Best of EDEN 2010

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at the 2010 EDEN Conferences

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Edited by
András Szűcs, Ulrich Bernath

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Introduction

One of the important missions of EDEN is to support the exchange of academic and professional experience, to promote navigation and information reach on the rapidly evolving scene.

EDEN is organising since 1992 annual European conferences for open, distance and e-learning, and also bi-annual thematic research workshops and Open Classroom conferences on learning innovation for school level e-learning.

The EDEN conferences have become **major academic and professional events in Europe, with increasing attendance from other continents**. They are based on **collecting best practice**: the papers build presented and published in the Proceedings have been serving as relevant resources for the professional community.

The **integrating approach** of the conferences helps to **consolidate the academic and professional knowledge and to build the international community of professionals**.

Research in open, distance and e-learning is indispensable to provide information for development, decision-making and quality of products and services. Even more this is the case as many changes occur and the pace as well as the extent of innovation often seem to be dramatically fast and wide.

A selection of the best EDEN conference papers from the past few years, revisiting research, innovation, and professional practice in distance and eLearning has been published under the title: "Distance and eLearning in Transition – Learning Innovation, Technology and Social Challenges" (ISTE and Wiley). The book is revisiting research, innovation, and professional practice in distance and eLearning.

It has been an ambition to introduce the regular publication of outstanding papers presented at the EDEN Conferences. Key elements of the framework for such compilation can naturally be EURODL and the Best Research Paper Awards Scheme.

The EDEN Best Research Paper Award was launched in 2008 and it is granted at EDEN's Annual Conferences as well as at the Research Workshops. A high quality standard selection process guarantees the branding of the award for scholarly conference papers in the field of open, distance and e-learning.

The selection process takes place in collaboration with the Ulrich Bernath Foundation for Research in Open and Distance Learning and is supported by a Jury, nominated by the Foundation and approved by the EDEN Executive Committee.

A special issue of the European Journal of Open, Distance and E-learning – EURODL entitled "Best of EDEN 2010" has collected the enhanced versions of the final candidate and winner research papers of the Best Research Paper Awards 2010 (EDEN 2010 Annual Conference in Valencia in June and the 6th Research Workshop in Budapest)

EDEN is working on publishing the Special issue as printed version as well, later in 2011.

Dr András Szűcs
Secretary General, EDEN

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Mathematical Intimacy within Blended and Face-to-face Learning Environments

Oana Radu, Tim Seifert, Memorial University, Canada

Best Research Paper Award Winner

Abstract

This paper analyzes students' mathematical intimacy, confidence, perseverance and flow experiences while learning mathematics in two settings. Are students more engaged in problem solving, more inclined to experience joy, more confident and persistent while doing mathematics in blended or in traditional learning environments? Students in a blended learning environment responded to two sets of items assessing mathematical intimacy, confidence, persistence and flow. The first set of items asked about mathematics in general; the second asked about these constructs in the context of MyMathLab. The factor structure from survey one was imposed upon the data for the students in the blended classroom, and a multi-group analysis performed. Results suggested that students in the blended classroom had slightly lower intimacy scores for MyMathLab experiences than for mathematics in general, but differences were not statistically detectable. However, the variance of the distribution of intimacy scores was larger for MyMathLab experiences because of a slight decrease in those scores. Slightly lower mathematical intimacy scores for some students in the MyMathLab framework might interpreted as a result of their inability of experiencing joy in doing mathematics in the brief period of time when they were solving math online. These lower scores of mathematical intimacy translate into decreased enjoyment and sense of well being that leads to poorer confidence, and slightly lowered confidence scores.

Key words: mathematical intimacy, flow, confidence, blended learning environment

Introduction

Oftentimes, learning mathematics involves using technology as a conscious attempt to understand the material in a new and accessible mode, to increase performance, and to expand one's knowledge regardless of the level of training. While comparative assessments of students' performances in blended and face-to-face environments are essential, the authors of this paper analyze students' mathematical intimacy and flow experiences, as well as their confidence and perseverance while learning mathematics in two different settings. Are students more engaged in problem solving, more inclined to experience joy, excitement and affection, more confident, and more persistent while doing mathematics in blended or in traditional learning environments? The authors of this paper aim to answer the question from the perspective of using MyMathLab, a Pearson based online course, within a blended teaching and learning environment for Algebra and Trigonometry, a large first year university mathematics course. This paper aims to analyze and interpret students' mathematical intimacy, confidence and perseverance in these two different learning environments.

MyMathLab is an online course designed by Pearson Education Canada as an accompaniment to its Algebra and Trigonometry textbook. MyMathLab is built on the MathXL platform, Pearson's online homework and assessment system and is accessed via CourseCompass, the Pearson online learning environment. University professors can choose MyMathLab for use throughout the whole course, or just some topics within the course. MyMathLab offers instructors and students a remarkable selection of course materials that range from a large database of exercises to multimedia resources, such as video lectures, animations, and an electronic version of the textbook. Instructors are not constrained to draw on the existing database; new items can be added. Practice exercises regenerate automatically for an indefinite number of times, thus offering students the opportunity to rehearse each math problem. To aid comprehension of mathematics concepts students can use the interactive solution guide and worked examples accompanying each exercise in the database. Students receive instant feedback upon solving each exercise. Moreover, MyMathLab offers an online grade book, which automatically registers students' homework results and gives instructors control over computing final marks.

Implementing new technologies is especially significant at the undergraduate level where students encounter a wide range of definitions, theorems and proofs that lay the foundation for more sophisticated mathematical thinking. Students' abilities to interpret, analyze, retrieve and use different mathematics concepts become crucial for future work in science. To improve students' performance, reduce high failure rates, and to create long-term sustainable teaching and learning strategies for large mathematics classes, MyMathLab was used for teaching the Algebra and Trigonometry course at one comprehensive Canadian University. MyMathLab was used during two classes in consecutive semesters: first with a class of 26 and then with a class of 127 students. In addition to the face-to-face teaching format, written assignments, midterm and final examinations, students were required to complete 10 MyMathLab quizzes each semester. A variety of factors contribute to students' achievements, thus making comparisons difficult, but based on the assessment scores taken prior to enrolment in the course and on the average final grade scores it is believed that the group using MyMathLab made greater progress than students who did not (Kondratieva & Radu, 2008). A snapshot of the research study testing the effectiveness of this environment shows that the percentage of students who received As increased from 12.9 percent at the time when the course was taught without MyMathLab to 15.4 percent at the time when MyMathLab was incorporated in the course. As well, the percentage of students receiving Bs increased from 19.3 percent to 26.9 percent (Kondratieva & Radu, 2008). This snapshot was taken during the first round of implementation of MyMathLab. During the subsequent semester, the picture was even clearer, because not only the percentage of students who received As increased from 12.6 percent to 18.8 percent, the course average of those receiving As increased from 85 percent to 88 percent. Furthermore, this report underlined that structural support coordinating MyMathLab exercises, in-class instruction and assessments practices could help students in achieving better math results. It predicated future usage of tighter support for every topic in the course, and a higher correlation between MyMathLab and in-class instruction.

Subsequently, MyMathLab was used within a blended learning environment, where the instructor combined traditional teaching methods and computer-mediated instruction strategies as part of classroom teaching. The instructor had the opportunity to monitor, control, adjust and match the blended teaching process with the weekly online homework offered through the online laboratory created to assist students in their mathematics e-journey. Again, students were required to complete 10 MyMathLab quizzes. While it is apparent that students' performances improve

(Kondratieva & Radu, 2008), it makes sense to analyze students' emotional structures in blended and face-to-face environments, because how much success they eventually have in mathematics is intimately related to both the cognitive and the affective processes that characterize their thinking and problem solving in the subject (McLeod & Adams, 1989; Goldin, 2008). If the emotional tone of mathematical learning is integrally related to how mathematical information is perceived, processed, stored or retrieved, the potential value of studying the impacts of this learning could be essential. And this leads to one significant research question: Do students' mathematical intimacy and its positive by-products, namely confidence and persistence vary within blended and face-to-face environments?

In recent years, mathematics education researchers have started to pay attention to the role affective elements play in doing mathematics. Largely portrayed as encompassing emotions, beliefs, attitudes and values/morals/ethics, the affective domain is of primary concern for mathematicians and mathematics educators since it plays a fundamental role in the development and long-term appreciation of mathematics knowledge. Mathematics education researchers concerned with the learning of mathematics highlighted the importance of emotions in learning and problem solving performance (DeBellis, 1999; DeBellis & Goldin, 1997; McLeod & Adams, 1989). The emotive aspects of knowing could influence one's acquisition of mathematics knowledge. Affect, viewed as a representational system interacts with the cognitive representation systems, such as verbal, imagistic, formal notational and executive control (Goldin, 1987; 1988). As a representational system affect has a huge ability to encode as well as trade the affective information while interacting with other representational systems. Such exchange system is essential to "mathematical understanding and problem-solving performance" (DeBellis & Goldin, 2006, p. 133). Building on analogies with cognitive structures, affect as a representational system includes affective structures such as values, beliefs, attitudes and pathways of emotional feeling (DeBellis & Goldin, 2006). As a representational system, affect includes changing states of emotional feelings during mathematics problem solving, also known as local affect, as well as more permanent and stable constructs, known as global affect (DeBellis & Goldin, 2006). Situated within the context of local affect, mathematical intimacy is an affective structure that carries emotional meaning and weight for students.

Based on psychological research, mathematical intimacy is defined as a form of intimacy that consists of two components: intimate interactions and intimate relationships (DeBellis, 1998; Prager, 1995). A series of intimate mathematical interactions build up intimate relationships. Thus, the core of this affective structure lies with the intimate interactions, which are characterized by intimate mathematical behaviours and intimate mathematical experiences. According to DeBellis (1998), examples of intimate mathematical behaviours include "the distance a problem solver places between himself and his work, cradling his work, temporary loss of hearing external noises because he is so focused and consumed by the interaction, and hesitation in sharing mathematical solutions" (p. 437). Intimate mathematical experiences incorporate "positive feelings and perceptions of understanding which a problem solver incurs while solving a problem or thinking about a mathematical concept" (p. 437). Examples include warmth, passion, time suspension, vulnerability, loyalty, and positive emotions such as joy, excitement, affection, elation, or amusement. But, beyond this organized structure, experiencing mathematical intimacy is equivalent to being highly engaged in problem solving, having a warm-hearted dialogue with various math concepts, analyzing and comprehending its most inner structures, or creating a close bond with mathematics. Nevertheless, mathematical intimacy does not represent a guarantee to a "positive long-term relationship with mathematics" (DeBellis & Goldin, 2006, p. 138), as mathematics problem solvers could feel betrayed in intimacy. This occurs when they experience unpleasant emotions, "unexpected mathematical outcomes, failures, negative reactions from loved ones, rebuke from a trusted teacher, or scorn from peers" (DeBellis & Goldin, 1999, p. 252). The possibility of experiencing betrayal is explained through the vulnerability aspect of intimacy, and could be encountered by students and professors alike. The above description of mathematical intimacy underlines its focus on the profound relation between the individual and mathematics.

In addition, Goldin (2008) claims that mathematical engagement, a form of mathematical intimacy, may be connected to flow. This connection is based on items, such as loss of self-consciousness while being highly engaged in problem solving, altered perception of time and experiencing satisfaction or enjoyment. But, in addition to these associations, the mathematical intimacy and flow analogy could include the challenge-skill balance, clear goals and intense concentration. Experiencing mathematical intimacy invokes a challenge-skill balance since under conditions of anxiety or boredom mathematical intimacy could not come to fruition. Becoming intimately engaged in solving math problems implies one possible clear goal of solving

the problem, and furthermore assumes a certain level of concentration. Mathematical intimacy may lead to positive outcomes such as confidence in personal abilities to continue future problem solving activities, perseverance in pursuing solving math problems, or willingness to take risks due to a sense of safety provided by mathematical intimacy (DeBellis, 1998). Mathematical intimacy may also lead to negative outcomes, such as frustration, disappointment, or anger due to unexpected outcomes while solving math problems (DeBellis, 1998).

Enjoyment, an essential component of mathematical intimacy, is related to flow in doing mathematics (Seifert, Radu, & Doyle, 2010). Flow experiences of mathematics students are similar to flow experiences of musicians or skateboarders (Seifert & Hedderson, 2010). However, some important differences emerge. For mathematics students, experiencing flow is a deeply cognitive experience. And the combination of competence, challenge and concentration is central to experiencing flow. For example, students reportedly view mathematics as an enjoyable experience since solving problems make them feel good, and a sense of fulfilment or satisfaction prevails upon arriving at the solution to the problem. This, in turn, reinforces perceptions of competence in the subject. For such students, flow is commonly experienced alone, usually in an environment which they have control over. Engaging in solving challenging math problems becomes students' foundation for experiencing enjoyment. The structure of this discipline appeals to students and feeds their enjoyment. Mathematics has a set of clear rules that subsequently gave students a sense of control over their work and solutions. Within this description of flow, the centrality of challenge emerges (Seifert, Radu, & Doyle, 2010). Challenging problems allow students to become creative, and to experience loss of self-awareness and loss of surroundings. Within such settings, crystallizing thoughts into clear, incisive, swift and multi-layered thinking patterns stream from students' profound concentration.

Method

Participants in this study came from three classes of students enrolled in a first year mathematics course on Algebra and Trigonometry. The course is a prerequisite for Calculus courses, and students who take the course have failed to achieve the cut-off score needed to enrol in Calculus on a mathematics skills screening test. Two classes were offered in lecture-only format. Of the 69 students in the first class, 40 agreed to participate. Of the 66 students in the second class, 41 agreed to complete the survey. The third class was comprised of students enrolled in a blended version of the course, which combined lectures with participation in MyMathLab. Of the 72 students in this

class, 29 agreed to participate. In total, data from 108 students were included in the analyses; 2 students were excluded because of missing data.

The course curriculum includes sections on real numbers, functions (e.g. exponential, logarithmic), trigonometry, analytic trigonometry, and polynomials. The standard course layout involves four hours of face-to-face lectures per week, written homework, midterms and final exams, and no computer mediated teaching and learning. The instructor of the blended class used a combination of online and face-to-face teaching methods in the four-hour time frame per week. In the first two weeks of classes, computer laboratories were held and the instructor guided students throughout the MyMathLab registration process and explained the features of the software. Students were expected to complete their weekly quizzes via MyMathLab's online setting. When MyMathLab was initially implemented, computer laboratories were in place and students attended them on a weekly basis (Kondratieva & Radu, 2008). Within this study, the lab instructor went to class once a week for about 20 minutes. During that time, the lab instructor clarified the math examples where most common mistakes occurred in the previous week's e-homework, and used MyMathLab help files that show how to correctly obtain the solution to a problem. Thus, the objective was to show students how they could get help from the software when they worked on their MyMathLab homework and studied for tests.

Early in the semester, students in both groups (lecture-only and blended format) completed a 64-item survey assessing several constructs related to affect and flow in mathematics. Some items used in the survey were adapted from the research work of Galbraith and Haines (1998), Tapia and Marsh (2004) and Cretchley (2008). For the purposes of this study, only those items assessing mathematical intimacy, determination (which was a composite of confidence and persistence), and flow were used. The intimacy construct was operationalized using items that asked students about feelings they have when doing mathematics. The items were in 4-point Likert format (strongly disagree, disagree, agree or strongly agree), and were subsequently dichotomized (disagree or agree) for analyses. The determination construct was operationalized using eight 4-point Likert items that asked students about their perceived ability to solve mathematics problems (see Figure 1). Flow was assessed using a nine-item scale similar to the Short Flow Scale (Jackson, Martin & Eklund, 2008). Each item, taken from the Dispositional Flow Scale-2 (Jackson & Eklund, 2004), assessed one of the nine dimensions of the flow construct (Csikzsentmihalyi, 1990) using a 5 point Likert format; items were summed to establish a total flow score.

Items pertaining to intimacy and determination were subjected to factor analyses using MPlus (Muthén & Muthén, 2006). A number of models were explored including a single factor model and a second-order factor model. These models were rejected because they did not provide a better fit to the data than a two-factor model. The first factor in this model represented mathematical intimacy and was characterized by item responses reflecting excitement, curiosity and enjoyment. The second factor was labelled determination and was characterized by confidence and persistence. As depicted in Figure 1, there was a sizeable correlation between intimacy and determination. The fit indices for the final model were adequate suggesting the model fit the data well (χ^2 (47)=63.57, p=.05; CFI=.974; TLI=.980; RMSEA=.057).

The next step of the analysis was to determine if the two groups (lecture-only and blended format) possessed similar characteristics. Several multi-group analyses were undertaken to test the equality of means and variances between the two groups (Muthén & Muthén, 2006). In all instances, various models did not differ statistically from the equal means and equal variances model. This suggests that the lecture-only and blended classes had similar distributions on the intimacy and determination factors, as illustrated in Figure 2. However, the multi-group analyses indicated that the variance of the flow variable was not statistically different between the two groups, but the means were. Students in the blended classroom reported lower flow scores for mathematics than those in the lecture-only group, and the difference was substantial (ES=.62).

At the end of the semester, those students in the blended classroom completed the survey a second time, but with some modifications. Rather than asking about experiences with mathematics, the wording of the items was slightly altered to ask about intimacy, confidence and flow items asked about experiences in doing mathematics using MyMathLab. For example, factor structures for mathematical intimacy, determination and flow obtained in the analysis of the first survey were then imposed on responses to relevant items about their MyMathLab experiences.

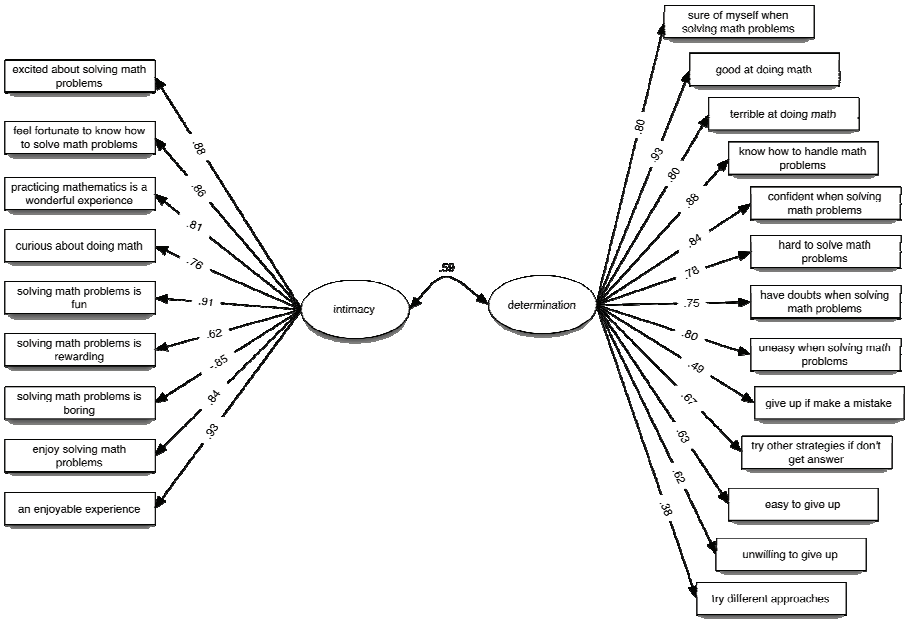

Figure 1. Factor structure for mathematical intimacy and determination. Coefficients are standardized regression coefficients using probit regression.

Results

The mathematical intimacy factor structure from survey one was imposed upon the data for the students in the blended classroom, and multi-group analyses were conducted on the intimacy, determination and flow factors. Descriptive statistics and correlations among the factors are presented in Table 1. The table of correlations suggests that flow, intimacy and determination are strongly related. This may be indicative of a pattern of affect and behaviour in which feelings of intimacy are closely tied up with confidence and persistence, as well as flow-like experiences.

