SITUATION, LEARNING AND DESIGN: CONTEXTS FOR EDUCATIONAL USE OF COMPUTER NETWORKS

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Abstract

The design of educational environments is potentially more difficult in networked environments when the experience of the learner may be more varied. This paper examines two approaches to educational design that can be applied to networked learning that approach design indirectly through the design of learning contexts. The approaches accept a situated view of learning in which learners constitute their own learning situation from the available resources but go on to suggest that the resources themselves remain open to design.

This paper uses interviews and observations of practitioners and students in higher education to illuminate the practice of design and the limits to which design may be subject in a networked environment. It suggests that networked environments are indeed highly contingent but that this contingency may not be open to an easy solution based on the design of contexts for learning. Practitioners don't have common 'rules of thumb' to apply and the flexibility inherent in networked learning brings greater contingency to the student's experience. In these circumstances it would seem that we are some distance away from being able to claim a resolution to the tension between a recognition of situated learning and the needs of design.

Keywords

Situated learning, networked learning, computer-facilitated learning, design

Design for networked learning

The very idea of designing learning and teaching in higher education is in tension with a system that still rests on the production and distribution of knowledge by what might be best described as craft producers. In higher education the individual academic still has a high degree of control over the style and content of courses that they teach. Higher education courses, though increasingly described in similar ways in formal documentation, still have a craft feel with their content being strongly influenced by the interests and research of individual academics. The idea of design itself is historically entwined with a particular view of science and rationality. Cooley (1999) argues that the Western view of science and the scientific method has highly influenced the predominant characteristics that a process or design must display to be regarded as scientific namely:

> predictability, repeatability, and mathematical quantifiability. This, by definition, precludes intuition, subjective judgement, tacit knowledge, dreams, imagination, and purpose. (1999, p.60)

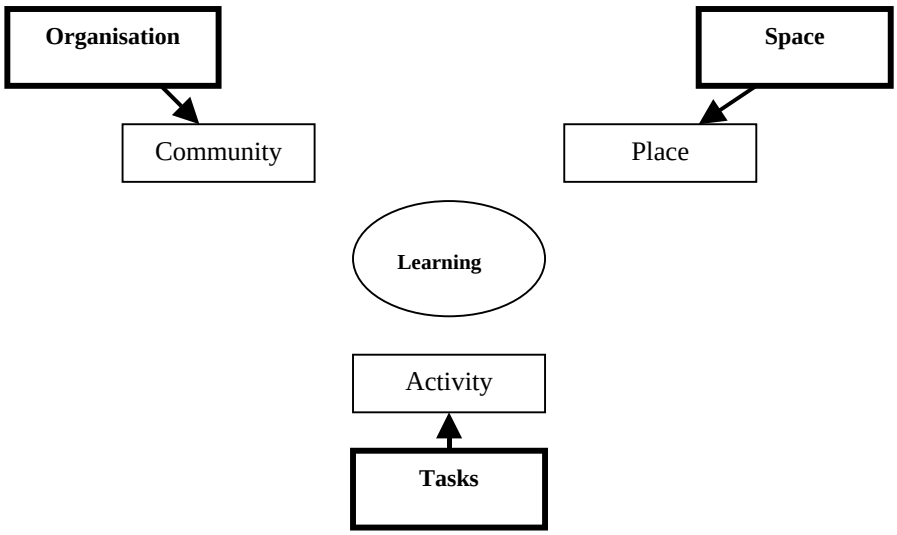
Ethnographic studies of the design process have demonstrated that these characteristics can be a gloss on the practices involved in design (Hughes, Randall and Shapiro 1992; Randall, Hughes and Shapiro, 1994). Design in this view is a situated action and cannot have the characteristics outlined for the scientific method. Rather than the formal scientific approach ethnographic studies suggest that design is an iterative process in which the products of design are not outcomes of the design itself but of a deeply

social and situated sets of work practices. This view that has developed strongly in the field of Computer Supported Cooperative Work (CSCW) has an educational analogue in the idea of situated learning.

