Developments in Generative Learning using a Collaborative Learning Environment

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Abstract

This paper describes and reflects upon the development of the on-line modules for the EdD in Teacher Education at the University of Nottingham, UK. This development has provided the course organisers with an opportunity to explore on-line collaborative learning involving knowledge transformation and creation. The course attracts mainly overseas students and consists of four taught modules followed by an equivalent period of research leading to a thesis. The paper presents the rationale for the pedagogic approach taken in developing the course including the rationale for the use of WebQuests and a collaborative learning environment (CLE) that is being developed by the University of Melbourne, Australia.

Keywords

WebQuest, collaborative learning, teacher education, pedagogy, knowledge creation

the on-line course

The background and rationale

The EdD in Teacher Education has been in existence since 1998 and has been run as a face-to-face course for full and part-time students by the authors, who are lecturers in the School of Education, University of Nottingham, UK. It is cuurently offered as a mixture of on-line and summer school residential modules and is being developed for full on-line delivery. There are currently 12 students studying on-line, in Hong Kong, China, Cyprus, Greece, Cayman Islands, Jamaica etc. The course in effect involves comparative studies of teacher education programmes and through a series of 4 taught modules (2 content plus 2 research) the students develop their research questions and methodology in relation to teacher education. The taught modules broadly aim to provide opportunities to develop student understanding of the main principles and issues underlying teacher education and the global and local research agendas that accompany these. During the taught sessions students are not only introduced to the research skills and methodologies that they will need in order to have an understanding of in order to complete their research, but are provided with opportunities to further develop and articulate their own research agenda in preparation for the research phase of the course. Because this course generates research students, due to staffing considerations for the research phase, no more than 12 new overseas students on the taught elements can be accommodated per year.

The development of the course

Central support for the development and some funding was gained from the University of Nottingham. The approach used involved pulling together the content expertise in the School of Education to develop the on-line sessions. The three course tutors developed the pedagogy within which this content was framed and the materials were piloted face-to-face with a mixture of campus based and distance students. Evaluation occurred through the use of focus groups part way through and at the end of the modules. From the experience at the University of Nottingham, the following factors appear to be important for success of on-line courses. Firstly, they need to be designed to match the needs of students. Secondly they should make full use of distributed resources, i.e. the expertise of

the students, staff, on-line resources, and thirdly there is a need for an induction process.

The rationale for the pedagogic approach taken

A key feature of this was the need to develop an understanding amongst the tutors developing the module of what added value learning on-line might bring for all involved, tutors and students. This developed out of a reflection by the lecturers upon the nature of the knowledge that they were working with, their own philosophical approaches to teaching and learning and the perceived needs of the learners. Johnstone (1995) argues for better mediation of learning in HE courses , i.e. a shift towards increasing learner productivity. The notion is that if learners are supported to engage in the learning themselves then learning will be more productive. This approach views the students on a course as a resource (Waterhouse, 1990) that can add measurably to the learning of the whole cohort. This can be done in a variety of ways through the sharing of resources , through supporting each other in developing ideas, through on-line problem solving etc. The ways the approach adopted relates to the work of others in this area will be discussed later, but the intention of the developers was to take account of the 'unique' learning context and develop the approach accordingly. So what is unique about this context? The uniqueness involves a combination of the following.

For the students they:

Choose to work at a distance;

Are all teacher educators & want to study part-time in their home location;

All value communication so do not want to study in isolation;

Tended to share a post modern perspective of knowledge and of learning;

Recognised the need to develop a level of criticality;

Were concerned that whatever they studied supported their understanding of their area of research;

All have an understanding of their own teacher education system and a willingness to develop this and learn from each other.

For the course tutors they:

Have an interest in comparative teacher education;

Favour a social constructivist approach to learning;

Are interested in exploring the use of the Internet as a tool for knowledge transformation and creation and in particular the joint construction of new analytic tools to develop new knowledge that relies upon the unique knowledge and perspectives of the students on the course.