The results of the multi-group analysis were consistent across all three factors: equal means with unequal variances. Responses to the time 1 measure had less variance than those for the time 2 measure of intimacy (χ^2 (16)=16.30, p=.50; CFI=1.0; TLI=1.0; RMSEA=.00), confidence (χ^2 (26)=24.38, p=.55; CFI=1.0; TLI=1.0; RMSEA=.00) and flow (χ^2 (1)=.50, p=.48; CFI=1.0; TLI=1.0; RMSEA=.00). There was greater variability in the range of scores for students' MyMathLab experiences than for mathematics in general, which is evident in both Table 1 and Figure 3.

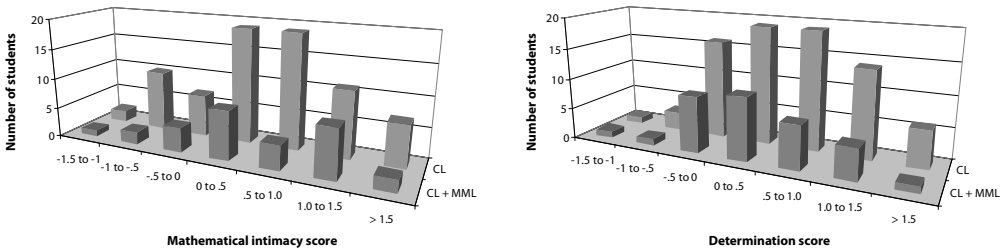

Figure 2. Distributions of mathematical intimacy and confidence scores by group.

The greater variability in time 2 scores is due to a trend towards lower scores in the time 2 measure than time 1. As illustrated in Figure 3, there is an apparent increase in the number of students having scores at the lower end of the scale, and it appears that this increase is due to a decrease in scores in the middle of the distribution. There is, however, a slight increase in the number of students at the upper end of the scale for both the intimacy and confidence factors.

Table 1: Descriptive statistics and correlations among factors

	Lecture only		Blended class (Math in general)		Blended class (MyMathLab experience)		Correlations		
	Mean (N=89)	SD	Mean (N=29)	SD	Mean (N=29)	SD	Flow	Intimacy	Determin.
Flow	26.58	4.32	23.93	4.15	22.93	6.18	1.0		
Intimacy	-.04	.71	.02	.71	-.20	.8	.57	1.0	
Determination	.04	.66	-.14	.69	-.10	.86	.59	.67	1.0

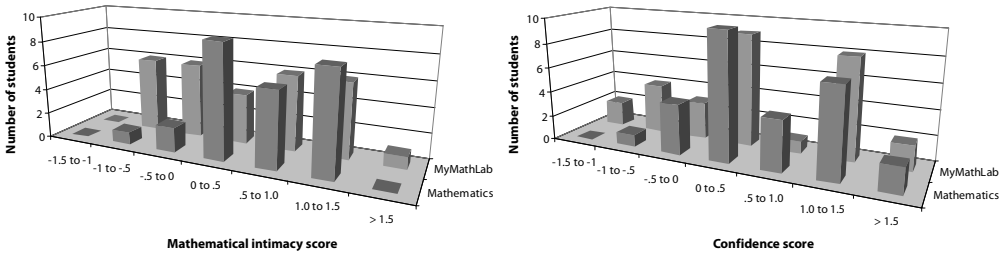

Figure 3. Distribution of mathematical intimacy and confidence scores for students in the blended learning group.

Discussion

In this study, students in a blended learning environment responded to two sets of items assessing mathematical intimacy, confidence, persistence and flow. The first set of items asked about mathematics in general; the second asked students about these constructs in the context of MyMathLab. Students in the blended class had mathematical intimacy scores similar to students in the lecture group. However, the mathematical intimacy scores for many students in the blended class were lower for MyMathLab than for mathematics in general, as indicated by an increase in range and variance. A similar finding was found for determination, but not flow.

Slightly lower mathematical intimacy scores for many students in the MyMathLab framework might be interpreted as a result of their inability to create a close bond with mathematics, and to experience joy and excitement in doing mathematics in the brief period of time when they were solving math online. Mathematical intimacy may foster the appearance of positive outcomes, such as confidence and perseverance (DeBellis, 1998). As such, for many students in the blended class, lower scores of mathematical intimacy translate into a decreased enjoyment and sense of well being that subsequently leads to poorer confidence, and thus slightly lowered confidence scores. But, perseverance alongside confidence is viewed as possible outcome of mathematical intimacy (DeBellis, 1998), as is indicated by the relatively high correlation among the factors. However, similar scores in determination between the two groups might be explained through students' devotion in passing the course or in obtaining a good grade regardless of mathematical context: blended or traditional. Based on the theoretical similarities of the mathematical intimacy and flow (Goldin, 2008), we expected that students would have similar experiences and scores. It came as a surprise that even if mathematical intimacy scores were comparable in the blended and lecture-format settings with respect to general math, there was a substantial statistical difference in flow scores, as the students in the blended classroom reported lower flow scores in general math than those in the lecture only class setting. However, there was no change overall in the two surveys.

There are a number of limitations to this study that suggest further investigation is warranted. First, the measures may not have been in sufficient temporal proximity to their activities to accurately measure students' affect. For example, the flow items asked about flow characteristics in general, and not about a specific activity at a given moment, and not capturing students' inner experiences (Hurlburt & Heavey, 2006). Second, the study may have been limited by low statistical power to detect differences.

The small sample size and the lack of a true pre-test post-test design reduced statistical power to detect differences.

However, the study suggests that MyMathLab may have a positive effect for some students, and a negative effect for others. A mixed-methods study employed pre-test post-test design with either case studies or interviews could shed much more light on students' inner experiences when using online technology for learning mathematics.

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Promoting the Concept of Competency Maps, Interprofessional Assessments and e-Portfolios to Enhance Student Employability

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Abstract

The developments discussed in this submission are outputs from the Assessment & Learning in Practice Settings (ALPS) Centre for Excellence in Teaching & Learning (CETL), which is working towards a framework of interprofessional assessment of common competences in the Health and Social Care (H&SC) professions. This large scale collaborative programme involved five UK Universities and sixteen professional groups and NHS partners and used mobile devices to deliver learning resources and assessments to enrich, enhance and extend practice learning. The focus of the paper is the development of the common competency maps for communication, teamwork, and ethical practice along with a set of standardised tools to assess these skills across the sixteen professional groups. ALPS has developed a shared services platform that enables these assessment tools to be delivered onto a mobile device and the benefits and challenges, as well as the future potential of this approach are discussed in this paper.

Key Words: Practice based assessment, Interprofessional learning, e-portfolios, mobile technology

Background to the ALPS CETL approach

Assessment and Learning in Practice Settings (ALPS) is a collaborative Centre for Excellence in Teaching and Learning (CETL) comprising five Higher Education Institutions (HEI) with proven reputations for excellence in learning and teaching in Health and Social Care (H&SC): the University of Bradford, the University of Huddersfield, the University of Leeds (lead site); Leeds Metropolitan University, and York St John University. There are 16 professions across the partnership from Audiology to Social Work, and a wide range of partners including NHS Yorkshire and the Humber and commercial partners who are working towards a framework of interprofessional assessment of common competences in the H&SC professions.

The focus of this paper is the development of the common competency maps for communication, teamwork, and ethical practice along with a set of standardised tools to assess these across the sixteen professional groups.

The aim of the ALPS CETL is to ensure that students graduating from courses in H&SC are fully equipped to perform confidently and competently at the start of their professional careers.

Fundamental to the care of service users within modern Health and Social Care are key skills commonly utilised by the range of professionals involved in ALPS. Key skills and learning outcomes vary across the 16 pre-registration H&SC courses but central to the practice of all of the professional groups represented by ALPS is a high level of professional competence in communication, teamwork and ethical practice. In order to make explicit this pretext it was decided that mapping these common skills would enable students to navigate their way through the professional competencies allowing them to gain confidence and competence in practice settings. ALPS worked with a commercial partner, MyKnowledgeMap Ltd. (MKM), to facilitate this process which resulted in interactive and creative competency maps from which multiprofessional assessment tools were derived for students to validate their skills in their practice placements. ALPS has developed a shared services platform that enables these common assessment tools to be delivered onto mobile devices used by the students in their practice placements.

Central to the ALPS process was the development of an e-portfolio tool to which the student could publish their completed tools and any relevant supporting documents and gain feedback from their tutor back at their University, further perpetuating the learning process and enabling the tutor to evaluate the students progress.

This paper discusses how these processes championed by ALPS can be transferred and shared across professions and describes the challenges, benefits and future potential of this approach aimed at enhancing the students ability to learn and produce effective assessments in practice settings.

Development of the Competency Maps

At the beginning of the mapping process each pre-registration course was asked to identify where communication, teamwork and ethical practice featured in programme structures, how these key skills were assessed and the relevant professional, statutory and regulatory body requirements guiding the development of these skills.

This information gave us a breadth of understanding around common language and the variations in terminology and assessment methods from which to build a mutually acceptable concept across professional groups.

A core working group was established to develop the maps constituted from a range of ALPS professions across the five HEIs and practice learning facilitators who had a multiprofessional practice perspective. The core working group of about 8-10 people was supplemented by a wider email consultation group representing all of the professions who were able to comment on each stage of this iterative development process.

The maps emerged with the guidance of MKM by grouping statements describing firstly communication skills into common themes and established a hierarchy of broad cluster statements. Each of these was then described by a dimension statement and then further subdivided into element descriptors for which performance criteria were written.

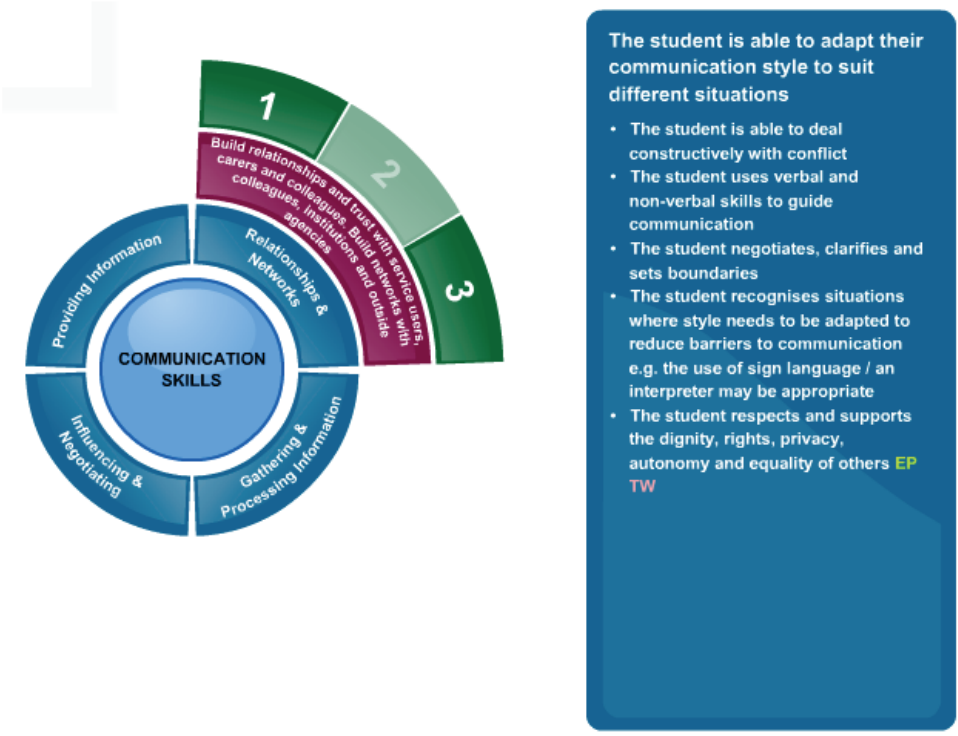

Figure 1. The ALPS Communication Skills Map

This process was then repeated for team working and ethical practice skills to develop 3 maps with many linking performance criteria which would ultimately form the basis of the common interprofessional assessment tools. The communication skills map is illustrated in Figure 2 and can be accessed, along with the other maps for teamworking and ethical practice from the ALPS CETL website (http://www.alps-cetl.ac.uk/maps.html). The common assessment tools that were derived from the maps can be rendered onto mobile devices allowing the students to complete mobile assessments in the practice setting and gain 360 degree feedback from practice assessors, service users and peers as well as promoting self evaluation and reflection to enhance their practice.

Additionally students could prepare themselves for practice and employment using the map to gain an understanding of the professional expectations within the work environment. The completed maps allow course tutors to develop assessment learning and teaching strategies which are linked to professional practice. At Leeds Metroplitan University these common competency maps have been embedded into the

interprofessional learning (IPL) strategy for students to use in a multiprofessional group as an aid to developing practice competencies.

Establishing an acceptable and effective process and structure during the mapping of communication was crucial to the success of this collaborative process (Coates et al, 2008; Holt et al, 2010). Initial discussions of the working group were lengthy and reflected discussion on topics such as common and differing language and terminology across professions, and whether the maps should reflect academic levels or a hierarchy of skills and protocols for the dissemination of the maps to colleagues. Gradually such debate resulted in a comfortable trust across and within professions and facilitated an acceptable and effective process and structure from which the same principles could be used to develop similar competency maps for other professional competencies, effectively embedding the ALPS approach across other Faculties and professions. For example the Enterprise CETL at Leeds Metropolitan University wanted to facilitate the development of an enterprise skills map to enable staff in the Faculty of Business and Law to develop modular content and assessment tools which can be linked to existing enterprise frameworks and also allow for consistency in terms of assessing enterprise attributes across the wider University.

The success of the competency mapping process depended on effective consultation across and within the professions during development and on completion. Each HEI ran consultation workshops for academic staff, students and service users to encourage feedback on the language, structure and usability of the maps. ALPS also consulted with the Professional, Regulatory and Statutory Bodies regarding the concept and content of the maps to gain their approval. As a result of this process a number of changes were made and the graphical representation of the maps was changed to a wheel format rather than the original linear presentation making the maps easier to navigate and more user friendly. This spherical presentation also eliminated hierarchy within clusters which had been a concern at the consultation events.

Development of the common assessment tools

The maps have been used to generate an assessment toolkit to increase the range of formative and summative assessments which can be used within and across the sixteen professions. Traditionally, H&C professions have tended to require a member of their own profession to assess a student's competency. ALPS challenged this principle by suggesting the common competencies, can be assessed by another profession, as long as the workplace assessor has been appropriately briefed.

The ALPS assessment tools were simulated using students, service user representatives, tutors and practitioners at a series of workshops to test the acceptability of the language and usability of the mobile devices prior to being piloted with students.

So far five assessment tools have been developed and accepted for use in practice assessment scenarios:

- Gaining Consent,
- Providing information to a colleague,
- Knowing when to Consult or refer,
- Demonstrating respect for service user during an Interaction and
- Working Interprofessionally.

The ALPS assessment scenarios can be used at different stages of an individual student's career and also by different professions at different levels of their academic development. For example, the Dental Hygiene & Therapy students used the "Gaining Consent" for peer feedback in their second year paediatric placement, in order to enhance their feedback skills and reflective skills (Norcini, 2003). The Audiology students used the same tool for their level three students in general clinics whilst in practice.

The approach to improving competence of students is to build on the Boud (2000) theory of sustainable assessment. Students are encouraged to take feedback from a variety of sources, reflect on that feedback and deduce further action to improve performance. This student activity is predominantly reflection in action (Schon, 1995) and enhances the richness and quality of the students' reflections thus developing life-long learning skills. The ALPS common assessment tools were developed using agreed best practice from the different professions involved in the ALPS programme. For example; Social Work students already gain feedback from service users at some time during their practice placement experience. This concept is being considered in the Nursing profession (Speers, 2008). The Dietetic students are used to reflective assessment tools which encourage feedback from a variety of sources as well as self evaluation and action planning to improve their practice. The ALPS common assessment tools reflect these principles with the potential to deliver formative feedback from a range of potential participants in the assessment scenario. These include the practice educator (from their own or a different profession), peers (from their own or a different profession), service users (and carers) and self. Feed forward is a key outcome of the process and there is provision in the tool for students to reflect

on the feedback they have been given and to develop an action plan which can be signed off by a practice educator.

Developing the mobile delivery of the common assessment tools

The decision to "Go Mobile" was made to allow the provision of "any time, any place" access to the common assessment tools, learning materials and tutor support to enable students to gain maximum benefit from the learning opportunities on offer to them whilst on placement. ALPS commissioned from its commercial partners, ecommnet MKM and T-Mobile the procurement of a shared mobile services platform (MSP), mobile devices and connectivity along with software tools. Development of the MSP was informed by the ALPS mobile learning pilots (Dearnley et al 2009) and the outcomes of the Mobile Enabled Disabled Students (MEDS) project (Dearnley et al, 2010). ALPS is a large scale implementation with a 1000+ user and is supported by a shared ALPS Helpdesk based in Learner Support Services at the University of Bradford, which provides support to the five HEIs for device roll out and gives advice to users across the whole of the ALPS programme. Cohorts of students from the partner sites were supplied with HTC Vario smartphone PDAs and were given unlimited free data connectivity on the T-Mobile network.

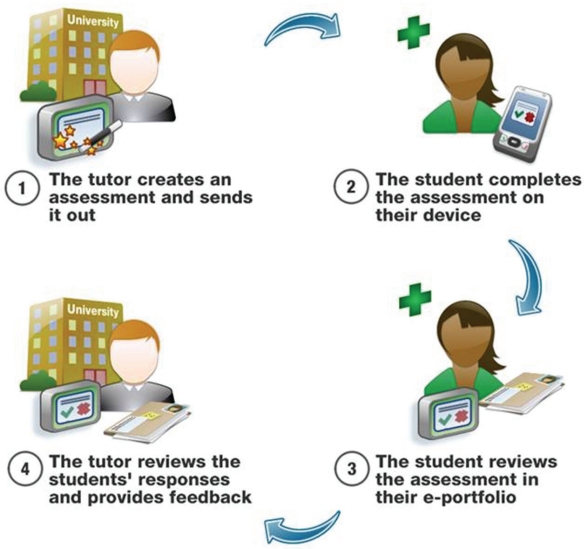

Figure 2. The ALPS Assessment Cycle

The ALPS assessment Cycle is depicted in Figure 2. The ALPS MSP allows the common assessment tools to be securely sent out to the students' ALPS devices and any completed assessment tools can be uploaded securely from their devices to a password protected web based e-Portfolio. Students are able to collect timely 360 degree feedback which can be captured in a variety of formats including images, audio, video, as well as text, supported by the predicted text and spell check function. This has meant that the devices have been found particularly useful by students with dyslexia (Dearnley et al, 2010). The uploaded assessments can be accessed by academic tutors (back at base in the university), via the e-portfolio, to allow them to monitor students' progress and provide an additional source of feedback.

Confidentiality was secured by requiring students to sign a "Contract of Use" drawn up, with legal support, jointly with the five ALPS partner universities. The contract had a number of governance purposes including; responsibility and fair usage of the device particularly advice on appropriate use of the camera function, ownership of the device and where to go for help. Students carried ID cards to confirm their device was being used for assessment and learning activities and all managers were briefed about the work of ALPS. Posters were sent to NHS Trusts to display in placement areas to inform staff and service users about the ALPS Programme.

The current Government policy promoting the implementation of interprofessional education and training for H&SC students (Craddock et al, 2006) has necessarily had to encompass elements of IPL. The introduction of mobile interprofessional assessments was a huge learning curve for staff and students on many levels. ALPS not only had to provide technical training on how to use the mobile devices and all the associated assessment and e-portfolio tools but also there was a significant change in practice for some professions with the introduction of 360 degree interprofessional assessment and reflective learning practices.

