaging and Harvard's Rotisserie system) were incorporated into one course at The UK Open University. The students' experience of using these tools was of enrichment and perceived as positive. Also, the study found that each technology supported one of the learning phases. Kong and Kwok [9] discussed how to develop a learning environment to fulfill needs situated in subject matter and ways to offer affordances for learners to interact within complex classroom environments.

Tanner and Jones [16] argue that integrating the affordances of ICT into the pedagogical structure of the Postgraduate Certificate of Education (PGCE) course has not only widened access but also improved the quality of learning for the face-to-face students. The University of Wales, Swansea, introduced a mathematics PGCE course

to distance learning. The project replaced, and was an alternative to some of the college-based elements by conferencing email, web-based bulletin boards and streaming video. A tele-collaboration project [8] confirmed that each technology has educational affordances and supports different levels of interaction.

In addition, the pedagogical affordances of ICT have been identified by analysis of the literature on the use of technologies [5,11,16]. McLoughlin and Lee [10] reviewed the current Web 2.0 research and practice and delineated some examples of the affordances of the social software tools with a full description of each affordance. I will mention the affordances only, as follows: "connectivity and social rapport, collaborative information discovery and sharing, content creation, knowledge and information aggregation and content modification". They argued that:

Social software tools such as blogs, wiki, social networking sites, media sharing applications and social bookmarking utilities are also pedagogical tools that stem from their affordances of sharing, communication and information discovery.

Shabajee et al. [16] explored the new technology Semantic Web features. They found it offers additional pedagogical affordances than the existing technologies. Finally Anderson (2004, cited in [11]) argued "the greatest affordance of the web for educational use is the profound and multifaceted increase in communication and interaction capability" (p.42).

III. METHODOLOGY

A. The participants

The sample in this study was composed of undergraduate students (65) and their teachers on the ICT Futures course, Exeter University, UK. The three students were all female. These interview participants were chosen purposefully after observing and analysing their posted messages on The Hive. The selection of the interview sample was based on: their engagement with The Hive and the nature of their interaction/contribution (e.g. brilliant ideas, hate technology, extremely engaged or extremely unengaged). The tutors (three tutors) on this course were interviewed.

B. Data collection

The data were collected through applying mixed methods, in this case observation and interviews, which provided the study with a full understanding of the phenomena and validity of data. In addition, the use of the two methods was useful in reducing misinterpretations of the participants' data.

1) Observation & content analysis:

observation of posted entries was done qualitatively during this initial, exploratory stage. In this study, I observed the students' messages on the social networking site and their interactions. At the same time, I noted my thoughts in my diary. Furthermore, the contents of the messages were analysed to enable the pedagogical affordances of the social network technology to emerge. With the help of Nvivo software tools, the messages were analysed qualitatively. The observations and analysis took place before the interviews, which helped to refine the construction of the interview questions, evaluate the results and clarify misunderstandings. At the beginning of the observation phase, all the posted messages were read. Further on I focused on just thirty students' blogs, due to time limitations. These blogs were chosen randomly.

When observing The Hive, there were several spaces where students could write and be interactive: e-Profile, Wall, Blog, Community and File storage. The data collected for this study focused on the ICT Futures Community, students' Blog, their Wall and e-Profile. Some students created their own presentation community to help them collaborate in the presentation task. This community was created for a specific purpose so it was not analysed. Furthermore, any new affordances could be used in this community, as in the course community. So I started to read the community Wall and community Forum. Each entry blog in the community linked with its writer's e-Profile, so I entered his/her blog and read and analysed all his/her entries.

To be certain that I did not read/code the blogs more than once or misread the new entry, I kept a diary for my reading and updated it. There were sixty-five students on the course, from whom I decided to focus on thirty personal blogs, selected at random. In analysing the blogs, the pedagogical affordances of The Hive were identified. Themes emerged from the analysis with the help of Nvivo. While coding, the themes linked with quotes from the data, and notes were made. This process continued until saturation was reached, where no further themes emerged from the data.