The iterative view of teaching and learning finds an expression in lifecycle models of course design. An example of this approach can be found in the work of Peter Goodyear (Goodyear, 2002; Goodyear, 2000) and these ideas have been used to inform guidelines for the effective use of networked learning (http://csalt.lancs.ac.uk/jisc/advice.htm). A central element of this approach is that design must take account of the socially situated nature of learning.

The tradition of relational research has had an important influence on educational design (Marton and Booth, 1997; Ramsden, 1992). This approach identifies broad categories of student approaches that are qualitatively different from each other and it is claimed that these approaches have a significant relationship to student learning outcomes (see Prosser and Trigwell, 1999, p.15). This relational approach to teaching and learning is concerned to optimise the conditions in which students can adopt the qualitatively better deep approach to learning. The claim has been made that the approach a student adopts to learning is related to their awareness of their learning environment (Ramsden, 1992; Prosser and Trigwell, 1999). Michael Prosser and Keith Trigwell (1999) have recently written an account of relational research into university teaching with the aim of improving the quality of student learning. In this account they distinguish between the context in which students find themselves and the unique learning situation constituted by each student for themselves. Prosser and Trigwell claim that the key for design of a learning environment is context, the overall environment affecting all students. This view has clear implications for the design of tasks in a networked learning environment. Design is concerned with the setting of an overall context in which particular tasks are designed such that students will be inclined to manage their activities by adopting a deep approach to learning. This approach to design is similar to that described by John Biggs as constructive alignment (1999). These approaches offer a strong basis for the design of learning environments because they emphasise that variations in the teaching and learning context can be controlled. The fundamental task, once having specified the desired outcomes, is to incline students through the design of context to engage in learning activities that are most likely to result in those outcomes.

Goodyear (2000) has developed a distinction between the prescribed task and real world activity in an educational context from the ideas of the French ergonomist Alain Wisner. Tasks are set out by teachers they are the prescribed work, whilst activities are what students actually do. This has been generalised into a three stage model that proposes two additional pairs; organization and community and space and place.



Both Goodyear's approach and the relational approach rely on the separation of situation from context and provide a focus for design that relies on the development of contexts that incline users to adopt certain kinds of use. Such a distinction allows for the idea that all learning is situated by separating out

relatively fixed elements in the design of context that can provide resources for action (Lave and Wenger, 1991). This paper explores this distinction using some empirical examples of current use of learning environments to explore what the nature of the relationship might be between designed environments, providing context and the situations that are generated when the environments are in use.

Learning environments

Learning is widely acknowledged to be socially situated and this idea is closely associated with an advocacy of the development of learning communities. Learning is also situated in the physical setting, in artifacts and places. This of course takes on a special significance in relation to networked learning. Goodyear has argued that this invests the quality of what he calls the 'learnplace' with considerable importance (Goodyear, 2000; 2002). He argues that the quality of the learner's activity, the support they obtain from a learning community and the nature of the resources available to them in their learnplace are the three sets of factors most influential in determining the success of learning, but that educational designers rarely have direct access to them. Goodyear goes on to suggest that designers cannot (and probably should not) control the learner's activity, create learning communities or aim to specify in exhaustive detail the tools and resources available in their learnplace. Rather he advocates a more indirect approach in which the design focuses attention on specifying productive learning tasks, creating the organizational conditions for convivial learning and stocking the wider learning environment with tools and resources which the learner can customise and reconfigure to furnish their own personal learnplace (cf Crook, 2002). The ideas expressed by Goodyear and supported by the relational approach suggest that there is a loose articulation between context and situation

The idea of a learning environment has two roots within educational research literature. One suggests something small scale and self-contained such as a simulation or microworld. The second is more encompassing and would include the totality of resources on which the learner can draw. The first sense of learning environment is closely connected with computers and computer programmes, although it could be applied to resources that are not computer based but which offer the student a contained experience where they might learn through the exploration and manipulation of objects. Modern museum exhibits often have this general approach to the design of a learning experience. The second view is found more widely in educational literature and is particularly strongly associated with the relational approach identified above (see for example Laurillard, 1993). More recently the idea of a learning environment has been strongly identified with commercial products marketed as Virtual and /or Managed Learning Environments. These computer environments could be thought of as mezzo level environments, neither the small scale self-contained environments, nor encompassing a totality of resources. It is this level of environment that will concern this paper, environments that involve wider social processes and that have significant control available for practitioners who wish to actively design course environments.

