Communal Constructivism:
Students constructing learning *for* as well as *with* others.

Bryn Holmes, Brendan Tangney, Ann FitzGibbon, Tim Savage,
Siobhan Mehan.
Centre for Research in IT in Education
Trinity College Dublin, Ireland.
e-mail Bryn.Holmes@cs.tcd.ie

Abstract

We believe there is a need for an expanded definition of social constructivism that takes into account the synergy between the more recent advances in information technology - which are increasing our potential for communication and the ability to store a variety of data types - and advances in virtual learning environments. In particular we are still at an early stage in trying to construct knowledge as to how to teach and learn effectively with ICTs. What we argue for is a communal constructivism where students and teachers are not simply engaged in developing their own information but actively involved in creating knowledge that will benefit other students. In this model students will not simply pass through a course like water through a sieve but instead leave their own imprint in the development of the course, their school or university, and ideally the discipline.

Introduction

The most interesting effects of the advent of Information and Communication Technologies (ICTs) in teaching is they force the teacher to undertake a radical re-assessment of the way in which they teach. The use of ICTs raises a whole series of questions ranging from the appropriateness of the 'chalk and talk' paradigm, through the role of assessment, to the need to cater for different learning styles. This paper describes how the authors, who are themselves both teachers and learners, are re-assessing the way in which they teach and learn in light of the enormous flexibility being offered by ICTs.

The context for the discussion is a 2-year, part-time Masters program in the area of ICTs and Learning – Master of Science in Information Technology in Education - in which a wide variety of techniques, many old but some new, are being used in an attempt to enrich the learning experience and have begun to fundamentally change the way in which we envision education. The theme, or educational philosophy, underlying our approach is one we call '**communal constructivism**', by which we mean an approach to learning in which students not only construct their own knowledge (constructivism) as a result of interacting with their environment (social constructivism), but are also actively engaged in the process of constructing knowledge **for** their learning community.

We argue that the modern education process is too like a sanitized pipe system through which large numbers of students are pushed through to emerge from the far end 'educated' but without leaving any discernable trace on the system they have passed through. The 'communal constructivist' philosophy is more akin to a river that shapes its own environment as it flows forward. We draw upon a diverse range of educational inputs ranging from the constructivist theories of Vygotsky to those of Cognitive Apprenticeship, through techniques used in one-teacher rural Irish primary schools to the Japanese *han* system. Of particular interest is the way in which ICTs can be creatively used to bring new life into these diverse ideas and how it can combine and synthesize many previously separate initiatives.

A search for an appropriate model of education

Our current classroom model is largely a product of the industrial revolution whereby groups of students of the same age come to a single physical location to be instructed in the same subject matter at the same pace. By comparison, earlier models of learning were much more tailored to individual learners and stressed high-level interaction between the tutor and student. Indeed modelling the process of learning was considered as important as imparting facts and information. A stress on skills of speaking and rhetoric has been largely lost as delivery was increasingly restricted to the teacher. Assessment plays a defining role that results in students being conditioned to learn only what is of

direct relevance to examinations and often only then in a superficial manner. Although it varies somewhat from country to country, for the most part the education system acts as a shrinking pipeline with students being channelled into greater and greater specialisations at earlier and earlier ages[1]. The emphasis is on an individual learning by oneself, for oneself, and even where learning is within a wide group or social context, the goal of learning is still for ones own benefit.

Not only are the processes of learning narrow, but the products are also boxed in. School subjects are increasingly standardised and defined. Science subjects, for example, have been delineated and divided while the field is increasingly connecting and evolving. Developments are moving so rapidly that whole areas of knowledge are increasingly obsolete. What is needed is a reflection of the growth and expansion of the knowledge of the discipline within the subject being taught in the classroom.

