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Video Annotation for Effective Feedback and Reflection on Micro-Lessons in a Collaborative Blended Learning Environment to Promote Self-Directed Learning Skills

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Abstract. This article discusses the process and findings of a study in which Video Annotation (VideoANT) and a Learning Management System (LMS) were implemented together in the micro-teaching lessons of fourth-year Geography student teachers at a university in South Africa. The aim was to ensure adequate feedback and reflection for each student, since this is, in general, a shortcoming of micro-lesson facilitation. VideoANT is an online environment-synchronising web-based video with timeline-based text annotations, and it was imported and managed in the university's LMS known as eFundi. The web videos of the students' micro-lessons on VideoANT were made accessible by the lecturer according to a rotational time schedule managed in eFundi. This enabled students to assess fellow students' micro-lessons in a collaborative blended learning environment, as well as to adequately reflect on their own lessons. Both qualitative and quantitative data was collected and the results indicate that Geography student teachers held positive views of these technology applications for micro-teaching in particular and their teaching careers in general. This video method also proved to contribute to the students' self-directed learning (SDL) skills.

Keywords: Micro-teaching; Micro-lessons; Video annotation; Technologies in education; ICT in Geography education; Web 2.0 technologies; Web-based technologies

Introduction

The integration of web-based technologies can promote student learning and facilitate the development of lifelong learning skills such as collaboration, creative thinking, metacognition and knowledge construction (Lin & Overbaugh 2013) – all of which are important for fostering self-directed learning. Web-based technologies afford teacher educators and teacher students' creative and

collaborative choices, as well as easy access to and interaction with ICT tools and global information. The universal and flexible nature of Web 2.0 tools that are mainly collaborative in nature, promote deeper understanding, solve problems creatively and transform thinking, all by using appropriate technologies. (Nelson 2007; Hemmi et al. 2008; Saeed et al. 2009; King 2011).

As part of their training, pre-service teachers usually receive feedback about their micro-lessons from peers and lecturers after their micro-teaching sessions, but sometimes they may have to wait for such feedback for up to a week. During practice teaching, they can also receive feedback from the supervising senior teachers and lecturers. However, this approach has two limitations. Firstly, in most teacher-training programmes around the world (Airasian 1993; Wu and Lee 1999; Fernandez and Robinson 2006; I'Anson et al. 2003), student teachers receive limited feedback because of time constraints and limited class time. Secondly, pre-service teachers have limited opportunities to reflect on their own teaching and micro-lessons. Reflection is an essential skill that they must develop and hone during their pre-service training (Kettle and Sellars 1996; Amobi 2005). Without proper reflection, student teachers will miss out on, among others, opportunities to recognise the limitations of their personal assumptions or to acknowledge and adopt new perspectives (Lee and Wu 2006). Therefore, Frick et al. (2010) emphasise the importance of teacher educators creating opportunities and facilitating experiences that will develop the student teacher's capacity to reflect on his/her own practice.

Research on the application of video recordings to enhance micro-teaching in teacher training used to be limited to Brent and Thomson's *Video-taped microteaching* (1996). Grossman (2005) later predicted that developments in video annotation tools would make video reflection increasingly viable and accessible. Recently, interest in using video to facilitate teacher reflection has increased significantly (Springer 2008; Trip and Rich 2012). Video annotation tools offer the potential to support both reflection on and analysis of one's own teaching. These tools provide potentially important methods for scrutinising instructional decisions within a specific context (Stevens 2007; Roblyer and Doering 2013). According to Rich and Hannafin (2009), video analysis programs such as Transana™ (www.transana.org), DIVER™ (diver.stanford.edu), Constellations™ (orion.njit.edu), StudioCODE and VideoANT provide significant data-mining capabilities, good management opportunities and fine-grained analysis and reporting opportunities. They also mention other video annotation tools with different functions, namely VAST, VITAL, the VAT, VideoTraces, VideoPaper, MediaNotes, and Studiocode. Regarding Geography teacher training, the Gilbert M. Grosvenor Centre for Geographic Education at Texas State University recently developed an online video-based professional development in Geography teacher training with great success (Boehm et al. 2012). However, most of the research that is limited to teacher training and micro-teaching focuses on self-analysis and self-reflection (Rich and Hannafin 2009), or on student teachers who received only single peer and teacher feedback (Colasante 2011).

At our University, we identified the need to combine collaborative student assessment, feedback and reflection with a video annotation program such as VideoANT, as well as with the managerial capabilities of a Learning Management System (LMS). This article discusses the results of a case study in which these web-based technologies (VideoANT and the university's LMS) were implemented in the micro-teaching methodology class of fourth-year full-time Geography student teachers (BEd degree).

The outlay of this paper is as follows: Firstly, the conceptual-theoretical framework regarding the application of micro-teaching, as well as the possible advantages of collaborative learning in micro-lessons for teacher education will be put in context. Secondly, theoretical advantages of the application of web-based technologies for micro-teaching will be discussed. This will be followed by a description of the method of research, including an intervention section that provides more detail about the operation and utilisation of the two web-based technologies, both separately and in conjunction with each other. The paper is concluded with a discussion of the results and findings regarding students' perspectives and experience of VideoANT, whether it effectively addressed the said limitations of micro-teaching in a collaborative way, and whether this video method has in any way promoted students' SDL abilities or skills in this collaborative blended learning environment.

Micro-Teaching

As student teachers in many training programmes complete their practical teaching with inadequate supervision and little or no feedback, the relative merits and economy of micro-teaching are quite apparent. According to Lee and Wu (2006) it is important that pre-service teachers should receive as much feedback as possible from their practice teaching.