Many students from the majority of professions involved were not initially confident in peer assessment practice. Other students were unconvinced by the idea of gathering feedback from service users using the mobile device; some social work students for example saw it as a potential barrier to communication. Most of the professions involved in ALPS were familiar with the concept of self reflective practice and so many could see a link with the self assessments and their placement diary. All students seemed to accept the idea of practice assessor assessment, probably as this does not signify a particular change to current practice. However whilst the majority of students could relate to the self and practice assessor assessments, they did not automatically see

them as adding value to their placement. A large part of training consequently concentrated on linking the assessments to their current placement practice and illustrating the benefits of completing ALPS assessments.

The potential of the ALPS approach to assessment and learning in practice settings

The mapping of key skills is a powerful way of enabling students and staff to navigate their way through professional competencies in a user friendly, interactive format which can be used to develop a deep understanding of the expectations of the practice environment and allow for consistency when translated to assessment tools in terms of evaluating knowledge, skills and attributes across and within professions.

The process initially established within ALPS to expose the key skills and attributes inherent in communication, teamwork and ethical practice (http://www.alps-cetl.ac.uk/maps.html) has now been extrapolated to develop a new enterprise skills map and a patient safety map to be used by students and staff to enhance learning and employability. The ALPS competency mapping process was equally relevant to make explicit enterprise skills in the curriculum at Leeds Metropolitan University. The Institute for Enterprise CETL supports and promotes enterprise education within the University and with key external national partners. Its small team has strengthened and developed enterprise education in the last 5 years through development of new courses and modules, collaborative projects and student led events. We anticipate that representing the enterprise dimensions in a competency map will allow students to grasp the diversity of the competency and help them to identify their strengths and areas for improvement. Additionally as part of the NHS Yorkshire and the Humber funded ALPS CETL extension project, Leeds Metropolitan University have secured financial support to set up a Competency Mapping Network whose primary objective is to produce a Patient Safety Competency Map. The network which is led by Catherine Coates and Julie Laxton has attracted many local experts in the field of patient safety and aims to complete this new ALPS map for a consultation event in May 2011.

The ALPS processes were designed to provide reliable, standardised, interprofessional assessments in practice settings. This enables opportunistic assessment scenarios to be fully realised and to include the full range of players in the assessment process, providing effective feed forward so enabling students to improve their practice competence. The cohort management aspects of the ALPS e-portfolio tool allow

tutors to comment on the students' assessments and provides the opportunity for the tutor to have an overview of the student's developing capabilities whilst back at base in the university. This will allow them to make informed choices regarding which students need early visits that has the potential to reduce the number of placement visits required, thereby reducing costs.

The whole ALPS journey has allowed tutors, practice educators and students to better understand one another's practice models and competency frameworks and the potential for further development of common assessment tools is evident.

As with the introduction of any technology enhanced learning process there has been an initial reticence to embrace this 'mobile' assessment process fully, however the benefits of the approach are widely recognised. Most of the ALPS professions still manage paper driven assessment processes but the ALPS electronic and mobiles assessment tools present the possibility of changing entrenched practices and cultures. The technological innovations recommended within the NHS modernisation agenda will be necessary to support this paradigm shift.

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Learning Styles: Which Type of Student is more Successful in which Modality?

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Abstract

As the e-learning population grows, students could find themselves enrolled in distance education modalities that may not be conducive to their learning style. The purpose of this study was to determine whether a postsecondary e-learner's learning style was a factor in the success of distance education studies. The researcher designed a study using a quantitative, comparative, and correlational methodology, investigating the relationship between learners' success and learning styles. Success was operationally defined by learner's satisfaction with the course upon completion, as well as the grade obtained. The sample learners were categorized into three learning styles and there appeared to be no significant difference in outcomes among the learners. Students experienced the same level of academic success and satisfaction, regardless of their learning style. As learning style does not appear to be a factor in academic success or in satisfaction, this researcher's recommendation would be that learners of all types of learning styles be encouraged to enrol in distance education courses. Although some of these learners may find it difficult at the beginning of their first distance education experience, this researcher shows that they will be able to adapt to the materials.

Keywords: learning styles, distance education, success

Introduction

Distance education is growing rapidly. The global e-learning market was $6.5 billion in 2003, increased to $21 billion by 2008 and is expected to exceed $52.6 billion by the year 2010 (Kopt, 2007). E-learning can have a positive impact on learning environments. For example, learners can benefit through the discussion of course topics from a multicultural perspective, rather than the limited view that may be present when learners from the same demographic gather in one room. Additionally,

learner interaction may change for the better: it is possible that some learners will be more willing to put forward their views in an online course than in a classroom. There may also be a perceived sense of safety and equality in the online world. Learners may not fear asking an unsuitable question because of the increase in perceived anonymity that may be inherent to the online paradigm. This added participation, by those who would otherwise be too timid to speak, can increase confidence and encourage the learning process (Meyer, 2003). Online courses can have negative aspects as well. Learners comfortable with face-to-face classroom learning may have a difficult time adapting themselves and their learning style to the distance learning environment. As distance and e-learning programs have become a more important part of the higher education market (Evans & Haase, 2001; Ngaia, Poonb, Chan, 2007), and as the number of higher education learners are projected to reach close to 20 million by the year 2014 (U.S. Department of Education, 2005), administrators of postsecondary institutes must address the issue of learning styles in this new arena if they are to compete effectively in this market.

The purpose of this study was to determine whether a postsecondary student's learning style is a factor in their success in distance education studies. If it is, school marketers and recruiters can better direct learners to their optimal type of learning environment and increase the likelihood of their success. Many college Web sites currently provide a brief interactive quiz, by which prospective learners can determine whether the distance learning format is suited to their personal learning style. (University of North Carolina, Greensboro, n.d.; READI, 2011). The findings of this research can assist distance education administrators in assessing the validity of the questions in these profile questionnaires, or give the institutions an authenticated set of criteria.

Research Questions and Methodology

The research questions used in this study were:

1. Is there a statistically significant relationship between learning style and learners' success in fully online distance education courses?
2. Is there a statistically significant relationship between learning style and learners' success in blended distance education courses?

This study was designed using a quantitative, comparative, and correlational methodology, investigating the relationship between learners' success and their

learning style. Success was operationally defined by learner's satisfaction with the course upon completion, as well as their grade obtained. The methodology for this study included a pilot study and a random sample survey using an online questionnaire survey and a statistical analysis of the results. The grades and satisfaction of learners in online and blended courses were compared to their learning styles and to their success.

Procedures

For this study, the researcher obtained written permission from two large postsecondary schools; DeVry University and the University of Phoenix, to access and survey their learner population and school administrators. To maintain anonymity and learner privacy, the program administrators of one of the participating institutions agreed to send e-mails to learners who had completed at least one distance education course, inviting them to participate in the research. The other institution's administrators posted a Web link on their e-learning platform directing the learner to an online version of the consent letter. The sampled learners could have been of any age and studying in any discipline. To complete the questionnaire, interested learners were provided a random password, necessary for their one-time access to the survey Web site. Once the subject completed the survey, and a sufficiently large sample size was obtained, the data were analyzed.

The survey, conducted at the Calgary campus of the University of Phoenix and DeVry University, consisted of those students who had enrolled in at least one distance education course during the fall of 2007. In total, 244 students replied to the survey. Of these 244, 124 identified themselves as fully online learners and 120 identified themselves as blended learners. Using the G-Power® software program (Boulet & Boudreault, 1998), the researcher determined that, based on the sample size achieved, power was 0.96 for the fully online learner sample and 0.94 for the blended learning sample (assuming an effect size of 0.6 and an alpha of 0.05).

Two survey instruments were developed by the researcher, one for the distance learning learner and one for the school administrators. The survey questions were developed with the aid and input from two Deans of Academic Affairs, J. Barmby from DeVry University and L. Bowd from the University of Phoenix, who administer programs in both blended learning and complete distance learning models. The survey questions were constructed by the researcher to effectively measure the learning style of students and their rate of success. A learning style questionnaire was part of the

survey, the results of which, categorized each student into one of three learning style categories: visual, auditory and kinesthetic/tactile numbered 1 through 3, respectively, with option "4" for those subjects who did not demonstrate a single, dominant learning style. Participants were also asked to provide the numerical grade they achieved in their online course and to indicate their satisfaction level by selecting one of the following: very dissatisfied, dissatisfied, neither satisfied nor dissatisfied, satisfied, very satisfied, or do not have an opinion. These responses were represented using the number 1 (very dissatisfied) to 5 (do not have an opinion). The questionnaires were first distributed by the researcher to a pilot group of postsecondary learners and administrators so that the questions could be validated and so that improvements could be made before distributing it to a larger sample.

The pilot study was conducted at the DeVry University campus in Calgary, Alberta, Canada. To obtain an unbiased sample, the data were gathered using a simple random sampling technique. The purpose of this pilot was to provide valuable information that could be used to improve the questions; therefore, an open-ended item at the end of the questionnaire was used to solicit feedback on the survey. Specific questions were examined by the researcher for variation, meaning, task difficulty, and respondent interest and attention. The entire questionnaire was reviewed by the researcher for the order of questions and timing. In the next stage of the research, the revised survey was distributed by the researcher at the University of Phoenix and DeVry University Online. E-mails inviting subjects to participate in the survey were issued randomly until the desired sample size was achieved. Finally, after the sample size was achieved, the two postsecondary institution administrators were asked by the researcher to participate in a paper-and-pencil survey to obtain completion rates for each course listed in the learner data collected.

Results

Table 1 shows the descriptive statistics for the variables used in this study, displaying the minimum, maximum, mean and standard deviation, for the entire sample.

Table 1: Descriptive Statistics for Sample

Variable	Total e-learners (n = 244)			
	Min.	Max.	M	SD
Interaction evaluation (content)	1.00	5.00	3.86	0.89
Interaction evaluation (context)	1.00	5.00	3.96	1.00
Interaction evaluation (institution)	1.00	5.00	3.79	0.92
Interaction evaluation (instructor)	1.00	5.00	3.69	1.08
Interaction evaluation (learner)	1.00	5.00	3.93	0.90
Learner's learning style	1.00	3.00	1.81	0.95
Learner performance	25.00	100.00	87.66	9.94
Learner satisfaction	1.00	5.00	3.88	1.00

Table 2 shows the descriptive statistics for the variables used in this study, displaying the minimum, maximum, mean and standard deviation, for fully online learners.

Table 2: Descriptive Statistics for the Fully Online Learner Sample

Variable	Blended Learners (n = 124)			
	Min.	Max.	M	SD
Interaction evaluation (content)	1.00	5.00	3.74	0.90
Interaction evaluation (context)	1.00	5.00	3.91	1.07
Interaction evaluation (institution)	1.00	5.00	3.64	0.82
Interaction evaluation (instructor)	1.00	5.00	3.51	1.10
Interaction evaluation (learner)	1.00	5.00	3.87	0.85
Learner's learning style	1.00	3.00	1.76	0.98
Learner performance	25.00	99.00	86.08	12.59
Learner satisfaction	1.00	5.00	3.83	0.94

Table 3 shows the descriptive statistics for the variables used in this study, displaying the minimum, maximum, mean and standard deviation, for blended learners.

Table 3: Descriptive Statistics for the Blended Learner Sample

Variable	Blended Learners (n = 120)			
	Min.	Max.	M	SD
Interaction evaluation (content)	1.00	5.00	3.99	0.86
Interaction evaluation (context)	1.00	5.00	4.02	0.94
Interaction evaluation (institution)	1.00	5.00	3.94	0.99
Interaction evaluation (instructor)	1.00	5.00	3.88	1.03
Interaction evaluation (learner)	1.00	5.00	4.00	0.95
Learner's learning style	1.00	3.00	1.86	0.93
Learner performance	73.00	100	89.29	5.71
Learner satisfaction	1.00	5.00	3.93	1.06

Table 4 shows the number of courses in the sample, as well as the minimum, maximum, mean and standard deviation of retention in those courses identified from the learners' survey. Four courses were removed from the sample because they were not offered in the year prior to the sample collection and therefore had no historical data.

Table 4: Completion Data

Course Type	n	Min.	Max.	M	SD
Online	20	71.43	97.78	86.22	6.73
Blended	21	61.19	100.00	85.69	10.34
Total	41	61.19	100.00	85.96	8.70

Using a multivariate analysis, when grade and total satisfaction was compared to the use of learning style in a fully online course, $F(4, 121) = 0.949$, $p = 0.390$, Wilks' lamba = 0.985. When grade and total satisfaction was compared to the use of learning style in a blended course, $F(4, 232) = 1.495$, $p = 0.204$, Wilks' lamba = 0.950.

Conclusions

The researcher designed the study to determine whether there was any relationship between the educational success of postsecondary learners enrolled in distance education courses and their learning style. For both the fully online courses and blended learning courses, the results indicated the value of p is higher than 0.05 (p = 0.390 for fully online, p = 0.204 for blended); therefore, there appeared to be no

statistically significant relationship between learning style and learner success in a fully online course.

This researcher also examined how learning styles affect academic outcomes and satisfaction of distance learners and show that learning style is not a factor in learners achieving higher grades or experiencing greater course satisfaction. The sample learners were categorized into three learning styles and there appeared to be no significant difference in outcomes among the learners. Students experienced the same level of academic success and satisfaction, regardless of their learning style. Although auditory learners comprised a small percentage of the sample, there is strong evidence to suggest that these types of learners can also do well in a distance learning course.

Recommendations

While it may be logical to assume that learning style would be a factor in determining learners' distance education success, the results clearly indicated that this is not the case. Although this researcher incorporated data culled from a diverse group of learners with a variety of learning styles, no significant differences in grade or learning satisfaction was noted. Although some types of learners may be hesitant to enrol in a distance learning course, the evidence shows that they can all be successful and should be encouraged to attempt a course in this modality. Learners may be surprised to find that distance education can be an effective and enjoyable learning tool in spite of their personal learning style and reservations. Benson (2005) concluded that this is because learners "have the ability to adapt to whatever learning environment they select, and that learning style may not be the most important consideration when students select a learning environment" (p. 131). Similarity, Neuhauser (2002) found that "learning preference and style has little or no impact on final grades" (p. 111). It is important to note that the results in this researcher's study may be skewed because of the low number of subjects who identified themselves as auditory learners. Over 93% of the respondents were either visual or kinaesthetic learners. This low auditory learner response rate may be due to an inability of distance learning courses to attract auditory learners.

Learning style is an important consideration when studying distance education. The literature in this area provides strong arguments for and against the effects of learning style on outcomes. Aragon, Johnson, and Shaik (2002), Benson (2005), and Zhang (2005) all concluded that learning style does not affect outcomes in distance education courses, while Christensen et al. (2001) claimed that a distance education class must

have components to satisfy all learning styles in order to be effective for a wide variety of learners. This researcher examined the significance of learning style by asking respondents to identify their learning style. Their answers were compared to their stated outcomes and it was found, in agreement with other studies, that learning style does not impact learner success. Learners should be aware of their learning style and enrol in courses that help them best learn the content (McClure, 2006), however, this study shows that learners exhibiting all learning styles can function well in distance learning courses.

Distance education learners who answered the survey identified their learning style and provided their outcome and satisfaction level. This would indicate that there is no predictive relationship between a student's learning style and the student's success in distance education courses delivered in either the fully online or blended modality. This conclusion implies that, although some learning styles appear to be better suited for the distance education modality, all students, regardless of their learning technique can benefit from this type of learning. This finding has been corroborated by other researchers. This result was also found by Childress and Overbaugh (2001), whose study showed that there was no significant relationship between learning style and final course grade. Aragon, et al. (2002) also reported that learning style was not a significant factor in learner success. Although the learning style and multiple intelligence theorists state that more technology is needed to satisfy the needs of all types of learners (Christensen, Anakwe, & Kessler, 2001; Krishnasamy, Lee and Sellappan, 2003; Lane, 2000), this researcher found that all learners were able to do well in distance learning courses in spite of the lack of additional technology embedded in some distance learning materials. Administrators of postsecondary institutions who may have thought that some students would not do well in the distance education setting can be assured that all students can do well in a distance education class. Some learners may require additional support but that can be handled by existing learner support mechanisms.

As learning style does not appear to be a factor in academic success or in learner satisfaction, this researcher's recommendation is that learners of all types of learning styles be encouraged to enrol in distance education courses. Students who have shied away from distance education for fear that their learning style is not conducive to that modality can now enrol in a distance education course without fear of poor performance. Although some of these learners may find it difficult to adapt at the beginning of their first distance education experience, this researcher shows that they will be able to adapt to the materials, regardless of their personal learning style.

Although mostly kinaesthetic and visual learners responded to this study, students with a variety of learning styles found success and satisfaction in their distance education courses.

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Learning in Digital: An Approach to Digital Learners in the UOC Scenario

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Abstract

The net generation discourse suggests that an entire generation, born roughly between 1980 and 2000, has been profoundly influenced by the advent of digital technologies and immersion in a digital and networked world. Futurists and commentators argue that we need to make radical changes to our educational systems because this "net" generation behaves differently, has different social characteristics, different ways of using and making sense of information, different ways of learning, and different expectations about life and learning, all due to their exposure to digital technology (Howe and Strauss, 2000; Oblinger and Oblinger, 2005; Palfrey and Gasser, 2008; Prensky, 2001, b, 2005; Tapscott, 1998, 2009).

However, as several reviews of the research have shown, few of these key claims about this generation are based on empirical evidence (Bullen et al, 2011; Bennett et al., 2008).

The international research project, Digital Learners in Higher Education seeks to develop an evidence-based understanding of how postsecondary learners in different institutional contexts consider technology and how they use it in their social and educational lives.

This project is led by the British Columbia Institute of Technology and involves the collaboration of the University of Regina and the Open University of Catalonia (UOC).

In this paper, we will explain the first results of this research project as well as its application at UOC.

Key words: ICT, e-learning, Digital learners, digital media, study habits, Higher Education.

Introduction

Some authors (Oblinger & Oblinger, 2005; Palfrey & Gasser, 2008; Prensky, 2005; Tapscott, 2009), describe the existence of a new generation of people that have spent their childhood surrounded by media and computing, and who have a more intuitive and deeper knowledge of ICT than previous generations. These authors contend that this has affected their experience of learning, as it is believed that they have different thought patterns compared to previous generations (Tapscott, 1998). From this perspective, the vast majority of university students could be considered within this so-called Net Generation as they "were born after the year 1980" (Oblinger & Oblinger 2005 p.12).

According to the literature, the Net Generation has been in contact with ICT since early childhood, and that allows them to adapt quickly and efficiently to technological revolutions.

There are numerous labels to define this generation: one of the best known is "Digital Natives" defined as those "native speakers of the digital language of video games and Internet" (Prensky, 2005 p.1); in contrast with "Digital immigrants" applied to those born before 1980.

Others identify them as the DIG Generation "Digital Immediate Gratification, the Millennium generation or Nintendo Generation" (Ferreiro, 2006 p.6). They have also been called New Millennium Leaners (NML), referring to "those generations born after 1980 and grown up in a context where digital technologies are an inevitable part of daily life" (Pedró, 2006).

Some of these authors identify a number of features of this generation (Oblinger & Oblinger, 2005; Prensky, 2005; Palfrey & Gasser, 2008): being digitally literate, continuously connected, showing a need for immediacy in receiving information, preference for social activities, being active experiential learners, showing a capacity to carry out several tasks simultaneously and being involved to the community. But, do Students at UOC fit this net generation profile?

In this paper, we outline our scepticism about what that literature has had to say about this generation.

Scepticism about digital learners

Several studies (Kennedy et al., 2008; Bennett et al, 2008; Guo et al, 2008; Selwyn, 2009; Bullen et al, 2011) show that scientific evidence or statistics are rarely used when discussing the characteristics of this generation. In fact, some of these authors refute the best known features, arguing that they also appear in other generations: "The oft-used example of a young person doing homework while engaged in other activities was also applied to earlier generations doing homework in front of the television (Bennett et al., 2008 p.779). They also refute its validity: "it is clear that many studies fail to find evidence to support claims that young students use digital technologies in a radically different manner or have a significantly different set of characteristics" (Margaryan & Littlejohn, 2008 p.4).