Pouts-Lajus and Riche-Magnier (2000) argue that new educational technologies give us an opportunity to rethink educational relationships as we reflected on what was presently being offered to students as an educational experience as well as best practice, both from our own tradition and internationally we began to evolve a new theory of an approach based on building a community of learners with a focus on the community itself rather than on the individual learner.

Our ideas on 'communal constructivism' derive from a wide variety of sources. Theories of social constructivism, combined with advances in ICTs are introducing new ways of learning. Social Constructivism is defined as a process by which students make meaning, and the central role their community, through culture and language, plays in this process. Learning is seen as a social and collaborative activity that is facilitated rather than directly taught by the teacher. Building on constructivist theories, where students are involved in building their own knowledge, social constructivism adds an interactive dimension. This approach is influenced by the work of Vygotsky who believed that children learn from within themselves and as well as from influences in their social or cultural environment. Although Vygotsky focused on the role of speech and not on the role of new technologies, the fact that communication is increasingly supported by computers, e.g. e-mail, discussion boards, chat rooms, MOOs, MUDS and Virtual Worlds, has lead to his work influencing theories of learning in the information age.

We also have been influenced by the concept of cognitive apprenticeship and the work done in designing supporting computer environments to test theory (Lajoie & Greer, 1995). Essentially teachers offer students cognitive apprenticeships by working with students and modelling key aspects of learning until the students are able to work unassisted. The teacher is responsible for passing on knowledge of the process rather than simply focusing on content. Earlier models of apprenticeship learning underlie the theory.

> *Before schools appeared, apprenticeship was the most common means of learning and was used to transmit the knowledge required for expert practice in fields from painting and sculpting to medicine and law. Even today, many complex and important skills, such as those required for language use and social interaction, are learned informally through apprenticeship-like methods - that is, methods not involving didactic teaching, but observation, coaching, and successive approximation (Collins, Brown & Newman, 1989; p. 453).*

The great educator Cardinal Newman argued in his classic *The Idea of a University* that people learned more from been in contact with each other than from formal classes. "If I had to choose between a so-called University which dispensed with residence and tutorial supervision and gave its degrees to any person who passed an examination in a wide range of subjects, and a University which merely brought a number of young men together for three or four years… I have no hesitation in giving the preference to the later…" (Newman, 1852; p. 35). This is very much the same thinking that underpinned the classic British Boarding School model for many years. In both these cases, however, the collective aspect of learning is in the area of socialization, or in Newman's case becoming a 'gentleman', rather than on traditional subject-based learning that was still done in a conventional classroom.

An in-depth study by one of the authors, Holmes (1998), of a rural Japanese community in the Hiroshima area identified many practices which have given us ideas as to how our view of teaching and

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[1] In Ireland for example many undergraduate degrees are specialised, or professional in nature. Entry to university is highly competitive and judged on the results of a single set of nation-wide exams and students are encouraged, and in some cases are required, to pick between language and science courses as early as fourteen.

learning can be expanded in a Western context. In Japan, for example, Grade 6 students primary school collect the younger ones walk with them to school each morning and home each afternoon. This is obviously a valuable exercise in socialisation but of even more interest is the use of *han* groups within school. A *han* is made up of 3 or 4 students within a class and it is the responsibility of the *han* to make sure that all members are able to progress through the materials. This is radically different from Western education where the individual is paramount.

The *han* system in Japan – from an interview with a Japanese teacher.
It looks like in the UK that students should not disturb other students; but in Japan, in such a class, it is encouraged. One plus one is usually more than two. Partly because of this, students turn to each other for help before turning to the teacher. Since the class moves at the same pace they will help each other to move forward. Students rarely compete with each other in class.

Students working individually– from an interview with a British teacher.
We do not deliver skills from the front, but instead, we are allowing people to develop skills at their own rate.

(W)e are very much encouraged to look at differentiation and we are asked to provide extensions of tasks for those people who are able to move more quickly.

