Creating a Community of Learners in Design and Technology Education: Triumphs, disasters and lessons learned!

Wendy Dow, University of Glasgow, UK

Abstract

This paper is an evaluation of an attempt to create a community of learners in an Initial Teacher Education course. Students who participated were in their third year of a four year Bachelor of Technology Education degree at a Scottish university. As part of the Educational Studies component of the course, students were required to work collaboratively to produce a unit of work based on the Scottish Higher Grade arrangement documents in one of three areas of Technology Education (Product Design, Technological Studies and Graphic Communication). The end of year assessment, however, was to be based not on the actual unit of work produced but on student reflection on the process of collaborative learning and their ability to establish links between practice and theory in the field.

There is a large body of research which demonstrates the importance and value of collaborative working. The many benefits that have been shown to accrue include: superior problem solving (Johnson and Johnson, 1989; 1999); the development and improvement of interpersonal relations (King & Sorrentino 1983); the depth and quality of communication (Deutsch,1973); increases in self esteem (Slavin 1990); higher achievement, creativity and productivity (Johnson et al, 1978) and increases in intellectual growth (Light, 1992). Arising from Vygotsky's (1978) social constructivist theories of learning and further developed by Wertsch (1984) Rogoff (1990) and Lave and Wenger (1991) the concept of a community of learners extends the notion of both collaboration and mediated learning to address fundamental issues such as equality and identity. Interdependence at a personal, as well as a functional level is therefore considered a necessary criteria for success (Fielding 1999).

Creating this type of community of learners can, however, be more difficult than is sometimes envisaged. Where the predominant ethos of an institution is based on a behaviourist, transmission model of learning, where assessment procedures have the effect of encouraging social comparison and competition, and where implicit epistemological beliefs are already deeply embedded, there can often be strong resistance to change. If future teachers of technology are to create the structures necessary to develop successful communities of learners in their school classrooms therefore, it is important that they should be encouraged to both explore and reflect on alternative ways of working for themselves.

Throughout the year, students were asked to keep a journal of their reflections on the process of collaborative working. Analysis of these journals and interviews with the class tutor provided the data for evaluation of the process. Analysis was carried out using the principles of Interpretive Phenomenological Analysis (IPA) in which the concern is with the individual's perception, as opposed to an objective description of events.

Results of the analysis demonstrated that although the process was very successful in some instances, it was by no means successful for all students. Reasons for this are explored within a theoretical framework relating to group processes (e.g. Tuckman & Jensen, 1978) and implicit theories of epistemology (e.g. Hofer (2001) Schommer-Atkins (2004). Implications for Initial Teacher Education courses are also considered.

Key words

collaboration, learning communities, implicit theories, epistemology, Initial Teacher Education

Introduction

This paper investigates an attempt to create a community of learners in a class of students studying for the degree of Bachelor of Technology Education. The intention was to provide a fairly loose framework within which self-selected groups of students could work collaboratively to produce a thematic unit of work for use during school placement. The students were expected to become actively engaged with the Scottish curriculum

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arrangement documents pertaining to the particular theme selected by each group by discussing how both the content and pedagogy of their unit mapped onto these. Reflection was encouraged by the use of learning journals in which they were asked to reflect both on the process of producing the unit and the process of working as part of a group. Although a number of students clearly found this way of working a valuable and liberating experience, there were others for whom the method clearly did not work.

This paper first of all explores what it means to be part of a community of learners. It then describes the methodology and the student experience before going on to discuss some possible reasons why the attempt to work in this way was successful for some students and not for others. It finally examines some of the implication of this for courses in Initial Teacher Education.

Communities of Learners

The impact of collaborative working has been well documented. Johnson & Johnson (1999), for example, demonstrated that groups displayed superior problem solving abilities compared to individuals working alone. Light (1992), suggested that collaborative working resulted in increases in intellectual growth, whilst Johnson & Johnson (1978), noted higher levels of creativity and productivity as well as higher levels of overall achievement during collaborative tasks. Collaboration has also been found to enhance the development and improvement of interpersonal relations (King & Sorrentino, 1983); the depth and quality of communication (Deutsch, 1973) and increases in self esteem (Slavin, 1995).

Whilst collaboration can be used to describe any situation in which students work together to accomplish shared goals and where the success of the group is dependent upon a collective effort, the concept of communities of learners adds extra dimensions.

Based on Vygotsky's (1978) social constructivist theories of learning and further developed by Wenger (1998), the concept expands the notion of both collaboration and mediated learning. Interdependence at a personal, as well as a functional level is considered an added criterion for success (Fielding 1999). While

interdependence occurs when the outcome for the whole group is totally dependent upon the success of every member of that group, the concept of communities of learners, extends this notion even further by addressing fundamental issues such as identity and equality.