2) Semi structured interview:

According to Wellington [19], interviews allow researchers to investigate and elicit things that cannot be directly observed. Interview methods are designed to elicit views, perspectives and multiple truths in social situations [19]. The aims of this interview were to deepen understanding of the issues surrounding the pedagogical affordances of the social network technology, as they emerged from analysis of the posted messages, and to evaluate them. Furthermore, the researcher sought and obtained additional information from the interviewees. In this part of the interview, the researcher used open questions for depth and extended responses from the interviewees, giving them space to speak about their own experience.

After the observation and analysis of the messages posted on The Hive, three students were chosen for interviewing. Since the interviews took place after the course had finished and many students had left, as well as there being a poor response from the students, the interview sample was selected at random. These students, with their teachers, were interviewed. Semi-structured face-to-face interviews were done at the end of the course. The interviews lasted between 15-20 minutes and each interview was recorded. The interviewees were asked to choose the location of the interview (in a public place or the postgraduate house). The frame questions were constructed based on the observation and analysis of the interactions on The Hive, with a carefully structured recall design. In the interview, the interviewer was open-minded about the issues that could emerge.

When selecting the participants to interview, firstly, the researcher chose three students according to the analysis of their blogs: where one of them hated the technology, the second one was a new student who was not part of the existing social network in Exeter and the third posted actively. The other participants would be

chosen based on these interview results. Unfortunately, only one student replied to the email invitation. So I decided to send emails to a random group of students and wait for their replies, then send again to another random group. After several attempts, I acquired three interviewees, which is an adequate number for a pilot study, and I was able to gain valuable data from them.

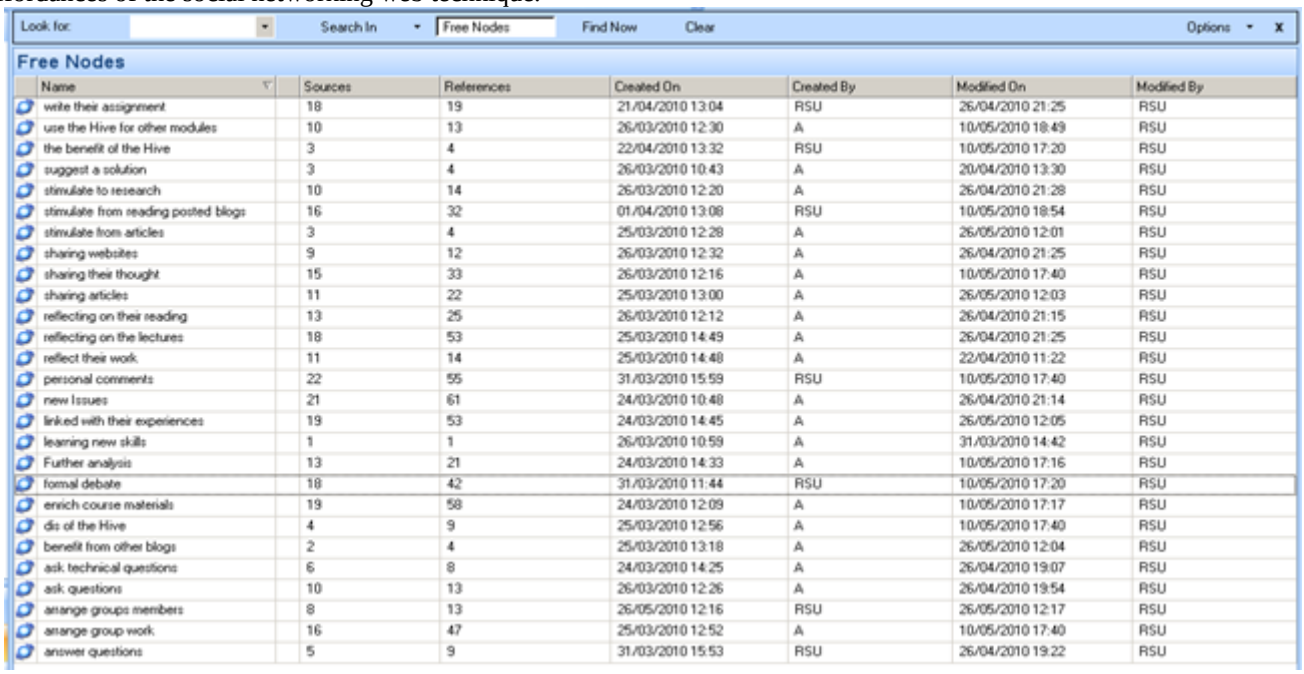
Before the interviews, the participants' coded blogs were read and reviewed to develop further interview questions. Because each student had her/his special interest, this review of blogs was helpful to gain deeper understanding and ultimate benefit from the interview. It also helped to formulate and ask appropriate questions. Furthermore, those posted blogs/comments which would be used to stimulate recall in the interview, were selected.