In relation to the knowledge involved:

The students bring with them unique and quite expert perspectives of their own systems;

Government and subject association documents tend to be on-line;

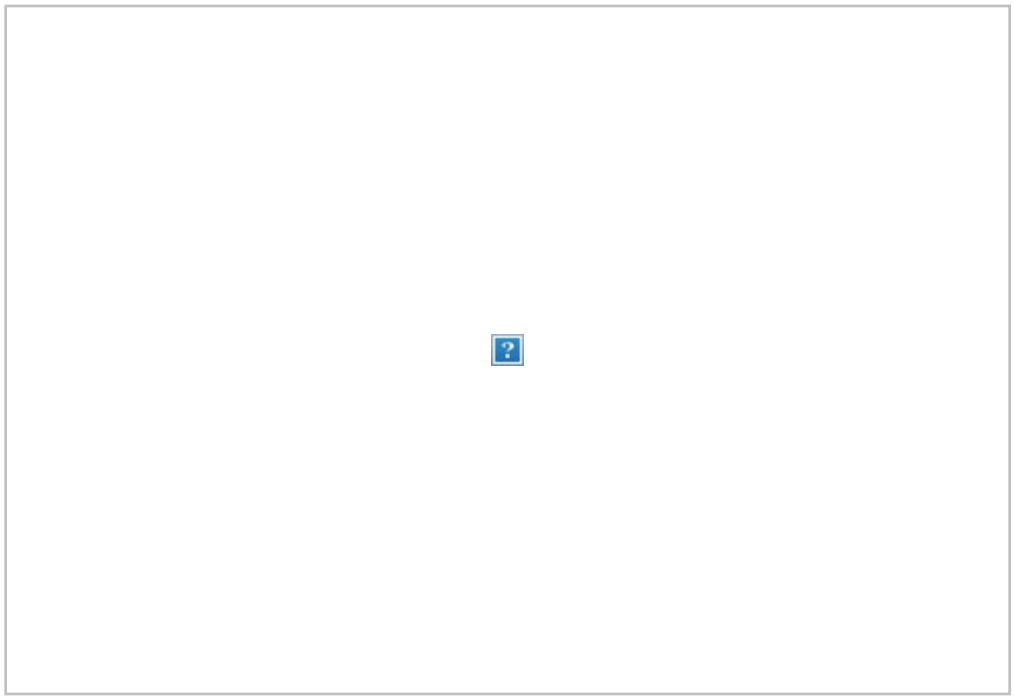
There are no analytic tools available that can be used to make judgments about teacher education systems

The 'Fundamentals in Teacher Education' module

The first module to be developed on-line was the 'Fundamentals in Teacher Education' module, which was originally delivered as a series of discrete three hour taught sessions and delivered face-to-face by a range of expert academics. These sessions were in effect replicated on-line through the commercially available virtual learning environment, WebCT. It was felt that this would be a familiar pedagogic format for the students and as such would allow them to gradually develop their skills of working on-line. Subsequent modules could then move away from this traditional format into ones that would utilise the study time to work collaboratively on themes across the whole module with the subsequent benefits for promoting deeper understanding. The tools on the home page were selected from those on offer in WebCT, see Figure 1. In order to induct the students into the E-learning process the first module has a series of Induction tutorials covering on-line pedagogy, their roles as on-line learners and the roles of their tutors etc.

The induction tutorials

Notions of the characteristics of adult learning or andragogy (Knowles, 1978) formed a pedagogic framework for decision making in relation to the design of the course. For example, ‘transparency of action’ was seen as essential by the course team, i.e. it was felt that whatever the students were to be involved in through the actions taken by the course developers the students themselves should have a clear understanding of the rationale and basis for this. Thus the induction tutorials were a means of involving the students in, not only developing the necessary skills for on-line working, but also helping them reflect upon the issues that arise when encountering an unfamiliar mode of working, such as approaches to studying or learning styles, their role and the tutors role in the learning process etc. Interestingly, the students were familiar with literature about learning styles, but had not applied the ideas to themselves as learners. On-line activities, such as the Index of Learning Styles instrument at North Carolina State University. http://www2.ncsu.edu/unity/lockers/users/f/felder/public/ILSpage.html , were positively received by the



students who gave spontaneous feedback on the bulletin board. These induction tutorials also helped the formation of the learning community by developing their skills in using e-communication purposefully, i.e. they began by creating and sharing home pages and resources , then their views and then moved on to an on-line discussion of these and of the articles and other resources they were accessing.. This move from interacting on-line by sharing uncontestable resource (biographies) to contestable resource (views, opinions, understandings) proved effective in developing an atmosphere of trust. The initial sharing of personal information also supported this process.