Exploring communities of learners within schools, for example, Fielding (1999), uses the arguments of MacMurray (1950), to critique the whole concept. He suggests that, for the development of a true community, there must be more than a shared purpose or set of aims; there must be a shared way of being. Interdependence is crucial, not only at a functional level, but also at a personal level, since it is through personal interactions that humans most become themselves. The idea of working towards a common purpose is therefore extended to take account of both the interpersonal and intrapersonal domains. It is through these that members of the community achieve both equality and freedom to be themselves.

It was hoped that, by giving groups the independence to develop their own themes and by reflective exploration of the process of working together, this deeper kind of community could be achieved.

Methodology

The participants were students on the third year of a four year Bachelor of Technology of Education (B.Tech Ed) degree course at a Scottish university. This course is designed specifically to produce teachers of Design and Technology for secondary schools. The research involved the entire class of 28 students.

The research involved an evaluation of work set as part of the Educational Studies component of the degree. This deals with theories and issues pertaining to teaching and learning and is separate from the specific curricular components which cover the content of technology education. In an attempt to bring theory and practice together, however, students were required to produce a unit of work for an S5 or S6 class working at Higher level (the equivalent of English A levels). The topic for the unit was to involve one of the three areas of Graphic Communication, Technological Studies or Product Design (an area which has recently been introduced into the technology curriculum at Higher Grade). The unit was to

be thematically based, and was to start with a major theme which could then be reduced to a core topic. The final unit was to include sufficient lesson plans, resources and exemplar materials to cover a ten to fifteen week period.

Students were required to work collaboratively in self selected groups to produce the unit. Formal classes amounted to fifteen hours, but as credits for the course assume a notional workload of 100 hours, there was an expectation that groups would meet outwith the allocated teaching time. This allowed class time to be used for more general discussion and also encouraged independent and autonomous learning outwith this. The brief was kept deliberately loose to enable groups to develop their own ideas and to encourage them to actively engage with the Arrangement Documents pertinent to the area selected.

An important departure from normal group working was also introduced. In the initial stages, students were informed that it was not the unit of work produced that would be assessed, but the process of working together to produce the unit. They were required to keep a reflective journal of this process. This was to include notes on all the work involved in the production of the unit along with reflections on their own learning as individuals and as part of a community. The format for the journal was also to be decided by the students.

The focus was on the active engagement of the students both in the process of carrying out the work and on the process of working as part of a group. The overall aim was to encourage students to become aware of themselves as active, critical and creative learners, both as individuals and in the process of forming a community. It was hoped that the process of reflecting on their own development in this context would, in turn, help them develop more effective practice in schools.

The findings in this paper are drawn from an analysis of informal writing provided by the students, interviews with students and interviews with the class tutor. Analysis was carried out using the principles of Interpretive Phenomenological Analysis (IPA) in which concern is with the individual's perception of events as opposed to an objective description of those events.

The five stages of analysis traditional in IPA (based upon the type developed by Smith & Osborn (2003)) were applied. This involved reading each case for awareness of overall meaning, identification of themes of meaning, structuring of themes, production of a summary table derived from the themes and finally a thematic integration of all cases.

According to Langdridge, (2004) three levels of code are traditionally used at the stage of theme identification in IPA, with the first, second and third levels building up systematically from the first, purely descriptive level towards a more interpretative one. At the descriptive level then, the data was simply categorised into units of meaning. At the second level a greater degree of interpretation of the data was conducted whilst at the third, thematic analysis was carried out with theory being called upon to inform interpretation. Care was taken at each stage to ensure that the final analysis was still firmly grounded within the actual data.

Although a number of superordinate themes emerged, the ones which will be discussed in this paper concern issues relating to effective learning and issues surrounding the formation of collaborative groups. Although there were some powerful and positive learning experiences in both these areas, there were also serious impediments to the success of these which require to be addressed.

Triumphs

The process worked at an individual level for a small number of students, with these purporting to find it a powerfully liberating experience. These clearly found the looseness of the brief and the chance to concentrate on process, rather than product to be a novel and exhilarating experience:

"We were given very brief and loose outlines of what was expected of us… I personally felt a type of freedom I had never experienced before."

Others expressed appreciation at the freedom from the constraints of assessment and the ability to develop the work in a way which would focus on motivation:

"I felt the freedom to decide how I want to teach the course …not necessarily sticking to the required course work…"

Others, in accordance with Fielding (1999) appeared to experience a growth in personal identity as both learners and teachers:

"This year saw us introduced to a new type of learning, a learning that would take us outside our 'comfort zone' and our usual style of teaching and learning. This learning style would be one in which we ourselves would be more in control of our learning techniques and development."