Micro-teaching is a common practice in teacher education and originated as a training technique in the United States in the 1960s. It is a shorter version of a school lesson – approximately eight to ten minutes long – and presented by a student teacher to a smaller group of classmates with the aim of providing student teachers with hands-on, learner-centred teaching experiences (Grossman 2005). Literature describes micro-teaching as a scaled-down, simulated teaching encounter designed for the training of student teachers and regarded as a beneficial and an accepted element of student teacher education. Micro-teaching can provide student teachers with a number of benefits: engaging in the critical examination or assessment of student teachers' lesson presentations (Lim and Chan 2007); critically examining or reflecting on the strengths and limitations of each (Lim and Chan 2007); providing hands-on knowledge and insight regarding effective practice for the trainee to reflect upon (I'Anson et al. 2003); introducing students to the different roles of a teacher (Amobi 2005); teaching them about the importance of planning, decision making, and the implementation of instructional methods and strategies (Gess-Nwsome and Lederman 1990); gaining valuable experience of lesson planning (Bell 2007); enabling students to develop and improve teaching skills (communication, public presentation, etc.) (Benton-Kupper 2001); and building practical teaching

confidence (Brent and Thomson 1996). According to Amobi (2005) and Benton-Kupper (2001), students themselves find micro-teaching to be a useful and enriching training tool (Amobi 2005; Benton-Kupper 2001).

From the literature it is evident that the implementation of micro-teaching in the training curriculum enables both student teachers and lecturers to engage in dialogue and discussion regarding connections between theories of teaching and practical micro-teaching experiences (Allen and Wang 2008). Benton-Kupper (2001) emphasises that feedback to students should be detailed rather than general in nature. She describes detailed feedback as supportive and constructive, and as providing suggestions that can be used to improve student teachers' teaching strategies and methods. Darling-Hammond et al. (2005) mention that "students develop an analytic framework to assess the micro-teaching performances of their peers". The critical examination or assessment of student micro-lesson presentations during micro-teaching is in line with Lim and Chan's (2007) view that "to critically examine or reflect on the strengths and limitations of each approach may restructure students' existing beliefs and encourage them to adopt new instructional practices that are consistent with their pedagogical beliefs". Studies indicate that feedback serves as the "content for and quality of reflection" (Amobi, 2005). This content enables student teachers to reflect on micro-teaching experiences, which leads to changes in self-perception and subsequent behaviour (Amobi, 2005; Benton-Kupper, 2001).

Advantages of collaborative learning in micro-lessons for teacher education

Fernandez and Robinson (2006) highlight the importance of collaboration among student teachers when they plan and present micro-teaching lessons and reflect on them afterwards. Successful collaboration, according to Strijbos et al. (2004), requires the careful design of the learning environment with a view to stimulating group interaction, and the provision of scaffolding (leadership and support) by the facilitator to promote students' understanding. Jianhua and Akahori (2001) point out that optimum collaborative learning performance occurs where collaboration between students is well supported by technology.

Learning is thus a social activity and peers play an important role in encouraging mutual learning (Jia 2005). Collaborative learning is also viewed as the result of a persistent attempt to construct and maintain a shared conception of a problem (Rochelle and Teasly 1995). This leads to a deeper level of learning, critical thinking, shared understanding and long-term retention of the mastered material (Kreijns et al. 2003).

Collaborative learning in micro-teaching offers a space in which group members can evaluate and reflect face to face on their own and fellow group members' micro-lessons to help improve the quality of their learner-centred micro-lessons. The discussions and reflection between group members provide excellent opportunities to engage in pedagogical reasoning that, according to Young and Birds (2009), helps students move toward a mastery of teaching. Savery and Duffy (1995), as well as Sawyer (2006), emphasise that interacting groups do not only provide feedback, but also support and monitor one another's work.

Regarding teacher training, Krajcik et al. (1994) argue that teachers construct their knowledge through social interaction with peers in the form of ideas applied in practice, and through their reflection on and modification of such ideas. Grossman and McDonald (2008) suggest that pedagogies in teacher training need to approximate practice in such a way that prospective teachers can engage in "intensive, focused opportunities to experiment with aspects of practice and then learn from those experiences".

The application of specifically focused Web 2.0 technologies such as video recording and annotation can effectively result in micro-teaching being more reflective, either collaboratively or individually, thus addressing the two limitations mentioned in the introduction. The syndication, authoring capabilities and technology infrastructure of Web 2.0 technologies and their associated applications provide the higher education community with authoring and community-building capabilities, the pedagogical implications of which are still largely unexplored (Hemmi et al. 2008).

Integration of web-based technologies and collaboration to propel micro-lesson learning objectives

As web technologies have grown and become more versatile, they have revealed more adaptable paths and opportunities for learning and assessment. With regard to the conventional role of learning, learners have moved away from their former passive position towards becoming active facilitators of the learning mechanisms. In the era of Web 2.0 technologies, learning has becomes synonymous with collaboration, and learning activities accordingly constitute a society of collaboration (Lin & Overbaugh 2013). Jianhua and Akahori (2001) were among the first researchers to concur that optimal collaborative learning performance should integrate Web.2.0 collaborative learning environments and classroom-based collaborative learning activities.

According to Fernandez and Robinson (2006), students view collaboration as a highly important learning tool in micro-lessons. Luttenburg and Bergen (2008) indicate that participants welcome the sharing of different points of view and the feedback contributed by group members. Wu and Kao (2008) also state that student teachers are usually satisfied with the peer assessment activities supported by the streaming video system and that they consider the *mark video* feature useful for providing more specific comments about a peer's teaching. This supports the suggestion by Jonassen et al. (2003) that technology should be a partner in the teaching and learning process as it engages and supports reflective thinking.

The application of Web 2.0 technologies fits the context of a social constructivist learning environment and examples include social networking sites, blogs, wikis, video-sharing sites, hosted services, instant messengers (IM), web applications, podcasts and vodcasts (Saeed et al. 2009; Roblyer and Doering 2013). From the literature it is also evident that the skilful integration of applicable technologies can promote student learning, facilitate the development

of lifelong skills and ultimately foster SDL. The lecturers of student teachers may also appropriate new uses for technologies according to specific content needs and curricular goals (Nelson 2007; Hemmi et al. 2008; Saeed et al. 2009; King 2011).

In order to integrate Web 2.0 technologies in their training programmes, teacher educators should create well-designed web-based activities that are applicable to specific curriculum standards, embody ownership of choice and provide time for student and teacher assessment and reflection (Nelson 2007; King 2011). For the purposes of the current study, VideoANT was implemented during Geography micro-teaching sessions. VideoANT allows users to make timeline-based textual comments in synchronisation with an on-line video (see Figure 1). It is ideal for peer assessment and provides feedback or facilitated peer reviews (Hosack et al. 2009). When managed within an LMS, it provides an effective training opportunity for student teachers.