Group-work is also of course prevalent in Western education and much has been written on the advantages of group-work and project-based learning (Papert, 1993; .Rotherenberg, 1999) A related concept is that of peer tutoring which has been shown to have benefits for the tutee. We are particularly interested in the benefits for the tutor in such arrangements.

Closer to home small rural Primary schools, of which there are still very many in Ireland, where two or three teachers take the full range of ages from 5 to 12 years old, offer very interesting models of education. Enormous creativity is required in timetabling subjects and extensive use must be made of both group project work and peer-tutoring. Economies of scale argue that such schools are not viable units but the power of ICTs to extend the horizons of such schools is seriously challenging that assumption.

At the other end of the educational spectrum, the concept of a learner making a contribution to the field within which they are learning is at the core of what it means to do Ph.D. level research. Ph.D. students attempt to expand knowledge of a discipline and are encouraged to publish their results so that their own work is recorded and helps develop the field of knowledge. At this level in the formal education system delivery, and reception, of information is replaced by the process of building new knowledge and making it available to others. This we argue is one of the best learning experiences but applies only to a select few. We shall explore how it can be delivered at other levels in education.

Courses in the formal educational system are predominantly static in that a teacher covers the same material year after year. At the same time new technologies are impacting with subject disciplines and teaching pedagogy to evolve present fields, such as biology into new areas such as biotechnology. The syllabi of many courses could be constantly rewritten and still be almost always out of date.

External pressures are also calling for change in the education system as employers are more and more looking for people with good teamwork and communication skills. There is a real challenge for an education system to ensure its graduates have relevant and applicable knowledge and skills. Partly in a response to such issues, large-scale organisations such as the OECD are stressing skills of knowledge management and creation rather than simply memorization of content materials.

Communal Constructivism

Many of the previous proposed solutions to challenges faced by educators today involve more time and more money. Teachers are increasingly pressured to provide more of their own time to training and updating their skills while governments are obliged to keep increasing educational budgets. What has not been considered is a way to build on the knowledge, skills and energy of those at the heart of schooling – the students.

We believe there is a need for an expanded definition of social constructivism that takes into account the synergy between the more recent advances in information technology - which are increasing our potential for communication and the ability to store a variety of data types - and some of the educational ideas outlined above. In particular we are still at an early stage in trying to construct knowledge as to how to teach, and learn, effectively with ICTs. What we argue for is a communal constructivism where students and teachers are not simply engaged in developing their own information but actively involved in creating knowledge that will benefit other students and teachers. In this model students will not simply pass through a course like water through a pipe but instead, river-like, leave their own imprint in the development of the course, their school or university, and ideally the discipline. This will result in a gain for the institutions or course, but more importantly the students themselves will benefit.

We argue that a diverse range of techniques can, and should, be used to enrich this type of learning environment within which the focus is on learning *with* and *for* others. Peer tutoring and project-based learning are obvious techniques but we also advocate the ideas of cognitive apprenticeship, the publishing of information, flexibility in the time table, a radical look at the way in which assessment is done, and so forth.

Our pipe and river analogy derives from the observation that presently much of the student learning that happens in one year of a course is lost for the next. The pipe can not be enriched by water travelling through it, indeed over time the pipe may need repairs, whereas water flowing through a river will leave rich mineral deposits and slowly influence the course of the river. Obviously the students have learnt material during their studies, and the teacher would have learnt from the students, but there is little or no year-to-year transfer of knowledge between students. If the student learning processes and their work could be captured then courses might instead build on knowledge rather than simply repeat it.

To create an environment where students leave their imprint on the course, and the field, as an integral part of their learning not only benefits their own learning, the learning of their colleagues in their classes and those that will come after, them but more importantly creates a vast number of graduates who will be well aware of the importance of teaching and education and thus communal constructivism also provides a teaching apprenticeship for all those who come through the school system. The profession would benefit from a rich pool of people who understand the concerns and support new initiatives.

