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Teachers' reflective practice via video enquiry: the usefulness of peers, teacher mentors and video as a method to enhance the enculturation and reflection of pre-service teachers.

Academic biographies:

Fergal Corscadden is currently the Co-ordinator and Educational Developer for the Centre for Excellence in Teaching & Learning (CETL), Stranmillis University College, Belfast. His main area of expertise is focused on the design, delivery and embedding of technology enhanced learning (TEL) at the College. This involves assisting academic staff in the development and enhancement of curriculum delivery across all pathways (Early Years, Post-Primary & Primary) and across all disciplines. Fergal has over 11 years experience of developing TEL approaches using eLearning and experimental pedagogical techniques in higher education institutions (HEIs), and more recently critical reflective practice, collaboration and interaction approaches to learning. He is also in the final year of his PhD with Queens University Belfast (QUB), School of Education, where he is studying the effectiveness of introducing video analysis and multimedia tools in T&L in HEI's in Northern Ireland.

Dr Irene Bell is the co-founder of the B.Ed. (Math/Science) Post-primary course and the Cross College Numeracy Co-ordinator in Stranmillis University College. She teaches on the subject application section in both Years 1 and 2 of the BEd(Math/Science) programme. She has a particular interest in the development of numeracy within other subject areas and was jointly awarded the 'Developing Learning and Teaching Award' in the academic year 2006-2007 for her work with Technology and Design in assessing and improving the mathematical understanding of the students undertaking this subject area. During the academic year 2004-2005 she received the College Teaching Award for her work on the e-assessment of student mathematical subject knowledge. Her recent research and publications are within these areas.

Before joining Stranmillis University College **Dr. John McCullough** was Head of Chemistry in a Belfast Grammar School. He currently lectures in Science Education on both the B.Ed primary and post-primary pathways. His research interests are the integrating of children's stories within enquiry-based science, the use of digital technology to make primary science more accessible and engaging and the use of Science Centres within initial teacher education. He also has a keen interest in the use of video analysis as a tool to support critical reflection during teacher training.

Abstract

This paper describes a collaborative project between Stranmillis University College (HEI), Belfast and Lumen Christi College, Derry in Northern Ireland. The project involved a Community of Learners (CoL) made up of nine undergraduates in the first of the four years of their Bachelor of Education degree course. The aim was to explore the merits of engaging students with teacher mentors at the school, who would facilitate an observational and reflective role in relation to the students' first-time teaching experience in the classroom. Additionally, the students were paired off and co-taught a lesson in both Science and Mathematics. Video recordings were carried out by each student while the other taught the lesson. The students then were required to edit the video and prepare a montage that demonstrated their competency in relation to the subject and the teaching methods. Furthermore, the students were then required to produce either and/or a VideoPaper (VP) or a multimedia learning object (MLO) (using the Generative Learning Object Maker [GLO] tool). The MLO's encapsulate the video as evidence, augmented by audio reflective narrations; recordings of both their mentors observations and reflections and their peer observations and reflections. The VP, allowed the students to match theory to their practice by way of inserting play buttons at precise and predetermined timeslots on the video time line. The experiences of the students were captured by questionnaires and focus group interviews. This paper outlines the richness in terms of reflection from multiple interpretations of the video evidence or practice as recorded by the students in the classroom. It considers what actually constitutes feedback, situated learning, reflective practice and collaboration in terms of the holistic approach to the development of pre-service teacher training the in the U.K and Ireland.

Key words: (Generative Learning Object Maker (GLO); VideoPaper; reflective practice; situated learning; collaboration).

Introduction/background

The partnership between Lumen Christi College, Derry (a Science Specialist School) and the Year 1 BEd (Mathematics/ Science) students of Stranmillis

University College, Belfast allows the students to become immersed in a supportive learning environment which will give them a positive image of teaching, assist them in developing skills in STEM teaching and mature, in their ability to be a reflective practitioner of their teaching. The students were teamed in groups of 2 or 3 and were assigned a teacher mentor for each subject area. In preparation for the first of their three contacts with their mentors, videos in each subject area of the teacher mentors in the specialist school, were made and analysed by the students using the 5 Es (engage, explore, explain, elaborate and evaluate). These were edited and restructured for training resources for both students training in Stranmillis University College and for staff development in Lumen Christi College.

The first contact the students had with their mentors was a video conference session allowing the students the opportunity to query the staff on the planning, delivery and associated pedagogical issues arising from the video lessons (5 Es). This conference session also allowed initial social contact for the students with their mentors prior to their first visit to the school. The first visit to the school was a day grounded in mentor observation and reflective discussion on their mentors' teaching. Time was allocated both before and after each mathematics and science lesson for the students to discuss pre-lesson their mentors preparation and post-lesson, to question their mentors teaching. The students felt that observing their mentor with the lesson plan and having engaged in discussion about the class and their mentors approach to the lesson greatly improved their comprehension of the teacher's thinking process. Students expressed the opinion that this exercise of reflection and critiquing the teacher's lesson developed their appreciation that this was a lifelong professional skill and not simply for their training, as student teachers.