Empirical research

Research objectives and design

The first objective of this study was to determine final-year student teachers' perceptions and experience of the contribution made by the video annotation technology VideoANT – as managed and made accessible within the university's LMS (named eFundi) – to achieve the learning outcomes of micro-teaching in Geography methodology in a collaborative way. As a second objective, it was important to determine if this video annotation method in any way enhanced the students' level of self-directedness in general as well as their SDL skills in particular.

The research question could in this instance be answered best by a case study evaluation, as "the case study method fills a distinctive niche as an evaluation tool" (Yin 2012). A case study is bound by time and activity (Creswell 2009) and suggests being distinctive with regard to place, time and participant characteristics (McMillan and Schumacher 2010). In addition, Merriam (2009) points out that the "case study has proven particularly useful for studying educational innovations, evaluating programmes and informing policy". Pragmatism was employed as the philosophy underpinning this study.

Context

The present study was conducted in the context of a teacher education programme offered at a university in South Africa. The Faculty of Education Sciences at this university offers two modes of delivery, a four-year BEd degree, as well as a one-year Post-Graduate Certificate of Education (PGCE). The learning outcomes of the fourth-year methodology module in Geography inter alia comprise micro-lessons, in other words students are afforded the opportunity to present to fellow students a short version of a lesson (±10 minutes as a micro-lesson) that is video-recorded and assessed by peers and lecturers. The micro-teaching sessions are introduced approximately six weeks

before the students leave for practical teaching in schools during the first semester. There are roughly four to five weeks available for micro-teaching.

Participants

All the 2013 fourth-year BEd Geography methodology student teachers (N=20) took part in the study.

Instrumentation, data collection and analysis procedure

A mixed-method approach that involved collection and analysis of both qualitative and quantitative data was used (Cresswell 2008). The researchers employed the following qualitative and quantitative data collection methods:

- *A questionnaire* with 25 Likert-scale questions was administered to the students to determine how they perceived, experienced and valued these technologies for Geography micro-teaching. The questionnaire also included open-ended questions on any positive or negative aspects regarding the workability of this video method operated in eFundi, as well as some questions about the collaboration between the students in a group context.
- *Semi-structured interviews* were conducted with some of the students in a focus group that had been compiled from different class groups (n = 6). The aim of these interviews was to evaluate the contribution that the technologies involved made to micro-teaching in particular and to teacher training in general.
- To determine the students' level of self-directedness in learning we used Williamson's (2007) Self-Rating Scale of Self-Directed Learning (SRSSDL). The SRSSDL was developed to measure the level of self-directedness in one's own learning, and it consists of 60 items categorised into the following five areas of SDL:

  Awareness: Twelve items that relate to learners' understanding of the factors that contribute to their becoming self-directed learners.

  Learning strategies: Twelve items that explain the various strategies self-directed learners should adopt in order to become self-directed in their learning processes.

  Learning activities: Twelve items that specify the requisite learning activities in which learners should actively engage to become self-directed in their learning processes.

  Evaluation: Twelve items that reveal learners' specific attributes so as to help monitor their learning activities.

  Interpersonal skills: Twelve items that relate to learners' skills in inter-personal relationships, which are a pre-requisite to their becoming self-directed learners.

  In our study, a five-point Likert scale was used to rate each item, with 5= always and 1= never. All items were positively stated and a maximum score of 300 and a minimum of 60 could be obtained. According to Williamson (2007) a score between 60 and 140 is defined as low and definitive guidance

from the facilitator is still needed. A moderate SDL score lies between 141 and 220, which implies that there are still areas in respect of self-directedness that need improvement. A high score of between 221 and 300 indicates effective SDL (see Table 2).

Reliability and Data Analysis

The present research formed part of a larger research project on SDL conducted at this University. Within the large project, we utilised the SRSSDL (n=403) and Cronbach's alpha coefficients (Anastasi, 1988) for the five categories of the questionnaire. Their values ranged from 0.76 to 0.88, which implies that they do not only correlate highly with the Cronbach alpha coefficient reported by Williamson (2007), but also that the SRSSDL is reliable within this South African context.

Our quantitative analysis of data was conducted by means of descriptive statistics such as frequencies, means and standard deviations. The questionnaire was based on a five-point Likert scale with (1) indicating strong disagreement with the statement, and (5) indicating strong agreement. The internal consistency for each group of questions (grouped together to best respond to the different research objectives) was estimated using Cronbach's alpha coefficient. According to Nunnaly (1994), a scale with a computed alpha greater than 0.70 is considered to have an acceptable level of internal consistency, especially for cognitive or ability tests. However, since Field argues that it is realistic to expect values below 0.70 because of the diversity of the constructs being measured, a value of greater than 0.60 was also considered internally consistent in these instances (Field 2009). For this study, Cronbach's alpha coefficients of 0.674 and 0.631 were calculated for the research objectives identified in 3.1. Furthermore, unidimensionality and descriptive statistics such as frequencies, means and standard deviations were applied where necessary.

For the qualitative analysis, a process of inductive coding was employed, which followed the sequence of open coding, axial coding and selective coding. The questions asked during the interviews guided the coding process, but new codes emerged from the answers to open-ended questions and hence led to new insights. Code generation was handled manually and required continuous metacognitive reflection.

For the SRSSDL, a mean score per category was obtained for the pre-test as well as the post-test. T-tests were used to analyse the differences in the responses of the students in the pre- and post-test. Effect sizes (Steyn 2002) were also calculated to determine whether practically significant differences had occurred between the pre-test and post-test. Seeing that a random sample was not used, p-values and statistical significance could not be reported. The effect size (d-value) indicated the practically significant differences between the two mean scores (pre-test vs. post-test), where 0.2 indicated a small effect, 0.5 a medium effect, and 0.7 a large effect that was of practical significance.

