

# **Reflections on Reflections: A Communal Constructivist Approach to Evaluation of an ICT Intervention**

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## **Abstract**

In (Holmes et al., 2001) we outlined an approach to learning with Information Communication Technologies (ICTs) which we termed Communal Constructivism. By this we meant an approach whereby learners use ICT to “ *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*”. This paper describes how we applied the principle of “Communal Constructivism” to the evaluation of a targeted ICT classroom intervention. The exercise was not treated as an evaluation one but rather one in which the researchers adopted the role of “holding up a mirror” to the participants in order to help them reflect upon, both the process in which they were involved and, their own learning. More importantly the evaluation exercise was treated as an opportunity for all involved to engage actively in building knowledge with and for others.

## **Introduction**

The field of ICTs in learning is still very much in a state of flux. Researchers and practitioners are, very much, engaged in constructing knowledge about the discipline itself. One of the great opportunities we have to learn is when they are medium-scale, focused, ICT classroom interventions. Such interventions offer an opportunity to put into practice in a structured fashion the lessons learned in the discipline to date while at the same time offering a non-trivial test-bed in which to evaluate strategies and to further contribute to the level of knowledge in the area.

Evaluation is however a problematic exercise. ICTs have unveiled new learning horizons for which those engaged in an evaluation processes have been forced to design and develop suitable methodologies and assessment tools. In particular there is a tension between quantitative and qualitative approaches to evaluation. Whatever the approach adopted, it must aim to further construct knowledge in the field of ICTs by identifying, labelling, classifying, understanding and judging the novel and complex elements, the processes and outcomes of teachers, learners, context and ICTs interactions.

Against this background of change in learning being brought about by ICT and changes in approaches to evaluation, also being brought about by the ICTs, the authors were invited to run an evaluation study for a major ICTs intervention in all the schools (primary and secondary, eighteen in total) in one Irish town. The exercise provided the framework for the design, development and implementation of an interactive and reflective quantitative and qualitative data collation, analysis and dissemination process built upon the principles of Communal Constructivism.

Our approach attempts to amalgamate the “medium and the message” in a multi-layered fashion. ICTs are used in an integral way to collate the findings, to allow the evaluators to reflect upon those findings

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and to allow the participants to in turn reflect upon both their own initial observations and the reflections of the evaluators. By allowing layers of interpretation to be built on each other the participants in the process are enabled to build their own knowledge both for themselves and others.

The process put in place is described in detail in the body of the paper but it involved collating all of the data gathered into a two dimensional spreadsheet. The key findings were tabulated under different headings – mostly questions from the logs (one of the data collection tools) – and there was an entry for each teacher who part-took in the exercise. Thus the empirical data and key observations from the participants were captured. Onto this the researchers then laid a layer of interpretation or reflection. This was done in a number of ways including associating comments (which appear on mouse-over) with different entries in the spreadsheet. Observations from different teachers on the same issue were linked, in a hypertext chain, allowing the reader to navigate through the mesh of data to see what insights others had on the same topic. An overall index was then built which outlined the main issues identified by the researchers. The index pointed into the hyperlinked chain of teacher observations upon those issues. The index also contained links to selected digital video clips, from the structured interviews, thus giving the teachers’ voices another mode of expression. All of this information was put on CD and returned to the teachers involved allowing them to see the all of the raw data collected and our initial reflections upon what they the teachers had told us. This was of course an incomplete picture so all were invited to build another layer of information and analysis by part-taking in a (closed) threaded discussion group which contained a thread for each key item identified in the initial analysis.

Thus we argue that the spirit of communal constructivism has been embodied in the evaluation process. ICTs are used to enable the participants to socially construct knowledge with and for others.