The second day of this work was allocated to the teaching of the student. The students presented their lessons in groups of 2 or 3. Having engaged in collaborative planning with their mentors and discussed their preparation beforehand, the student lessons were recorded by their peer partner while simultaneously observed by both teachers and university tutors from whom the students received written and oral feedback after they themselves had made their initial immediate reflections on their work.

The assessment element of these mathematics and science subject application courses is focused on the student's ability to analyse their teaching and not on their ability to plan and present the lesson. In mathematics the students reviewed the video of their teaching using the ETI(2006) 'Better Mathematics' documentation and presented their reflections through a VP in which clips from their recorded lesson illustrated the analytical comments on their teaching. In science the students compiled a Multimedia Learning Object (MLO) which included the video evidence and reflective comments on their teaching from their teacher mentor, college tutor and themselves.

An overview of the literature

'You can observe a lot by just watching.' - Yogi Berra

Faced with a flood of options to enhance pedagogy in relation to technology rich environments and supporting tools, educational developers, educators and indeed much of the student population in today's Information Age might well find themselves a little bit overwhelmed. However, as Turney *et al* (2009:80) note, an assimilation of technologies, as augmentation to the face-to-face delivery rather than just a bolt-on to modules, as has been the thinking generally for some time (blended learning), may alleviate the burden. They discuss the fact that success in delivery is apparent when technology is "…fully aligned to the teaching aims and fully embedded within any module…". This perception is a valid one especially in light of a global precipitate to

encourage student learning and undergraduate teaching in a more collaborative and interactive model. In this project the essence of learning was facilitated through active and enquiry-based methods as a blend of face-to-face (lecturer, student, other, for example researcher or co-teacher) and technology-based artefacts enhancement for example digital video or other multimedia and handheld tools (Chan *et al,* 2006). Moreover, using such tools and approaches in an authentic way (Brown *et al,* 1989) and echoed by Turney (2009) as mentioned above, might also be perceived as providing what Kember *et al* (2009) discuss as a motivational 'relevance'. Or, indeed what Blumenfeld *et al* (2006) describe as 'intrinsic value', 'instrumental value' and 'attainment value'. This concept of a motivational relevance is useful in this study as the students were immersed into a rather foreign environment, that is, first time teaching in the classroom and using digital video tools. And yet the tools used and the philosophy behind these methods were deemed appropriate and exciting to use in relation to the overarching aim to provide a cohesively rich and reflective environment from multiple and authentic interpretations.

Moreover, where each entity or artefact as Greeno *et al* (1996) and Collins and Brown (1989) note, act as equal and integral variables in the 'system' and processes (see Figure 1 for more on this).

Borrowing from the original concepts of the social practice of learning into a twenty-first century classroom model, Hung *et al* (2009:205) argue that educators should bring a generous slice of social learning theory and practice to the pedagogical table and into the classroom and to focus this as 'a craft for the 21st century', see also Kennedy (2005) for more on this. They note further "Social Practice of Learning (SPL) refers to life-long learning, deep reflection, and dialogue in a community". They argue that the SPL should be taken more seriously and adopted much more steadfastly to

reinvigorate the allegory of social learning theory and situated learning discussed in depth by many other educational theorists.

As Jonassen *et al* (2005) note further this holistic mix between people, objects, meaning and other variables, consolidates the notion of SPL. Making practice work by reinvestigating the boundaries of social learning theory, through the facilitation of reflective practice in an authentic, situated learning arena, helps in part to eliminate the need to reinforce learning via transmission only, students get 'it', 'it' being the proverbial understanding of the whole picture: they are in 'it'. This practice also supports the notion of a Community of Learners (CoL), (Lunenberg *et al,* 2007). In this project the nine students were involved in dialogue or narrative inquiry (Latta and Kim, 2010), they reflected with each other (peer reflection), both in the classroom and outside the classroom at the College campus. If we examine Figure 1, we can see that throughout the 'cycle' or iterations of reflection and the production of artefacts, students are engaged in a continuous feedback loop with each other. As Juwah *et al* (2004:8) note in relation to effective formative feedback,

> "Peer dialogue is beneficial to student learning in a variety of ways. First, students who have just learned something are often better able than teachers to explain it to their classmates in a language and in a way that is accessible. Second, peer discussion exposes students to alternative perspectives on problems and to alternative tactics and strategies. Alternative perspectives enable students to revise or reject their initial hypothesis and construct new knowledge and meaning through negotiation."