Instructional procedures

At the University concerned, four scheduled contact sessions per week are offered in the Geography methodology module for the fourth-year BEd and PGCE student teachers in a semester course. Two of these sessions are used for theoretical studies and two (in this case a double period) for micro-teaching. In the theoretical studies the focus is on teaching and learning theory, strategies, methods and teaching aids, as well as on assessment strategies and methods in Geography teaching and learning. For the micro-teaching part, students have to design learner-centred instructional lessons that are embedded in the socio-constructivist approach. The purpose of the micro-teaching sessions is for the student teacher to demonstrate the ability to integrate content, methodology and pedagogy, as covered in the National Curriculum Statement (NCS) for Geography. Students are expected to present at least one properly assessed micro-lesson (± 10 minutes) per semester.

As part of our study, students were instructed to select themes for micro-teaching as prescribed in the NCS for Geography teaching according to their specific specialist phase, i. e. intermediate, senior or Further Educational Training (FET). Each student had to design a learner-centred 10-minute micro-lesson in collaboration with the other four members of his/her group. (A micro-lesson normally consists of three prominent phases – a creative introduction phase, a teaching and learning phase with an applicable teaching/learning strategy, and finally, a reflection and consolidation phase.) The lesson was subsequently presented in a class setup to the group who acted as the 'learners', and it was video-recorded by a fellow student or assistant. The presenting students were expected to make use of teaching aids such as PowerPoint, transparencies, worksheets, posters, models, role play, educational games, etc. The main focus of the micro-lesson was to see whether the student succeeded in implementing learner-centred instructional strategies and activities that would not only ensure the active involvement of the learners in the learning process, but also promote and facilitate communication and collaboration among learners in the class.

The recorded micro-lessons were then uploaded in VideoANT and embedded in eFundi (see Figure 2), from where they were made accessible to fellow students according to a predetermined assessment schedule (see details later in this article). The students then assessed one another's micro-lessons (group-by-group assessment as illustrated in Figure 3) on VideoANT by adding comments or recommendations at specific lesson moment – indicated by a marker on the video timeline (see Figure 1).

Intervention

VideoANT 2.0 beta

VideoANT is an online application tool – designed by Hosack, Miller and Ernst (2009) from the University of Minnesota – that synchronises web-based video with an author's timeline-based text annotations. VideoANT was designed to engage learners by supporting interactions between students, instructors, and

the video content. This application allows students to tag specific portions of a video on which they wish to make a comment or give feedback (Hosack et al. 2009). VideoANT can be accessed via the web address http://ant.umn.edu/vae.php (a newer version is available at http://ant.umn.edu). For the proper operation of videos in VideoANT, it is preferable to access them in flash Video (*.flv) format. The videos (usually in *.MOD, *.MPEG or JPEG format) must be compressed and converted to a *.flv file (a common flash player video). A variety of products for this purpose can be found on Google as free versions, such as the *Riva FLV encoder* or *Format Factory*. With this software, it is for example possible to compress a 120 megabyte (MB) video file six to ten times to approximately 12-20MB, which is much easier for web operation.

Figure 1 shows the different attributes and functions that VideoANT offers. The video can be viewed on the left of the VideoANT screen with the play and pause buttons underneath. On the timeline at the bottom of the screen, markers and corresponding comments/remarks can be added at any place by clicking the *Add a Marker to this Timeline* button, which then correlates with the comments column to the right of the screen. On clicking this button, the video pauses and a pin or marker appears on the timeline of the video to which the comment corresponds. This ability of VideoANT is seen as extremely valuable for the purpose of micro-lessons. The viewer can also slide the video forwards and backwards by clicking and dragging the timeline with the mouse for quick browsing through the video.
A group's own video of their micro-lesson can be made viewable to them but will not be editable. Viewing is possible by activating the VIEW link of VideoANT in each group's eFundi site. It only allows the group members to view the comments (see Figure 2 that shows the VideoANT embedded in eFundi without the *Add a marker to the timeline* button).

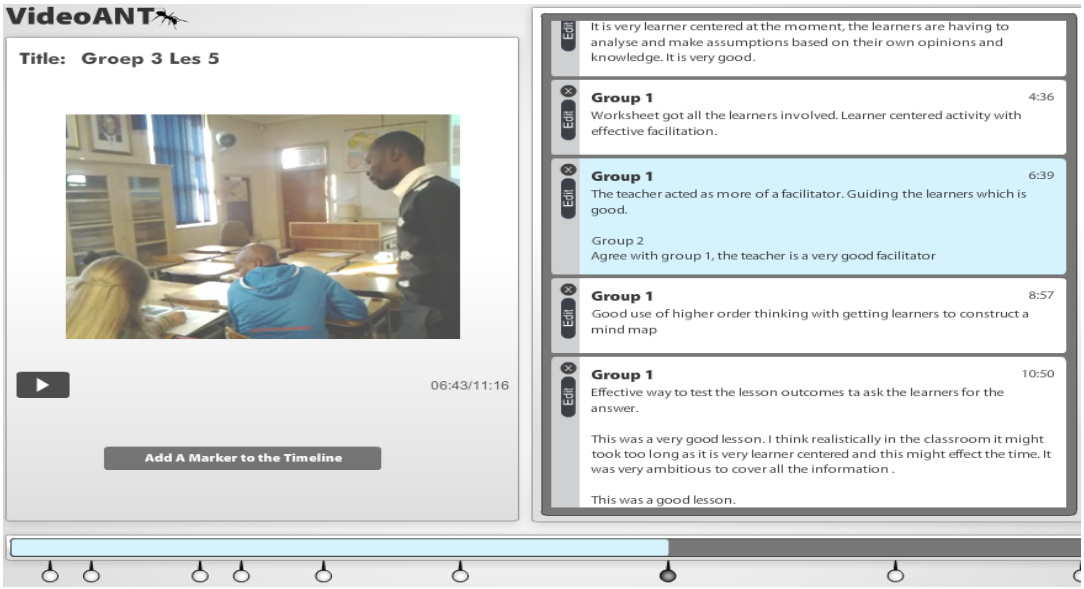

Figure 1 Screen shot of VideoANT in operation (video on the left, comments column on the right and timeline with markers that indicate the corresponding place of the comment)

To manage these videos according to an assessment schedule between the groups, it is necessary to upload and access them through an LMS, in this instance eFundi.

eFundi as the University's LMS with VideoANT

eFundi is the university's name for Sakai (http://www.sakaiproject.org/), a web-based collaboration and learning management system (LMS). Being an e-learning education system based on the web, eFundi typically uses Web 2.0 tools for two-way interaction, and includes a content management system. An LMS is also known as a Course Management System (CMS).

