Student approaches to networked learning and the role of evaluation

Gabi Diercks-O'Brien, Terence Karran, University of Lincolnshire and Humberside

The objectives of this paper are to discuss the role of evaluation in helping to understand networked learning better and to contribute towards constructing a new paradigm for this new and unexplored mode of learning. Moreover, the preliminary findings of the large-scale evaluation of networked learning, as part of the Teaching and Learning Technology Programme TLTP3 funded Extended Learning Environment Network (ELEN) Project, will be presented here.

The ELEN project involves eight HE institutions and integrates electronic key skills and subject resources in the curriculum through the use of a networked learning environment, the *Virtual Campus*. The ELEN project is evaluating the integration of networked learning into the curriculum from the point of view of students and academic staff. Significant resources have been allocated to enable a comparative evaluation to be undertaken across the eight institutions and individual projects. The ELEN project team views the evaluation as an opportunity to make universally applicable statements about perceptions of networked learning, reusability of resources, and the nature of integration. Within these broad themes, the evaluation focuses on support, feedback and monitoring systems which are believed to be *the* vital link between classroom and open learning:

> A fully developed learning support system would allow a very high degree of self-paced, exploratory learning and research will be required to identify those features of the environment which best support learning. [...] Teachers will be involved increasingly in the support, development and management of learning environments. The organisational implications of this shift are very great. (MacFarlane Report, CSUP 1992)[1]

The ELEN evaluation of the learning experience has its roots in the student-centred learning approach at the University of Lincolnshire and Humberside:

> Learning to learn will help students manage their own learning. It will also develop students as independent and lifelong learners by making effective use of their own time, tutors and other support staff, learning materials and technology. (Ford et al. 1996)[2]

Dynamic and interactive learning environments which demand learner independence and autonomy need to be flexible as regards learning styles and learning routes. Moreover, a systematic approach to support, feedback and monitoring is needed, more particularly for passive learners for whom learner autonomy and independence may be problematic. The concept of the autonomous learner who actively engage with the learning environment to construct knowledge underlies the philosophy of the ELEN Project and its perception of the learning experience. This understanding is underpinned by the MacFarlane Report (CSUP 1992)[3], the Learning Environment Architecture Model (Ford et al. 1996)[4], the work of the Open Learning Foundation and publications by ULH's Educational Development Unit. (e.g. Lewis & Merton 1996)[5]

The ELEN approach to evaluation of the learning experience

Designing an evaluation framework for a new kind of learning experience proved problematic because it is difficult to determine which evaluation criteria are appropriate to a new and unexplored mode of learning. An evaluation framework had to be constructed that would address:

- the complexity of the learning experience -the approach has to be holistic;

- the need to contribute to the understanding of a new mode of learning;
- the identification of changes in the infrastructures of support, feedback and monitoring systems following the introduction of technology into learning;
- the limitations of previous localised and context-bound evaluations of learning which fail to investigate the "learning infrastructures" needed to support networked learning environments. A comparative and empirical evaluation across different contexts is needed to identify these infrastructures.

The ELEN project shares the holistic view of the learning environment advocated by the MacFarlane report:

> Not only does an individual course provide a specific learning environment created by the course designer, but each department and institution has policies and practices which add further components. We have to consider this extended learning environment as a complex interacting system. [...] Effective change will depend on analysing the system, identifying problems and weaknesses, and then negotiating the types of change which are most likely to create the required improvements in outcome. (CSUP 1992)[6]

This holistic view has been reflected in the learning environment model developed for the ELEN evaluation:

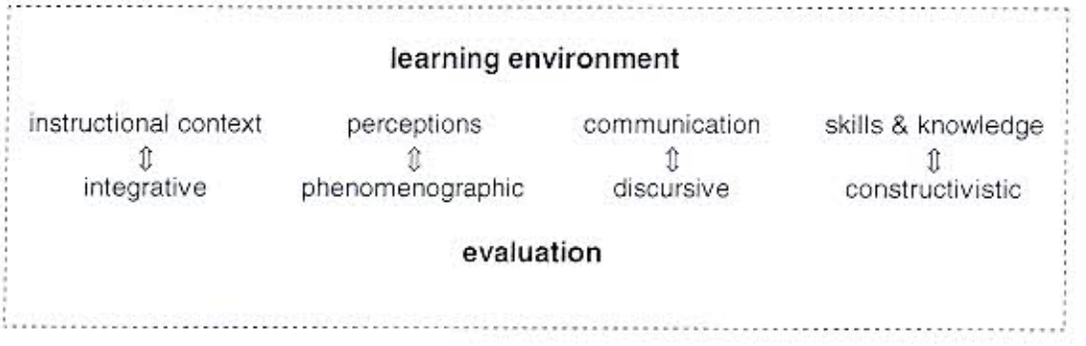

Figure 1 *The learning environment evaluation model*

This model, which has been detailed by the ELEN project team (Diercks-O'Brien 2000)[7], reflects the complexity of learning and is truly holistic. Four main domains have been identified and each has a corresponding approach to evaluation. Research into learning has identified these four domains and the corresponding approaches to evaluation but has not been able to integrate them into one single model of evaluation of learning.