The particularities of learning using networks

The focus of this paper is the way in which the uses of computer networks affect the design of learning environments. Up to this point no clear distinction has been made between design of learning in networked settings and design in other environments. This section sets out briefly those aspects of networked environments that might suggest that networked learning would have different characteristics. Networked learning takes place in an enriched information environment. A key question for academic staff and students is the sheer quantity of information available and the provision of information in a digital form direct to the desktop. This process is not simply a result of the exponential growth of the Web or the outcome of the market, governments are also keen to harness networked information resources for education. For example in the United Kingdom there is currently a government funded initiative to provide digital resources specifically for teaching and learning in higher and more recently further education, the Distributed National Electronic Resource (DNER). The DNER is 'a managed environment for accessing quality assured information resources on the Internet which are available from many sources. These resources include scholarly journals, monographs, textbooks, abstracts, manuscripts, maps, music scores, still images, geospatial images and other kinds of vector and numeric data, as well as moving picture and sound collections' (DNER, 2001).

The technology of computer networks has generated a number of debates around issues that arise out of what now appear standard features of computer networks.

- Time shifts - Computer networks used in education affect the usual time patterns of education. Many courses delivered across networks are asynchronous.
- Place - The introduction of mobile and ubiquitous computing devices have begun to make the idea of education taking place anytime anyplace anywhere seem more attainable.
- Transcripts and digital preservation - The outputs of synchronous and asynchronous activity is easily preserved in transcripts and a variety of other forms including the archiving of web casts and audio interviews.
- Public/Private boundaries - The preservation of what would otherwise be ephemeral materials alters the boundaries between what is public and what is private. Tutors can now view and preserve the transcripts of detail of student's interactions in group activities, making them available as tools for assessment.
- Forms of literacy - The still largely text based world of networked learning has generated new forms of writing that are neither simple replications of either informal conversation or of formal written texts. The use of images and audio integrated into digital environments has suggested new forms of multimedia literacy.

Overall a claim can be made that computers disrupt and disturb traditional boundaries in education. If this is so then it will be important to consider how this might affect the parameters for design.

Some examples of the issues facing design in network environments

The illustrations below are taken from a JISC/CALT funded project 'Networked Learning in Higher Education' (http://csalt.lancs.ac.uk/jisc). The research was informed by a broadly phenomenographic approach. Ference Marton defined phenomenography as:

> the empirical study of the differing ways in which people experience, perceive, apprehend, understand, or conceptualize various phenomena in, and aspects of, the world around them (Marton, 1994, p.4424).

The aim in these examples is to describe qualitatively different ways of experiencing networked learning. The objective is to illuminate the *variations* in ways of experiencing networked learning and how this might impact on design (Marton & Booth, 1997; Laurillard, 1993). This paper investigates practitioners' and students' accounts of their experiences in designing and studying in networked learning environments. The data used in this paper relies on three sets of interviews.

1. Ten interviews with practitioners who were working with courses that used text based conferencing systems available over the Web.
2. Ten interviews with students on a single course working *at a distance* using a text based conferencing system available over the Web.
3. Ten interviews with students on a single course working *on campus* using a text based conferencing system available over the Web.

The interviewees were not intended to be a sample of networked learning practice the aim was for the research to illuminate. All thirty interviews were approximately one hour in duration and focused on the experience of the use of the technology to deliver a particular course or programme. The interviews were conducted as a dialogue and each interview began with a request for the practitioner or student to explain their involvement in a course taught using networked learning. Interviewees were encouraged to use prompts such as course documentation and online access to course materials, during the interviews. The interviewer tried to intervene as little as possible and concentrated on asking questions that provoked reflection by the respondent on their own experience.