The use of Webquests within WebCT

Figure 2: A WebCT content page

WebCT by default uses a ‘book’ metaphor and organises information in a contents page format see Figure 2 . This tends to discourage students from being able to take control over their route through the learning, as what they see are the content headings and subheadings. For students to take control of the learning they, at the very least, need an introduction that makes explicit the learning objectives and a notion of how any resources provided will support achievement of these. In addition they need a means of judging when they have achieved the objectives. (Rowntree, 1994) For this reason, each section of each module is introduced by a

Webquest http://webquest.sdsu.edu/webquest.html . This is in effect a one page on-line study guide that contains an overview of what the students have to do to achieve the learning objectives. Bernie Dodge (1997) their originator describes a WebQuest 'as an inquiry-oriented activity in which some or all of the information that learners interact with comes from resources on the internet.' The course uses both short term and long term WebQuests . The former requiring mainly information gathering , selection, manipulation and organization skills and the latter requiring in addition the higher order skills of criticality, knowledge transformation, and knowledge creation. Interestingly the short term WebQuests do not necessarily require collaborative working, but the latter lend themselves to this form of working and hence involve extensive use of the bulletin board to achieve this. There were other quite practical reasons for using WebQuests. They present a familiar interface for the student and they importantly provide a template for tutors to write materials. As already mentioned each module contained sessions that would have conventionally been taught by different tutors in face-to-face mode. These tutors were now required to develop on-line sessions with, in most cases, little idea about how to structure this for on-line delivery. It was found that the WebQuest format provided an excellent template, due to the embedded pedagogy underlying its structure.

The Contexts for Teacher Education module

Introduction

The second module 'Contexts for Teacher Education' uses collaborative pedagogy. It is still delivered through WebCT , using Webquests, but a Collaborative Learning Environment (CLE) developed at the University of Melbourne is also being used. This work extends the use of the CLE and is funded by both universities. The following explores the rationale for the pedagogy involved, the sequence of student collaborative activities and ways the CLE supports this.

The pedagogic approach

The pedagogic approach for this module was developed by the course tutors to be suited to on-line delivery however the materials were initially piloted in face-to-face mode at a summer school. An indication of the students' satisfaction with the approach was the perfect set of scores they gave the module in the University administered Student Evaluation of Teaching. The approach differs considerably to the delivery of discrete taught sessions used in the first module. WebQuests are still used as study guides, but these support the learning through what are essentially three major themes. The first them is the comparative study of teacher education programmes, the second considers subject cultures within the programmes and the third explores the research agendas that arise from the first two themes. The same basic assumptions were made in terms of learning, that is 'Education is about the experiences of the learners' (Waterhouse, 1990 p52), a notion first put forward by Dewey (1938), and a central consideration was the need to recognise the skills and knowledge that the students were bringing to the course and therefore to manage the learning process in order to organise, develop and utilise these as a key resource. These students were expert in that they had 'insider' knowledge about their own national teacher education programmes, what they would get from the module were the opportunities and structures to reflect on these in the light of a wider and more global perspective. They all had a sense of wanting to pursue a research agenda, but because they did not have this wider perspective in which to locate this work they were unsure of the relevance and importance of their proposed studies. It seemed important that the pedagogy underpinning the module should use these issues as a backdrop and at the same time should endeavour to develop these students views of the value of their own knowledge and skills through an interaction with the wider teacher education community, i.e. themselves, their tutors and the wide range of resources available. These students had to develop a 'realistic' confidence in their abilities of critical analysis as well their ability to contribute new knowledge in preparation for the next phase of the course. It was in this final phase that they were to pursue their own research agendas. Given this it seemed a logical approach to develop the module around three main learner needs:

> The need for the students to share their 'insider ' knowledge of their own teacher education systems;
>
> The need to situate these shared perspectives within a global and 'informed' perspective;
>
> The need to raise student awareness of their abilities as researchers, i.e. to transform and create new knowledge.