*The layout of the body of the paper is as follows. Section 2 briefly describes the ICT intervention we were invited to evaluate. Section 3 looks at some of the current approaches to evaluation and analysis. Section 4 elaborates upon our idea of Communal Constructivism and the approach we took to the collection, analysis and dissemination of data. It is followed by a discussion and conclusions.*

## **Kilkenny – An Information Age Town**

In 1997, the city of Kilkenny (pop. 19,000, [www.kilkenny.ie](http://www.kilkenny.ie)), was awarded a £1,000,000 fund as part of an “Information Age Town” initiative sponsored by the major national telecommunications provider (c.f. [www.eircom.ie](http://www.eircom.ie)). A Steering Committee was established to “position Kilkenny at the forefront of ICT developments and to create awareness and competency whereby people of all ages and all social groupings could benefit”, (c.f. [www.kilkenny.ie/infoage1.html](http://www.kilkenny.ie/infoage1.html)). Among the many activities it championed the committee lent support for local schools. Money was awarded to each school for the purchase of computers and a teacher was seconded on a full-time basis to act as overall project co-ordinator. The schools also received supported under a section of the Irish Government’s ICTs in schools program<sup>1</sup>. In all they were eight separate projects involving 44 teachers and 630 pupils in ten primary, six secondary and three special schools. The overall budget was in the region of £400,000 and the projects ran from January 2000 until June 2001. The projects focused upon topics such as: The Development of an ICT Resource Centre for Educationally Disadvantaged Children; The Use of ICTs as a Method for Interactive Language Learning; Training Video for Technical Subjects; Data logging in Science subjects; The Practical Use of ICT in a Transition Year Programme; Investigation of the usefulness of integrated Learning systems in Special Education; Primary Schools Archival (local history) Project.

The Centre for Research in IT in Education in Trinity College Dublin was approached in the summer of 2000 to carry out an evaluation study of these projects and it was within the auspices of that study that the approach described here was developed.

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<sup>1</sup> The initiative is known as IT2000 and the NCTE is the body charged with its implementation. One stream of that implementation are the Schools Integration Projects (c.f. [www.ncte.ie/sip](http://www.ncte.ie/sip)).

## Approaches to Evaluation and Analysis

In recent years evaluation has undergone a major transformation from monolithic “to pluralist conceptions, to multiple methods, multiple measures, multiple criteria, multiple perspectives, multiple audiences, and even multiple interest” (Heinecke et al., 1999). In our view this transformation is an intrinsic element of the multiple facet transformation wave being brought to the learning processes by ICTs. Perhaps the most significant transformation is the more permissive atmosphere being generated by the reformulation of evaluation methodologies. Researchers are shifting away from, or integrating into, highly regarded and quantitative approaches, less regarded and more context-based qualitative approaches (Heinecke et al., 1999) (Miles and Huberman, 1984). This new environment has promoted the adoption of mixed method approaches as a verification device to increase the validity and reliability of the data (Frechtling and Sharp, 1997) and hence the whole evaluation process and its findings.

When attempting the assessment of ICTs integration in learning processes formative evaluations engaged in examining projects’ developments, often leading to a restructuring of the initiative itself or the ways in which the initiative are implemented, are favoured over summative evaluations, concerned only with the final results of a project in terms of its successful achievement of stated goals (Frechtling and Sharp, 1997) (Inglis et al., 1999). This trend is justified by the continuously evolving and challenging knowledge construction process in which the discipline is engaged. The challenge is to develop models of evaluation that will reflect the complexity of the systems in which they are embedded (Heinecke et al., 1999), as well as achieve the imperative of providing usable information, on the processes and the results, that can be utilised directly by stakeholders (W.K. Kellogg Foundation, 1998).

In the battle against the subjective nature of evaluation, a process by which a value is attached to findings (Inglis et al., 1999), and the detractors of qualitative approaches, qualitative assessment supporters have long acknowledged the need to develop unequivocal, systematic methods leading to both conclusion drawing and testing (Miles and Huberman, 1984).

## A Communal Constructivist Approach to Evaluation

Our ideas on ‘communal constructivism’ derive from a wide variety of sources including mainstream theories of project-based learning, peer-tutoring, constructivism, social constructivism and cognitive apprenticeship as well as ideas from further a field including the ideas of Cardinal Newman, the Japanese “han system” and practices used two teacher Irish primary schools (Holmes, 2001).

In particular we argue 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 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 using ICTs to support a variety of pedagogical processes to create knowledge not just for themselves but for other students, teachers and wider community.

In the case of a classroom this model requires that 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. In the case of an evaluation exercise like the one described here the model requires that all the participants – be they *evaluators* or *evaluatees* – work together to co-operatively construct, not a static snapshot tied to one point in time but, an organic process by which all can reflect, learn and grow. Central to this process should be the use of ICT. It should not be possible to separate the medium from the message or in the words of W.B. Yeats to “know the dancer from the dance”.