The practitioner interviewees had at least two academic years experience of the use of networked learning in higher education. They ranged from experts who had used a variety of systems for a long period of time to early adopters. The interviewees were from eight departments in five universities, six taught at postgraduate level, four at undergraduate level. The interviews focused on the practitioners' use of networked learning technology to deliver a particular course. The interviewees all made use of text based

conferencing systems provided over the internet. All were available using web access, either primarily or as a supplement to a client server system, and some had additional web resources that were distinct from the conferencing system itself.

The first student case study reports findings based on interviews and observations with ten Open University (UK) students about their work on the final project for Information Technology and Society (THD 204), a second level inter-faculty course that was presented from 1995 to 2001. The interviewees were students recruited from a single local tutor group in the 1999 presentation. The tutor group had 20 students who completed the year. Overall the course attracts approximately 1,500 students per annum from the UK and between 20 and 30 European students. A full description of the course can be found in Kear and Heap (1999) and details of the assessment regime in Macdonald, Mason, and Heap (1999). The course is resource based and students are issued with a course reader and a CD-ROM library containing 400 journal articles, video clips and animations. Computer conferencing has a key role in the course and is used to provide a discussion space throughout the course and an area for the completion of collaborative assignments. The course used FirstClass conferencing software and was available using both the FirstClass client and a standard web browser.

The second student case study examined a compulsory first year undergraduate course in the Lancaster University Law Department. Some of the 75 students on the course were second year students who for technical reasons had to complete the course as part of their degree requirements. Fuller details of the course are discussed elsewhere (Bloxham, 1999). A fuller description of the case study of which the interviews formed one part can be found in Jones and Bloxham (2001). The interviews were conducted following a 'networked negotiations' section of the course. The two, team-based, negotiation assignments were undertaken over a 5-week period. For the negotiations each team represented a “client” in a simulation of a four-cornered legal dispute with the objective of reaching a realistic “out of court” settlement. The assignment for the negotiations was designed to test the students’ ability to conduct independent legal research and to think creatively and independently in applying knowledge to problematic situations. Students were intended to work collaboratively, to communicate with clarity and to manage their time effectively, in order to achieve their objective that was a mutually acceptable and realistic settlement.

The analysis of the interview data has concentrated on the written transcripts of the interviews taken verbatim from audio recording. The interviews have been examined for variations in the experiences of the respondents and to try and identify emergent themes that might be common between them. The transcripts have been analysed from the point of view of the phenomena, networked learning, rather than the individual interview.

Design – the practitioners’ experience

This section explores the educational practice of educators active in the design of networked learning. The interviews indicated that there was a common acceptance of the notion of design for networked learning. All the practitioners interviewed spoke of design, though one used the term ‘develop’ to discuss the same features and activities as others used the term design to cover. There was evidence of a widespread acceptance of features of what has been identified as the *new paradigm* in teaching and learning (Jones, Asensio & Goodyear, 2000). The practitioners expressed this outlook in terms of their educational philosophy and the conceptualisations of learning that underpinned their designs.

Overall practitioners identified collaboration as an aim but were concerned that it was difficult to achieve and difficult to conceptualise. These difficulties led several practitioners to describe collaborative learning as a 'problem'. Collaboration exemplified a gap that all the practitioners experienced between expectations and outcomes:

> I certainly haven't yet learnt how to do it so I so I still don't know how to create an on-line learning environment that would work in the way I imagined it might. There are probably trivial examples where I can get things to pan out the way I want but I think you find this quite common that people however much experience they have developed, how ever many articles they write about good ways of doing things, however much they analyse student experiences it's

> still extremely difficult to design an on-line environment and on-line course on-line activities in ways where you are not surprised and/or disappointed by the output. *John*

The issue for all respondents in terms of design was a problem of linking planned outcomes to actual results.