The pedagogic approach chosen was social constructivist one based on the ideas of Vygotsky (1962)and Bruner (1990). Put simply the notion is that a learner on their own can only construct an individual and limited view of the world, however if they are able to share their ideas with knowledgeable others then they can test these out and as a result their ideas will have an opportunity to further develop. This learningn process is iterative and needs opportunities for communication, collaboration and reflection over extended periods of time. This social constructivist pedagogy as applied to on-line collaborative learning follows the principles underlying Grabinger and Dunlap's (2000) Rich Environments for Active Learning (REALs). A key feature of a REAL is that not only are there opportunities for knowledge creation but that this is situated within authentic interactions. This authenticity is shaped within this module, by using a task that will genuinely create 'new' knowledge, that is directly relevant to the students studies/interests and utilises appropriate higher order and research relevant thinking skills. The additional element within this is that these learners genuinely hold expert knowledge that will be new to the others in the group. It is the deliberate use of this aspect in the course that

aims to establish a notion of the need to belong to, and participate within the group, and to ensure students feel part of a professional community (Wenger, 1998).

Generative learning

Generative learning (Dunlap, 1996) is one of the features of a REAL. In essence generative learning is a process of generating ideas using static information as a starting point and re-organising this into more flexible knowledge structures. These knowledge structures are more flexible in that they organize knowledge, reveal relationships between ideas and through their construction identify gaps in knowledge or conflicts between ideas. One example would be the development and sharing of concept maps , but there are other forms of flexible knowledge. The form used in the 'Contexts for Teacher Education' module is the collaborative creation of an instrument or tool that can be used to critically analyse teacher education programmes. This process allows students to reflect upon the key features they would value in an education system and develop these as a set of questions they would ask of a teacher education programme. Clearly these initial ideas need informed development and the main sources for revision are their own values and beliefs, their expert understandings of their own programmes, government views of programmes as set out in regulations or standards, and the published literature in the field. The module activities were designed so that initial individual contributions could be refined through an iterative process involving collaboration and peer review, as well as application of the tool to analyse their own teacher education programmes. The intention was that the outcome would be a highly revised and refined tool, that represented a group view of the key features of an effective teacher education programme. As mentioned earlier this generative learning process was successfully piloted in face-to-face mode at a summer school and on the strength of this is now being developed as a set of on-line activities.

The module activities

These are presented in figure 3.

Activity	**Description** ***(Italicised items indicate areas where on-line collaboration occurs)***
1. Start-up	This is an individual written task in which the students reflect upon their personal understanding and perceptions of their own national teacher education programmes
2. The ideal teacher education programme	In this task students consider the attributes of a teacher education programme that would train teachers to be able to work in schools that would produce what could be termed educated people. *This starts with individual reflection and moves to a group consensus through a discussion of their ideas.*
3. Creating the analytic tool	In this task students consider the outcomes of activity 2, together with literature about different models and conceptions of teacher education as well as value systems that underpin programmes. *They work in pairs and submit a series of questions they would use to analyse a teacher education programme. This is peer reviewed and then the outcomes of all pairs are presented on a web form to aid on-line decision making.*
4.Applying the analytic tool	Each student presents a case study of their own teacher education programme & tutors present others. The tool is used as a means of structuring the presentations and for revealing issues that might form part of the global teacher education research agenda.
5. Revising the analytic tool	*Suggestions for revision to the tool are made and a final version agreed.*
6.Exploring Subject cultures	*The ways subject culture is embedded in teacher education is studied and pairs from different subject disciplines* work together to establish the ways the analytic tool addresses this. Suggestions for further revision to the tool are presented for peer review and those ideas surviving this process are adopted.
7.The research agenda	Each student then presents their potential future areas of research and locates this within their new understanding of the research issues revealed through the process of developing and applying the analytic tool. *Ideas are refined through peer review.*