Key event recall was used in the interview by which participants' memories were stimulated back to events during their blogging to explore what they meant and how they felt new ideas had come out of "writing this comment /blog". For example, using quotes from a participant's posted message: how did you get this idea? and why you write that comment? The stimulated event recall was only used with two participants because of certain issues. The key event interview technique should be acknowledged as an indirect method of obtaining evidence of pedagogical affordances of the social networking web technique.

Furthermore, the interviews were recorded by digital recorder (with the permission of the interviewees). One of the interviews was transcribed, while the rest were imported to Nvivo as audio and coded. The codes emerging from the interviews were the same as the themes which had emerged from their blogs. However the interviews produced explanations for some of the themes and allowed for a deeper understanding of the pedagogical affordances that emerged.

C. Using Nvivo software

Welsh [20] showed that the best data analysis results can be achieved by combining manual and computer-assisted methods; whilst Crowley, Harre & Tagg [6] argued that qualitative software can "both assist with and enrich the abstraction". Moreover, use of software opens up the opportunities for mixed methods. Bazeley [2] concluded that the qualitative analysis tools facilitate the integration of various kind of analysis which would be hard to do without the software. Nvivo –computer assisted qualitative data analysis software - was used to analyse the qualitative data and it provided "an accurate and transparent picture of the data also providing an audit of the data analysis process as a whole - something which has often been missing in accounts of qualitative research" [20].



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Name	Sources	References	Created On	Created By	Modified On	Modified By
write their assignment	18	19	21/04/2010 13:04	RSU	26/04/2010 21:25	RSU
use the Hive for other modules	10	13	26/03/2010 12:30	A	10/05/2010 18:49	RSU
the benefit of the Hive	3	4	22/04/2010 13:32	RSU	10/05/2010 17:20	RSU
suggest a solution	3	4	26/03/2010 10:43	A	20/04/2010 13:30	RSU
stimulate to research	10	14	26/03/2010 12:20	A	26/04/2010 21:28	RSU
stimulate from reading posted blogs	16	32	01/04/2010 13:08	RSU	10/05/2010 18:54	RSU
stimulate from articles	3	4	25/03/2010 12:28	A	26/05/2010 12:01	RSU
sharing websites	9	12	26/03/2010 12:32	A	26/04/2010 21:25	RSU
sharing their thought	15	33	26/03/2010 12:16	A	10/05/2010 17:40	RSU
sharing articles	11	22	25/03/2010 13:00	A	26/05/2010 12:03	RSU
reflecting on their reading	13	25	26/03/2010 12:12	A	26/04/2010 21:15	RSU
reflecting on the lectures	18	53	25/03/2010 14:49	A	26/04/2010 21:25	RSU
reflect their work	11	14	25/03/2010 14:48	A	22/04/2010 11:22	RSU
personal comments	22	55	31/03/2010 15:59	RSU	10/05/2010 17:40	RSU
new Issues	21	61	24/03/2010 10:48	A	26/04/2010 21:14	RSU
linked with their experiences	19	53	24/03/2010 14:45	A	26/05/2010 12:05	RSU
learning new skills	1	1	26/03/2010 10:59	A	31/03/2010 14:42	RSU
Further analysis	13	21	24/03/2010 14:33	A	10/05/2010 17:16	RSU
formal debate	18	42	31/03/2010 11:44	RSU	10/05/2010 17:20	RSU
enrich course materials	19	58	24/03/2010 12:09	A	10/05/2010 17:17	RSU
dis of the Hive	4	9	25/03/2010 12:56	A	10/05/2010 17:40	RSU
benefit from other blogs	2	4	25/03/2010 13:18	A	26/05/2010 12:04	RSU
ask technical questions	6	8	24/03/2010 14:25	A	26/04/2010 19:07	RSU
ask questions	10	13	26/03/2010 12:26	A	26/04/2010 19:54	RSU
arrange groups members	8	13	26/05/2010 12:16	RSU	26/05/2010 12:17	RSU
arrange group work	16	47	25/03/2010 12:52	A	10/05/2010 17:40	RSU
answer questions	5	9	31/03/2010 15:53	RSU	26/04/2010 19:22	RSU