"I now feel that working through this course has given me the confidence to question more and to try different styles when teaching… I also feel the confidence to share my ideas with others."

Although for a number working collaboratively was a problem, for reasons to be discussed later, the process of reflection on why it did not work resulted in powerful personal insights for some. In one instance there was a realization that being too proactive and dominating within the group situation was counterproductive to the development of a community of learners.

"Perhaps it is my presence that causes problems… perhaps because of the age difference and my organized nature I am actually limiting the effectiveness of the team in an unconscious way."

In another instance there was a powerful insight into the experiential influences which can impact implicitly upon attitudes and behaviour. This came with the realization that formative years spent in the armed forces had resulted in a strong need not only for specific rules and guidelines but also for a hierarchical "pecking order" in which tasks are allocated and completed without question and "which require the individual to act under extreme conditions and circumstances in a prescribed way without too much independent thought". In this case whilst the initial stages of the experience were characterized by issues of control and frustration with other members, by the end of the process there was at least the beginnings of an awareness of development:

"It has highlighted areas I hadn't considered and possibly helped me to put my dislike of group work into context… I believe this has created in me a new thread that I wish to explore further, I feel I have not so much opened my soul, but I have created an itch and the more I scratch the more I need to look at the critical thinking and concepts I have used to date."

Disasters

Although research highlights the clear advantages that accrue from the formation of communities of learners, and from reflection, it was clear that this is by no means easy to achieve. Although virtually all participants highlighted the importance of encouraging collaborative work with their pupils and of developing autonomy, agency, relevance, freedom and creativity, it was evident that these were difficult goals for them to attain for themselves. One of the most important hurdles was the development of successful collaboration.

It was clear, for example, that although being set a group task was by no means a novel experience, the majority had traditionally found working collaboratively to be problematic. There were clearly several reasons for this.

One reason was the conflict between individualism and collectivism. Although Johnson & Johnson (1999) place emphasis on the importance of positive interdependence as an essential element of successful collaboration, it was clear that this was not easy to achieve. Although all groups had some degree of success in implementing what Aaronson & Bridgeman (1979) refers to as a 'jigsaw' effect through an individual allocation of tasks required to complete the unit, it seemed that for some group members, personal success was of greater importance than the success of the group. As a member of one group noted:

"Differing levels of motivation, ability and ambition all caused certain problems within the group… It was clear that some were happy with simply passing the course while others were overly ambitious and wanted to exceed the requirements."

Another important factor in the failure for groups to work collaboratively was a misperception of the role of conflict.

Tuckman, (1965) famously outlined the now well known stage model of successful group development as "forming, storming, norming, performing, and adjourning". The stage of conflict (storming) is an important one for solving issues of structure, status, roles and authority, (Kelly 2001), for addressing interpersonal conflicts, (Johnson & Johnson 1999) and for reaching some kind of synthesis from the variety of ideas and opinions expressed. It is only after such issues have been resolved that the group can move on to the stage of productive and successful positive interdependence. In this case, however, individuals tended to interpret conflict not as a natural part of group development but as a sign that things were going drastically wrong.

"Group sessions are mostly a waste of time, too much time spend in pointless disagreements and not enough time spent on the important aspects of putting a scheme together."

This was further exacerbated by the fact that previous experience of group work appeared to have consistently resulted in negative experiences for some.

"…once again we have to work in groups. Over the last three years I have found this one of the biggest downfalls and personally frustrating parts of the course structure… what I have seen time and again is one or two people who work a lot, one who works a little and two or three who just come along for the ride."

The result of this was that at the first sign of conflict, some groups gave up trying to work collaboratively and worked independently on a particular area. Others settled for compromise rather than using conflict positively in order to reach a synthesis.

Another problem related to the adoption of particular goals. Although some clearly regarded the process as an opportunity to develop themselves as learners, others remained focused on performance throughout. This was evident in the fact that some deliberately avoided the challenge of basing the unit on an area of the technology curriculum which was perceived as either difficult or unfamiliar. The result was that no group based the unit on the area of Technological Studies, which was perceived as too difficult and while a number initially

opted for the challenge of exploring the new area of Product Design, for some, this challenge quickly became too great a risk. The result was a retreat to familiar and therefore safer territory:

"…we decided we don't know enough or have enough experience of teaching Product Design so change our remit to Higher Graphic Communication. This is an area we are all confident in and have all studied and taught at some point."