VideoANT can be more proficient if accessed, operated and managed within eFundi. To make VideoANT operational in eFundi, the appropriate links have to be added to the tool list in the left-hand column of eFundi. The customisable *web content* function that is available in the *edit tools* option underneath the *site info* tool on the LMS should be used to give the video your name of choice. This *web content* or customised name of the VideoANT video will then appear as a choice in the left-hand toolbar of the eFundi website (see examples of added toolbar options in Figure 2, such as *Own Lesson 4* and *Assess+Edit 2de Les*).

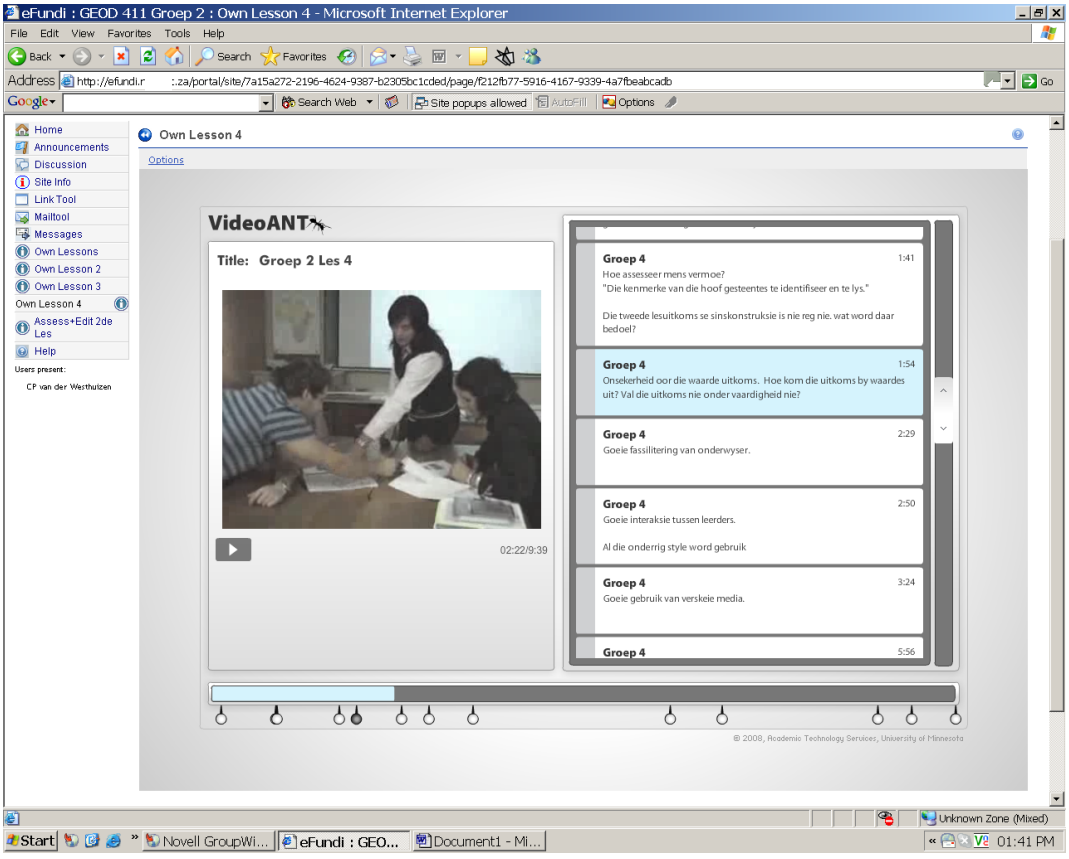

Figure 2 VideoANT within the LMS, eFundi (showing the toolbar on the left with the web content as a customised name, e.g. "Own lesson")

Use of VideoANT in a collaborative context managed by eFundi

The class of 20 students was divided into four groups of five. The micro-lesson experiences stretched over a period of five weeks to enable each group member to present a micro-lesson – one lesson per group per week. Thus four micro-lessons were recorded per week (one per group), which needed to be assessed by two other groups each week (see Figure 3). We created a website for each group in eFundi – there they were able to view the videos of their own micro-lessons with the annotations (comments made by other groups) and to moderate and evaluate other groups' micro-lessons at allocated times (see Figure 3). The assessment opportunity was made available in the left-hand toolbar list of each group's eFundi site on different days of the week as it was turned on and off by the lecturer (see left-hand toolbar in Figure 2).

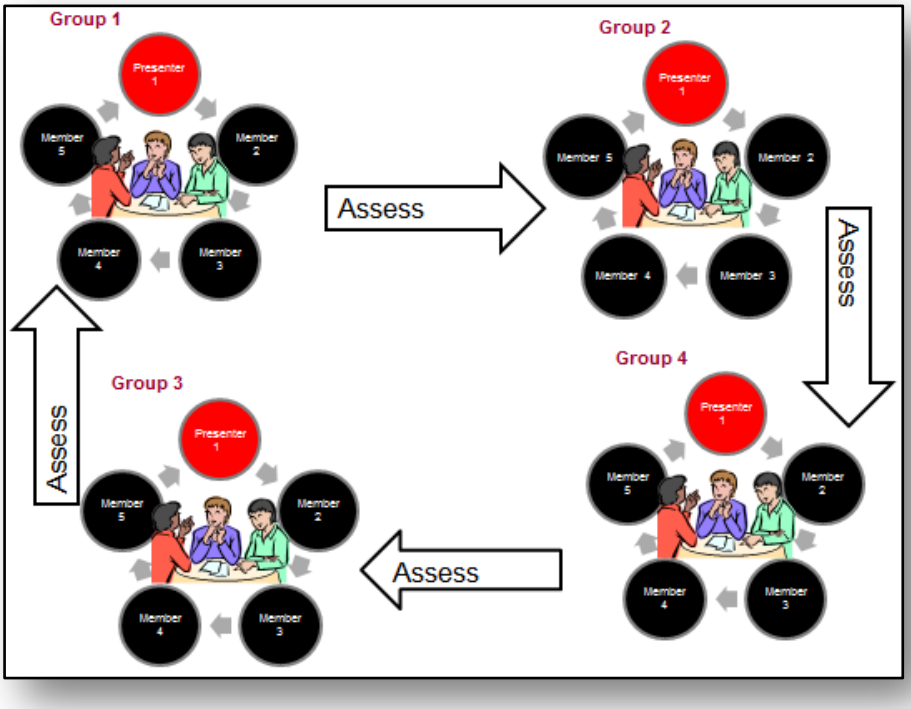

Figure 3 Collaboration and group-by-group assessment on a rotational schedule

In each week, the following sequence of day-to-day activities took place on each group's website in eFundi:

- DAY 1: The micro-lessons were recorded.
- DAY 2: According to a rotational system, each group received a micro-lesson to assess.
- DAY 3: To ensure detailed and fair assessment of micro-lessons, the assessed lessons of DAY 2 were rotated (managed by the lecturer in eFundi) to a next group. They had to evaluate and moderate the assessments made by a previous group by indicating whether they agreed or disagreed with

the comments made, and they could also make their own assessments where necessary. These options were made available or unavailable by the lecturer by editing the toolbar choices on each group's eFundi website. (See the highlighted comment in Figure 3 where Group 2 commented on the comment made by Group 1. Also see the left-hand toolbar in Figure 2 for options made available.)

All the recordings of DAY 1, assessments of DAY 2 and moderations of DAY 3 had to be done outside of class time. During contact sessions the lecturer continued with normal course work.

- DAY 4 (usually a Thursday or Friday) comprised the class session (preferably a double period) of micro-teaching. The videos of all four micro-lessons were played to the whole class via VideoANT (within eFundi), and the program showed all the assessments and moderations made by the groups during the week. This class session allowed for further discussions, reflections and the lecturer's input, and it gave the respective groups the opportunity to 'defend' their micro-lessons where/if necessary. This ensured that the comments made on VideoANT as well as in the class sessions were constructive and properly debated, and that they contributed to an effective learning experience of the student teachers in their Geography micro-lessons.

In the course of the five weeks, every group member got an opportunity to present a micro-lesson, have it assessed by two other groups, as well as listen to the class discussion and the lecturer's input on his/her micro-lesson. In total over the five weeks, each group presented five lessons (one by each member), assessed/moderated ten lessons in a group context (two lessons per week from two different groups), and listened to most of the lessons during the joint class sessions on DAY 4 (including the comments and input of the lecturer and all class members). All five annotated micro-lessons (one for each group member), remained available on each group's eFundi website for them to view and reflect upon in their own time. This enabled them to look at other additional information that was available in the video recording, such as the presenter's appearance, mannerisms, teaching skills, etc.

Findings and discussion

All the student teachers were pleasantly surprised by the efficiency of VideoANT, they thought it to be an excellent teaching and learning aid, and they remarked on how easily it operated for the assessment of micro-lessons. The following qualitative data gained from the open-ended questions of the questionnaire provided support and triangulation possibilities with regard to the quantitative data. The respondents remarked inter alia: "Excellent aid for effective learning" and "Programme is easy and simple to use even on a beginner level". From the interviews, John (pseudonyms are used for all participants) commented as follows on the easy accessibility and simple operation of VideoANT:

> I think the big thing with VideoANT is that the programme was so easy to use; nobody could have said they could not operate it, could not get it right, struggled, etc… I think you really don't have to be very skillful [sic] with a computer to use the programme correctly.

To emphasise their positive attitude towards the VideoANT method, Diane said that she and her fellow group members were very satisfied with the way VideoANT and eFundi managed this exercise with micro-lessons. They were also impressed by the number of assessments and reflections made possible by these technologies within a short period of time:

> ...Now we record all lessons in one day, assess two lessons according to a time schedule on eFundi in our own time on our computers, whilst we can monitor our own lessons being assessed, as well as watch and discuss them again during the class session, all in one week, and over four weeks it is a lot of lessons to learn from.

The Geography students' perception and experience of the effectiveness of the VideoANT method for collaboration

Questions 8, 9, 10, 19, 22 and 25 from the questionnaire, which deal specifically with how the student teachers perceived and experienced the VideoANT method's effectiveness for collaborative learning were grouped together in response to the second research objective. The students' responses are presented in Table 1. The computed value of Cronbach's alpha coefficient for this group of questions was 0.631 and according to Field (2009), points to an acceptable level of internal consistency.

Table 1: The students' perception and experience of the VideoANT method as effective for collaborative learning and promoting SDL (n=18)

		5-point Likert Scale: 1 = *strong disagreement*, 5 = *strong agreement*					
No.	Question	1	2	3	4	5	*Mean*
8.	The collaborative working method in group context was always effective.	0	1	3	6	**8**	*4.2*
9.	The collaborative working method made the work easier.	0	1	2	7	**8**	*4.2*
10.	Everybody in the group worked well together and carried his/her part of the responsibility.	0	2	2	3	**11**	*4.3*
19.	The use of VideoANT and eFundi made group work more effective.	0	0	3	6	**9**	*4.3*
22.	VideoANT and eFundi as technology aids enhanced self-directed learning.	0	0	1	7	**10**	*4.5*
25.	VideoANT and eFundi as technology aids effectively supported collaborative learning.	0	0	0	5	**13**	*4.7*

Cronbach's alpha coefficient = 0.631 (average for the six questions)
Average of six questions = 4.4 with a standard deviation of 0.45

From Table 1 it is evident that the majority of evaluations scored a 5 or 4 on the Likert scale, which implies *strong agreement* or *agreement* with the statements. The only exceptions were questions 8, 9 and 10. Nevertheless, the average mean for the six questions together is still 4.4 (see bottom of Table 2). In respect of questions 8, 9 and 10, Payne and Monk-Turner (2006) remark that students are

often inexperienced at working collaboratively; they have difficulty meeting in groups because of conflicting schedules and priorities; they are intimidated by the amount of work and organisation involved in collaborative learning experiences; and they are often frustrated by other students who do not carry their weight. Furthermore, Table 1 reveals that almost all the students (17 who *strongly agreed* or *agreed*) reported that they believed that the VideoANT method ultimately enhanced SDL. In fact, all the students (18) *strongly agreed* or *agreed* that this video method effectively supported collaborative learning. Fifteen of the 18 students also felt that this method made group work more effective. According to Diane, they were very satisfied with the way eFundi and VideoANT helped manage the collaboration:

> …Moreover, we each effectively gave four lessons because we were part of a group and helped the presenter on the planning of lessons. Furthermore, VideoANT was not time consuming, it helped to do the assessment quickly and efficiently.