The methodology of the studies that support the Net Generation thesis has also been dissected to reveal some notable mistakes (Schulmeister, 2008):

Media activities of young people are reviewed from the perspective of entertainment without regard for other aspects of their lives.

Research into the actual use of media shows that young people continue to watch traditional television and listen to music to an enormous extent and also read print media; in contrast with Internet use.

The studies make incorrect generalizations about the whole generation based on the results of accidental samplings.

Most Net-generation authors assume that young people's behaviour is determined by new media, while various surveys show that the use of these media is not transferred to learning preferences.

Moreover, this overexposure to technology may not always be considered from a positive perspective: "spending too much time in cyberspace may establish an imbalance in brain processes, creating an overload that can reduce the ability of young people to process the information they receive" (Berson & Berson, 2005, p. 32)

Research increasingly shows that exclusion criteria regarding the Net-gen are based purely on the age factor. (Lee, 2005; Hargittai, 2010). However, some studies suggest a great variation in the use of technology in the same age range in selected samples (Kennedy et al., 2008).

In the case of higher education, the criticism mentioned is more palpable because, firstly, the use of technology in education does not imply a greater knowledge of it: "exposure to computer information systems at the high school or community college level was found to have little significant impact on student computer literacy" (Karsten & Roth, 1998, p. 15). And secondly, having extensive skills in ICT use does not necesarrily lead them to being employed in academic activities: "A transfer of the abilities gained from using the computer to learning does not seem – or at least not to the degree expected – to take place. The use of the computer, for school assignments as well as for work done at the university, is soberly regarded by users as a means to an end. Possessing a high degree of e-competence does not mean that the wish to transfer e-methods to learning is in the blood" (Schulmeister, 2008).

Most studies on the learning traits of the Net-gen reveal that students do not consider the use of technology in university teaching to be very necessary (Bennet et al., 2008). In fact, Bennet et al. contended that "far from demanding lecturers change their practice", students "appear to conform to fairly traditional pedagogies, albeit with minor uses of technology tools that deliver content." (Margaryan & LittleJohn, 2008, p.6).

The digital learners in higher education international research project

Digital Learners in Higher Education is an international research project that is investigating how postsecondary learners in different institutional contexts and cultures think about ICTs and how they use them in their social and educational lives. The goal is to gain an understanding of what the growing use of the new ICTs means for teaching and learning in higher education.

The research questions driving this study are:

- Do postsecondary students distinguish between their social and educational use of ICTs?
- What impact does students' social use of ICTs have on postsecondary learning environments?
- What is the relationship between social and educational uses of ICTs in postsecondary education?

We are using a multi-case study embedded design (Yin, 2009) containing three cases of social and educational use of ICTs. The cases consist of three distinct postsecondary institutional contexts: a Canadian polytechnic teaching institution (BCIT), a Canadian

research-intensive university (University of Regina) and a European online university (Open University of Catalonia).

In the first phase of the study, BCIT partners reviewed the literature and tested some of the claims made about Net Gen students. Specifically, they sought to determine whether or not students at the BC Institute of Technology (BCIT) fit the profile of the Net Generation learner as portrayed in the literature, and to try to understand how BCIT learners were using various ICTs. A review of the literature suggests that the discourse around the impact of new digital technologies on postsecondary education has been dominated by speculation, anecdotal observations and proprietary research that is difficult to assess. We found that there is no empirically sound basis for most of the claims that have been made (Bullen et al., 2011).

In the second phase of the study, a survey was designed in order to gather information about students' communication and study habits. Later, the survey was adapted for administration to students of UOC's cross-over course "ICT Competences".

Context: ICT competences at UOC

UOC offers an internet-based learning system in a Virtual Campus, through which students can, at any time or place, create and access a dynamic and personalized learning process.

UOC students are generally older than typical undergraduate students: 9% are under 25, 33% are between 25 and 30, 40% are between 31 and 40, and 18% are over 40 years old.

UOC students do not attend face-to-face classes at University; instead theirs is a fully-online learning process. There is one appointment that UOC students can attend in person voluntarily (the opening session at the beginning of the semester) and another that can be compulsory depending on the courses they are taking (the exam or validation test at the end of the semester).

Since the foundation of UOC, ICTs have been integrated into the educational activity. A specific and "in all programs" course on digital literacy was created and has been evolving in parallel with students' needs. Currently, this course is aimed at meeting the basic ICT competences outlined in the Bologna declaration (Guitert & Romeu, 2008):

- Search for information on the Internet.
- Produce digital information.
- Disseminate digital information.
- Acquire communication skills in an online environment.
- Understand the basics of digital technologies.
- Plan and manage a virtual project.
- Acquire a digital civic attitude.
- Acquire team working skills in an online environment.

The ICT Competences course is based on a project-work methodology that facilitates the progressive acquisition of the ICT competences listed above. Students develop an online project in groups researching a specific scope of study. It helps them to acquire all the necessary competences to accomplish their program. The project is carried out with a series of linked activities that lead to the development of a final report that can take a number of formats (a text document, a wiki, an audio-visual production, all depending on the program where is taken).

Our course is adapted to the use of web 2.0 tools (depending on the requirements and the program's needs): all students upload their research links to a social bookmarking network (Delicious), some of them use GoogleDocs in order to plan and develop their projects, wikis are set up and online audio and video editing (Jaycut) is used.

UOC's participation in the digital learners in higher education international research project: Tool for gathering data and its adaptation to the UOC context

For this study, UOC adapted a survey designed by the BCIT partners and administered it to the students in our ICT Competencies course. The adapted survey is divided into 5 sections:

The first section is related to general information about participants, such as gender, year of birth or which program they are taking.

The second section analyses their habits regarding whom they ask for help (with their learning process).

The third section is related to the tools they use to communicate with peers and instructors.

The fourth section analyses their communication habits with classmates and instructors and their study habits in individual and group activities.

Finally, the fifth section takes a look at the temporal dimension of studying (time they spend studying one course, time needed to finish the program, time planning, etc.)

All sections were in the original survey except the fifth one. It was administered online to all ICT competences' course classrooms and participants completed the survey once.

Results

Demographic information

1036 students completed the online survey (approximately 35% of the students in the course) so we have a representative sample of the population.

61.4 % of the respondents were women and 38.6% men.

If we analyse their year of birth, the 26.7% (276) were born between 1940 and 1970, 46.9% (486) between 1970 and 1982, and 26.4% (276) between 1982 and 1991. This last age-group of the sample (26.4%) could be classified as Net generation, with the remaining 73.6% seen as non-Net Generation.

Habits relating to who they ask for help

The results of Section 2, which sought information about what students do when they have a doubt about their courses' content, showed that the majority of participants (both Net and non-Net generations) prefer to try to solve it on their own (e.g. read the materials of the course) or by searching the Internet for an answer.

Table 1: What students do when they have a question about course content (Mean, 1= never, 6=always)

	Non-Net Generation	Net Generation
Prefer to address it on their own	5.05 (Standard Deviation: 0.8)	5.05 (Standard Deviation: 0.8)
Prefer to search the Internet	4.21 (Standard Deviation: 1.2)	4 (Standard Deviation: 1.4)

As we can see in Table 1, there is virtually no difference in the responses of the two groups to this question. Both groups are highly independent.

Tools they use to communicate with peers and instructors

Results from section 3, as represented in Table 2, showed that the tools used most by students were the UOC e-mail account and the campus' forums. The responses from the two groups are almost the same: both groups seldom communicate with these tools. This suggests they do not communicate frequently with their peers, which is consistent with their tendency to prefer to work independently.

Table 2: Which tool student use to communicate with peers and how often?

	Non-Net Generation	Net Generation
UOC e-mail account	39.3% (Seldom = 1 to 4 times per month)	39.5% (Seldom = 1 to 4 times per month)
Other campus' tools (e.g. forums)	35,8% (Seldom = 1 to 4 times per month)	35.8% (Seldom = 1 to 4 times per month)

Synchronous tools and telephone were the least used methods of communication (up to 60% say they never use them).

We have gathered similar data in the case of communication with instructors, shown in Table 3.

Table 3: Which tools student use to communicate with instructors and how often?

	Non-Net Generation	Net Generation
UOC e-mail account	60.5% (Seldom = 1 to 4 times per month)	47.5% (Seldom = 1 to 4 times per month)
Other campus' tools (e.g. forums)	50.7% (Seldom = 1 to 4 times per month)	32 % (Seldom = 1 to 4 times per month) and 32% Often =5 to 10 times per month

Both groups seldom use their UOC e-mail accounts to communicate with instructors, but we can see a small difference between the two groups in the case of other campus' tools: Digital learners use the campus' tools to communicate more frequently with instructors.

Study habits

Table 4 represents how students see their own study habits, which they were questioned about in section 4.

Table 4: Study habits (expressed in mean, 1-6 Likert scale)

	Non-Net Generation	Net Generation
I prefer to work on assignments on my own when doing schoolwork.	5.31 (Standard Deviation: 1.08)	5.14 (Standard Deviation: 1.1)
I prefer to study only with friends.	2.27 (Standard Deviation: 1.4)	2.23 (Standard Deviation: 1.3)
I prefer to learn by trying things out for myself.	4.43 (Standard Deviation: 1.4)	4.22 (Standard Deviation: 1.4)
I prefer to get clear instructions before trying something new.	4.55 (Standard Deviation: 1.4)	4.36 (Standard Deviation: 1.4)
I am used to doing several different tasks at the same time.	4.57 (Standard Deviation: 1.4)	4.46 (Standard Deviation: 1.3)
I usually have a work plan for each course	4.49 (Standard Deviation: 1.3)	4.22 (Standard Deviation: 1.5)

In both cases, we can see that the lowest rated item is studying with friends. This result is consistent with participants' responses that suggest they prefer to study independently. This is likely related to the fact that they are studying in an online university that gives them access to programs that offer them more flexibility and allows them to study at their own pace.

Multitasking has similar ratings too. This indicates that there is no difference in one of the main characteristics that has been attributed to the Net generation.

Table 5: Their opinion about working with peers expressed in means (1= totally disagree, 6=totally agree)

	Non-Net Generation	**Net Generation**
it helps me understand course content better.	4.23 (Standard Deviation: 1.4)	4.28 (Standard Deviation: 1.4)
I enjoy it.	3.99 (Standard Deviation: 1,4)	4.07 (Standard Deviation: 1.3)
it results in better work completed.	4.17 (Standard Deviation: 1.4)	4.15 (Standard Deviation: 1.3)
it saves time.	3.53 (Standard Deviation: 1.5)	3.68 (Standard Deviation: 1.5)
it keeps me motivated to keep working	4.07 (Standard Deviation: 1.5)	4.10 (Standard Deviation: 1.4)
classmates provide useful feedback for my work.	4.33 (Standard Deviation: 1.3)	4.41 (Standard Deviation: 1.3)
I feel isolated from other students of this program	2.33 (Standard Deviation: 1.4)	2.39 (Standard Deviation: 1.5)

We can see, like the other items, that there are very similar ratings in both cases. All items show high scores so we can tell that participants prefer to work individually (as table 4 items show) but they find work in groups useful when they have to do it.

The fourth and the seventh item have the lowest rating:

In the first case, we have calculated the Pearson correlation index between this item and two items referring to the time taking the course; in order to find out if students

with a lower rating in this item are those who spend more time in a course. We cannot confirm a relationship between these items because the correlation indexes are very near to 0 in all cases.

In the second case, we can see a high standard deviation (1.4 and 1.5 respectively). The high level of the dispersion in the responses renders the Pearson index inapplicable, and we therefore cannot deduce any tendency.

Temporal dimension of studying

Analysis from the results of the last section of the survey, concerning the temporal dimension of studying, shows similar responses but with some differences (see Table 6).

Table 6: Opinion about time and studying (expressed in frequencies)

	Non-Net Generation	**Net Generation**
Studying online requires more time than studying face to face	45.8% strongly/totally agree	54% strongly/totally agree
In order to study a university program through the Internet, time planning is a key issue	69.1% totally agree	72 % totally agree

It seems that digital learners are more worried about the time they spend taking an online program, because 15.2% of them strongly agree with this statement and a 38.8% totally agree (in the case of digital immigrants 17% strongly agree and 28.8% totally agree; this is a difference of nearly 10 percentage points). The same is true in the case of considering the time planning as a key issue, but with a minor difference.

Finally we can see what students think about the time they need to finish their programs and a single course.

Table 7: Time they need to complete a program and a course (expressed in frequencies)

	Digital immigrants	**Digital learners**
How many semesters do you think you will need to finish your program	90.4% (more than 5 semesters)	83% (more than 5 semesters)
How many hours per week do you think is necessary to complete an online course?	53.7% (between 5 and 10 hours per week)	47.3% (between 5 and 10 hours per week)

As Table 7 shows, there seems to be little difference from the previous items: there are more digital immigrants than digital learners who think they need more time to finish a course or a program but, as can be seen in Table 7, this difference is not very great.

Conclusions

Based on an analysis of this data we can conclude that there is no relationship between generation and study and communication preferences of the students at UOC. This finding is consistent with the findings of the BCIT study and is further evidence that the notion of the Net Generation as presented in the literature is more speculation than based on reality.

We could not find any statistical data supporting Tapscott (2009) and Oblinger's (2005) statements. In fact, the data suggest the opposite: Older learners at UOC's feel as confident with the use of ICT as the younger learners, they are capable of carrying out different activities simultaneously and the differences between the generations are almost imperceptible in most cases.

But if we have to point to some differences, it seems that, surprisingly, younger learners are more worried about the time issues of studying online and they communicate with instructors more frequently. However if we analyze the means we see that these differences are not that great. Older learners seem to be more worried about the time they need to finish their course or program, a fact that could be explained by the short time they have to study because of their commitment to work and family activities. But these differences are not statistically significant.

The second phase of the Digital learners in Higher Education international research project will deal with the following:

- We will set up virtual focus groups with some of the students that participated in the first phase. The principal aim of these focus groups is to gather qualitative data to analyze their academic and social use of ICT in greater depth.
- A second survey will be given to the participants of the focus groups, in order to gather more statistical data supporting their statements.

Once the second phase is complete, further research could be carried out to find out if fully online students have different study habits to students that use online programs as a part of a blended system.

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Establishing a Foundation for Reflective Practice: A Case Study of Learning Journal Use

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Best Research Paper Award Winner

Abstract

To support students in the development of reflective practice, educators must skilfully incorporate techniques for encouraging and developing critical and reflective thinking within the classroom. The purpose of this case study is to develop a deeper understanding of the digital learning journal as a tool to support student reflection and self-directedness in learning. The case study begins with a review of the literature, including definitions of reflection, strategies for encouraging reflective thinking and practice, and assessment techniques. Next, the study describes a specific case where digital learning journals (wikis) are being used to establish a basis for reflective practice as students begin their studies in the Foundations course of an online masters program. Instructor experience and practice are compared with conclusions from the literature. Finally, student perceptions of the pedagogical value of using reflective learning journals are examined and discussed. An important finding of the study is that students are able to differentiate among different learning activities in terms of outcomes and identify the digital learning journal as helping them better understand course content and their individual learning processes and preferences. Recommendations are made and areas for further investigation are identified.

Key words: reflection, learning journals, social media, e-portfolios, online teaching

Introduction

A key role of higher education and one of the measures of its effectiveness is how well graduates can engage in critical and reflective thinking and apply these lifelong learning skills to problem solving in complex real world situations (Johnson, Levine, Smith, & Stone, 2010; Schön, 1983; The World Bank, 2003). The use of learning journals to encourage students to become more reflective and action oriented in their learning is not a new concept. The documented benefits are numerous (Moon, 2006; Andrusyszyn & Davie, 1997; Henderson, Napan, & Monteiro, 2004; Rose & Devonshire, 2004). The learning journal is most commonly seen as a way to help individuals to reflect on when and how they best learn, to engage in critical thinking, to make connections among ideas and between previous learning and new learning, to create new knowledge and theory, and through these processes, to become self-directed autonomous learners.

Learning journals were initially incorporated into the Master of Distance Education and E-Learning (MDE) program as a form of learner support, with the journal providing a framework for students to organize coursework samples, information, reflections, and ideas (Walti, 2004). In 2009, the digital learning journal was introduced as a formal learning activity into the Foundations of Distance Education and E-learning course (OMDE 601), with the explicit objectives of helping students become more reflective and self-directed in their learning, and to engage them in creating content while experimenting with the use of web 2.0 tools for this purpose.

This case study attempts to understand the digital learning journal as a tool to help students embarking on a graduate studies degree develop a strong foundation of reflective practice that will help them become more effective nimble learners and problem solvers in their studies and in the workplace. The case study is itself an example of reflective practice in that findings are considered in the context of planning further investigation and ways in which practice can be improved, in particular by providing instructional guidance to students in using their journals and assessing the learning journal as a formal assignment.

Methodology

Case studies are a popular form of descriptive, explanatory, and/or exploratory investigation in fields such as educational technology where questions of "how" and "why" are common (Willis, 2007, p. 212). Case studies involve collecting and/or choosing, organizing, and analyzing various types of data to better understand a particular phenomena in a real life setting. Hence, the case study is chosen as a method of investigation here because we want to know more about how learning journals promote the skills that we want students to develop in the MDE, how we might improve our practice in this regard, and how we might investigate these questions further. To this end, we examined the literature on learning journals, in particular, what research can tell us about the use of learning journals to build reflective and critical thinking skills with a goal of developing independent learners and reflective practitioners. We also reviewed the history, evolution, and purpose of the learning journal in the MDE program from the perspective of instructors. Experiential knowledge of instructors is documented in the form of a detailed description of the methods developed to guide students in using their journals and assess their work. The case study also includes the learner perspective based on a recent survey of MDE students about their perceptions of the effect of social media use, including that of learning journal wikis, on their learning experience and outcomes. The methodology used for the survey is described later in the paper in the section where the learners' views are addressed.

Literature Review

In recent years, there has been considerable renewed interest in the practice of reflection (Herrington & Oliver, 2002). Boud, Keogh and Walker (1985) define reflection as: "those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to new understandings and appreciations" (p. 19). Andrusyszyn & Davie (1997) consider reflection to be "a personal process that evolves from the cognitive and affective synthesis of ideas and [one] that...may be strengthened through dialogue," with the goal of constructing meaning through the reflection process (p. 120). Hatton & Smith (1994) describe reflection as "deliberate thinking about action with a view to its improvement" (p. 7).

Dewey (1916) describes five features of the reflective experience in practice:

- *Confusion and doubt*: learner is confronted with a new situation and/or experience
- *Conjectural anticipation*: learner begins to evaluate the situation and makes tentative assumptions or hypotheses
- *Examination, inspection, exploration, and analysis*: learner conducts a thorough evaluation of the situation
- *Elaboration of hypothesis*: learner further defines the hypothesis and begins to test it against facts
- *Testing the hypothesis*: learner recreates the situation in order to test the hypothesis (pp. 117-118)

According to Dewey, for a reflective experience to occur depends upon the degree of completeness and accuracy with which steps 3 and 4 (evaluation of the situation, hypothesis testing) are conducted.

Reflection also plays an important role in heutagogy, an emerging pedagogical theory in distance education (Anderson, 2010). In heutagogy, control of the learning process shifts from teacher to learner, making learning significantly more student focused. In a heutagogical approach to learning, students reflect upon the problem solving process, as well as the process they have gone through in solving the problem (Hase & Kenyon, 2000). This self-reflection in the form of double-loop learning helps prepare students for a future of lifelong learning, where the skill of knowing how to learn will be essential in a rapidly innovative workforce (Hase & Kenyon, 2007). By supporting learners in developing the capacity to learn in unfamiliar situations, educators can thus better prepare learners for the managing the complexities of a global and evolving work environments (Anderson, 2010; Hase & Kenyon, 2007).