Successful integration of networked learning depends on the dynamics within and between the various elements of the model and the degree of learner interactivity. Evaluations tend to focus either on the implementation process, which investigates institutional cultures and infrastructures to identify opportunities for, and barriers against, technology implementation; (Alexander *et al* 1998)[8] or integrative evaluation, which investigates the learning context in the light of effective integration of technology in the classroom, but without consideration for support systems outside the classroom boundaries. (Draper *et al.* 1996)[9] Integrative evaluation, as perceived within the ELEN project, extends beyond the classroom. Evaluation further needs to investigate the learning infrastructures available to support increased learner independence, such as feedback, monitoring and support systems. Kember states that "approaches to learning are direct descriptions of learning processes used by students" and they are "sensitive to the various contextual variables which constitute the teaching and learning environment." (Kember 1997)[10] It becomes increasingly important to investigate how, when and where knowledge is constructed in a multiple media, resource-based and learner-centred learning environment. Hence the focus of the investigations should be on learner interaction with knowledge chunks because "knowledge is not a fixed

commodity, but a function of our interactions with external resources including tools, media, other humans." (Ryder & Wilson 1997)[11]

The ELEN project has adopted the model for its empirical investigation into the networked learning experience. For the purpose of this paper the focus will be on the instructional context domain and the skills & knowledge domain of the model.

Preliminary ELEN evaluation findings

For the first part of the evaluation, Level 1 students were sent questionnaires which focused on the following areas:

- appraisals of the importance of specific skills,
- perceptions of what kind of learner they are;
- expectations of tutorial support;
- usual source of support when faced with difficulties;
- importance of IT skills for study and for work
- confidence in using IT
- personal information - gender, age, ethnicity

In addition to closed questions, students also had a series of open ended questions addressing, inter alia, why they believe IT skills are important. Currently 679 completed surveys have been returned from three of the universities in the project. The sample size means that there should be a high level of reliability for the results. It is inappropriate to report all statistics here, and this analysis will examine some initial findings and indicate possible connections of interest. For most questions within the survey, students were asked to provide responses on a six point scale ranging from, for example, "Very Confident" to "Not at all Confident". For the purposes of succinct exposition, the percentage scores for the highest and lowest categories are used in this paper. Similarly, to try to tease on any cultural differences between the different ethnic groups, the students from the India sub-continent were grouped together. Tables 1 gives a breakdown of the sample in respect of gender and ethnicity.

Table 1: Sample by Ethnicity and Gender.

	All	Male	Female
	%	%	%
White	19	55	45
Black Caribbean	3	44	56
Black African	12	44	56
Black Other	2	50	50
Chinese	6	47	53
Indian	30	45	55
Bangladeshi	3	56	44
Pakistani	9	59	41
Other Asian	6	46	54
Other	6	32	68
Prefer not to answer	4	64	36
All		51	49

Table 1 shows that the sample is split nearly exactly by gender, (49% male, 51% female). In terms of ethnicity, the table shows that the dominant ethnic group is from the Indian sub-continent - students from India, Bangladesh, and Pakistan make up 42% of the sample, with those designating themselves as "White" as the second largest group. Splitting

the group by gender and ethnic background shows that the Indian female group is clearly the largest.

The first question examined students' perceptions of the value of particular skill areas to themselves. As Table 2 shows IT skills are considered the most important skill area - over 70% see these skills as "very important", this is closely followed by Communication Skills at 68%. In contrast to these new skills, which are very much a part of the knowledge economy, the traditional skills (the three Rs) of writing and arithmetic figure comparatively low - only half the students thought that numeracy was very important. In terms of gender difference, in every instance, the females tended to regard these skills as being more important than their male equivalents. Interestingly, the white ethnic group regarded IT and communication skills as less important than did the other ethnic groups, for example 76% of the Asian group saw IT skills them as very important, compared with 53% for the white group.

Table 2 : Importance of Skill Areas.