The above remark emphasises Amobi's (2005) viewpoint that good feedback serves as the "content for and quality of reflection". Moreover, the VideoANT method optimally supported the effective collaboration between group members despite the fact that they could not always come together. This fact was best testified to by Marli:

> When the group can't get together to do the micro-lesson assessment of another group, we each did it on our own…while the other group members could add comments or edit each other's comments on their own time until all agreed on the final assessment….

To this, Sam added:

> …you could access VideoANT wherever you were at a computer which could get internet access to login to eFundi.

The most commonly mentioned advantage of VideoANT was that students were able to *reflect more* thoroughly on their own micro-lessons, which helped them to *improve* their lessons more than other methods do. This correlates with Lee and Wu's (2006) viewpoint of the value of reflection. Marli again summarised this aspect the best:

> Everybody has a different way of teaching, and with the help of this technology you could see everybody's lessons and implement what you've learned from others in your own lesson…

The Geography students' perception and experience of the ability of the VideoANT method to promote SDL skills

The scoring range in Table 2 indicates the respondents' level of self-direction in learning, based on their individual scores and the corresponding interpretation according to Williamson's (2007) SRSSDL, which were developed to measure the

level of self-directedness in a student's own learning.

Table 2: Scoring range of the 2013 fourth-year LASD411 students to indicate their level of SDL and the interpretation of their scores according to Williamson (2007)

Scoring range and level of self-directed learning	Pre-test total score	Post-test total score	Interpretation according to Williamson (2007)
60-140 Low	-	-	Guidance is needed from the teacher. Any specific changes necessary for improvement must be identified and a possible re-structuring of the methods of learning must be suggested.
141-220 Moderate	(n=9) Ave = 204.7 Mean = 3.41	(n=4) Ave =207.3 Mean = 3.45*	This is half way to becoming a self-directed learner. Areas for improvement must be identified and evaluated, and a strategy must be adopted with teacher guidance when necessary.
221-300 High	(n=11) Ave = 237.2 Mean = 3.95 <u>Whole Class</u> (n=20) Ave = 223 Mean = 3.72	(n=15) Ave = 239.1 Mean = 4.00 <u>Whole Class</u> (n=19) Ave = 232 Mean = 3.90	This indicates effective self-directed learning. The goal is to maintain progress by identifying strengths and methods for consolidation of the students' effective self-directed learning.

The test results of the fourth-year students in the current study showed that no one scored in the lower range. In the pre-test, nine students achieved a moderate score for their level of SDL. Remarkably, in the post-test, five students migrated to the high level, three remained in this category, and one migrated down from the high level. This left the moderate level with four students, while the high-level category increased from 11 to 15 students. The mean of both the moderate and high categories also increased slightly in the post-test. This indicates that the use of the video method in this methodology class could have assisted in increasing the level of self-directedness of the whole class, which is emphasised by the fact that the overall mean of the whole class increased from 3.72 to 3.90. Thus (according to Williamson's interpretation), only four students in the class would in the end need guidance for improvement in becoming more self-directed.

As indicated earlier, the computed coefficient alpha in all five areas indicates sufficient correlation. For establishing the construct validity, a known-groups technique was used; it was observed that the average scores for the pre-test and post-test was 223 and 232 respectively. The students' post-test scores were higher than their pre-test scores, which suggests that overall the students improved their SDL skills.

Regarding the five broad areas of SDL, the students tested as follows in the pre- and post-tests (see Table 3 for paired sample statistics). The students' responses to the SRSSDL were summarised in frequencies and percentages. The responses of both the pre- and post-test of the students were summed up in order to obtain the average scores.

Table 3: Measured changes between the pre-test and post-test results in the five broad areas of the SRSSDL for the fourth-year LASD411 students of 2013

Paired areas of SDL	Mean	N	Standard deviation	Effect size *(d-value)*
Awareness (pre-)	3.97	20	0.38	
Awareness (post-)	4.02	19	0.45	0.12
Learning strategies (pre-)	3.82	20	0.39	
Learning strategies (post-)	3.73	19	0.43	0.22
Learning activities (pre-)	3.55	20	0.52	
Learning activities (post-)	3.70	19	0.42	0.29
Evaluation (pre-)	3.48	**20**	0.40	
Evaluation (post-)	3.79	**19**	0.44	**0.80**
Interpersonal skills (pre-)	4.07	20	0.36	
Interpersonal skills (post-)	4.12	19	0.41	0.15

According to Table 3, the fourth-year student teachers improved in all areas except for the *Learning strategies* area where a slight decline was noticed. However, this proved to be not practically significant with a small d-value of 0.22. Because of the evaluative character of this video method to support assessment, reflection and feedback on micro-teaching in the Geography methodology class, it is not surprising that there was a practical and significantly large effect in the *Evaluation* area of the student's self-directedness. According to Table 3 it was precisely the *Evaluation* skills of the students that tested lowest in the pre-test, but improved most in the post-test. According to Figures 4 and 5 that show the responses of the students in the broad areas of the SRSSDL in the respective pre- and post-tests, it is clear that there was a significant improvement in the *Evaluation* skill area, as the 'often' choice increased from 35% to 49.1%. Besides the improvement of *Evaluation* and *Learning activities* skills all the other broad areas stayed more or less the same.