In describing the role of reflective practice within the professions, Schön (1983) defines reflection in reference to 1) *reflection-in-action*, that is reflecting while in the midst of problem-solving, and 2) *reflection-on-action*, that is reflecting on the process of reflection-in-action (as a reflective practitioner). "When someone reflects in action," writes Schön (1983), "he becomes a researcher in the practice context. He is not dependent on the categories of established theory and technique, but constructs a new theory of the unique case." (p.68). Reflective practitioners engage in a dialogue of reflection with their situation, which allows them to engage in continuous self-education and lifelong learning as researchers-in-practice. Gibbs (1988) also finds that reflection plays an important role in experiential learning, as the process of reflection

helps solidify experience in the learner's memory, raising the potential for further learning.

Research by Candy, Harri-Augstein, & Thomas (1985) indicates that when students are not taught how to reflect and not provided subsequent guidance in reflective practice, they will not automatically practice or actively engage in reflection. Bourner (2003) notes that "developing students' capacity for reflective learning is part of developing their capacity to learn how to learn" (p. 267). By teaching and guiding learners in the development of their reflective skills, educators thus support students in developing their capacity to learn and better prepare them for lifelong learning.

How then do we move instructional design away from a focus on content mastery and toward a focus on acquisition of higher order thinking skills (HOTS) and competencies such as critical thinking and reflective practice? According to Bergman (2009), a basic form of generating HOTS is to ask open-ended questions that require the student to reflect before responding rather than cite facts. Bourner (2006) recommends the use of *searching questions*, guiding questions that structure or scaffold the learner's reflective process. In this way, the student is encouraged to think reflectively and to use questions as a way of developing meaning, which then leads to deeper learning.

Defining these guiding questions is critical in order to effectively support students in reflecting in their learning journals (Pulman, 2007). Hatton & Smith (1994) found that a useful strategy was "to engage with another person in a way which encourages talking with, questioning, even confronting, a trusted other" (p. 9). Rose & Devonshire (2004) report that instructor guidance by scaffolding feedback (i.e., formative and summative feedback) and providing prompts throughout the reflective process positively influences the quality and depth of student reflections. To support reflective practice in the classroom, Herrington & Oliver (2002) incorporate activities such as project problem-solving, online journals and diaries, discussion boards, and publication of findings (as a form of reflection-on-action). Hatton & Smith (1994) also identify numerous techniques for fostering reflection, from oral interviews and personal narratives to reflective essays based on practical experiences and journaling.

According to Moon (2010), a learning journal is primarily "helpful in personalising and deepening the quality of learning and in helping learners to integrate the material of learning...and is usually a vehicle for reflection" (pp. 2-3). Learning journals can also help learners to slow the learning pace, give them a stronger sense of ownership of

their individual learning process, encourage development of meta-cognitive skills (Moon, 2006), support deep exploration into issues, encourage linking of theory to practice, improve writing skills, support development of critical thinking and learner autonomy, and provide a mechanism for providing instructor feedback (Henderson, Napan, & Monteiro, 2004; Rose & Devonshire, 2004; Morgan, Rawlinson, & Weaver, 2006; Wolf, 2008). Case studies published by EDUCAUSE (2007) also found that the use of learning journals reduced incidents of plagiarism, helped predict a learner's overall classroom performance, and supported learners in developing technology skills.

Having established the benefits of reflective thinking and identified techniques for helping students develop the necessary skills for this practice, we turn our attention to assessment. There are those who argue that assessing learning journals is strictly subjective and is akin to assessing learner emotions (Moon, 2010). Hatton & Smith (1994) note that ethical issues can arise in assessing reflections and that the assessment activity must be carefully structured. Issues that should be addressed prior to assessing learning journals include identifying what should be assessed (process or product), how the journal should be graded (adequate or inadequate), who is responsible for developing the criteria for assessment, and what type of work should be assessed (written or oral) (Moon, 2006)

Bourner (2003) emphasizes that by assessing student work, educators are guiding the learning process by helping learners to reflect and thus learn through reflection. Churchill (2009) reports that students are more motivated and more likely to blog (and reflect) when their learning blogs are graded (p. 182). Moon (2006, 2010) recommends assessing learning journals if only to address the increasingly common phenomenon of the *strategic student*, who only completes minimum course requirements (i.e., only those elements that are assessed. Bourner (2003) proposes a two step assessment process: 1) identifying that the student is engaged in critical thinking, and 2) confirming that the student demonstrates reflective thinking, basing the assessment "on evidence of the capacity to interrogate experience with searching questions" (p. 270). Bourner states that one must look for evidence of reflective thinking, in particular through references to past and current experiences.

When assessing the final reflective product, most approaches recommend evaluating content based on a scale or level of reflection. Henderson, Napan & Monteiro (2004, p. 360, and based on Bain, Ballantyne, Packer & Mills, 1999, p. 60) examine levels of reflection starting from reporting and responding, then moving to relating, reasoning,

and reconstruction. Surbeck, Park Han, and Moyer (1991) describe three categories of reflection for assessment, each monitoring the ability of the student to move from one category to the next as reflection deepens: 1) reaction, where students describe general reactions to the content and report on activities and any personal concerns or issues; 2) elaboration, where students further expand on their reactions in different ways, for example, by relating them to a specific event, example, or situation; and 3) contemplation, where students consider these reactions and elaborations in relation to their personal and/or professional life and world view (social, ethical, and moral).

Hatton & Smith (1994, p. 19, based on Smith, 1992) propose four criteria for identifying types of reflective writing:

- *Descriptive writing*: describes what has happened (not considered reflective)
- *Descriptive reflection*: considering multiple viewpoints and explaining what has happened by rationalizing or justifying reasons for the action
- *Dialogic reflection*: entering into a dialogue with oneself and/or others about an event or action, reviewing potential alternatives, and forming hypotheses
- *Critical reflection*: considering the social, political, and cultural factors that are influential within the context of the action

Additional criteria identified by Moon (2006) include: length, presentation, legibility, and number/regularity of entries; clear and objective description of events; clear relationship of content to the coursework and course objectives; and evidence of creative and critical forms of thinking and deep learning, as well as of speculation and willingness to reassess ideas and pursue further ideas and lines of questioning (p. 115).

This brief literature review has served to provide definitions of reflection and to establish the role of reflection in developing student skills for lifelong learning. It also establishes the importance of active guidance and assessment of reflection as a formal learning activity in order to encourage development of reflective skills and ongoing practice. Finally, the review identifies instructional strategies and assessment techniques for this purpose. We will now discuss how the digital learning journal is used within the Foundations course and MDE program.

Learning Journals in the MDE: Building a Foundation for Independent Learning and Thinking

The central focus in the online MDE program is on developing leaders in distance education and e-learning who are "active advocates" and who can "manage significant change processes" (Bernath & Rubin, 2006. p. 20). As such, it is important to develop lifelong learners who are reflective practitioners committed to continuous learning, self-education, and professional development. Toward this end, every course in the program includes learning activities such as online collaborative group work, peer assessment, problem-based learning, and case studies - each activity designed to engage students and encourage deeper learning and thinking, reflection, and critical thinking. Throughout the program, students are actively engaged in creating content through discussion, presentation of ideas, and various forms of documentation.

From the launch of the MDE program in 2000, students have been required to present an e-portfolio that documents their progression through the program. The e-portfolio is essentially seen as "…..a passport to the professional world" which demonstrates "the student's qualifications gained in the field and provides evidence of their competencies and skills gained in a variety of disciplines/roles" (Bernath & Rubin, 2006. p. 20). The e-portfolio must include two major components: 1) selected work samples and related material (e.g. papers, projects, instructor feedback, and a curriculum vitae), and 2) the learning journal that is the focus of this case study. Students use the journal to document their reflections about how and what they learn, and about their experiences in the MDE – and how these experiences have influenced the way they think and learn. In particular, students are guided in and encouraged to reflect on and record moments of insight, instances of connecting theory to practice, and the experience of constructing knowledge through connecting ideas and building on previous knowledge.

In the early stages of the MDE, the e-portfolio with its learning journal component was introduced as a project when students reached the capstone course, which is the final course before graduation. A voluntary online tutorial that provides guidance in how to create and use an e-portfolio and learning journal (in the form of a learning log) was developed (Walti, 2004), and students were encouraged to start building their e-portfolios when they entered the program. The results of these efforts were hit and miss. A small minority of students diligently built e-portfolios, both collecting work samples and documenting their learning, while others collected work samples but did

not necessarily keep a journal. Many students waited until they reached the capstone course before beginning work on their e-portfolio and reflections.

The Foundations course instructors speculated that the learning journal could be a more effective teaching and learning tool in the MDE if it were formally introduced in the first course in the program so that students could be guided in developing reflective practice from the beginning of their studies. Further, it was clear that students needed explicit guidance and regular feedback in order to use their learning journals to develop the desired reflective and critical thinking skills, and that they would only adopt journaling as part of their regular learning activities if the significant time and effort they were required to invest was rewarded with receiving credit as part of their final grade for the course. These perspectives reflect a shift in instructor attitude and practice from a few years earlier when it was thought that the learning journal should be encouraged but not be formally assessed (Walti, 2004). However, experience with the capstone course and a more fully evolved MDE program, feedback from instructors, observations of student journaling, findings in the literature, and advances in web 2.0 technology all provided evidence that the learning journal represented a significant opportunity to more explicitly help students discover and develop reflective and critical thinking skills.

A Means for Reflective Thinking...Using Social Media

In January 2009, development and use of the learning journal became a formal assignment in the Foundations course, contributing 5% to the student's final grade. In early 2010, this percentage was boosted to 15% of the final grade, a substantial enough portion to warrant students' attention. A wiki is used for the assignment, allowing students to easily create a digital learning journal where different types of information, ideas, and resources can be organized and stored, and shared with instructors, and if they wish, their peers. Wikis also offer the flexibility to change and adapt content over time, easily accommodating the learning journal as an ongoing project that accompanies students throughout their graduate studies and beyond. Use of wikis as learning journals supports these future managers of distance education in creating their own content that is generated from reflecting on their classroom experience (readings on theory and practice, interactions with classmates), and their individual learning process. At the same time, students are using the Web 2.0 applications that will be a critical part of their tool kit in professional practice.

The learning journal assignment instructions include guidance in developing the journal, a description of the journal and its purpose, links to wiki resources (e.g., PBWorks and WikiSpaces), the assignment objectives, and a link to the grading rubric (see description below) which clearly defines the expectations for journal entries. Assignment objectives for students are as follows:

- Report on what has been learned within each course module and in the course overall
- Examine, analyze, and critically reflect upon the new knowledge acquired through the course, for example, by relating it to personal experience and existing knowledge and/or applying it to current problems or challenges
- Make connections between/among the course topics and understand how the connections made relate to the learner's individual learning process
- Explore their own evolving ideas about and understanding of distance education and relate these to the course content
- Describe if/how module objectives and overall course objectives have been achieved

An important implicit objective, which becomes explicit through the guidance provided and assessment of work, is the establishment of journaling as a regular practice in critical and reflective thinking for students as they progress through the MDE program and beyond.

The first part of the learning journal assignment asks students to work in dyads to research wikis for their fitness of purpose as a learning journal tool and report their findings to the class. Many of the students are unfamiliar with wikis, and this exercise helps them to explore these tools in a non-threatening way by sharing the experience with another student. Through this exercise, they begin the reflective and critical thinking process by considering how they want to use their journals, what criteria are most important to them individually, which wiki might best meet their needs, and how their ideas compare to those of their peers. Once each student chooses a wiki, the student is required to set it up, post an initial definition of distance education, and provide the wiki link to course instructors. At this point, the student can begin writing in the learning journal. The activity of creating the learning journal in a wiki gives students practical experience in using web 2.0 technologies, and allows instructors to effectively monitor the student's progress within the course.

In each of the three units of the course, a checklist of activities to be completed is provided. Posting learning journal entries appears as an activity on this list to remind students to post their reflections. Specific "questions for reflection," which are intended to guide students in their journaling, are also provided in each course unit. These open-ended questions are intended to motivate students to move beyond a focus on content and passive acquisition of knowledge to a focus on process so that they can begin to actively direct and manage their learning. In attempting to respond to the questions, students start to reconstruct their learning experiences in the course in the context of personal knowledge. Many also begin to demonstrate that they recognize their learning processes such as moments of insight and connection of ideas. Within the journals, students are encouraged to experiment with different types of media (e.g., audio and video) as opposed to posting purely text-based journal entries. For example, some students choose to design and develop YouTube videos to document their reflections on module readings, interactions, and experiences, an approach that allows them to exercise their preferred learning style, or in this case, reflection style.

Providing Guidance in Learning Journal Development

Henderson, Napan & Monteiro (2004) note that providing feedback and grading reflective learning journals can be an arduous process for instructors. This is consistent with the experience of instructors in the MDE Foundations course. Although there may be ways to incorporate learning journals so that they are not so labour intensive, further investigation of factors that contribute to student engagement with the journal is necessary. With the current course design in OMDE 601, a significant investment of instructor time is required to help students to use their learning journals effectively. The activity is designed into the course in such a way that students can easily gain access to clear instructions and guidance, and instructors are available to help with technical as well content and process questions. Clear instructions and a link to an online tutorial for the full e-portfolio (including the learning journal) are posted in the classroom. A description of an e-portfolio, what kinds of material to include, why it is important to begin one early in the program, and how it will be assessed in the capstone course is included. Two weeks into the course, students are invited to a one-week MDE orientation program, where they can learn more about the e-portfolio and how they can immediately begin to develop one in preparation for the final capstone course.

For the Foundations course, students are expected to set up their wikis as full e-portfolios, and begin saving significant pieces of work, but at this early stage, the focus is primarily on the learning journal, and this requires careful instructor guidance. Instructors closely monitor the first group activity and post feedback to the class regarding each dyad's wiki research results. As students subsequently post the links to their wikis, instructors enter the individual sites and provide initial feedback on the design and any initial postings so that students are immediately rewarded for completing this task and any problems with set up are identified early.

Assessment of Learning Journal Content

Wikis allow instructors immediate access to student journals, and students can actively seek instructor feedback on their journal entries at any time. Once instructors become members of a student's wiki, they can set up their account profiles so that they receive an e-mail notification each time the student modifies the site. As well, students have access to the grading rubric from the time the assignment is posted so they can assess their own journals against these criteria. Approximately midway through the term, instructors give formal written feedback to each student on their journal including assigning a grade (which does not count toward the final grade but is a benchmark in determining the student's standing with his/her journal). The feedback is based on the rubric and explicitly addresses areas for improvement. This mid-term formative assessment provides students with an opportunity to think about and try to understand the process of reflective thinking, reassess and improve their own work and incorporate the feedback into subsequent journal entries. At end of term, the learning journal is formally assessed, again using the rubric, and each student receives written feedback on individual performance, as well as a grade that contributes toward the final grade for the course.

The rubric is a detailed assessment tool developed by Foundations course faculty that addresses four aspects of the learning journal weighted according to their perceived importance by the instructors: knowledge and understanding (40%), presentation and communication (30%), timeliness and frequency of posts (20%), and technical aspects (10%). *Knowledge and understanding* refers to documentation of what was learned, including a reflection on the experience and process of learning. The student must go beyond a report of what happened (descriptive writing) to a reflection on what happened (descriptive, dialogic, and critical reflection) (Hatton & Smith, 1994). Instructors look for a progression in the development of meta-cognitive skills demonstrated by students being able to articulate how they learned, when they

learned, and what kinds of experiences triggered the learning process. In this category, students are also assessed on their construction of new knowledge through connection of ideas and/or connection of theory and practice, an approach recommended by Boettcher (2006) for developing problem-solving skills through student development of content. As working adults, MDE students are often able to connect concepts in the course to real life situations at work, bringing innovative new approaches to solving problems or expanding in new directions. Often they discuss these insights and applications in the classroom conferences but their understanding and ability to make the same kind of connection going forward appears to be enhanced by reflecting on the experience in their journal.

Performing well in the *presentation and communication* category of the rubric includes the ability to communicate logically and clearly and use different kinds of media to present ideas, but students are also asked to demonstrate their progression of ideas, building on related thoughts and ideas over time. They are aided in this task by the questions for reflection that are posed in the conferences for each unit of the course, and part of their assessment in the presentation and communication category is their approach to these questions. Students are also assessed on *the timeliness and frequency* of their submissions. Regularly recording reflections is more likely to facilitate the kind of progressive development of skills, and construction of knowledge and ideas that is the goal of these activities. Finally, a small percentage of the assessment is attributed to *technical presentation*. Despite the language of the journal being less formal, often more "personal, tentative, and exploratory" (Hatton & Smith, 1994, p. 12) than in an academic paper, it is still important for students to demonstrate recognition of intellectual property and citation standards and writing that is free of grammatical errors and misspellings. It is equally important that students demonstrate the ability to share the content that they create by managing web 2.0 tools to successfully design clear and intuitive navigation paths.

Through the guidance and assessment processes described here, students are encouraged to adopt and continue the practice of journaling throughout the program and beyond. Returning to the larger picture, the mission of the MDE is to develop leaders in distance education, creative and critical thinkers who are lifelong learners committed to challenging assumptions and continuously improving practice. In the capstone course, the e-portfolio submitted as a final project must include a summative reflective statement that conveys how the student has developed personally and professionally while in the MDE, how the MDE curriculum has affected the student's evolution as a scholar and practitioner in the field, and a description of the student's

goals and how the student intends to pursue these. If the learning journal assignment in the Foundations course is successful in meeting its goal of setting students on the path of becoming reflective practitioners, they should be well prepared to write this statement at the end of the program. That being said, in order to reflect on and continue to improve and refine our own practice as instructors, we want to better understand how students view the learning journal, how well they understand its purpose, and in what ways (if at all) they see it as contributing to their learning.

The Learner Perspective: A Survey

Although learning journals are widely accepted by educators as tools for critical thinking and reflection, as part of the case study, we wanted to better understand how students view learning journals, whether they see them as beneficial, and if they can identify specific ways in which learning journals support their learning. In the summer of 2010, a survey to investigate student perceptions of the use of these social media tools in the online classroom was conducted among all of the students who have participated in MDE 601 since September 2009 (five sessions, N=54) (Blaschke, Porto, &, Kurtz, 2010). The online survey was developed using SurveyMonkey software (http://www.surveymonkey.com). Students were asked to endorse (strongly agree to strongly disagree with options for non-applicability or no opinion) statements about the specific type of impact that Web 2.0 applications used in OMDE 601 (podcasts, video/YouTube broadcasts, live classroom sessions, mashups, and learning journal wikis) had on their learning (Survey statements about using the journal wiki are shown in Table 1).

Survey Results

Eighteen of 54 students responded to the survey (33.3% return rate), with 16 students indicating that they used the reflective learning journal (29.6% response rate). For the purpose of this case study, only the responses from those students who indicated that they used the learning journal wiki (16) are considered. To facilitate and simplify comparison of response patterns item to item, categories of endorsement were collapsed to three: agree (includes strongly agree and agree), disagree (includes strongly disagree and disagree), and no opinion. Table 1 shows the number and percentage of students in each endorsement category for all of the items that refer to the learning journal wiki.