Crucially, in this study, the students recognised that a successful lesson is not enough without great execution, without careful planning, without critical and reflective practice and without dialogue. Also, that to be a 'teacher' you must understand and immerse oneself in the 'culture' of T&L. This immersion demands reflection

firstly in the classroom during delivery and then secondly, post-delivery (from analysis of video footage, for example to create a snapshot of their best practice),

students enhance and reinforce the positives from delivery, making note of any negatives.

Key:

A,B & D are processes

C, D1 & D2 are artefacts/entities

CT = Classroom Teaching
VP = Video Paper
MLO = Multimedia learning Object

Agreed lesson planning

Video recorded by peers
•Reflection in practice
•Peer observation
•Immediate feedback

A

Teacher mentors observe CT & collect field notes

B

Video editing by peers
•Reflection on practice
•Negotiation skills
•Interaction skills
•ICT Skills development
•Post-immersion, peer feedback

Video production by peers
•Evidence of CT
•Peer observation
•Immediate feedback

C
Video

D

Produced video used for:
•Production of VP
•Production of MLO
•Matching mentors observations against evidence

Enhanced Self/Peer Reflection on practice
•Linking theory to practice

D1
VP

D2
MLO

Multiple interpretations from:
•Peers
•Mentors
•Lecturers

•Learning new software
•Negotiation skills
•Interaction skills
•ICT Skills development

Teacher mentors compare field notes against produced video & write narrations for D2 MLO

•Learning new software
•Negotiation skills
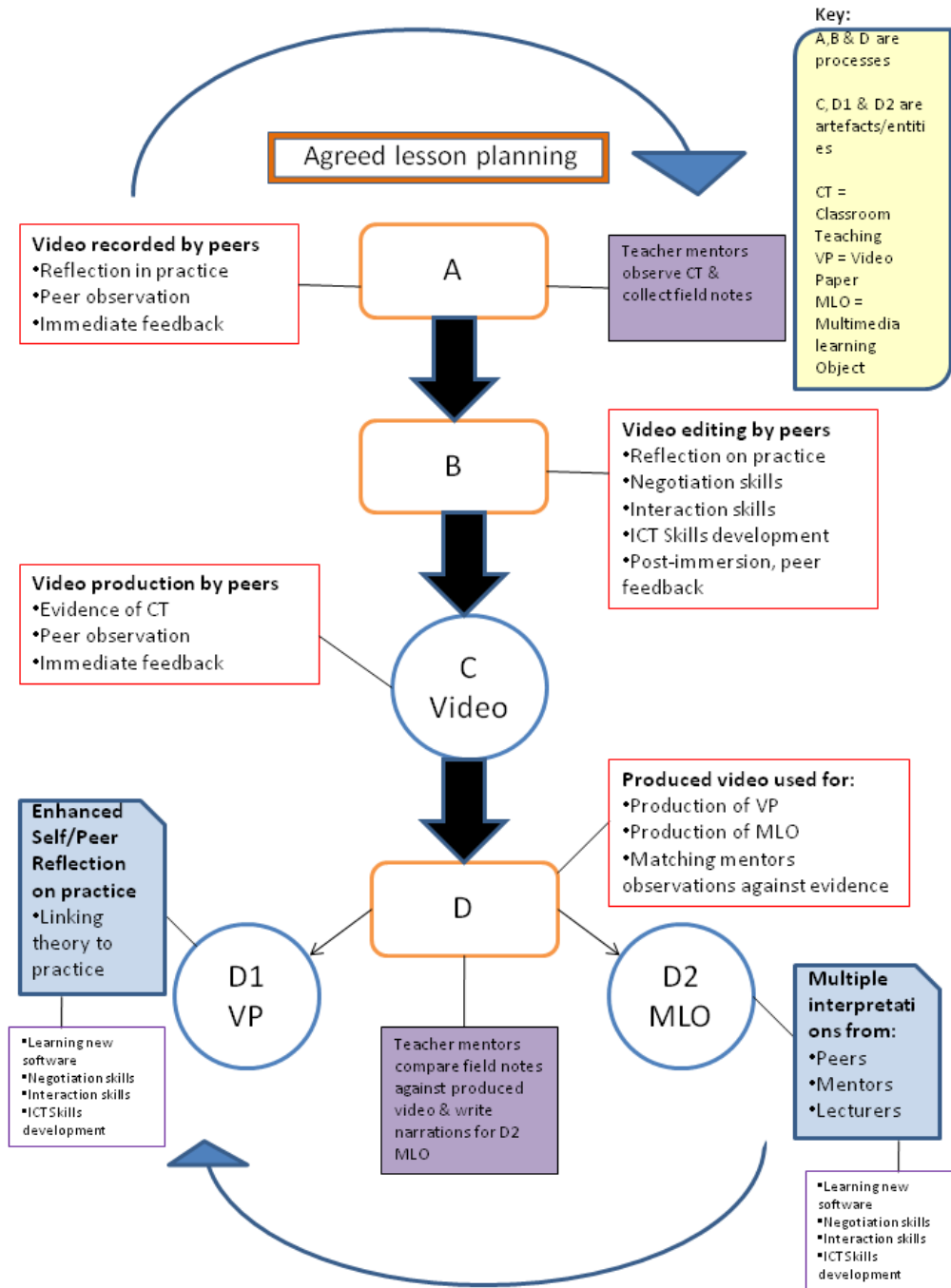•Interaction skills
•ICT Skills development