Figure 1
The code of students' usage the Hive

Nvivo was chosen based on its simplicity, ease of importing Word documents and ability to allow the researcher to write memos and link them with quoted text in documents. This helps the researcher to form theory from the data, as Welsh [20] claims. Moreover Rich & Patashnick [14] argue that using the software "significantly enhanced our ability to analyse". In addition it is argued that "it serves to facilitate an accurate and transparent data analysis process whilst also providing a quick and simple way of counting who said what and when, which, in turn, provides a reliable, general picture of the data" Morison & Moir, 1998; Richards & Richards, 1994; as cited in [20].

A major benefit of this software was that I coded the audio interview without transcribing it. Moreover, the codes could be integrated with the same themes in the text codes, as well as linking the audio quotes with the code. Figure 1 presents a screen shot from NVivo Interview questions:

Face-to-face key event recall interviews were carried out with students and their tutors. The researcher was open-minded about their answers, from which other questions could emerge. The questions are only a frame that helped in the interviews. The questions were established after careful consideration of the research questions and reviewed. The field notes form was

designed to cover a sequence of themes, as well as suggested questions. Nevertheless, at the same time there was openness to changes of sequence and the wording of questions in order to follow up the answers given and stories told by the participants.

For ethical reasons, permission was obtained from the students and school, and access to data from The Hive was authorized. Students' permission was obtained by signing a consent form. Additionally, students' privacy and confidentiality was respected through the use of pseudonyms. In this, I have followed the BERA guidelines for ethical principles [4].

IV. FINDINGS

The following illustration of the study findings were divided according to the space that the student used. Firstly, the Wall (personal/community) is used for personal communication and comments and for asking general questions about assignments and lectures; sometimes technical questions like how to format the entry text are posted. In addition, the personal Wall is used mostly to organise group members and group work. Nevertheless, some students created their presentation community and discussed group work in this space.

Most of the students were confused between their blog and community forum. Some of them posted their entry twice in their blog and community forum. Others posted in the community forum so their blog was empty. In contrast, some students posted only in their blog and rarely posted in the community forum.

The themes emerging from coding the students' blogs and participants' interviews are shown in Figure 1 (from the NVivo file). Each theme was described in more detail and illustrated with a quote. Reflection on the lectures was one of the most frequent themes to emerge from The Hive, with the enriched course materials and new issues raised in the course as revealed in Figure 2. The students were reflecting on their reading, works, and on the lecture in their entries. A student stated that: "Having read a research project by Cynthia R. Smith carried out on a child using an ICT game I became increasingly aware of the link between a computer-based dramatic play and a child's literacy development..."

Furthermore, they were sharing web sites, articles and videos, and also their feelings: a student posted: "A little nervous about The Hive as I usually take a long time getting used to new sites but so far so good." In this sharing they recommended some resources or uploaded some video clips.