Table 1: Data on Learning Journal Usage (Wikis) [n=16]a

Survey Statement	Agree % (n) b	Disagree % (n) c	No opinion % (n)
The experience of using wikis made me feel more connected to the instructor	56% (9)	25% (4)	19% (3)
The experience of using wikis made me feel more connected to other students	56% (9)	31% (5)	13% (2)
The experience of using wikis made me feel more connected to course content	75% (12)	19% (3)	6% (1)
The experience of using wikis helped me to better understand course material	75% (12)	12.5% (2)	12.5% (2)
The experience of using wikis made me further reflect on what I had read and/or experienced in class	87.5% (14)	0% (0)	2 (12.5%)
The experience of using wikis gave me a better understanding of my personal learning process d	93% (14)	7% (1)	0% (0)
The experience of using wikis made me think about how I think	81% (13)	13% (2)	6% (1)
Use of wikis enabled me to create new content d	87% (13)	0 (0%)	13% (2)
Use of wikis promoted collaboration between me and my classmates d	73% (11)	20% (3)	7% (1)

a: 18 students completed the survey; 2 responded that they did not use wikis for their learning journals
b: Strongly agree and Agree have been combined into one category (Agree).
c: Disagree and Strongly disagree have been combined into one category (Disagree).
d: One student skipped the question.

Survey findings reveal that within the group surveyed, almost all students who reported using the wiki agreed or strongly agreed that the reflective learning journal helped them understand their personal learning process (93%), reflect on what they had read and/or experienced in class (87.5%), and create new content (87%). The same students indicated that the learning journal helped them think about how they think (81%) and helped them better understand course material and feel more connected to course content (75%). A much lower percentage of these students agreed that the learning journals made them feel more connected to the instructor or to other students (56%), indicating that they differentiated among the types of effects that the learning journal had on their learning. Other results from the survey support this finding. Although the figures are not reported here, it is important to note that the survey turned up different endorsement patterns for learning activities other than the journal. For example, the majority of students who participated in a live classroom session agreed that this activity contributed to their sense of connectedness to the instructor; however, the same students indicated that a live classroom session did not contribute

as strongly to those items that might be associated with the development and use of reflection and meta-cognitive skills (Blaschke, Porto, & Kurtz, 2010).

Discussion

The design and use of the Foundations learning journals is strongly rooted in early pedagogical practices established within professions that have traditionally used learning journals as a means for reflection. The fundamental difference lies in the design and scaffolding approach that MDE instructors have implemented and the technology that they have used. By requiring students to create a reflective learning journal at the start of the MDE graduate program and guiding them with a learner-centred approach, instructors encourage students to become independent and autonomous learners. Formative and summative assessment provides opportunities for students to learn from experience, and use of a transparent assessment rubric allows students to take greater control of their learning and performance. Guiding questions support students in beginning and extending the reflection process. Skills of reflective practice that are well established in this way will accompany students throughout their graduate program, and into the professional workforce.

In the larger picture, the Foundations' learning journal practice supports a heutagogical approach to teaching and learning, an approach "critical to life in the rapidly changing economy and cultures that characterize postmodern times" (Anderson, 2010, p. 33). Reflective learning journals help students build upon their skills of reflection and develop their metacognitive skills so as to extend competency in reflection, but also capacity. In forming the habit of reflective practice, students venture into the unknown, attempt to find meaning in uncertain contexts, and to form their own ideas and hypotheses about what they have learned and how they have learned it. In this way, competency in reflection creates an opportunity for capacity. Although the survey sample for the case study is small, the findings do reveal important information about the learner's experience and perspective. It appears that students are able to attribute specific learning effects (e.g. skill development, reflection, connectedness, meta-cognition) to different kinds of learning activities (e.g., journaling). It also appears that reflective learning journals, as a form of learner-generated content, can support students in the development of meta-cognitive thinking skills, for example, by helping students become more aware of their thinking and learning processes. These preliminary findings indicate that from a learner perspective, the goal of using the learning journals to support students in developing skills of reflection, critical thinking, and meta-cognition is being achieved. Further

investigation is required to better understand how students use their journals, how they make attributions about the effects of journaling and different types of instructor intervention on their learning, and what implications there might be for practice.

Conclusion

Findings from this case study indicate that learning journals provide real value in developing student skills for lifelong learning, while actively involving students in their individual learning processes by having them collect, organize, reflect on, and create content. Within a larger context, learning journals form a foundation of reflective practice, supporting the MDE in achieving its program objectives of producing distance education managers skilled in managing change. Findings presented here also indicate additional areas of research, for example, establishing whether students can distinguish which instructor practices support them most in becoming more reflective, reviewing the role of learning journals within the framework of the MDE (development of reflective thinking skills over the span of the graduate experience), and identifying critical incidents of learning in the MDE as demonstrated through successful transfer of this learning to the workplace.

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Student Assessment of Affective Variables in an Internet-based "Introduction to Quantitative Research Methods" Course

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Abstract

Two groups of first year university students who studied in a compulsory "Introduction to Quantitative Research Methods" course were exposed to two different modes of instruction. The first group of students was exposed to internet-based learning and the second group received traditional classroom based instruction. The content studied by internet-based learning as well as classroom-based learning was identical and the students received the learning material weekly during one academic year. Results of the study indicate that there were no significant differences between students exposed to the two learning strategies regarding academic achievement. However, there were significant differences between the two groups on the other research variables. Students who received internet-based instruction were significantly more positive on the three affective variables, namely learner motivation, learner autonomy and learner control of the learning process than students who received traditional class-based instruction. Results of the study indicate the great potential evident in sophisticated internet-based learning technology from the motivation, autonomy and control of learning points of view.

Introduction

Distance learning has developed over the years to overcome the limitations of traditional face-to-face learning which necessitates the presence of the student in a formal classroom setting. From its inception when distance learning was confined to the delivery of learning material via snail mail, landline telephone and radio broadcasts, it has progressed through delivery systems such as television broadcasts, videoconferencing and email and at present focuses on digital delivery systems such as internet and mobile learning platforms (Katz & Yablon, 2003).

In the wake of the development of sophisticated third generation Distance Learning systems which include, inter alia, internet-based and mobile learning technologies, learning activity through the medium of these Distance Learning systems has been redefined to include and focus on student self-learning (Trentin, 1997). Both internet-based learning and mobile learning methodologies offer tuition that is not bound by space or time and are especially characterized by flexibility. In addition internet-based as well as mobile learning allow tutors to modify, reinforce and even model educational processes, thereby fulfilling the cognitive as well as affective needs and requirements of students (Wilson & Whitelock, 1997).

Some research studies have indicated that third generation Distance Learning is especially suited to higher education mainly because of increased flexibility due to the sophisticated internet-based and mobile learning systems that are increasingly used at present. Other studies have emphasized the importance of student activity provided for by current Distance Learning systems and have indicated that the student activity variable contributes significantly to improved student achievement (Trentin, 1997). Hofmann (2002) confirmed that internet-based learning at the university level is more effective for students than traditional classroom-based learning because students are necessarily active in internet-based learning.

In the present study, the comparative effectiveness of internet-based distance learning and traditional classroom based learning of students in the compulsory "Introduction to Quantitative Research Methods" course was examined at the university level. Internet-based learning and traditional classroom learning served as the learning platforms in this study. In addition to academic achievement, student perceptions of the affective attitudinal variables of learner motivation, learner autonomy and learner control of the learning process were assessed.

Internet-Based Learning

Bennett (1999) contended that radical improvements in learning and instruction have been made as a result of the advances achieved in three major areas: technology, measurement, and cognitive science. Of the three, new technology has probably been the most influential in the short term because it is increasingly pervading our society. Much effort and substantial financial resources are invested annually to create and make commonplace powerful, general technologies for commerce, communications, entertainment, and education. Due to their generality, these technologies can also be used to improve learning and instruction (Wideman & Owston, 1999).

The internet has been described by Bennett (2001) as an interactive, switched, networked, and standards-based communication medium that has contributed significantly to many areas of endeavour and particularly to the learning and instructional processes. When detailing the unique aspects that describe the particular strengths of the internet it is important to note that the 'interactive' aspect of the technology is designed for the presentation of a task to a student at the school or university level and allows for an immediate response to that student's actions and for the provision of assistance to the student when help is needed. Bennett added that 'switched' aspect of internet indicates the ability to engage in different interactions with different students simultaneously. In combination, these two characteristics (interactive and switched) make for individualized learning and instruction.

Bennett added that the 'broadband' feature of Internet allows for the manipulation of a wealth of information in interactions when using the internet for learning and instruction. The information utilized by students for their study through the medium of internet includes possibilities based on audio, video, and simulation technology.

According to Bennett the interactivity, switching and broadband aspects of internet are 'networked' which indicates that everything is interlinked. This linkage provides an electronic platform that ties universities, schools, resource centres, teachers and students together in order to provide improved efficiency and potential for the learning and instructional processes. Finally Bennett postulates that 'standards-based' Internet implies that the network runs according to a set of conventional rules that all participants follow. That fact facilitates the interchange of data and access from a wide variety of computing platforms, as long as the software running on those platforms (e.g., Internet browsers) adheres to those rules too.

Based on the abovementioned characteristics, the internet has the potential to deliver efficiently and on a mass scale individualized, highly engaging learning and instructional content to almost any desktop and make information available to the teacher and student at anytime of the day or night. Thus, the very essence of internet is its efficiency, effectiveness, and its facilitating qualities that promise a long-awaited educational breakthrough at all educational levels.

Internet-Based Learning at University Level

Wideman & Owston (1999) declared that increasingly more university courses are being delivered to students through the medium of internet. Both university lecturers and students increasingly utilize the new medium to increase meaningful learning based on the use of online audio-visual material, databases, simulations and tutored exercises (Fabos & Young. 1999; Fetterman, 1998). Hellebrandt (1999) indicated that the internet provides students with authentic learning materials – difficult to obtain in the traditional learning situation – that increase the effectiveness of learning and instruction.

Idrus & Lateh (2000) confronted the implications of university learning and instruction using internet-based courses. They contended that the internet has moved formal instruction in these courses from the formal setting of the university campus to the home of the student. Learning has become significantly more flexible and content sources much more accessible. Creating, sharing and knowledge capitalization are all facilitated by internet. Wider sources of learning are provided in internet-based courses and worldwide expertise can systematically be brought to the student's desktop. In addition, a decade ago, Szuprowicz (1990) foresaw internet-based university courses as contributing not only added learning and instructional efficiency to the educational process, but also improved cost-effectiveness in university tuition in that internet-based courses can be made available to an almost infinite number of students.

With the rapid development of internet-based courses for use in university level education, increasingly more research studies have been conducted in an attempt to evaluate different issues related to e-learning. For example Blake (2000) investigated the level of learning enjoyment of students who studied through the medium of internet and Schramm, Wagner & Werner (2000) examined students' satisfaction with an internet-based training course. Johnson, Aragon, Shaik & Palma (2000) as well as Soong, Chan, Chua & Loh (2001) and Watson (2000) studied the academic performance of students who participated in an online course and Volery & Lord (2000) addressed the efficiency of an online course from the students' point of view.

Affective Variables that Enhance Distance Learning

Affective variables are strongly correlated with successful learning delivered in both traditional and technological modes. Recent studies have been conducted in order to investigate the relationship between specific attitudinal variables and the outcome of the learning process. Warschauer & Healey (1998) conducted a research study that sought to identify those factors related to successful ICT based learning. They reported that learner motivation, learner autonomy, learner control of the learning process, learner curiosity, learning flexibility and ICT user friendliness are some of the major factors contributing to enhanced language learning through the medium of ICT strategies. Braten & Stromso (2006) suggested that perceived self-efficacy, self-regulatory skills, and familiarity with computers could enhance the use of distance learning by students. Limayem & Cheung (2008) indicated that ICT based learning enhances learner motivation. Mainemelis, Boyatzis & Kolb (2002), Zurita & Bruce (2005), Cavus & Ibrahim (2009) as well as Katz & Yablon (2009) confirmed the association of some or all of the above variables with effective ICT based learning. In the current study, particular attention is to be paid to three of the above variables particularly known to enhance effective learning, namely learner motivation, learner autonomy and learner control of the learning process.

Learner motivation is a critical factor in learning (Lee, Cheung. & Chen, 2005) In a comprehensive meta-analysis study on the connection between learner motivation and learning, Masgoret & Gardner (2003) clearly confirmed that learner motivation is a major factor known to enhance successful learning. Kiernan & Aizawa (2004), followed by Chinnery (2006) indicated that ICT technology promotes learner motivation in learning. Thus this study will examine the hypothesis that internet-based learning promotes learner motivation in university learning.

Howland & Moore (2002) as well as Blin (2004) stated that an important factor in learning in general is learner autonomy. They indicated that learner autonomy is a major contributor to effective learning enhanced by ICT strategies. Granic, Cukusic & Walker (2009) confirmed that learner autonomy is an integral factor in effective learning through the medium of sophisticated ICT technology. Another of the hypotheses of the present study is that internet-based learning is a learning strategy that enhances learner autonomy thereby contributing to the effectiveness of learning.

Learner control of the learning process has also been identified as an important factor that positively contributes to learning. Shin, Schallert & Savenye (1994) and Boekaerts

(1997) indicate that control of the learning process allows students the freedom to learn more comprehensively, especially when learning is delivered digitally. Katz & Yablon (2009) confirmed that control of the learning process is a major contributor to successful ICT based learning. The third research hypothesis to be studied in this research will examine the relationship between learner control of the internet-based learning process and learning outcomes.

Method

Sample

The research sample consisted of 94 first year university students enrolled in the Faculty of Social Sciences at one of Israel's chartered universities. A breakdown of the sample indicates that the sample included 16 males and 78 females aged between 21 and 34 with a mean age of 24 with similar social and attitudinal profiles (Bar-Yaacov, 2001). The students were accepted to their course of study on the basis of grades attained in a psychometric university entrance examination as well as on the basis of grades attained in their school-leaving matriculation examinations. The students were enrolled in a year long compulsory "Introduction to Quantitative Research Methods" course. The students were randomly assigned to the two different research groups that received instruction as follows: 43 students received instruction via a sophisticated internet-based learning platform that included voice, text and simulation delivery as well as exercises; and 51 students were assigned to a traditional classroom where they received their instruction via formal lectures, manual demonstrations and exercises.

Instruments

Two research instruments were administered to the students in this research study. The first instrument was a standardized achievement test in order to assess students' mastery of the topic studied in the year long "Introduction to Quantitative Research Methods" course. The scale ranged from 0-100, higher grades indicating higher levels of acquirement. The second instrument was a 28 item Likert type Response Scale, designed to examine the attitudinal levels of the students toward affective aspects of learning on the three research variables. The first variable, learner motivation, contained 10 items (Cronbach $\alpha = .84$), the second variable, learner autonomy, consisted of 10 items (Cronbach $\alpha = .86$) and the third variable, control of the learning process was made up of 8 items (Cronbach $\alpha = .89$).

Procedure

The internet-based "Introduction to Quantitative Research Methods" course consisted of three key pedagogical elements which were integrated into the learning and instructional process. The first element was a weekly asynchronous audio-visual presentation of the material to the students who logged in to the course. In each lesson the lecturer taught content of the course using aids, simulations and demonstrations. The second element consisted of a presentation of the content of each lesson in full text specially compiled for the course. Students were able to access the full text asynchronously at their convenience. The third element consisted of pre-prepared exercises that the students answered and checked online. Throughout the duration of the internet-based course students were able to maintain contact with the lecturer via email messages and consult the lecturer in a course chat-room.

The traditional classroom-based course consisted of two weekly sessions, one of two hours and one of one hour. During the two-hour meetings the lecturer presented the students with content matter, explained the material and answered any questions arising from difficulties students' may have had understanding the material. During the one-hour weekly meetings the students participated in supervised exercise sessions in which they solved a series of problems directly related to the material taught in the weekly two-hour lecture. Students were at liberty to meet and consult with the lecturer during reception hours in addition to the two weekly sessions they attended.

The students in both internet-based and traditional courses studied identical content matter and handed in similar exercises. The lecturers in both internet-based and classroom-based courses participated in periodic faculty meetings in order to ensure that these courses would be similar regarding syllabi, content emphasis, and assessment. The standardized achievement test administered to students in the two research groups at the end of the year long "Introduction to Quantitative Research Methods" course was identical so that valid comparisons could be made. In addition to the standardized achievement test, the affective response scale was administered to the students the end of the year long "Introduction to Quantitative Research Methods" course in order to ascertain students' attitudes towards the two different learning strategies.

Results

The mean scores and standard deviations on the four research variables are presented in Table 1.

Table 1: Mean scores and standard deviations for achievement, learner motivation, learner autonomy, and learner control of the learning process

Variable	Learning Strategies			
	Internet-Based Learning		Classroom-Based Learning	
	Mean	SD	Mean	SD
Achievement	81.28	9.04	81.69	8.91
Learner Motivation	37.72	3.61	33.53	4.66
Learner Autonomy	36.86	3.31	32.33	3.57
Learner Control of the Learning Process	32.14	2.76	28.00	2.86

T-tests were used in order to compare students' achievement and attitudes related to the two learning strategies. While there were no significant differences on the achievement scores, with students from two groups achieving similar grades (see Table 1), significant differences were found for learner motivation, $t(92) = 4.80$; $p<.001$, learner autonomy, $t(92) = 6.33$; $p<.001$, and control of the learning process, $t(92) = 7.10$; $p<.001$. Students who participated in the internet-based course attained higher scores on the three affective variables than students who participated in the classroom-based course (see Table 1).

In addition to the above analysis of group differences, a discriminant function analysis was conducted in order to identify the characteristics of participants in the two learning groups and to assess the contribution of each of the three affective research variables to the assignment of students to the two learning groups. It appears that of the three variables, learner control of the learning process was found to be most discriminating followed in descending order by learner autonomy and learner motivation (see Table 2). Achievement did not significantly contribute to the discriminant model. An overall assessment of the model reveals that it efficiently discriminates between students in the two learning groups (Wilks' Lambda = .49) and significantly distinguishes between the groups (Chi-square (4) = 63.26; $p<.001$). According to the model, 85.1% of the students were correctly classified as members of their learning groups.

Table 2: Standardized discriminant function coefficients

Variable	Function
Achievement	-.07
Learner Motivation	.15*
Learner Autonomy	.64*
Learner Control of the Learning Process	.69*

*p<.001

Discussion

From the results of the statistical analyses of the data obtained from the two research groups in this study it is clear that neither internet-based learning nor classroom-based learning held any advantage regarding academic achievement of students on the content taught in the "Introduction to Quantitative Research Methods" course. Students, who studied by way of both strategies, attained similar levels of academic achievement. Thus it appears that achievement is a factor that does not distinguish between strategies with measured achievement outcomes. This result confirms those indicated in a number of research studies that, on the whole, different learning strategies do not significantly contribute to differential academic achievement (Bohlen & Ferratt, 1993; Dyer & Osborne, 1996; Katz & Yablon, 2009).

However, the research findings clearly indicate that the different learning strategies employed in the present study are significantly associated with differential levels of students' attitudes, namely, learner motivation, learner autonomy and learner control of the learning process. Students who studied the "Introduction to Quantitative Research Methods" course delivered via internet-based learning indicated higher levels of learner motivation, learner autonomy and learner control of the learning process than students who studied the "Introduction to Quantitative Research Methods" course via traditional classroom-based learning.

Thus the results of the present study clearly indicate that internet-based learning is more effective than classroom-based learning regarding the affective aspects of learning. This finding confirms previous studies that indicate the relative strength of ICT learning strategies when compared to traditional classroom-based learning in relation to students' affective perceptions (Divitini, Haugalokken & Norevik, 2002; Garner, Francis & Wales, 2002; Kiernan & Aizawa, 2004; Lu, 2008; Seppälä, 2002; Stone & Briggs, 2002; Thornton & Houser, 2003).