Figure 1: Reflection, processes and artefacts model.

Therefore, the 'reflection in practice' and 'on practice' fit as component parts of a holistic system, involving people, objects, concepts, and practices. Moreover, that this interconnectedness demands a narrative inquiry in and around the topic of classroom delivery. These associated components are captured through the lens of the camera and are understood better when the process of extrapolation is implemented to demonstrate 'evidence', i.e., one element is viewed as largely useless without the other. This clearly emerges once you have seen for yourself and discussed with others the *actual* delivery, as opposed to purely reflecting from memory (including field notes or other non-visual instances recorded in real time, at the time). As Rosaen *et al* (2008:347) found in their study looking at how video records change the way teachers reflect on their experiences, "...video-supported reflection enabled interns to write more specific (vs. general) comments about their teaching than writing from memory." And this is where the inspection of delivery via video enquiry reflection really comes into play, as opposed to just recording reflections in a journal for example.

Reflection in and on practice: evidence from digital video, not just from memory.

Much of the literature on reflection confirms the nature and importance of it as a crucial part of the 'practice' in relation to T&L. Indeed, locally in Northern Ireland the General Teaching Council for Northern Ireland (GTCNI) in 2009, published a significant document entitled 'Teaching; the Reflective Profession' (GTCNI, 2009) to promote further the importance of reflection as a process towards understanding better the professionalism of teaching. In the case of this study we refer to reflection, whereby the self, peer or group essentially interrogate the video evidence to solve 'problems' and answer questions which forms a strong link towards finding out about the 'truth' about oneself and/or others in relation to subject teaching and the delivery of that to KS3 pupils. In another guise this process was referred to as micro-teaching for example,

in higher education (HE) previously ITE students were provided access to self and peer reflection by way of videotaped recordings played back asynchronously and paused for clarity and reflection with a lecturer post-delivery. However, this did not provide the same level of interactivity among peers or, for in-depth self, repeated objectification. Furthermore, the 'moment' was a time restriction. It was less 'situated', and rather more, 'simulated'.

Using digital video and the ability to edit and re-edit content, enhances the examination and recall of their teaching as an 'object' in relation to the lesson plan and overall teaching delivery, repeatedly. If we examine figure 1 more closely, we can see that process 'A' primarily involved the students and their mentor teachers from the school; the former busy in the collection of video evidence by the students each recording the other in turn as the other taught the lesson, using the digital video recorder (standard Flip Camera); the teacher mentors observing this delivery against the lesson plans and recording their own thoughts, which were then relayed to the students in an immediate, post-delivery feedback session. During process 'A' both entities were involved in a reflection in practice (RIP) method. This RIP process initially for the students engaged in the delivery, was recorded in memory synchronously; for the teacher mentors they recorded their observations for feedback by making notes, and also by way of viewing reflection in practice, again recorded to memory. However, as Roth (2007:368) notes, "...Experience is not recorded in the human body and mind as an indelible trace but takes the character of cinder". Cinder as we interpret it here means that it burns out easily, and is spent residue. Roth (2007:375) notes further in relation to 'extending reflexivity' "...video allows us to push our analysis to deeper and more accurate levels": Sentiments echoed by students involved on this project.

Indeed, memory recall in itself is by no means a reliable source or evidence, especially in light of having a digital video record as evidence to analyse: the Justice System would not work at all if this was the case, why should it be any different in T&L? Indeed, the Health Science subjects embed reflection throughout their statutory benchmark schemes (Fleming, 2009). Field notes written at the time of memory recording can be misleading as the moment passes and the next moment occurs. As Goldman and Mc Dermott (2007:101) explain,

> "Video records in real time, like life, go by too quickly to allow more than a confirmation of opinions and biases, but unlike life, unlike paper and pencil note taking, video allows a slow down and multiple viewings. Reexamination invites new methods of analysis, new ways of looking and listening that can reveal both the complexity of participants and the poverty of language available for describing them.".