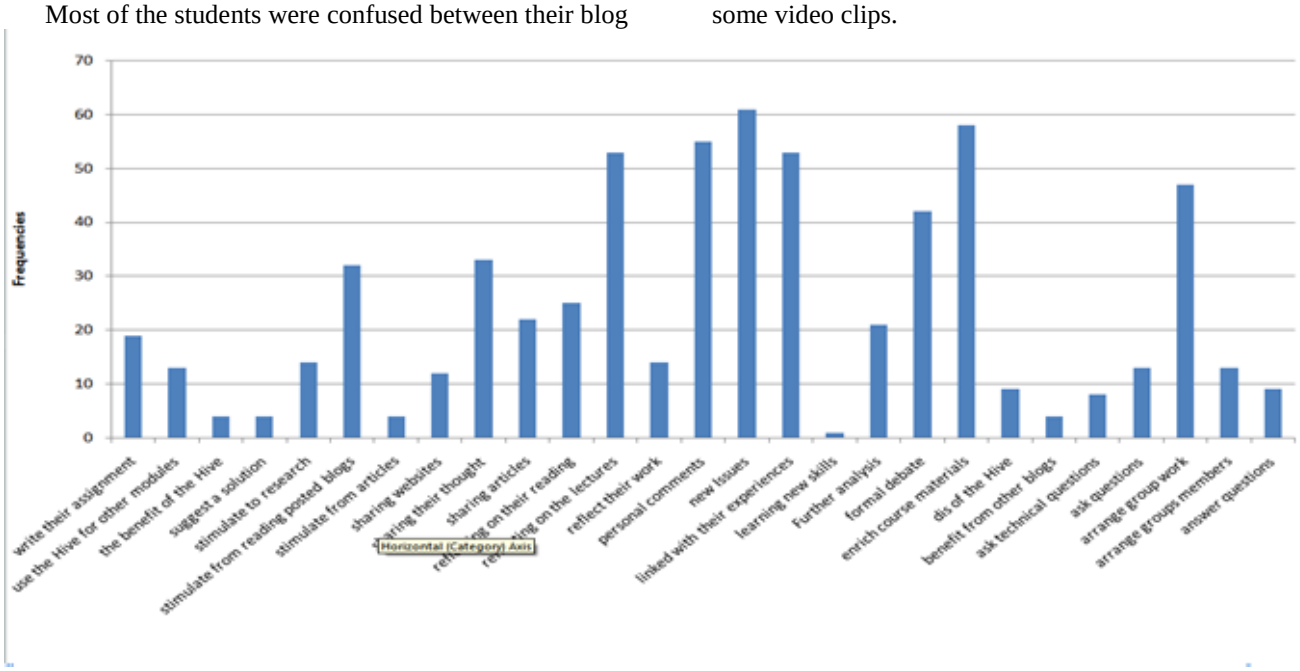

FIGURE 2
THE EMERGED THEMES

In addition, reading other blogs simulates students to research, read and think. One student said: "From writing my previous blog, it really made me think about the 'digital divide' that is present among society."

Student "As I was browsing this forum I suddenly thought of something that has not yet been discussed. ICT and Poverty"

Student "A couple of weeks ago there was an article posted about ICT and poverty and at the time I found it quite interesting to read of…"

Some time their blog stimulates themselves. For example, a student write "Thank you …, you just make me think! :) ". "I got to see how ICT and maths are used together for myself".

The students' blogs enriched the course material by: posting reading articles, videos, web sites, personal experiences and discussing new issues from different points of view. A student: "On the other hand, the article below looks into the use of technology in poor countries across the world." Also they linked ICT with their experiences. One student said: "As I am carrying out a placement at the moment in a Primary School it has been clear to see the extent to which schools and even Primary Schools use ICT".

Additionally, they make use of The Hive as formal debate medium. This debate allows the student to write his/her references and evidence. Also the contribution to the debate is flexible.

Interviewee "… The Hive makes it [debate] easier …wait your turn to speak, in modules that do not use The Hive you raise your hand and wait. Sometimes you don't…. But in The Hive any time whenever…"

Moreover, the students use The Hive for other modules and benefit from posted blogs for other modules.

Student: "Through another module I have been researching the use of ICT in literacy lessons. I have researched children and tried to see how they feel they use computers and other technology in their class."
Student: "…because this actually ties in really well with what I am currently researching for another module."
Student: "Hello! I just found a paragraph about mature students that you might be interested in; it is on the bottom of page 250-251 of this article."
Student: "We are even starting to use it for our other modules, instead of meeting up and discussing certain topics we have decided to do it all over The Hive."
Interviewee: "Yes, I make a link between this module and ICT, so I cross from one module to another."