Tight and Loose Structures

A way of categorising practitioners' concerns about outcomes was in terms of 'structure'. For example:

> … the structuring of the exercises in terms of the time schedule has been and I think necessitated in order to actually save them from wasting their time going to a PC lab checking, finding nothing, going away and getting frustrated and annoyed about it. We've tried to structure it fairly tightly and we may tighten that up even more this year because ultimately that means they are actually using their time more effectively and efficiently… *Norman*

Within the respondents' accounts the issue was often seen as either tight *or* loose structures. Practitioners had often experienced courses that had not run as expected. In their plans for future iterations they referred to changes in the assessment criteria and course requirements, such as attendance at face to face sessions or active participation on line.

Loose structure was often associated with assessment. Practitioners that had prior experiences of assessment being used to engineer participation or interaction were concerned about its consequences:

> ..what they seem to see is the fact that the tutor wants to see them interacting on-line and our experience has been that they will work together off-line and then come into the lab and they'll put the stuff up onto the conferencing system which is supposed to show that they are learning on-line, but there not they're doing that for your benefit or because that's what their perception is- this is what the assessment is based on... *Jack*

Looser structures were in part responses to the effects that structured interventions had in undermining their designed intent. The concern with structure was a response to gaps between design intentions and actual outcomes

The practitioner interviews provided a clear sense that whilst the new paradigm was clearly in evidence as an underlying philosophy, practitioners were much less confident in terms of the practical issues of design. This was expressed in terms of insecurity about intentions leading to definite and specifiable outcomes. Revisions of the courses were planned iteratively but attempts to control student behaviour using interventions such as assessment often had perverse consequences

Design – students' experiences

The two case studies reported here were taught using computer conferencing systems to assist in the collaborative elements of the course. Both are examples of courses that were informed by a clear sense of design that had been reported in published articles prior to the case studies being undertaken. Both examples had the conferencing systems available throughout the course but the research concentrates on those points when collaborative work using conferencing was required and linked to an assessment.

Assessment

The project assignment in the Open University course was double weighted and provided an opportunity for students to synthesise the different elements of the course and to experience collaborative work in a computer conferencing environment. The assignment book for the project was a separate 12 page booklet containing sections on; the aims of the group project, activity, report structure, mark allocation and advice on establishing group working. Students interpreted these aims differently. An example of two contrasting interpretations is illustrated below (Interviewer in italics):

> *What did you conceive that task to be?*

> I would assume that it was more to continue the computer mediated conferencing as an exercise in itself for people to work together to sort of exchange ideas and irrespective of what the particular project was to work on. (Daniel OU)

> *What do you think the emphasis was?*
> Your personal individual um your personal big 500 words or whatever
> *So the individual submission was ….*
> Was more important than the group work
> *And how about content and process if we split it that way?*
> Content
> *Rather than process…*
> Rather than process and yet it's, I would argue the process probably took as much time as writing the content if not more (Lillian OU)

The two students were co-operating in the same group to produce a joint project yet they had different views of the task they had been set, despite extensive documentary guidance being provided. When prompted to re-read the booklet Daniel revised his view and conceded that content may have been more important.

> *Well does the assessment scheme reflect the view you had …?*
> Um probably thinking about it in that way erm probably not. It's more, unless I'm misreading it, it's more the content than how it was achieved so it doesn't cover the process therefore really.

It was Daniels' initial view that was most common, Lillian's view emphasising content and individual work was uncommon. Her view was clearly instrumental and she expressed the view that she worked to the assessment guidance. Daniel was less focused on the assessment criteria:

> I don't think I actually used the marking scheme to structure my answer, maybe I was wrong

There were two reasons offered by students in the group that shed light on why the group process dominated over the intention of the assessment criteria. Firstly the group process was pervasive:

> "I couldn't just approach it on my own, it's a TMA that's impossible to approach as an individual" (Wayne OU)

Secondly the ability to communicate was a valued element within the Open University experience:

> "it's the isolation I think when you're doing a course like this…..That's the main thing for me it takes away that little bit of isolation." (Frank OU)

A sense of place

The on campus students at Lancaster had no dedicated work areas. Computers on which the students could work could be found in the main library, the law library and computer labs in various colleges. All of these locations had difficulties associated with them. In the Law library there were 5 PCs, two of which were dedicated to searching Law databases. There was a small Quiet Discussion area consisting of five tables separate from but adjacent to two PCs. The notice for the area read:

> "Quiet discussion of work related matters. Please confine group discussion and group work to this area and keep noise within reasonable limits".