Therefore, digital video recording, in this case, of the co-taught lessons and used as evidence draws on what Collins (2006) notes as the three forms of reflection, (1) reflection on your process (action), (2) comparison of your performance (action) and (3) comparison of your performance (action) against a set of criteria for evaluating performances. Roth (2007:368) argues that reflection on action is "…one of the most salient practices not only in the study of teaching but also for developing it". If we examine Collins' three forms a little closer we can apply this to our research. The first of these, 'reflection on your process': involves the use of technology to record practice for later analysis with self, peer or whole group sessions; this is relevant to this study, the second form, 'comparison of your performance'; includes an evaluation of your own delivery against peer delivery repeatedly. This process is salient within this project and the third form, 'comparison of your performance against a set of criteria for evaluating performances'; essentially comparing your individual performance against set criteria with a tutor,

in this case a teacher mentor using the overall lesson plan and then the video evidence, produced by the students during forms 1 & 2 as mentioned. Of course, the media, the 'video' acting as a multimedia source is easily accessible due to the nature of what Clark and Paivio (1991) described as the 'Dual Coding Theory', whereby human cognitive abilities are able to deal with and simultaneously interact with verbal and non-verbal objects and events. Sentiments echoed by Dodds and Fletcher (2004) who emphasise that the acts of seeing, hearing and doing make more or less use of the limitations of our stimulus in relation to our human perceptual capabilities.

The skill of video analysis, reflection on practice, editing digital video content and presenting this content as evidence is a craft of multimedia learning. However, in relation to this project, this aspect is seen as the developing of transferrable skills which the students hopefully will make further use of in the classroom as In-service teachers. Roy and Chi (2005:272) in relation to 'the self-explanation principle in multimedia learning', note, "Self-explanation is a domain-general constructive activity that engages students in active learning and insures that learners attend to the material in a meaningful way while effectively monitoring their evolving understanding". In this regard we feel that the students benefit greatly in enhancing their understanding of the learning environment, i.e., the classroom, much more than they would if they had simply attempted to recall their teaching from memory post-delivery. Next, we will examine the additional skills and attributes the students were engaged in with reference to the development of the video evidence and other multimedia artefacts.

The use of multimedia tools: enhancing collaborative and reflective practice skills.

In addition to the pedagogical enrichment, the students on this project were involved in a computer supported collaborative learning (CSCL) environment, as Clara &

Mauri, (2009:2) note, "The field of CSCL refers to a set of theoretical, methodological and empirical approaches to the situations of teaching and learning which involve some type of collaborative use of the information and communication technology (ICT)". For example, the use of the Flip cameras to record; the use of Windows Movie Maker (WMM) to edit and produce the video; the use of Movavi Video Converter to convert files; and the use of the VP and the Generative Learning Object (GLO) Maker; the GLO maker was used so that students could produce a MLO as an example of their lesson delivery. The choice of these tools was taken by the CETL Educational Developer (researcher), charged with embedding CSCL tools across the HEI. Furthermore, agreement was made with the academic staff that these were the most appropriate tools in relation to the aims of the project so that the project was pedagogically led with the technology enhanced learning (TEL) tools as augmentation. As Jonassen *et al* (2005:251) note,

> "Implementers of CSCL are advised to select technology that matches the pedagogy of the instruction, design instructional practices that take advantage of the technological tools, and identify student attributes that may interact with using technology for collaborative learning.".

If we examine figure 1 again and process 'B', it is clear that the students were involved collaboratively in editing the video in pairs. This collaborative learning enabled the students to develop their ICT, negotiation and interaction skills by using simple tools (camera and WMM) in an authentic way, but also pushed them towards developing higher level skills in a pedagogical framework using tools not known to them previously i.e., the VP and GLO maker tool. Interestingly, the students noted that the video editing *per se* was the most intuitive in relation to discovering the 'truth' about their delivery, they did not necessarily think that the addition of adding to this *produced* evidence, via VP or GLO, provided for any more 'cognition'. In short, by the time they had created the video as an entity, at point 'C'

in figure 1, students commented they had sufficiently 'reflected' and did not essentially need to elaborate any further, options that both the VP and GLO tool provided for. However, they did mention that the use of the aforementioned tools was 'interesting' because they were 'new' and 'different'. Therefore, student reflection, in their minds, had reached the ultimate level through the process of editing the video content for the production of evidence of their lesson delivery. Nevertheless, what both the VP and GLO maker tools did provide for having been used was an enhanced critical reflective aspect. Critical in that in the case of the VP, students were engaged in identifying within the video aspects of best practice by way of linking text descriptions to actual footage in the video time line. As Beardsley *et al* (2007:489) note,

> "The intellectual work the VideoPaper assignment demands arises from the fact that video, text, and slides must be connected in order for the narrative to emerge. This interconnectedness pushes the author to closely examine the relationship between the images and their text, to think carefully about exactly how to generate meaning from their media".