Despite the attempts to create a risk- free learning environment by the use of loose criteria and removing the pressure of assessment, the focus still appeared to be on the end product rather than the process of developing learning.

Lessons learned

It was clear that this experience was different from anything that the students had previously experienced on the course. Although previous activities had involved group work, the relative looseness of the brief, the focus on process rather than product and the reflection on group and individual development were entirely new experiences. This, for many, was clearly a cause of insecurity.

"This is completely different from anything we had done previously and I am worried that we will get it wrong."

"This is completely different from anything we have done in any other course and I feel… worried of failing."

The differences in the experience of those students who were positive about the whole process, both in terms of collaboration and in gaining important insights into themselves as learners and those who were negative about these processes can usefully be analysed within the framework of personal theories of epistemology

Based on Perry's (1970) seminal work, various models of personal epistemology have evolved. Although each model is slightly different, all typically include common elements pertaining to thinking and beliefs about knowledge. These include beliefs about how knowledge is defined, constructed and evaluated, where it resides and how it occurs (Hofer 2001).

In most instances, this system of beliefs is considered developmental, to the extent that there is:

"…movement from a dualistic, objectivist view of knowledge to a more subjective, relativistic stance and ultimately to a contextual, constructivist perspective of knowing." (Hofer, 2002 p 7).

While the change process is governed by motivational, affective and contextual factors, the assumptions which are characteristic of the earlier stages are generally more evident in students at the point of entry to university, whilst those who are at later stages of their degree course are more likely to hold assumptions which are more consistent with the more advanced stages of these models. (Hofer 1991)

These theories may also be regarded as implicit to the extent that they may be relatively unexamined and are not always made explicit at a conscious level, but can be detected in action and through discourse analysis. They can, moreover be in direct opposition to espoused theories.

Personal epistemology can moreover be regarded as a trait (entity) that is stable and resides within the individual or contextually situated (incremental). If the latter, then educational contexts can clearly promote one or the other. This is similar to Dweck's (1999) concepts of implicit entity and incremental theories of personality and intellectual ability.

Using this framework for an analysis of the discourse used by the participants suggested that those who were most negative about the exercise were those who were at the earlier stages of epistemological development. Whereas virtually all placed an emphasis on such qualities as autonomy, freedom, choice and authenticity for their pupils and many explicitly purported to value the promotion of creativity and risk taking, the insecurities of some indicated very different implicit epistemological beliefs.

For example when imagining using the unit of work within the classroom, there was a strong emphasis on collaboration and self evaluation and evidence of the later, more independent stages of epistemological thinking:

"By getting the pupil to work in groups and discuss among themselves the problems and almost teach themselves to overcome them would help their learning considerably as research shows that when pupil to pupil learning takes place, it is often more effective than teacher to pupil."

And

"True education is not the mere learning of specific knowledge and skills, it is the development of children's learning abilities- that is their capacity to think clearly and creatively, plan and implement their plans and communicate their understanding."

Yet these same participants were clearly insecure in engaging in this kind of activity themselves, feeling the need for 'expert advice' from the lecturer and disliking group work because "there was no leader… there was no voice within the group saying 'this should be carried out because…'"

Closely related to this is the fact that, when describing what they desired for their pupils, there was an explicit emphasis on the importance of developing self assessment for the promotion of "self motivation, self monitoring, self reflection and self reliance" and on giving pupils a more active and responsible role in their own learning in order to achieve this. Despite this explicitly stated view, however, one of the main sources of negativity arose from the perceived lack of precise instructions on what was to be achieved. There was therefore a general implicit inability to deal with uncertainty in the stages of reaching a decision which was solved only after direct tutor input. Once this was received, there was a feeling that "we seem to be moving in the right direction" and "we were worried about taking the wrong route" implying that there is very definitely a right and wrong direction (i.e. knowledge is absolute) and that only the lecturer as the source of authority can say what the right and wrong direction actually is.

Similarly, within the context of working as part of a group, there was, for most, a constant focus on the notion of "authority." Groups were perceived by members to fail either because no one would take on the role of an authority figure by telling others what to do, or because one member attempted to take on this authority role and felt rejected by the others.

Implications for ITE

One important implication is the role of university courses in promoting the type of epistemological development outlined earlier. If the context can promote or hinder this type of intellectual development, then it must be cause for concern that most members of a class of third year students appeared to be at the earliest stages of epistemological development in their implicit beliefs that there are right and wrong answers (i.e. knowledge is absolute) and that the role of the lecturer is to *"tell us what to do and how to do it."*

That the context can promote development is suggested by the experience of those who felt that their identities as learners had indeed developed. Two students, for example noted important changes in their beliefs and ways of thinking:

"I found I began to question myself more as to why I had certain views and why children should be taught in a certain way… in an area such as learning and development I have found I am more at ease as there is no correct answer or path that should be followed."