At the same time the evaluation must tackle the issues raised in the earlier discussion on approaches to evaluation and analysis. In particular the process should be formative rather than summative in nature.

## ***Data Collection***

Data was collected using standard data collection techniques including “pre” and “post” questionnaires, and structured interviews - recorded on digital video (Brophy, 2001) (Benson, 2001). Each teacher (48 in total) was also asked to fill out a weekly “log” or diary, during the course of the year. This log was a self-evaluation tool designed to collect both empirical data as well as teacher reflections. A day long face-to-face seminar was held at which the researchers and the teachers exchanged ideas and visits were made to as many schools and classrooms as possible. The seminar day also included an evening social event which proved to be particularly beneficial.

Aiming to design and present an inclusive and teacher friendly data-gathering artefact, the logs were delivered to schools in the format of two hardcopy booklets with eleven one-page weekly diaries each. They covered two distinct periods: October – December 2000 and January – March 2001. The questions covered in the diaries were intended to obtain both quantitative and qualitative data. Quantitative data issues covered areas such as class time spent on the project, teacher’s own preparation time, teacher’s use of computer in the classroom, in the staff room and at home, and time spent on training among others. Qualitative issues included the lesson’s focus, its relation to the curriculum, methodology employed, technical support needed and provided, among others. However, the most popular and fruitful question was that that prompted teachers to reflect or provide key thoughts on the process (Brophy, 2001).

The evaluation team had considered the option of providing the logs in digital format, however this alternative was decided against taking into consideration the fact that it may have become a non-inclusive tool, jeopardizing its effectiveness and hence the data collection process as a whole. Lack of teacher time, particularly in primary schools settings where teachers are constantly in direct contact with the students, lack of access to technology during and after school hours, and the stakeholders’ own lack of confidence and proficiency in dealing with technology were the main envisaged deterrents to the use of on-line log diaries (Brophy, 2001).

Not surprisingly the completion of the logs was patchy but nevertheless between the various instruments used a very large amount of interesting data was collected from which the authors were able to abstract some key findings.

## ***Layers of Interpretation and Reflection***

In order to facilitate the participants to reflect upon our findings (or reflections) and to enable them to partake in the further construction of knowledge it was necessary to devise a strategy which would embody the ideas of “communal constructivism”. This was done in a number of steps.

## ***Data Analysis***

The sheer volume, and assorted quantitative and qualitative nature, of the data in the form of individual hardcopy “Log Diaries” and video interviews presented a challenge in terms of opting for the most suitable tool to use for analysis.

A number of software tools were considered including SPSS, Textsmart and NUD-IST. However, they were decided against on the grounds that they would have represented an enormous overhead in terms of time, considering firstly, the induction period needed in order to become acquainted with the packages themselves, and secondly, the time required to process the data into a form to optimise its analysis (Inglis et al., 1999). The envisaged outcome, a categorization of the main issues arising from the logs without further analysis, as this must be provided by the analyst (Frechtling and Sharp, 1997) would have not justified the time investment.

Instead Microsoft Excel, the generic software package offering a variety of uses according to the user’s needs was identified as the most suitable and flexible software to enable the design and development of a tailored data collation, display and analysis tool. The features that justify this choice are the package’s facility to support and display both, raw qualitative and quantitative data, with automatic analysis and graphical representation of the latter, the possibility of inserting a layer of

reflections/analysis on top of the raw data in the form of comments, the insertion of hyperlinks enabling the association of issues arising from the raw data and analysis, and the tracking system that enhances a collaborative analysis approach. These features correspond with many of the requirements suggested in the three stages of the qualitative analysis framework developed by (Miles and Huberman, 1984): Data Reduction, Data Display, Conclusion Drawing and Verification.

The Data Reduction process, cutting words that represent people, places and events, was minimised on the grounds that although these words may have not been relevant for the analysis itself (Miles and Huberman, 1984), they provided an extremely rich setting for conceptualisation analysis techniques.

At this point in time it was necessary to address the most important issue, that of interpreting the data. Memo-Writing Techniques, that is ongoing process of writing the researcher's reflection about the data and the interpretations attached to the same (W.K. Kellogg Foundation, 1998), were possible by inserting comments, which appear on mouse-over, in each relevant cell. This layer of reflections was inserted in the raw data at the same time that the data was being entered, maximizing the time spent entering the data by allowing simultaneous analysis.