The matching of text descriptions, or narrative, to video footage to generate meaning, helps the student to be critical, much more than producing a video of best practice evidence only. This is because the video alone (without text hints or descriptions of what is going on) does not include critical reflection from the students. Al-Seghayer (2001), found that the combination of text with video improved results in the teaching of language, over and above that of either text only or pictures only. Rich and Hannifin (2009:61) in relation to the use of VP's note further, "Researchers who encourage reflections of video self-analysis…report that teachers who record reflections after viewing video of their teaching demonstrate more accurate perceptions of their abilities than those who do not". Using the VP, the students select appropriate bits and lead the viewer, similar to

the edited, produced version at 'C', but with direct and precise text descriptors. Furthermore, their video had to match the observations of their teacher mentors. This is because if the students only selected their best bits, and this did not configure with the mentor observations, then they were being untrue to their reflections and delivery and instead only presenting their best bits. This aspect is where the importance of critical reflection from multiple interpretations comes into play, and is the most resonant feature of this project.

The GLO tool although primarily designed for use in developing teaching materials and admittedly difficult to use initially, provided for the students the ability to include audio narrations from themselves, mentor and lecturer. These were included as points of view and enhanced further the reflections and observations: in essence, to produce MLOs of their reflections and evidence of practice. This negated any chance that the students would leave out any negative aspects from the video production (at point 'C' in figure 1) and would therefore produce reflections on everything. Transcripts of the audio narrations were included as additional media content. So, although the students acknowledged the VP and the MLO resources were not wholly necessary for reflection, their use did provide deeper and more critical reflections for the viewer, see figure 2, example MLO for more on this.
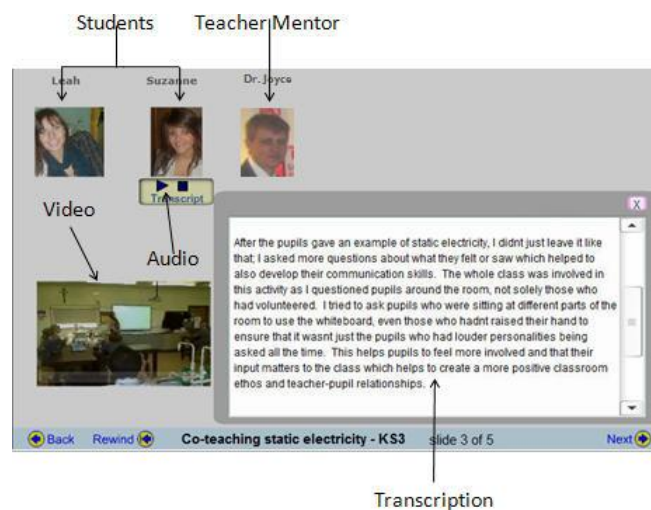

Figure 2 – Example MLO

Indeed, although it was not the nature of this project, our recommendations (see Conclusion and recommendations for more on this) are that this type of 'record of practice' could very much be used and included in a portfolio of work that students could gather to demonstrate their development over the duration of their training. In fact, such a portfolio could be used as a type of formative assessment, Black and Williams (1998). As Gardner *et al* (2008:3) note,

"Change in assessment must begin with some form of innovation, which might be quite different from existing practices in any particular situation. But what do we understand innovation in assessment to be? In education the newness identified in innovative contexts is more likely to be 'situated' or context dependent. The assessment process may not be new in itself but may be new to the teachers and schools concerned. Indeed, in this 'situated' context, the innovative assessment being promoted may be no more that a reincarnation of practices that have waned over time, or a new way of carrying out established activities."

Indeed, although observations in the classroom and then feedback sessions in relation to collected video evidence, has been used before (micro-teaching), this project demonstrates the 'situated' relevance of recording actual classroom delivery, and not merely delivery to peers. Video evidence was produced to be critically analysed, from multiple interpretations of that evidence, and delivery observations. Therefore, the finished product the VP or MLO, encapsulates a 3-way observed critique and as evidence of an analysis of teaching, surely this artefact could be used as an inclusion in a portfolio, to demonstrate competencies over the duration of a training course.

Methodology

Reflection tasks

In order to fully explore any potential impact on students' experiences of reflection as a result of interacting with video, we designed an approach which provided a range of interactive tasks and experiences. The students' reflections on their teaching of Mathematics required the production of a VP structured around the parameters outlined within the ETI (2006) 'Better Mathematics' document. In contrast the students' reflections on their teaching of science required the production of the MLO and followed a less prescriptive approach. The students, working in pairs planned and taught a three part enquiry-based science lesson, comprising an introduction, hands-on practical activity, and a concluding plenary session. Each student was assigned to teach either the introduction or the conclusion, each lasting approximately 10- 15 minutes, with both students co-teaching during the activity. The students were tasked with identifying areas of strength and areas for development within their particular part of the lesson. In contrast to the Mathematics task, this less directed evaluation exercise was intended to develop a learner centred awareness and appreciation of the issues attending the overall process of reflection. It was also our intention to examine to what extent our students transferred their understanding and interpretation of the evaluation rubric used within the Mathematics task to the Science task.