"I feel I have reached a point where I can let others know my ideas without fear of being on the wrong wavelength… I feel I can now develop solutions which I have thought of myself. I also feel the confidence to share my ideas with others."

Perry (1970) describes this kind of moment as a "rebirth" as those who expect knowledge to be transmitted from outside "experience in themselves the origin of meanings" (p87).

This, however, was not a feeling experienced by the majority, who clearly felt threatened by the lack of a rigid structure and clearly specified outcomes. Part of the problem was that it was a way of working that the students were clearly unused to and this in itself is an issue.

One comment in particular, while indicating some progress, also appears to highlight the fact that the encouragement of autonomy and epistemological development is not an integral part of the course.

"I feel that I am learning a different style of teaching. It is different as we have been given a basic outline of what we are required to do and it has been our decision as to how we carry it out and what it will involve. I feel that this has opened my mind as to how we actually learn."

Barr and Tagg (1995), clearly recognize this as a general problem in higher education in their contention that, although the role of undergraduate courses should be to produce learning rather than provide instruction, attempts to do the former often fail because "they have been applied piecemeal within the structures of a dominant paradigm that rejects or distorts them" (p14). This certainly appeared to be an important factor in the failure of the present project.

The participants were clearly used to operating within a framework in which instruction was provided and most therefore felt insecure when encouraged to take greater control of their learning. Although this insecurity was recognized and to some extent taken account of by removing the pressure of assessment from the actual unit of work, the dominant paradigm was evidently such that this was not in itself sufficient to allay anxiety or change implicit views. This may be compounded by the circular nature of the way in which theories once formed form frameworks for interpretation.

"…It is possible that the structure of… academic tasks, over time, shapes epistemological theories, which are then difficult to change… moving to a class where higher level processes are expected may require not only a change in strategy use but a change in epistemological theories." (Hofer & Pintrich, 1997 p129)

This also has implications for the development of structures which encourage true collaboration. Whilst the use of group work was clearly not a novelty for the students, the focus on the process in this instance clearly highlighted problems which may be less evident when the focus is on the final product. With the focus of assessment removed from the end product (the completed unit) the problems in the actual process were thrown into stark relief. This again can be related to stages of epistemological development of individual students:

"At lower levels… knowledge originates outside the self and resides in external authority, from whom it is transmitted. The evolving conception of the self as knower, *with the ability to construct knowledge in interaction with others is a developmental turning point."* (Hofer & Pintrich, 1997 p120) (my emphasis).

It seems clear then that the achievement of a satisfactory end product is not necessarily an indication of successful collaboration. The role of conflict, an ability to tolerate ambiguity and uncertainty and to be open to various possibilities are important aspects both of successful collaboration and epistemological development. There is a need therefore to concentrate on programmes of work that will advance epistemological development in general in order to develop true communities of learners. These might include a greater emphasis throughout the entire degree course on tasks which focus on unstructured problems, or dialectic argumentation which actively emphasise the uncertain, contextual and constructed nature of knowledge, tasks which are deliberately designed to lead students:

"..from a world of Absolutes and Truths into a world of contexts and Commitments in which one must take stands and choose a way of making meaning in one's life through identity choices." (Moore 2002, p19 cited in Hofer & Pintrich, 1997).

Although students in the present study talked explicitly about the importance of fostering such qualities as creativity, autonomy, independence and risk taking in their pupils, this research would suggest that most are in fact unlikely to do this when out in schools. Their implicit theories of epistemology revealed suggest that their classrooms are more likely to be structured in a way in which an expert transmission model will predominate and in which their pupils in turn will develop epistemological theories in which knowledge is seen as absolute and transmitted by experts. As Baxtor Magolda (1992) so aptly warns:

"When students derive their ways of knowing from their teachers' objectivist epistemology and conventional pedagogy, they view knowledge as certain, see the teacher as the authority and define learning as individual mastery." (p267).

This would clearly seem to be setting up a cycle which all courses concerned with educating future teachers should take cognizance of and address.

Creating a community of learners was not an easy task. What emerged from this research was a clear need to make more explicit the processes involved in reaching a stage of positive interdependence, identity and equality. There was also a need to more carefully balance pedagogical challenge and support. That students were clearly unused to being expected to take responsibility for and think about their own learning processes and were used to operating within the "comfort zone" of instruction, however, was probably the most important issue to emerge. Whilst the dominant ideology on university courses focuses on instruction rather than learning, the intellectual development of students is at risk and any attempt to address this may be doomed to failure.

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