Putting Ideas Into Practice aided by ICTs

We are now seeking to explore ways in which these ideas of communal constructivism could be developed by applying them in a classroom setting. The course in question is a new two-year, part-time Master's programme in the area of Information Technology in Education. The students, or learners, on this course are predominantly teachers themselves who are involved are some level in using ICTs in the classroom. The course has an intake of 25 and the first year is made up of a taught component with the second year being devoted to a research dissertation. The first in-take was in October 1999 and at the time of writing we have now both the taught year and the dissertation year up and running.

The Communal Constructivist approach requires that the course be dynamic and adaptive. As the field itself (ICTs and Learning) is so dynamic it is necessary that both the course content, and more importantly the method of delivery, be capable of adapting to new information and new techniques as they emerge from within the course itself and from the discipline at large.

The potential of information and communication technologies (ICTs) in the area of learning are well known. Aspects which are particularly relevant to our subsequent discussion include the potential to allow students to become publishers, and not just consumers, of information through the use ICTs, for example, word processing, web and multimedia authoring tools. The use of Email, list servers, discussion boards, virtual chat rooms, MOOs and so forth greatly enhance communication capabilities and cut across divisions of space and time. Digital audio, video, web cameras, on-line logs can capture and disseminate classroom experiences for research and reflection. Databases, referencing packages, statistical and text analysis packages allow the storing, structuring, and analysis of information. On-line tracking, monitoring software, adaptive learning environments, for example, aid in the structuring and analysis of ones own learning.

Our approach also requires that from the very outset students see themselves as producers and not just consumers of information. Students are given instruction in various technologies for presentation to their peers, ranging from PowerPoint tools to produce slides to sophisticated Web design. All coursework and projects have presentation built in as a fundamental part of the exercise. The students must present their work to their peers and also place it on the Web for use by students in subsequent years and for inspection by the wider community. Students are actively encouraged to submit their work to national and international conferences, not just at the end of the degree but during their study and not simply as an addition but as an integral part of their studies. All proposals for research topics must include a section on how the work could make an impact on their field and an outline of plans for publication and dissemination of the research. Students are encouraged to write research papers with the academics and to jointly present their work at conferences, specific individuals are not encouraged but rather the entire class is prepared. This is not just a passive participation but an active collaboration in both the preparation and the presentation. It is probably best summarised by our experience at the students first outing at a national conference where one first year student, who was asked to videotape a presentation being given by some students from the second year, felt compelled to come forward and give the audience the benefit of his views on the topic. Students are also required to write their dissertation proposal in the form of a grant application and to actively pursue (with some success) real research contracts.

Within the course a wide variety of techniques are used to instil in students the idea that they are involved in a process of constructing knowledge and that that construction is a communal affair. Of particular interest are the following.

1. Extensive use is made of **group work** and **project-based learning.** Assignments are done in groups of 3-4 for first term and then in groups of 2 for the second term. The final term assignment is an intensive individual project by which time the students are much more confident with the technology and the subject matter.
2. The initial specification of the course had built in assessment by examination. A realisation that the learning taking place in an exam is purely focused on the individual lead us to adopt a portfolio approach **assessment process** that would both benefit the individual, their peers and learners that followed them[2].
3. Student work has developed into a **portfolio** allowing for reflection on their year-long learning process and also allowing for future students to see the progress of knowledge acquisition.
4. The **lecture format** used varies somewhat between modules but typically involves making reading material available on the web a week in advance with a modest amount of "lecturing" in any class. Students engage in project work and discussion during lecture time.
5. Extensive use is made of **peer tutoring** and **mentoring**. There is considerable diversity in the backgrounds of the students on the course so peer tutoring arises naturally within the class. More formally each student on the 1st year negotiates with a student on the 2nd year of the program to act as their mentor.
6. 2nd year students are encouraged to engage in an **apprenticeship** lecturer role by being given the opportunity to: deliver part of a lecture; lead a discussion group; develop course content; adapt and expand on a lecturer's notes; act as a technical assistant; act as a general helper (there is always a need for someone to answer questions in the hands on session); develop related tasks for students to undertake in the hands-on sessions and add relevant links into the lectures.