The production of the VP required the students to review their teaching and edit selected video clips which they felt demonstrated evidence of good or bad practice with respect to the 'Better Mathematics' document. Each video clip was synchronised with supporting text by a play button, a process which required the accurate identification and coordination of the classroom event with the corresponding evaluation and qualification. The generation of the MLO required the students to identify examples from the video recording which characterised good and bad practice. This edited material was then supported by an audio commentary (also available as a text document) evaluating the strengths or weaknesses of each section of the video. The final edited video clips were also shown to the course tutors and the teacher mentors who in turn produced an audio recording of their analysis of each section of the video. In this way each MLO contained a video and an audio evaluation from the perspective of the tutor, teacher mentor and the student themselves.

Data Collection

The lived experience of the students was captured by a questionnaire (n=9) administered at the end of the project and by a focus group interview (n=5). The interview allowed for students' experiences to be further explored with their feedback and to be qualified by group discussion.

Data Analysis

The questionnaires were independently analysed for recurring themes and emergent perspectives, by each of the three researchers. A similar analysis was carried out on the full transcript of the focus group interview.

Findings

Initial engagement with video

All of the students found this use of video analysis to be hugely beneficial and helpful at this early stage of their teacher training course. Once the initial 'shock' of seeing themselves on video had been overcome, the consensus was that the experience of confronting the actual reality of the lesson, as opposed to the memory-based recollection, was a very powerful developmental experience. As one student recalled:

> It was embarrassing however it was useful as I could see for myself what I thought was done well and what I should change and improve on.

The potential 'gain' emerging from this 'pain' was identified in the comment that *'although evaluations from others are beneficial seeing it yourself means you are able to see things they* maybe *didn't see or didn't want to mention.'* All the students welcomed the opportunity to experience as full a reality of their practice as possible. In addition to the richness and fullness afforded by the reality of the video, the students also identified the merits in capturing the classroom experience for analysis long after their post-lesson emotions had subsided. As one student put it:

> Sometimes after the lesson you are on a high if you think the lesson went really well or you could be a bit down because maybe one or two things did not work out. It is much better to watch it when you are calmer and when even if it was not great could be encouraged by seeing a good part which you had forgotten about.

The facility to re-watch the video recording was also considered to add value to the comments and evaluations of tutors and teacher mentors as evidenced by the conclusion that *'watching the video again made the tutor's comments more helpful as at the time I sometimes did not agree with what he had said, but when I watched the video I could see his point.'*

Advantageous as the simple process of watching their lessons again was considered to be, all the students reported that the real value was gained by the interactivity provided by the video task in the form of the VideoPaper and the MLO. As one student put it:

> Simply watching the video gives immediate feedback on my body and communication skills and a general impression of myself and my methods. To develop further the next stage (production of VP and MLO*) was more useful.*

Interactive video analysis

The task of preparing both the VP and the MLO would appear to further enhance the learning experience and support development in two ways. Firstly the very act of watching and re-watching segments of their lessons forced the students to examine much more closely their classroom practice. The process of editing required the students to deconstruct their overall teaching into individual actions and thus afforded the opportunity to evaluate the effectiveness of the many instantaneous decisions they had made. This process was felt to provide a much clearer description of their practice as evidenced by the comment:

> This (preparation of VP and MLO*) developed the experience considerably. It required the need to comb carefully through the video, being specific in my choices and actions. This gave me a much closer look at my methods than simply viewing the video as a whole and gave*

27

me a much better impression of the good,

the bad, and what should be improved.

The second advantage provided by the deeper analysis required in the production of the VideoPaper and the MLO was that the students were challenged to respond to their actions in the form of a written or audio transcript. The learners' role was now transformed into a less passive one as this comment describes:

> *When editing you watch the video closer to see which bits to cut and therefore you pick up on things in the lesson that you wouldn't have before. Developing the transcript forces you to think about what actually went on in the lesson and consider how to explain this to someone who wasn't there.*

The production of post-lesson evaluations is a common experience for student teachers. All the students welcomed the opportunity to carry out this task with the aid of video evidence directly corresponding to the particular classroom incident. The transformative nature of this experience was indicated in the comment,

> *'it is very easy to remain modest or talk yourself up in an evaluation or analysis but with the video there as evidence, the reflection had to be completely honest and therefore the experiences we will take away will be much more relevant in future practices.'*

The students critiqued their mathematics lesson through the compilation of a VP. They used the 'Better Mathematics' ETI (2008) statement as a benchmark document and to guide them to relate theory and practice. However, there were some mixed reactions to the need to produce either the VP or the MLO

> *'I actually found the editing of the video within Windows Movie Maker, I found*

that more useful than the actual making of the Video Paper because I watched on the video and like when I watched it from start to finish I got just a kinda general impression of everything that I'd done but when I started going through it, kinda fine-tooth combing in Movie Maker I started picking up on a specific, very specific small things that I had done that were good that were bad, you know, or that needed development on and I think that the actual editing of the video was more useful for me than making either the VP of GLO.'