Several student groups reported being asked to stop their group activity in the Law library because of unacceptable noise levels. All felt inhibited in the main library, which was designed for individual computer use in relative quiet. The computer laboratories were used by students but did not provide an adequate group environment. As a result many students found alternative locations, one group met entirely face to face despite the networked nature of the course.

> "It was all face-to-face pretty much with our team. There was not Web or phone or anything. I was like right we're meeting from now, which was a bit of a problem because like I say some of them didn't turn up a lot…." (Gawain Lancaster)

Another alternative when a computer was available was to work in an individual student's room. In general it was clear that students found meeting to work together and have access to a computer was a problem.

The communication facilities between students were an aspect of the experience of the network environment that concerned many students. The experiences were features not solely of the group nature of the course design but also the technological mediation of the network. Students used a wide variety of communications media to organise their work. There was no standard pattern either between different groups or even within team units. The communication media used was highly sensitive to particular even personal characteristics. The telephone system on the Lancaster campus was free for internal calls. Naturally the students who had campus rooms favoured this means of contact. Other students were off campus, sometimes using expensive mobile telephones, for these students telephone communication was generally too expensive. The range of communication devices had a significant impact on the availability of students to each other. Patterns of interaction were sharply differentiated by access to good communications.

Discussion and Conclusion – The challenge of NL design

Theories of educational design when applied to networked environments have to deal with a greater contingency concerning the physical and informational settings in which learning will take place. Theories that have taken into account the relational and contextual elements of teaching and learning have separated out those elements that designers can expect to control from those that they cannot. In general terms this means designing the educational context in which students generate their own learning situations. The examples set out here illustrate just how difficult it may be to make this distinction. While it is analytically possible to distinguish between the design elements of context and the situationally specific activities of practitioners and students it would seem that the practical negotiation between the two is more difficult.

Practitioners show an inclination towards a common philosophy informing their design. equally they incline towards a lack of clarity with regards to the specifics of design. In particular it is of interest that measures designed to ensure some degree of control appear to be particularly difficult. The tight-loose variation was displayed between practitioners' accounts and within them. It would seem that the practitioners have low levels of confidence in their ability to apply designs in areas such as assessment and to anticipate the outcomes in terms of student activity. The findings support the idea that because the students' situation relies upon an individual reading of context, student activity needs continuous monitoring. An emphasis upon the design of networked learning environments might lead to a sharp focus upon the construction of contexts and to a down grading of the tutor's position in making timely interventions.

Students experiences of design show how well designed contexts can be subject to a vast array of contingent pressures that affect the way in which students make sense of any given context. This paper has examined some aspects of the students' experience in relation to the intentions of the course. It illustrates the range of complicating factors that impinge on the design intent. The course designers have little control of the institutional infrastructure. In the example of on campus students, central provision of room space and facilities has a significant impact on how students constructed their personal situation from the overall context. The technological context for the course included the provision of free telephone calls on campus and this impacted upon the minority of students who lived off campus. The overall picture in both cases was of limited control being held by course tutors over the educational context. Though this could also be said to affect courses taught traditionally these findings indicate a greater vulnerability of networked environments to disruption. Assessment criteria in the case of distance students were read in the light of other pressing student concerns. The pressure to cooperate and the subtle pleasures that cooperation gave to distance students affected their reading of a well designed and specified course document.

It might be contended that all these factors affect non networked learning as much as networked learning. The claim made here is twofold. Firstly the idea that there can be a simple separation between context and situation relies upon a reading of context that places it outside of situated actions. The illustrations here would support the view that contexts are themselves constituted in and through situated actions. That is there is no clear separation between the context, which is open to design and situationally specific actions. This then presents a problem for design generally and for networked learning in particular. Networks disrupt the consistency of learning environments making them less predictable. If contexts are read only in and through situations then this can threaten the notion that design can accommodate an awareness of situated learning by separating the design of context from situated activity.

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