The second stage in Miles and Huberman's data analysis framework, Data Display, implies going beyond a simple reduction of information to actually providing data that is organized and condensed in order to permit conclusion drawing. These requirements are in part fulfilled by the data collation and layout in the spreadsheet, and the analysis provided through the comments inserted. Nonetheless, the insertion of hyperlinks, joining the observations of the teachers on the same issue, that is, the main recurrent issues, provided the association of insights needed to enable conclusion drawing. They also allow the creation of physical and conceptual nets to help the reader walk through the researcher's thought processes, an extremely useful itinerary when encountered by the question of objectivity in qualitative data analysis.

The spreadsheet embodying the incredibly rich amalgamation of raw quantitative and qualitative data, together with physical and conceptual nets and graphical representations of the analysis, in the form of comments as well as graphs provide a most suitable and inviting environment for collaborative data analysis to crosscheck findings and enrich the process by the importation of new ideas. The use of the change tracking system allowed other researchers to provide a further layer of reflection on top of the raw data and the first layer of interpretations.

## **Dissemination of Data and Analysis**

The researchers' report, the hyperlinked spreadsheet and video clips were placed on CD and copies distributed to all the participants allowing them not only access to the "key findings" but also to the raw data itself and to the researcher's reflections upon that data. The objective of all of this, is to hold up a mirror to the participants, so that they get reflected back to them as complete a view as possible of the overall picture, breaking down borders between teachers, classrooms, schools (primary and secondary) and all the participants involved (including the teachers, researchers and project co-ordinator).

In order to involve the stakeholders in a participatory analysis and to engage them in a reflective feedback exercise firstly, the spreadsheet was delivered to the schools and teachers involved. This was done by placing an enriched spreadsheet, comprehensive of video clips of school visits and interviews to teachers and ICT co-ordinator, as well as findings from other data collection tools used, such as questionnaires, on a CD.

## **Reflections Upon Reflections**

A picture is of course just that, a static, partial, reflection of what is happening in a selected area at one point in time. What is now needed is a way in which the participants can themselves build upon the picture (or knowledge accumulated to date) in a communally constructive way. There is no guarantee that the picture presented was fully accurate and the picture as presented on the CD is certain to promote further discussion and learning.

The forum within which further building of knowledge can take place is a closed, web-based, threaded discussion group to which all the participants are invited to contribute. Threads have been created for each of the key themes identified in our initial report. Participants are invited to comment upon the issues identified but more importantly they are invited to create new threads in which issues not captured to-date can be explored.

## Discussion

Not surprisingly the key themes that emerged from the process were to do with time, training, technical support and integration into the curriculum. Lack of time for the implementation of the project was associated with overloaded schedules, other school and administrative duties taking priority over ICTs, and time spent trying to solve technical problems. Insufficient training on how to integrate ICTs into the curriculum in order to enhance higher order thinking skills resulted in some teachers imparting mere ICT skills. Lack of school's ICTs plan or vision contributed to localization of the learning experience to only those teachers and students directly involved in the intervention not allowing the creation of a whole school ICT culture, necessary to engaged all members of the learning community. This also resulted in lack of general support for those undertaking the initiative. Lack of technical support generated great frustration among participants, frustration that grew stronger when compounded with the time issues mentioned previously.

When reflecting upon the evaluation process itself 70% reported that had either changed the way they used ICTs or incorporated ICTs into their classroom practice, while half thought that the evaluation process was very good for focusing on the project objectives. This supports the argument made earlier that the evaluation can be formative rather than summative.

Most thought that the time taken to complete the log was acceptable and most found the seminar with face to face seminar with the researchers from CRITE very helpful. The social interaction at a seminar dinner was viewed as excellent for connecting with other schools with one teacher remarking it was the only the time in his career that he attended such an event.

## Summary

The authors hope that the methodology presented here is of use to the participants in the intervention in question and that it helps them to reflect upon their own experiences. More importantly the authors argue that the methodology outlined embodies the spirit of "communal constructivism" and that it can be utilised and built upon by ourselves and others working in the area.

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