Furthermore, according to these graphs, there was an overall decline in the 'seldom' and 'never' choices from the pre-test to the post-test, not only for the *Evaluation* skills, but in all the broad areas of the SRSSDL. Furthermore, from a breakdown of the dataset, the effect size (d) for the students who scored in the 'moderate' SDL category in the pre-test was as high as 3.65 in the post-test, as the mean size of their *Evaluation* skill improved from 3.1 to 3.7, followed by the *Learning activities* broad area which had a d-value of 0.73. The improvement of the *Learning activities* as one of the broad SDL areas is noticeable. All over, the broad areas of the SRSSDL remained fairly moderate to high.

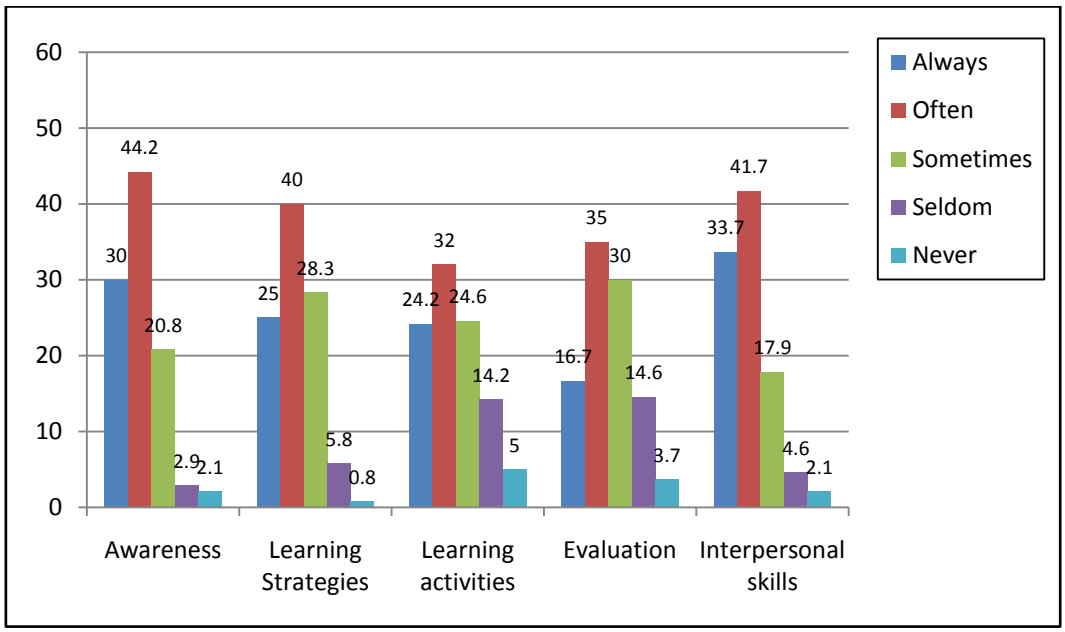

Figure 4: Fourth-year student teachers' pre-test responses to broad areas of the SRSSDL (in %)

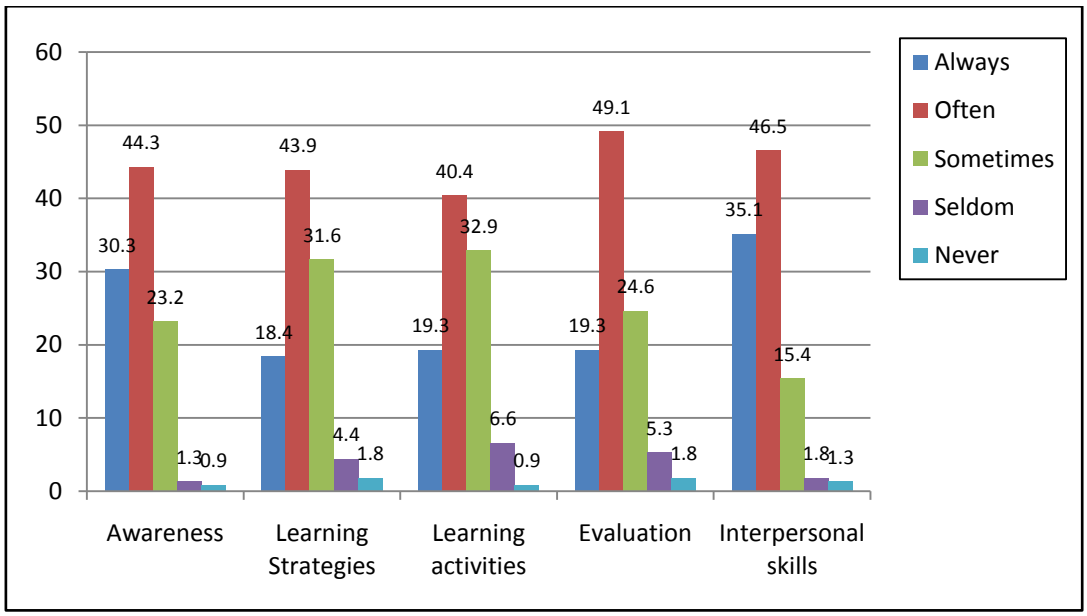

Figure 5: Fourth-year student teachers' post-test responses to broad areas of the SRSSDL (in %)

Conclusion

The students involved in this case study felt that this video method (VideoANT in conjunction with eFundi) supported micro-teaching optimally. They rated it an excellent teaching and learning aid to improve micro-lessons because of the greatly increased reflection, feedback and assessment opportunities that it offers.

From the students' point of view, it was a great asset to be able to watch and re-watch their micro-lessons and to again evaluate the comments made by fellow

students in respect of exact moments in the video. The students were equally impressed with the benefits of working together in groups. The VideoANT and eFundi technologies proved supportive in achieving the learning aims of micro-teaching, in improving the students' teaching skills in general, as well as in empowering them to do sufficient and effective reflection and self-reflection. Using this method also seemed to help improve the students' self-directed learning skills in general, but it was their evaluation skills in particular (one of the five broad areas of the SRSSDL) that were improved most significantly (this area was tested as the lowest SDL skill in the pre-test). It was precisely the self-directed learning skill that was most repeated and trained with the VideoANT method, and Jacques valued this method by saying that many assessments could be made in one week …*and over five weeks it is a lot of lessons to learn from.*

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