Conclusion

There are a number of down stream effect of the flow of students through the course. Although it has taken time and effort to set up a system the benefits are already apparent, numerous, and include the building of a dynamic and well-researched body of course material. This material will be continually updated and thus new directions for the course will evolve. Already there is a to expand the course into new areas such as distance learning and we hope to be able to offer the course for the blind. The active participation of students in the course has created an internship for university teaching as well as strengthening their own understanding of the 3rd level learning environment thus increasing their

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[2] The specification for the end of year capstone project is "Do something interesting that showed you learned something".

metacognitive and reflective skills. Having student work available also drives up the level of the course as other students can more easily understand what is expected of them and thus build on a high standard rather than reinvent the wheel.

The fact that we had a student population of adult learners who had already demonstrated responsibility in their learning and professional lives was of benefit to us. We were interested in how this model might be rolled out for learners of other ages. One of the most interesting effects observed in the first year of the course was, therefore, the extent to which students on the course began to replicate the learning environment they themselves were part of in the classes that they in turn were teaching. The most dramatic example was where one of the authors, herself a primary teacher, employed both peer-tutoring and Web-based publication with her class of 10-year olds. The class were taught how to use a simple story-authoring package and gained experience in its use. They then were given the task of going into the classes of 9-year-olds in the school and teaching not just the students how to use the package but also the teachers of the other classes. The whole process was documented on a Web page that the students took great delight in showing their parents. The teacher in question would have described herself as barely IT literate at the outset of the course and what is interesting is to see how she felt empowered to apply her own experiences from the Masters course to her very different classroom situation. Other examples include the accompanying papers in this proceedings by Dearbhaill McKibben and Sharon McDonald on their experiences in the course and as well a paper by Eileen Brennan on how she is conducting research into public policy in ICTs.

Dewey (1916) argued at the turn of the century that learning is a building process, we believe that education as a whole should also be considered as a in the same light. It is early days yet but we feel that we have much to learn, or rather much to construct, in this communal approach to constructivism. Luckily we are not alone in this rather daunting endeavour but have the human resources to regularly expand and update the course as we are presently supported and aided by over 25 master's students and will soon be aided by 25 more and so on and so on... With their aid we will enrich the course and our own ideas with resources. Not just the identification of more useful information but we are investigating developing software that supports interactive student input to the course. Ubiquitous computing we believe will ease applying communal constructivism ideas to classrooms. When students all have lightweight, wireless laptops that are connected to the Internet they are able to download lectures, visit resource, and post material to the lecturer while engaging in group work or listening to lectures. As our own students reflect on and record their experiences in the course we will also research on our own learning in order to build back into the course. This will aid future students and record the evolution of the modules, future teachers understand the work to date and indeed the discipline itself.

We are also meeting a need to identify and train 3rd level instructors as the course provides an apprenticeship and internship for lecturing at university. As each of our own students returns to influence teaching practices in their own schools communal constructivism is impacting the community and thus supporting lifelong learning.

The biggest benefit of communal constructivism, however, is to the learners themselves. At present their role in the education system is akin to a charity case. They receive benefits from the state and/or their parents for years and have very little input into what they learn, as well as when, where and how they learn it. This has created passivity not only in the learners but within the whole system. A sense of community has been lost. Communal constructivism is about empowering the learner to allow them to reclaim a role in their own education. The advantage to the learner is in taking part in deep meaningful and allowing them to have a role in society throughout their formative years and not just after graduation. Giving students responsibility will train them to be responsible.

Communal Constructivism stresses that learners should be listened to and to be important to others. We believe that they should be useful and have some say in their own lives. They must be included and their work should be valued by others. Their learning tasks should be useful and recognized as such. They have a right to be needed.

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