	All		Male		Female		White		Asian	
	Very High	Very Low	Very High	Very Low	Very High	Very Low	Very High	Very Low	Very High	Very Low
	%	%	%	%	%	%	%	%	%	%
IT skills	72	1	69	2	74	0	53	2	76	1
Communication Skills	68	0	64	1	72	0	60	0	70	1
Independent study skills	66	1	59	1	72	1	55	0	65	1
Finding/using information	63	0	61	1	65	1	62	0	61	1
Presentation Skills	63	1	57	1	68	0	56	1	62	1
Writing skills	61	1	57	1	64	1	52	0	59	1
Working in a group	59	1	58	1	58	1	52	1	58	1
Numeracy	52	1	46	2	58	0	41	1	55	0

The second question looked at students perceptions of their own learning attributes. The results in Table 3 show students perceive themselves as open minded, patient and enjoying group work - although students consider themselves as patient, paradoxically they dislike routine work. There appear to be few gender differences, although males seem less likely to enjoy routine work. On all the learning attributes described, the "white" ethnic group has lower scores - for example 16% of the white cohort see themselves as "Thoughtful Learners" compared with 25% for the Asian group, similarly the scores for the two groups on the liking of routine work are 9% and 18% respectively.

Table 3: Student Perceptions of Learning Attributes

	All		Male		Female		White		Asian	
	Agree	Dis-agree	Agree	Dis-agree	Agree	Dis-agree	Agree	Dis-agree	Agree	Dis-agree
	%	%	%	%	%	%	%	%	%	%
Open Minded	33	1	34	0	34	1	26	2	29	0
Patient Person	30	3	28	2	31	3	22	3	30	2
Enjoy Group Work	30	2	32	1	30	2	25	2	33	2
Learn in logical way	30	0	29	0	30	0	23	0	27	0
Practical	28	1	29	0	28	1	26	0	27	0
Thoughtful Learner	25	0	25	0	25	0	16	0	25	0
Like Routine Work	16	4	13	5	18	4	9	6	18	3

Table 4 shows student expectations of tutor support. This table indicates that students attach most importance to tutors explaining concepts and providing guidance, but are less keen on tutors experimenting with learning, and on student discussion and more particularly on undertaking independent work. What is perhaps surprising is that students are less likely

to expect tutors to provide lecture notes (and hence take a passive role in learning) and more inclined to expect tutors to provide guidance and explanation (which is more indicative of an active and participative ethos). For gender characteristics, the only difference appears in a greater inclination by the female cohort to expect tutor support in the form of guidance. In respect of ethnic background, in every one of the different roles described in the survey, the students from the Asian sub-continent had higher expectations of tutor support than those in the White ethnic group, the differences between the groups being most marked in respect of the provision of lecture notes where 57% of the Asian group agree strongly with the expectation of the Tutor as a provider of lecture notes, compared with 35% for the White ethnic group.

Table 4: Student Expectations of Tutor Support

	All		Male		Female		White		Asian	
	Agree	Dis-agree	Agree	Dis-agree	Agree	Dis-agree	Agree	Dis-agree	Agree	Dis-agree
	%	%	%	%	%	%	%	%	%	%
Explain topics	74	0	72	0	76	0	71	0	74	2
Provide guidance	61	0	53	0	70	0	54	0	57	3
Supply list materials	63	1	63	1	63	1	54	0	63	0
Provide lecture notes	53	1	50	2	55	1	35	0	57	2
Allow experiments	39	1	35	2	43	1	26	1	39	3
Emphasise discussion	37	1	39	1	34	0	26	1	35	4
Allow independence	19	2	20	2	19	1	14	2	19	2

In terms of seeking support, students see module tutors rather than learning support staff as the most important for help with subject questions. To address learning difficulties, students are likely to turn to Learning Support staff and also fellow students, but about a third of students still referred general learning difficulties to subject tutors. For IT problems, students generally refer to Computer Staff rather than other groups. There are few apparent gender differences, although female students are more likely to refer to the Module Tutor for subject questions, while male students are more likely to seek help from library and learning support staff. Students in the white ethnic group are generally more likely to seek help from the main support areas (Tutors, Library and Learning Support), than their asian counterparts. However, knowledge of english is not a barrier to seeking support - 86% of native english speakers asked their tutor for subject advice, compared to 82% for which English was the second language.

Table 5: Where do students seek help?