Afterwards, these themes (which are presented in Figure 1 and Figure 2) emerged into 27 themes where the themes related to each other were grouped to one code and presented as meta-codes as Table 1 shows, codes led to the five meta-codes with average of five themes behind each meta-code. For instance, reflecting on their lectures, their work and their reading were grouped into the meta-code "Reflecting" as Table 1 shows. As a result the affordances of The Hive are Reflecting, Sharing, Stimulating, Enriching and Managing. Table 1 shows these affordances and their grouped themes driven from Figure 2. I am aware of that Sharing and Enriching course materials meta-codes have some overlaps, but I decided to separate them to emphasise certain issues. For example, in the "writing their assignments" theme, some assignments enriched the course by the issues they raised.

Finally, in the Hive I noticed that the tutors did not contribute at all, even towards questions regarding The Hive or the course, the students just answered each other. Only one of the tutors contributed occasionally for technical help, for instance uploading their presentation files.

TABLE 1
META-CODES

Meta-codes	Group of themes
Reflecting	Reflecting on their work, reflecting on the lectures, reflecting on their reading.
Sharing	Personal comments, sharing articles, sharing their thought, sharing websites, writing their assignments.
Stimulating	Stimulate from articles, stimulate from reading posted blogs, stimulate to research.
Enriching course materials	Enriching course materials, formal debates, learning new skills, linking with their experiences, new issues.
Managing	Asking technical questions, asking questions, organising group members, arranging group work, answering questions.

IV. DISCUSSION AND CONCLUSION

In this era of the Web 2.0, learning can take place through conversations about content, grounded interaction about problems and actions, and learning from multiple perspectives. The Hive – social networking web technology - successfully presents this educational style. The Hive offers many pedagogical affordances which help students to contact peers anytime from anywhere, enabling them to stay up to date, gain a lot of experience, gain confidence in the module, and learn from each other. The Hive gives students the opportunity to learn from each other by interacting with the posted contents, posing problems and raising new issues.

The findings of this pilot study were the pedagogical affordances that emerged after analysis of the students' interaction with this learning environment. These affordances imply the complementarity of the students and the environment of The Hive [7]. Whilst all the participant students disliked technology, all of them agreed with using this web environment in other courses. Interviewee: "I am surprising myself. I will say with Hive, for these reasons…."

Furthermore, the students used techniques online in The Hive such as brainstorming, and the process of selecting their presentation topics. Also The Hive enabled an on-line debate, which has a lot of advantages over a face-to-face debate. In addition, The Hive saved the students' time, as the entry blog summaries saved members hours of searching and reading.

Interviewee "I can spend two hours in The Hive; it takes me all the day to do in the library. As practical affordance The Hive is great."

Interviewee: "The references I used in my blog, spending a lot of time to search it and summarise it, so some people [students] read an article then summarise it in a paragraph."

When new issues were discussed, several different points of view could be taken. Sometimes students could raise a question without any answers in mind. After the discussion, they may have received an answer from others, or a comment may have stimulated them to provide the answer for themselves.

In group work, The Hive made it easy for students to organise their groups, manipulate and inform group members. Sharing articles, videos and websites enriched the course material and effectively presented different points of view. One student said: "I feel that the internet is great to discuss your views with others where you may not have had the chance without it."

Participants had started to see connections between ICT and many aspects of their lives. Interviewee: "I want to argue that ICT is linked in everything, every where." Another student posted: "It would be unfair not to acknowledge the benefits I have received from interacting with my peers and learning from their blogs/posts."

Most of the students went on to use The Hive for other modules, which indicates the advantages that the website affords. One student concluded that: "…… however, due to this module, I can safely say that my attitudes towards ICT have changed".

Moreover, the study has elicited some pedagogical affordances of this social networking web technology in higher education in a British university. In addition, it has demonstrated the role this website environment can play in the "education 2.0" era.

In conclusion, this study helps to answer the research questions. The pedagogical affordances of a social networking site can be categorised as: reflecting, stimulating, enriching course materials, sharing and managing. Consequently these affordances, found in this exploratory study, were used to design a design framework

(see Table 2) while this framework helped to design new intervention of social networking site in higher education.