Nevertheless, having a series of comparative statements was felt by all the students to provide a very helpful reference structure. It also allowed the college tutor to assess the ability of first year students to comprehend and interpret the theoretical perspective to their classroom reality. Using this document clarified for the students the distinction between reflecting and critiquing a mathematics lesson compared to a lesson within another area of the curriculum. However, incidental transitional skills of interaction, peer and professional negotiation and significant ICT skills were evident, appreciated and reflected upon by the students. They commented that initially they had interpreted the recording of their lesson as the focus but quickly realised that the editing process was the crucial element. However, in reflecting on this, one student commented that the development of the resultant VP was a constructive exercise on their teaching and allowed them to reveal positive elements of their work thus improving their confidence. As Roschelle *et al* (2009:2) note,

> "...computer technology can structure tasks in accordance with proven principles of cooperative learning and can provide group feedback. In the context of tasks that require cooperation, feedback at the group level can encourage social processing, which can encourage students to question, explain and discuss disagreements."

Areas for improvement were included and constructively commented upon but having analysed such elements and realising that they were not happy with how this part of their lesson had manifested itself, the students were in a position not to include it in their work. This control over the video content was appreciated by the students and contributed to confidence building for Year 1 students. And moreover, this they achieved by scrutinising their delivery repeatedly as this next comment indicates.

> *'Well...definitely inserting the play buttons [in VP] was probably the best part of reinforcement of certain things that went on because you would have to look at a clip and then you would just miss where you needed to insert so you'd have to look at it again so I think we must have all watched ourselves a hundred times and sort seen how we got on.'*

Students expressed the view that for a first time teaching experience the initial post lesson elation of 'surviving the lesson' can positively or negatively influence the student's interpretation of the actuality of the lesson. One student stated that without the video she wouldn't have been so objective in analysing her work and the exercise increased her confidence in her ability to deliver a lesson as she had evidence to illustrate how she had at times demonstrated good practice. The time lapse and physical distance between the lesson delivery and its analysis created a more neutral environment in which the video could be reflected upon. There was agreement amongst the students that the critiquing of the video forced a much deeper degree of analysis than a simple written reflection would have required. Viewing the video also revealed aspects of their subject knowledge and presentation skills which would not have been realised through reflective writing alone.

While feedback from the teacher mentors was positive and constructive and included the expertise of subject teachers from a specialist school the students expressed the view that because peer observation and critique was presented in a more informal atmosphere than in-depth observations by their peers could be received easily. They also felt that the dynamics between the pairs of students and within the entire group had to be right for this exercise of constructive analysis to be successful.

Finally, the students commented on how using the MLO allowed multiple interpretations of their work and this was viewed as a positive strand to the exercise. Interestingly, one of the side elements of this arose from the collaborative nature of this work. Despite being first year students they commented that through the collaborative nature of the exercise they felt that this was a first and giant leap into being part of the teaching profession.

Conclusion and recommendations

We conclude and recommend the following based on the information discussed in this paper, these are in no particular order.

- The artefacts (multimedia tools and video evidence in file format) are inexpensive, accessible, and intuitive and provide a rich and authentic means to discovering the 'truth' about professional practice, from multiple interpretations. Therefore, we recommend that other educators experiment with this notion of reflective practice using TEL tools.

- The artefacts and processes involved (see figure 1 for more on this), support students' own personal reflection and at any stage in their professional development career due to the transferability of the skills involved in the interdisciplinary nature of the project.

- Students got a sense of 'reality' in terms of the 'situated' nature of the delivery and learning experiences; engaging and interacting with the pupils and being able to record this and reflect upon it repeatedly.

- Students involved in this process in their first year and first time teaching are malleable in terms of the ethos of lifelong learning, before they develop bad habits, and then attempting to change these over a

course of reflection. Furthermore, knowing that reflection is a salient component in their own professional development, negates any negativity that might otherwise be assumed if reflection in and on practice is only included as a bolt-on concept or practice.

- This process gets rid of surface learning from an early stage and promotes a metacognition of learning.

- This first time teaching through video reflective enquiry as a process and model should be adopted more readily by other disciplines and/or educators, to enhance the learning experience and provide a holistic immersion into teaching and learning for pre-professional student teachers.

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