		Module Tutors	Fellow Students	Library Staff	Learning Support	Computer Support	Other Staff
		%	%	%	%	%	%
	All	83	45	33	23	8	3
Subject	Male	83	44	38	26	9	3
Questions	Female	85	47	29	18	6	1
	White	88	51	39	15	7	0
	Asian	80	45	29	22	5	3
	All	32	51	33	58	7	3
Learning	Male	36	50	26	53	8	3
Difficulties	Female	31	54	37	63	5	1
	White	44	53	29	63	5	2
	Asian	31	51	33	60	8	2
	All	16	24	23	16	80	2

IT	Male	16	24	24	14	76	2
Questions	Female	15	24	24	17	85	1
	White	18	32	28	21	83	0
	Asian	14	23	23	11	81	2

All students were convinced of the need for IT skills to help them to study and in their future careers, as table 6 shows. The gender differences are small, but it is interesting to note that the female group were more likely to see IT skills as important for study and career than their male counterparts. Similarly in respect of ethnic differences, the Asian cohort placed greater importance on IT skills than the white cohort.

Table 6: How Important are IT skills?

		Very Important	Important	Not Important
		%	%	%
	All	90	10	0
	Male	87	12	1
IT Skills for Career	Female	92	8	0
	White	83	14	3
	Asian	93	7	0
	All	79	21	0
	Male	76	24	0
IT Skills for Studies	Female	83	17	0
	White	68	32	3
	Asian	83	17	0

Students were also asked to state why they thought IT skills were important and the findings from the open questions can be divided into three categories:

- **Career:** students think that IT skills enhance their career prospects or are essential to obtain a job and make a career in an ever increasingly technological age.
- **Business, Work**: students think that businesses, organisations, and the workplace in general are increasingly dominated by technology and that effectiveness is increased through IT. Some believe that businesses will not be able to survive without computerisation and an IT-literate workforce.
- **Global issues:** the vast majority of students believe that computerisation is an inevitable fact and the most important element of present and future life: "Because computers are the future. Because everything involves computers." "The world is becoming increasingly IT based. If we don't learn how to grasp the concepts, we will fall a long way behind." The most surprising finding is that students seem to see computerisation as something that is beyond their powers to influence and there is a sense of doom and domination: "They are important because the general trend in the present society we live in dictates so, it is predominantly dominated by them."

Surprisingly few students from these cohorts have identified clearly positive reasons for becoming IT literate, such as effectiveness and efficiency, access to information and global communication, IT for learning. Most students clearly see themselves as instruments of computers, rather than themselves as agents who can manipulate computers and use them as a tool to achieve their aims. The task of educators will have to be to develop more positive notions about computers and IT skills

Table 7: Student Confidence in using well known IT programs

	All		Male		Female		White		Asian
Very	Very	Very	Very	Very	Very	Very	Very	Very	

	High %	Low %	High %	Low %	High %	Low %	High %	Low %	High %	Low %
Text Processor (Word)	58	4	57	4	59	4	42	5	65	3
Spreadsheets (Excel)	39	5	41	4	38	6	23	6	47	4
Email	38	7	41	5	35	9	24	9	42	5
Searching the WWW	34	8	46	5	24	10	27	12	37	6
University Intranet	24	9	32	6	16	12	15	13	27	8
PC/Mac Environments	24	9	28	7	19	12	20	9	25	7
Presentation (Powerpoint)	19	14	21	13	16	16	12	17	25	9
Database (Access)	15	19	16	16	13	23	6	26	16	14
Stats Package (SPSS)	5	27	6	22	3	34	3	32	5	21

Student confidence in using well-known IT packages varied considerable, most knew how to use Word and Excel and were confident with email. However, relatively few were acquainted with Powerpoint, Access and SPSS. In every instance, the males tended to be more confident in the use IT programs than the females, which provides some explanation for the greater tendency for the female cohort to seek help with IT, as reported in table 5. The White ethnic group generally were less confident with using the new technology - for example 15% of the White group were confident about accessing university information, compared to 39% for the Bangladeshi group, 38% for the Black African, and 27% for the Indian. Similarly in respect of using the Web, 27% of the White group were very confident, while the comparative figures for the Bangladeshi, Indian and Pakistani groups were 50%, 37% and 32%.

Conclusions

The first part of the evaluation has suggested useful areas for further study, and the next step is a more sophisticated data analysis to inform the collection of qualitative data through focus groups, and thus put some interpretative flesh over the bare bones revealed by the quantitative survey. An empirical and comparative evaluation will take evaluation out of the context-bound sphere and provide universally applicable statements about networked learning environments. These initial findings indicate for the instructional context and the skills & knowledge domains that:

- students want clear guidance from their tutors and their willingness to work independently needs to be properly supported;
- students need clear information about the type of support they can expect from staff – thinking that computer staff can support computer-assisted learning can be problematic;
- even a unsophisticated preliminary analysis demonstrates indicative perceptual differences between student cohorts, in respect of their experience of using technology in learning.

The intended outcome of the ELEN evaluation of the learning experience is to identify the supportive contexts for, and effective approaches to networked learning, and thus to contribute towards the definition of a new paradigm.

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