TABLE 2
THE DESIGN FRAMEWORK

affordances	Design Framework 1
Reflecting	Students should be encouraged to reflect. Designing course activities that support reflection.
Sharing	Students should be encouraged to share their work on the social networking. The tutors should encourage their students to contribute positively to the course.
Stimulating	Encourage students to read others blogs and comment on it. Students' interaction on the social networking site should be assessed to help them take the online course more seriously.
Enriching course materials	Encourage debate and discussion. Teacher role should be encouraging students to discuss and criticise and challenge each other. Also open space for discussion.
Managing	Encourage group work. Prompt students' collaboration by given to students group work.

REFERENCES

[1] Bazeley, P. (2002). The evolution of a project involving an integrated analysis of structured qualitative and quantitative data: from N3 to NVivo. International Journal of Social Research Methodology, 5(3), 229-243.

[2] Bazeley, P. (2007). Qualitative Data Analysis with NVivo. London: Sage.

[3] Beetham, H., & Sharpe, R. (Eds.). (2007). Rethinking Pedagogy for a Digital Age: Designing and Delivering e-Learning. Oxon: Routledge.

[4] BERA (2004). Revised ethical guidelines for educational research. Retrieved from http://www.bera.ac.uk/files/guidelines/ethica1.pdf [accessed the 15 Mar 2010,10:40].

[5] Conole, G., & Dyke, M. (2004). What are the affordances of information and communication technologies? ALT-J, 12(2), 113-124.

[6] Crowley, C., Harré, R., & Tagg, C. (2002). Qualitative research and computing: methodological issues and practices in using QSR NVivo and NUD*IST. International Journal of Social Research Methodology, 5(3), 193-197.

[7] Gibson, J. J. (1979). The Ecological Approach to Visual Perception. Boston: Houghton Mifflin.

[8] Hauck, M., & Youngs, B. (2008). Telecollaboration in multimodal environments: the impact on task design and learner interaction. Computer Assisted Language Learning, 21(2), 87-124.

[9] Kong, S. C., & Kwok, L. F. (2003). A graphical partitioning model for learning common fraction: designing affordances on a web-supported learning environment. Computers & Education, 40(2), 137-155.

[10] Lai, C. H., Yang, J. C., Chen, F. C., Ho, C. W., & Chan, T. W. (2007). Affordances of mobile technologies for experiential learning: the interplay of technology and pedagogical practices. Journal of Computer Assisted Learning, 23(4), 326-337.

[11] McLoughlin, C., & Lee, M. J. W. (2007). Social software and participatory learning: Pedagogical choices with technology affordances in the Web 2.0 era. 2009(28/6/2009),

[12] Norman, D. A. (1999). Affordance, Conventions and Design, Interactions, 6(3), 38-43. Retrieved from http://www.jnd.org/dn.mss/affordance_conv.html

[13] Norman, D. A. (2002). The Design of everyday things (2 Ed.). New York: First Basic Paperback.

[14] Rich, M., & Patashnick, J. (2002). Narrative Research with Audiovosual Data: Video Intervention/ Prevention Assessment (VIA) and NVivo. International Journal of Social Research Methodology, 5(3), 245-261.

[15] Sadler, E., & Given, L. M. (2007). Affordance theory: a framework for graduate students' information behavior. Journal of Documentation, 63(1), 115-141

[16] Shabajee, P., McBride, B., Steer, D., & Reynolds, D. (2006). A prototype Semantic Web-based digital content exchange for schools in Singapore. British Journal of Educational Technology, 37(3), 461-477.

[17] Tanner, H., & Jones, S. (2002). Using information and communications technology to support interactive teaching and learning on a secondary mathematics initial teacher training course. Technology, Pedagogy and Education, 11(1), 77-91.

[18] Weller, M., Pegler, C. & Mason, R. (2005). Use of innovative technologies on an e-learning course. The Internet and Higher Education, 8(1), 61-71.

[19] Wellington, J. (2000). Education Research Contermporary Issues and Practical Approaches. London: Continuum.

[20] Welsh, E. (May 2002). Dealing with Data Using NVivo in the Qualitative Data Analysis Process. Qualitative Social Research, 3(2), 1-9.

[21] Wijekumar, K. J., Meyer, B. J. F., Wagoner, D., & Ferguson, L. (2006). Technology Affordances: The 'Real Story' in Research with K-12 and Undergraduate Learners. British Journal of Educational Technology, 37(2), 191-209.