Figure 3: The collaborative activities

The contribution of the CLE

The philosophy behind the redevelopment of the CLE is in line with calls by Reeves for instructional technology research to be driven by 'use-inspired goals' (Reeves 2000). These goals focus on developing creative approaches to particular learning requirements. It is in this spirit that the module requirements are being used to extend the capabilities of the CLE, which is able to ‘create customised activities that have contextualised learning interfaces, are responsive to student actions, can maintain discursive interactions and provide opportunities for reflection on the individual learning experience. These are capacities that are generally not well handled by current online courseware systems’ (Kavnoudias et al, 2001). The development of a model for student-centred learning within a CLE was a response of the Physiology Department at the University of Melbourne, Australia to an increased level of lecture-dominated teaching. The CLE was first set up in 1998 to encourage student interactions between peers and tutors in a friendly study environment in which the tutor acted as a 'facilitutor', to guide and assist. The two-hour time tabled tutorials employed a variety of software and teaching approaches, with the students encouraged to work in groups. Results suggest that this general approach has had a significant positive effect on student learning outcomes (Kemm et al, 2000). The CLE is capable of organizing a series of steps in an activity, storing contributions at each step, together with any peer or tutor comments. The students can then revisit these at anytime, reflect upon them, re-use them etc. Students can work individually, in pairs or larger groups keeping their contributions private or making them available to the whole cohort. The module activities, set out in figure 3, rely on the ability of the CLE to not only allow for this flexibility in collaborative working, i.e. in pairs or in larger groups, but the final outcome, activity 7 has the requirement that the outcomes of earlier activities can be revisited. The ways the CLE is being developed to support the collaborative activities and on-line decision making is illustrated below through a consideration of activity 3, creating the analytic tool. In this task students consider the outcomes of activity 2, together with literature about different models and conceptions of teacher education as well as value systems that underpin teacher education programmes. They work in pairs and submit a series of questions they would use to analyse a teacher education programme. This is peer reviewed and then the outcomes of all pairs are presented on a web form to aid on-line decision making. The process is shown in figure 4.

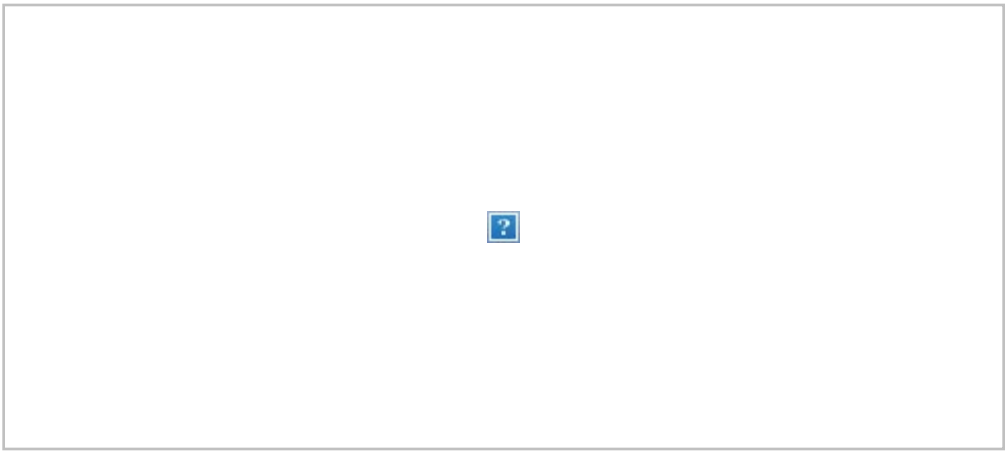


Figure 4: The process involved in creating the analytic tool

In step one a range of resources will have been studied and the outcomes of earlier activities will need to be revisited. Pairs of students will contribute questions and they will need to decide how best to word these and which ones to leave. This could be supported by an email discussion between the pair or simply by a series of documents in step one which contained questions and reviews of these contributions within the pair. Once the pair were satisfied with their questions they would contribute these for peer review by another pair. The tutor could also provide feedback at this stage. As a result of the peer review process, students will not only have received feedback on their questions, but will have seen and reviewed another set of questions. They then have an opportunity in step two to revise their questions. All of the questions remaining will then be given a number and be merged into a large document at step 3. Students will then have the task of making suggestions for refining the list, removing duplication, grouping the questions etc. This might be supported with a bulletin board discussion. It is envisaged that at step 4 the remaining questions will appear in the CLE as a webform allowing students to vote for the questions that will remain in the analytic tool, making comment as and when necessary. The outcome will be step 5, the first version of the analytic tool, which will be applied to case studies of teacher education programmes and through this process be modified as appropriate.

Conclusion

The ways the CLE will handle all the proposed interactions has yet to be finalized, but it has been successfully used on a variety of courses at the University of Melbourne and has proved flexible enough to meet the needs of eight different subject contexts and this

work is being extended across other institutions. Future developments of the course at the University of Nottingham involve the move of the two research modules to on-line delivery. The CLE developments widen the pedagogic possibilities for these modules, which will further explore the ways generative learning might be used. Interestingly the knowledge creation function of this process will have real benefits. The process has already produced resource in terms of the 2001 cohort's analytic tool, which could be introduced to the students at the end of the module to support further reflection. In addition the course tutors intend to utilise the case study presentations prepared by the students as a bank of resources for future use.

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