Despite the clear affective advantages of internet-based learning over traditional classroom-based learning as indicated in the present study, it should mentioned that

such differences do not exist in the domain of achievement. However, previous studies have indicated the importance of affective factors in the learning process in addition to the importance of achievement. For example it has been shown that positive affective feelings of students during the learning experience promote a feeling of well-being, belongingness, social acceptance, coherence and decreased non-adaptive behaviour (Zins, Bloodworth, Weissberg & Walberg, 2004). In education affective goals are accepted as part and parcel of the learning process. Despite the finding that the two learning strategies did not contribute to differential levels of achievement, nevertheless one cannot underestimate the educational importance of the contribution of learning strategies to students' affective well-being.

Conclusion

The results of the present study indicate that, although the two learning strategies examined in the study were no different from each other in promoting students' academic achievement, the relative advantages of internet-based learning over traditional classroom-based learning is clearly evident regarding the affective domain. This study adds to the list of research projects that have indicated the effectiveness of internet-based learning from the affective point of view (Divitini, Haugalokken & Norevik, 2002; Garner, Francis & Wales, 2002; Kiernan & Aizawa, 2004; Lu, 2008; Seppälä, 2002; Stone & Briggs, 2002; Thornton & Houser, 2003). Thus internet-based learning strategies can be offered as real alternatives to the more traditional classroom-based learning strategies, especially when affective goals are set as part and parcel of the learning process

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Feedback Personalization as Prerequisite for Assessing Higher-order Thinking Skills

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Abstract

Personalized support for students becomes even more important when learning takes place in open and dynamic learning and information network environments. It is believed that personalization in education raises the motivation and interests of the students, which are critical success factors in the learning as well as in the assessment process. Feedback plays a central role in the assessment process, because it provides information about the current areas of strength and weakness of the students. This paper presents a comprehensive analysis of feedback personalization in four adaptive assessment systems (AASs) namely SIETTE, PASS, CosyQTI and iAdaptTest. The results show that these systems are far from being able to adapt the feedback to the students' individual context, prior knowledge and preferences, because personalization is still insufficiently implemented or even not addressed. Reasons for that could be found in analyzing the thinking skills assessed. As shown, they only address lower-order thinking skills and are not appropriate for assessing higher-order thinking skills. The findings of the analysis are meant as a starting point for future work aiming at implementing a new AAS providing personalized assessment. Moreover, the proposed 3-dimensional feedback classification helps identifying and addressing the potential of personalization that feedback actually has.

Keywords: assessment, personalization, feedback, adaptivity, higher-order thinking skills

Introduction

Nowadays, personalization is increasingly becoming a crucial factor in many areas of life including education, health care and television. Almost every service is designed to accommodate preferences and expectations that are usually different between individuals. It is believed that personalization in education raises motivation and interests of students, which are critical success factors in the learning process. Personalized support for students becomes even more important, when learning takes place in open and dynamic learning and information network environments. In this context, a manually performed personalization is too time consuming and thus the use of information technologies appears to be a necessity in personalized education. Over time, several Educational Adaptive Hypermedia Systems (EAHS) namely *Interbook* (Brusilovsky et al., 1998), *AHA!* (De Bra & Calvi, 1998) or *APeLS* (Conlan, 2005) were developed, which aimed at addressing personalization issues in learning context. EAHS build a model of the goals, preferences and knowledge of each student and use this model throughout the interaction with the student in order to adapt the system as well as the learning content to the needs of that student.

Although personalization in educational settings is well advanced, it is still neglected in assessments. Assessment is defined as any systematic method of obtaining evidence by posing questions to draw inferences about the knowledge, skills, attitudes and other characteristics of people for a specific purpose (Shepherd & Godwin, 2004). Stand-alone applications that are designed to be delivered across the web for assessing students' learning are called online-assessments. Online-assessments enable the assessors observing and automatically evaluating students' progress. This results in reduced economical costs by cost savings in room and staff necessary for supporting and correcting, time savings in correcting the results as well as material savings through digitalization. Furthermore, online-assessments provide improved reliability, because automated marking is much more reliable than human marking and enable enhanced question styles, which incorporate interactivity and multimedia. The integration of pictures, sounds and videos in online-assessment improves the clearness of questions and tests by the use of interactive scenarios and simulations. From the students' point of view, online-assessments help to learn by providing instant and detailed feedback, which serve as motivation and learning aid. Additionally, online-assessments offer students increased flexibility with respect to location and timing. But online-assessments have reached their limits when it comes to considering individual and social aspects. A fully automated process and the loss of personal contact and

support can be frustrating for the students and thus can cause the feeling of getting lost in the masses.

Although several online-assessment systems indicate some aspects of personalization (Brusilovsky et al., 2004; Cheniti-Belcadhi et al., 2008; Conejo et al., 2004), personalized assessment goes a step further. Issues such as subjects of the tasks, levels of difficulty and feedback should be adapted to the students' individual context, prior knowledge and preferences.

With respect to feedback adaptation, only a few studies were investigated: Lütticke (2004) has experimentally demonstrated the effectiveness of feedback adaptation in a problem-solving task. He adapted the content of feedback to the students' individual errors, knowledge, preferences in support and progress in solving the problem. The experiments showed that 80% of the students favour feedback adaptation and most of them wish to have more adaptive feedback. Chuang and O'Neil (2006) also performed a study to investigate various types of feedback. More than 120 students were asked to search a web environment of information and to improve a knowledge map. The study clearly showed that students, which got adaptive feedback, performed better than students, which got no adaptive feedback. To summing up, the results of the experiments seem to suggest that the perspectives of feedback adaptation for web-based systems are promising, in particular for online-assessment systems.

These were the reasons why the authors have decided to investigate adaptive (online-) assessment systems providing personalized feedback. The focus in this paper is to analyze the incorporation of feedback personalization in adaptive assessment systems and possibly to point out potential areas for improvement in this respect.

The remainder of the paper is organized as follows: The second chapter gives an insight in feedback research and proposes a 3-dimensional feedback classification. The third chapter describes four existing AASs (SIETTE, PASS, CosyQTI and iAdaptTest) and provides an analysis of these systems according to the previous defined feedback classification. The fourth chapter investigates thinking skills as well as how these systems address these skills. The fifth chapter discusses these findings and concluding remarks and references complete the paper.

It is important to note that the term student in this paper means everybody aiming at acquiring, absorbing and exchanging knowledge, whereas learning is to be understood likewise. Hence, the explanations and conclusions in this paper are not limited to typical teacher-student relationships, but also applicable to any kind of knowledge provider and knowledge consumer.

Feedback Research

Feedback plays an important role not only in education but also in various fields of science including psychology, biology and economics. Generally, feedback is studied within human-computer interaction based upon two problems: how to organize feedback to the user and how to predict and process feedback from the user (Vasilyeva et al., 2007). The focus of this paper lies on the former problem. In education, the main aim of feedback can be defined as informing and motivating the student to increase their effort and attention. Further, feedback is fundamental for information systems design, because it constitutes an important part of how users experience a system (Sharp et al., 2007). Adequate feedback increases the users feeling of being in control (Benyon et al., 2005). In the case of personalized support for students, feedback would indicate whether the student actually is learning and keeping the right track. As such, it can make the difference between using and not using a system.

Kulhavy and Wagner (1993) introduced the concept of a feedback-triad, which included three definitions of feedback: feedback as a motivator for increasing response rate and/or accuracy, feedback reinforcing a message that would automatically connect responses to prior stimuli and feedback providing information that students could use to validate or change a previous response. The study clearly demonstrates the nature of the feedback problem. The users stated that feedback should function and be analyzable on several levels: as a motivator, provider of information and reinforcement. Black and Wiliam (1998) distinguished four elements of a feedback system: data on the actual level of some measureable attribute (students' answer to a question), data on the reference level of that attribute (the correct answer), a mechanism for comparing the two levels and generating information about the gap between the two levels and a mechanism by which the information can be used to alter the gap (as it presents help to a student in the case of an incorrect answer). Iahad et al. (2004) defined feedback as rich, if it provides feedback through automatic grading, if it provides correct answers and if it refers the students to the learning content, which explains the correct answers.

In the literature, different types of feedback classifications have been presented. A short excerpt is presented in the following: According to Kulhavy and Stock (1989), effective feedback provides the student with two types of information: *verification* and *elaboration*. Verification is the simple judgment of whether an answer is correct or incorrect, while elaboration is the informational component providing relevant cues to guide the student toward a correct answer. Elaborative feedback can be used in form of hints and represents a kind of stimuli towards the correct answer. Feedback elaboration is typically *informational*, *topic-specific* or *response-specific*. Moreover, feedback can take on many forms depending on the levels of verification and elaboration incorporated. According to Mason and Bruning (2001), feedback can be distinguished into: *no-feedback, knowledge-of-response, answer-until-correct, knowledge-of-correct-response, topic-contingent and response-contingent*. No-feedback simply provides students with the performance score with no reference to individual test items. This minimal level of feedback contains neither verification nor elaboration, but simply states the students' number or proportion of correct responses. Knowledge-of-response tells students whether their answers are correct or incorrect. While this type of feedback is essential for verification purposes, it does not provide any information that would extend the students' knowledge or provide additional insight into possible errors in understanding. Answer-until-correct feedback provides verification but no elaboration and requires the student to remain on the same test item until the correct answer is given. Knowledge-of-correct-response feedback provides individual question verification and supplies students with the correct answer, but does not offer any elaborative information. Topic-contingent feedback provides item verification and general elaborative information concerning the target topic. Response-contingent feedback gives response-specific feedback that explains why the incorrect answer was wrong and why the correct answer is correct. According to Dempsey and Wager (1988), feedback can also be classified into *immediate* and *delayed.* Immediate feedback is presented to the student immediately after the answer is given. In contrast, delayed feedback is presented after a specified delay interval during testing. In addition, feedback can be differentiated according to the form of presentation used: *textual, graphical, auditory* and *animated* or a combination of these (Sharp et al., 2007). Textual feedback like 'ok' or 'well done' in case of correct answer and 'no' or 'try again' in the opposite case is the most commonly used form of feedback presentation. Graphical feedback is often used in computer games and illustrates the completed levels or progress. Animated feedback is typical used in multimedia systems as well as computer games. For a more comprehensive overview

of feedback classifications, reference is made to Mory (2004) and Vasilyeva et al. (2007).

Analyzing the different feedback classifications, feedback can be categorized into three dimensions: *response, occurrence* and *presentation*. These facts are graphical represented in Figure 4.

Feedback plays a central role in the assessment process, because it provides information about the current areas of strength and weakness of the particular students. Feedback can be regarded as the so called speaking tube of the question and test evaluation and thus able to communicate the result of the assessment to the students as well as other information, which may contain reasons for incorrect answers, hints or advices for continuing the assessment. The next chapter investigates how four established AASs deal with feedback and especially how comprehensive they cover the three dimensions of feedback.

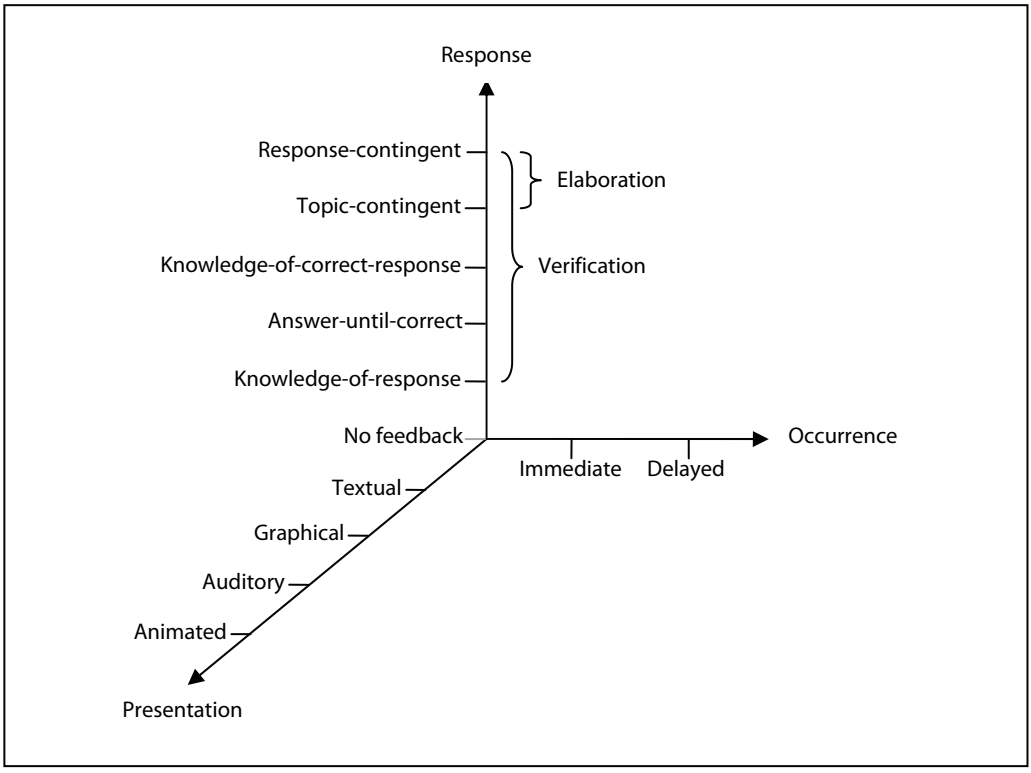

Figure 1. Dimensions of Feedback

Adaptive Assessment

There is a demand towards personalization in online-assessment to take care of the individual needs and avoid treating all students in the same manner. An AAS poses one way to realize personalization in online-assessments. AASs and technologies are used to test students at their current knowledge level and change their behaviour and structure depending on the students' previous responses, individual context, prior knowledge and preferences. There are two types of adaptive techniques that can be applied in AASs namely adaptive testing (Wainer et al., 2000; Linden & Glas, 2000) and adaptive questions (Pitkow & Recker, 1995).

Adaptive Testing

The adaptive testing technique involves a computer-administered test in which the selection and presentation of each question and the decision to stop the process are dynamically adapted to the student's performance in the test. The technique uses a statistical model, mostly the Item Response Theory (Hambleton et al., 1991), to estimate the probability of a correct answer to a particular question and to select an appropriate question accordingly. Appropriate questions are selected from a pool of questions so that their difficulty matches the students' estimated level of knowledge. The questions that provide most amount of information about the current knowledge level of the student are usually those with difficulty similar to the students' knowledge level (Bloom et al., 1956). An advantage of adaptive testing is that questions, which are too difficult or too easy, are removed. Thus, the technique ensures that the student only sees questions that are very close to his or her level of knowledge. However, the technique only supports multiple-choice or true-false questions. It is not designed for advanced question types. Several approaches exploit the technique of adaptive testing such as SIETTE (Conejo et al., 2004) and PASS (Gouli et al., 2002).

SIETTE is one of the first web-based tools, which assists authors of questions and tests in the assessment process and adapts to the students' current level of knowledge. The system uses Java Applets for authoring and presenting adaptive tests. In SIETTE, the selection of questions is based on a function that estimates the probability of a correct answer to a particular question, which leads to an estimation of the students' level of knowledge. The question with the highest probability will be posed. Although SIETTE infers students' knowledge level through adaptive testing and presents questions to the student adapted to the current level of knowledge, the system has some disadvantage in terms of estimating students' knowledge level separated to the particular topics in a

test. It mainly uses multiple-choice questions and provides only insufficient support in terms of feedback and help.

PASS (*Personalized ASSessment*) is a web-based assessment module, which can be integrated into an adaptive educational hypermedia system to provide personalized assessment. The system estimates students' performance through multiple assessment options (pre-test, self-assessment and summative assessment) tailored to students' responses. The system enables the educators to define assessment specifications and to have a detailed overview of the students' performance and progress. Advantageous of PASS is the consideration of the students' navigational behaviour, the re-estimation of the difficulty level of each question at any time it is posed as well as the consideration of the importance of each educational material page. However, the feedback provided to the students is not adapted to their performance and thus lacks personalization.

Adaptive Questions

The adaptive questions technique defines a dynamic sequence of questions depending on students' responses. The technique defines rules, which allow selecting questions dynamically. The defined rules are linked, for example, to the response of the student and an overlay student model, which represents student knowledge of different concepts and topics. Based on these rules and the last response of the student, appropriate questions can dynamically be selected at runtime. The technique of adaptive questions offers more flexibility than the technique of adaptive testing, because authors of tests are given the flexibility to express their didactical philosophy and methods through the creation of appropriate rules. Several approaches exploit the technique of adaptive questions such as CosyQTI (Lalos et al., 2005) and iAdaptTest (Lazarinis et al., 2009).

CosyQTI is a web-based tool for authoring and presenting adaptive assessments based on IMS QTI (2006), IMS LIP (2005) and IEEE LTSC PAPI (2001) learning standards. The system consists of a *student model*, a *domain model* and a *rule model*. The *student model* contains information such as the goals, preferences, qualifications, knowledge estimations and usage data of each student. The *domain model* follows the IEEE/ACM vocabulary structure and allows educators of various disciplines utilizing the system. Adaptation decisions are set by the educators during the authoring phase by defining *IF <condition> THEN <action>* rules, which are contained in the *rule model*. Moreover, CosyQTI allows students to access parts of their profile and to raise the awareness of their current knowledge, strengths and weaknesses. The advantages of

CosyQTI are the conformance to different established standards and specifications, which make the system interoperable with other standard-compliant learning tools and systems. Moreover, the open information policy leads to enhanced learning, but there are still some problems with authoring and selecting questions. Regarding the authoring of questions, the limited rule system and the few question types restrict the incorporation of didactic philosophy and methods. Besides, the use of feedback in the assessment process is rather limited. In terms of question selecting, CosyQTI is relatively weak in estimating and representing students' current knowledge level.

iAdaptTest is a desktop-based modularized adaptive testing tool conforming to the IMS QTI (2006), the IMS LIP (2005) and XML Topic Maps (2001) in order to improve the reusability and interoperability of the data. The data are stored in distinct files and can independently be shared across different learning tools and systems. Although iAdaptTest is entirely based on established standards and specifications, the system has still some problems. The first one is that it has been implemented as a Microsoft Windows application, which means that it can only be used on Microsoft Windows operation systems. In addition, iAdaptTest provides only a few question types and the implemented feedback and help is rather simple and does not enable personalized support.

Comparison of Adaptive Assessment Systems towards Feedback

The comparisons between the above mentioned AASs according to the different feedback classifications are provided in Table 1. The table above shows that each of the AAS provides possibilities to incorporate feedback in the assessment process. However, the use of feedback techniques is limited. According to type of information (response), almost all systems are limited to the use of knowledge-of-correct-response feedback. Thus, the respective systems only provide verifying information in form of correct responses. This type of feedback provides no elaborative information, for example, the part of the course, in which the subject of the question is described. According to the way of presentation, all systems use the textual way of presenting feedback. The authors of the systems are restricted to use several words like "ok", "well done" or "not correct, try again" as the form of presenting feedback. According to the time of occurrence, all systems are restricted to immediate feedback. This means that feedback to the student is given immediately after answering and not delayed during testing.

As a result, SIETTE, PASS, CosyQTI and iAdaptTest provide possibilities to incorporate feedback in the assessment process, but they only use a limited set of feedback techniques (see Table 1) and do not take into account any students' individual characteristics or needs. This results in not exploiting the potential of personalization that feedback actually has. In order to determine the reasons for that, the next chapter will investigate thinking skills as well as how SIETTE, PASS, CosyQTI and iAdaptTest address these skills.

Table 1: Comparison of Adaptive Assessment Systems towards Feedback

Dimension		**SIETTE**	**PASS**	**CosyQTI**	**iAdaptTest**
Response	Response-contingent				
	Topic-contingent				
	Knowledge-of-correct-response	x	x	x	x
	Answer-until-correct				
	Knowledge-of-response				
Presentation	Textual	x	x	x	x
	Graphical				
	Animated				
	Auditory				
Occurrence	Immediate	x	x	x	x
	Delayed				

Thinking Skills

The term thinking skills refers to the human capacity to think in conscious ways to achieve certain purposes. Such processes include remembering, questioning, forming concepts, planning, reasoning, imagining, solving problems, making decisions and judgments as well as translating thoughts into words (Fisher, 2006). Thinking skills were conceptualized in a number of ways and at present there is little consensus with regard to the actual term. But, it is generally agreed that thinking skills can roughly be divided into lower-order (LOTS) and higher-order thinking skill (HOTS). HOTS are grounded in LOTS and linked to prior knowledge (King et al., 1998). HOTS include critical thinking, problem solving, decision making and creative thinking (Lewis & Smith, 1993). These skills are activated when students encounter unfamiliar problems, uncertainties, questions or dilemmas. Successful applications of these skills result in explanations, decisions and performances that are valid within the context of available knowledge and experience and promote continued growth in higher-order thinking as well as other intellectual skills.

In this paper, the efforts undertaken by Benjamin Bloom were used to differentiate thinking skills. In the 50s of the last century, he led a team of educational psychologists trying to analyze and classify the varied domains of human learning (cognitive, affective and psychomotor). The efforts resulted in a series of taxonomies in each domain, known today as Bloom's taxonomies (Bloom et al., 1956). The cognitive domain involves knowledge and the development of intellectual skills. In this domain, Bloom et al. distinguish between six different levels namely *knowledge*, *comprehension*, *application*, *analysis*, *synthesis* and *evaluation*. The first three levels are referred to as LOTS and the last three levels are referred to as HOTS (King et al., 1998). More than 50 years later, Bloom's taxonomies of the cognitive domain were revised by Anderson and Krathwohl (Anderson et al., 2001). Differences are the rewording of the levels from nouns to verbs, the renaming of some of the components and the repositioning of the last two categories (see Table 2).

Table 2: Taxonomies of the Cognitive Domain

Bloom (1956)	**Anderson and Krathwohl (2001)**
Knowledge	Remember
Comprehension	Understand
Application	Apply
Analysis	Analyze
Synthesis	Evaluate
Evaluation	Create

The lowest, so called *remembering* level requires the students to recall and recognize terms and their place in a particular domain. The *understanding* level requires the students to inherit information from these terms by interpreting, summarizing or inferring. The *applying* level requires the students to use a learned topic in an appropriate situation. The *analyzing* level requires the students to separate the parts of a whole and to understand the relationships in between. The *evaluation* level requires the students to make judgments based on criteria and standards through checking and critiquing and the *creation* level requires the students to combine parts to create a new whole, where that whole is not apparent before creation. But, the major differences are the addition of how the taxonomy intersects and acts upon different types and levels of knowledge, namely *factual*, *conceptual*, *procedural* and *meta-cognitive* (see Table 4). *Factual knowledge* is knowledge that is basic to specific disciplines. It encompasses essential facts, terminology or details students must know order to understand a discipline or solve a problem. *Conceptual knowledge* is knowledge about the interrelationships among the basic elements within a larger structure that enable them

to function together. *Procedural knowledge* is knowledge that helps students to do something. It consists of criteria for using skills, algorithms, techniques and methods. *Meta-cognitive knowledge* is knowledge of cognition in general as well as awareness of one's own cognition.

Assessing Thinking Skills

Assessment is regarded as very useful for measuring LOTS such as recall and interpreting of knowledge, but seen as insufficient for assessing HOTS such as the ability to apply knowledge in new situations or to evaluate and synthesize information. But, this need not be the case. Sugrue (1995) identified three response formats for measuring HOTS namely *selection*, *generation* and *explanation*. *Selection* means using simple question types such as multiple-choice and matching for identifying the most plausible assumption or the most reasonable inference. *Generation* means using advanced question types, which let students more creativity in answering, such as free-text answers, essays and interactive and simulative tools for measuring HOTS and *explanation* means giving reasons for selection or generation of a response. This is often realized by asking for an additionally written justification of the answer.

In addition to the even explained response formats, it is crucial that the students have sufficient prior knowledge, because it serves as basis for using their HOTS in answering questions or performing tasks. For that reason, assessments that address HOTS should adapt for diverse student needs. They should support at the beginning and then gradually turning over responsibility to the students to operate on their own (Kozloff & Wilmington, 2002). This limited temporary support helps students develop HOTS.

As it is generally agreed that assessment systems and in particular AASs are able to assess LOTS (for example, recall and interpreting of knowledge), in the following, special attention is laid on the assessment of HOTS by SIETTE, PASS, CosyQTI and iAdaptTest.

Comparison of Adaptive Assessment Systems towards the Assessment of Higher-order Thinking Skills

As mentioned earlier, there are three response formats for measuring HOTS namely selection, generation and explanation. As the presence of these formats indicate the potential for addressing HOTS during the assessment process, the comparison was focused on these criteria. The results of the comparison are provided in Table 3. The

table shows that that each of the AAS is limited to the selection response format. That means that they only provide simple question types. SIETTE and PASS only admit traditional multiple-choice questions without any written justification (explanation). This is due to the fact that they use the technique of adaptive testing, which only supports multiple-choice or true-false questions and is not designed for advanced question types (generation). CosyQTI allows creating true-false, multiple-choice, single-, multiple and ordered response as well as image hot spot questions. The question types provided by iAdaptTest are similar to CosyQTI, namely true-false, single-, and multiple-choice, gap match and association. As CosyQTI and iAdaptTest follow the adaptive questions technique, they are less restricted in providing advanced question types compared to SIETTE and PASS. However, they do not allow the creativity in answering as required by the generation response format. Additionally, both systems do not include any form of question justification necessary for the explanation response format.

Table 3: Comparison of SIETTE, PASS, CosyQTI and iAdaptTest towards the Assessment of Higher-order Thinking Skills

Response Format	SIETTE	PASS	CosyQTI	iAdaptTest
Selection	x	x	x	x
Generation				
Explanation				

Summarized, this means that although all analyzed AASs can be used for measuring some specific HOTS such as deduction, inference and prediction, they are inappropriate for measuring skills on the evaluation and creation level. With respect to the taxonomies presented above, the potential of these AASs for assessing thinking skills is presented in Table 4. The table illustrates that SIETTE, PASS, CosyQTI and iAdaptTest have the potential for assessing thinking skills on the remembering, understanding, applying and limited on the analyzing level in all knowledge dimensions.

Table 4: Taxonomy Matrix of SIETTE, PASS, CosyQTI and iAdaptTest (adapted from Anderson et al.)

		Cognitive Process Dimension					
		LOTS			HOTS		
		Remember	Understand	Apply	Apply	Evaluate	Create
Knowledge Dimension	Factual	x	x	x	(x)		
	Conceptual	x	x	x	(x)		
	Procedural	x	x	x	(x)		
	Meta-cognitive	x	x	x	(x)		

Discussion

Each of the AASs investigated, presented and compared in this paper estimates the knowledge level of each student and based upon the system selects appropriate questions using different approaches and techniques. There are many systems using the number of questions answered correctly and the difficulty level of answered questions, such as SIETTE and PASS. By contrast, other systems such as CosyQTI and iAdaptTest define rules, which allow selecting questions dynamically.

Although the majority of these systems tailor the selection of question within the assessment process to the knowledge level of each student, personalization with regard to feedback is almost entirely disregarded. The comparison of these systems towards feedback substantiates this statement. All systems are restricted to provide knowledge-of-correct-response feedback. They usually provide feedback in forms of simply telling if the answer is correct, not correct or partially correct as well as giving the correct answer. Although knowledge-of-correct-response feedback not only provides feedback regarding whether the answer was received or not (knowledge-of-response), but also whether the answer was correct or not, it does not provide additional information. But elaborative feedback is essential when striving for implementing feedback that is adapted to the individual students' context. Elaborative feedback could be realized, for example, through a virtual coach, which appears at the end of a question block and presents a summary of completed questions as well as hints or advices for continuing the assessment. This intensifies the dynamic behaviour of the system resulting in the feeling of the students to communicate with another actor. This can be compared with oral examinations, in which the assessor provides additional information that is important for completing the task, but does not immediately offer the correct solution. This fact can be verified by referring to Kulhavy and Stock (1989). They demonstrated significant improvements in learning using elaborative feedback. Concerning the

timing of the feedback, some researchers argue that immediate feedback is needed to maintain the students' attention and motivation (Corbett & Anderson, 2001), while in earlier research others have shown that delayed feedback can contribute to better retention and transfer of skills (Kulhavy & Anderson, 1972). Osborne and Winkley (2006) also stated that a good online-assessment system provides the student with immediate and relevant feedback at the point of error in order to take advantage of the lessons learned. As analyzed above, all investigated AASs are limited to provide immediate feedback. They present the feedback to the student immediately after the answer is given. Although immediate feedback seems to be more effective than delayed feedback, they could benefit from each other if immediate verification feedback is combined with delayed elaborative feedback. This enables students to have immediate knowledge about the correctness of their response, but they still have time to think about errors before elaborative information is given. With respect to the way of presenting feedback, all investigated AASs make use of textual feedback and do not provide possibilities to integrate other forms of feedback presentation like graphics, animations, videos or sounds. But with respect to a personalization of feedback, these forms are of particular importance. Czerwinski and Larson (2003) argued that these forms of feedback increase the attention and can motivate the students. It is also important to note that the provision of feedback must be carefully provided in order to prevent unintended influence of the student. The feedback should not affect the students in such a way that they are no longer able to answer questions independently, but instead make their decisions according to the provided information.

As shown, feedback has an enormous potential in realizing personalization in assessments. But, what are the reasons of SIETTE, PASS, CosyQTI and iAdaptTest to not making use of them. On this account, thinking skills their addressing by these AASs were investigated. As a result, SIETTE, PASS, CosyQTI and iAdaptTest are able to assess LOTS, but they are inappropriate for measuring skills on the evaluation and creation level (HOTS). But, learning in the twenty-first century is about integrating and using knowledge and not just about acquiring facts and procedures (Fadel et al., 2007). For example, in engineering education, the students should be able to develop new technical systems. For that, they have to combine parts to create a new whole and to evaluate the results appraisingly (Wuttke et al., 2008). Furthermore, HOTS are essential for success not only in learning, but also in life (Fisher, 2006). Due to that fact, assessment systems and in particular AASs need to evaluate not just the students' factual knowledge (LOTS), but also their problem-solving and reasoning strategies (HOTS), which are currently left to oral examinations or project work. In addition to

use the explained response formats (selection, generation and explanation) for addressing HOTS, it is crucial that assessments adapt for diverse student needs. This limited temporary support helps students develop HOTS. As SIETTE, PASS, CosyQTI and iAdaptTest do not really address HOTS (see Table 4), it is not surprising that they do not exploit the potential of personalization that feedback actually has (see Table 1). Finally, it can be stated that when striving for the assessment of HOTS of students, personalized support and in detail personalized feedback is essential.

Conclusions and Future Work

The objective of this paper was to analyze the incorporation of feedback personalization in AASs (SIETTE, PASS, CosyQTI and iAdaptTest) and possibly to point out potential areas for improvement in this respect. The analysis was caused by an understanding of the need of assessment adapted to the students' individual context, prior knowledge and preferences. Taking into account such criteria in order to personalize the assessment may result in more valid assessments and in particular in more objective assessment findings. Although these systems adapt the assessment process of each student resulting in presenting different questions they still enable a better comparability between different individuals, because each individual would be more correctly assessed. Moreover, they reveal the current areas of strength and weakness of the students more precisely.

The results of the analysis pointed out that SIETTE, PASS, CosyQTI and iAdaptTest provide possibilities to test students at their current knowledge level and change the systems' behavior and structure depending on the students' responses and detected abilities. But as shown, personalization of feedback is still insufficiently implemented or even not addressed in these systems. Reasons for that could be found in analyzing the thinking skills assessed. As shown, SIETTE, PASS, CosyQTI and iAdaptTest only address LOTS and are not appropriate for assessing HOTS. But, as learning in the twenty-first century is about integrating and using knowledge and not just about acquiring facts and procedures, the assessment of HOTS is becoming increasingly important. Moreover, AASs are in response to the emerging need of personalization while assessing HOTS.

Future work of the institution of the main author will address these issues by implementing a new AAS providing personalized assessment of not only LOTS, but also HOTS. The system designers will take advantage of the benefits of existing systems and compensate their disadvantages by taking into account more

sophisticated feedback techniques and methods. This development will result in providing feedback that is appropriate for the students' context, knowledge level, individual characteristics, preferences, behaviour and attentiveness. Thereby, the proposed feedback dimensions help identifying the potential of personalization that feedback actually has.

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Teaching with Youtube: Quality Assessment of English and Hungarian Videos on Physical Education

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Abstract

New Web 2.0 technologies and websites, such as a blog, wiki or YouTube, make new demands on learning, while they provide new and extremely motivating supports to it. Educators, however, are still reluctant to use them as flexibly customisable educational resources because of doubts about quality and relevance. Educators seem to need orientation and assessment tools as facilitators for making regular and satisfying use of products of the Social Web. Using films for demonstrating best practice is especially important in areas like Physical Education (PE), where an integrated cognitive and psychomotor development is required for successful acquisition of complex movements. For this discipline, a shift from classic vehicles used for learning today (lecture notes, printed material, PowerPoint, websites, animation) towards ubiquitous user-centric, user-content generated content seems to be inevitable.

In order to evaluate YouTube as a potential learning resource repository, we developed a search word structure and identified 9754 YouTube video items that were subsequently divided by genre, topic and student population. A sub-sample of 50 films in English and Hungarian language was constructed. We evaluated the *technical quality* of the film that is decisive for its usability in an educational setting, *professional content* that makes it a valuable learning resource, *methodological aspects* that influence the way the film can be introduced before, during or after a PE lesson, and *aesthetic qualities* that contribute to the motivational effects and general appeal of the film. Our paper summarises the results of the project: the system for quality assurance, content identification and evaluation for video entries to be used as resources in PE.

Keywords: e-learning, social web, knowledge creation networks, evaluation, digital learning resources

Effects of Web 2.0 solutions on current learning theories

Current e-learning paradigms focus on the digital empowerment of the individual. *Connectivism,* often called the learning theory for the digital age, invites teachers to utilise collective knowledge rather than developing the capacities of single individuals and *distributed cognition* that designs learning experiences based on knowledge existing within systems which are accessed through learners participating in activities using social computing tools as catalysts for collective creation and sharing. Within these new, virtual learning situations, the value of individual creations – be it expressive utterances or learning objects – are rarely questioned. "For working for nothing and beating the pros at their own game, TIME's person of the year for 2006 is you!" (Grossman, 2006, 2) The famous Time Magazine cover article for the person of the Year 2008 suggests that all "WeTube" (Jenkins, 2008) is highly valuable and important to recognise.

New Web 2.0 technologies and websites, such as a blog, wiki or YouTube, make new demands on learning, while they provide new and extremely motivating supports to it. Educators, however, are still reluctant to make use of the wide repository of social computing sites and use them as flexibly customisable educational resources. Doubts about quality and relevance are among the most important reasons for this reluctance – a feeling not shared by their students. Described as "Gen-X, Millennials, the Nintendo and Net Generation" (Tapscott, 1997; Tapscott and Williams, 2006, Oblinger, 2003; Olsen, 2005), these students have grown up within a world of pervasive technology including mobile phones, digital cameras and the internet. While students regularly utilise Delicio links, Podcasts, Blogosperes, Wikis, RSS feeds, Flickr images or YouTube videos for their school work, educators seem to need orientation and assessment tools as facilitators for making regular and satisfying use of products of the Social Web. The moving image is especially important in areas like Physical education where an integrated cognitive and psychomotor development is needed for successful learning. This paper summarises the initial phase of a research project aimed at producing a system for quality assurance, content identification and evaluation for YouTube video entries to be used as resources in Physical Education (PE). For this discipline, a shift from classic vehicles used for learning today (lecture notes, printed material, PowerPoint, websites, animation) towards ubiquitous user-centric, user-content generated content seems to be inevitable.

The video clip is probably the most popular multimedia product that may also serve as a powerful motivational tool if used as not an end in itself but a means toward achieving learning objectives. An effective instructional video is far more than a television program; it is a teacher-to student instruction with the video film as a vehicle for discovery. YouTube is used as a resource mainly by language teachers who retrieve "slice-of-life" videos to create the context for acquiring communication patterns of a foreign culture. YouTube, however, is also a "student medium", that assures a two way delivery of content. Thus, a new "Learning Ecology" is created where Web 2.0 technologies can be explored in collaborative and (co)creative teaching and learning situations. Collaborative content creation coupled with peer assessment may result in deeper learning both in the discipline targeted and in innovative media use. For PE, YouTube offers authentic documentation of sports events as well as detailed instructions in techniques presented by sportsmen of a variety of ages and cultures. It contextualises and thus enhances the learning experience. However in order for a new learning tool to be adopted, educators must be aware of the possibilities of its use within a concrete framework. John Seely Brown (2002) uses *ecology* as a metaphor to describe an environment for learning: "An ecology is basically an open, complex adaptive system comprising elements that are dynamic and interdependent. One of the things that make an ecology so powerful and adaptable to new contexts is its diversity." Brown further describes a learning ecology as, "a collection of overlapping communities of interest (virtual), cross-pollinating with each other, constantly evolving, and largely self-organizing." (Brown, 2002)

This paper outlines some possible strategies for educators to search for relevant content, create meaning (tag), and incorporate them into the student learning experience.

Educationally relevant characteristics of YouTube

YouTube is a website for user-generated content (UGC), just like Flickr, FaceBook and Wikipedia. It was officially launched in December 2005 and from 2006, it is part of the "Google empire". It attracts far more users than any other online video sharing service (e.g., *vimeo*, *eyespot*, *jumpcut* or *ourmedia*, cf. Brouwers et al., 2008) but it offers a far better user experience (Online Video Site Survey, 2009). Each month, 200 million unique visitors browse the site worldwide, a third of them come from the United States (YouTube Survey, 2008). YouTube's best educational feature is its interface which enables users to have quick access to videos and to switch from one clip to a new one. Educators may embed YouTube videos in their websites, weblogs, or social network

pages as the professional media does (e.g., BBC News and CNN constantly encourage and regularly utilise such content).

Teachers can start their new multimedia educational resource by creating a "*channel*" – a user account page – and organise relevant, self-created or downloaded content into learning units. They may customize these private "educational channels" by providing personal information, presenting their own videos, linking to other websites and showing lists of favourites and subscribers. Students, in turn, may be encouraged to also develop thematic channels and / or comment on teacher-selected content. They may (or must) subscribe to the teacher's channel and receive a message when a new video is posted. Furthermore, the channel owner may invite users – fellow teachers of the same discipline, for example – to contribute or comment.

Thus, *a learning community* evolves and (inter)national networks are created. According to the company's data (YouTube 2008) for the United States, 47 % of the users are registered users who in principle interact. Lange (2007) however, observes a "participating gap" resulting from the lack of skills, insufficient hardware or bad first experiences. Also, inefficient tagging of videos will result in negative user attitudes and decide whether participation will take place, and what the quality of that participation will be. Halvey and Keane (2007) examined the use of community building tools that have been designed for interacting and sharing on YouTube and found that only a minority of the registered users employs these tools often. Users do not exploit the community facilities available on the website: they do not invite friends, do not comment on videos watched and do not tag uploaded entries. These data clearly indicate that a training program is needed if we intend to make YouTube an accessible tool for PE teachers.

But is it worth the effort? Do we find valuable educational input on this site? Clark and Mayer (2002) considering the appropriate use of any media to improve learning suggest that media must be aligned with expected learning or performance outcome; reduce cognitive load; exclude superficial text or graphics; be appropriate for target learner's learning literacy. Further rules apply for video learning (Xu Cheng et al., 2000): it shouldn't be passive, it should promote active viewing and maximize learning. YouTube seems to be an appropriate learning platform as it allows your students to watch the video in short segments – and teachers to target content towards learning goals; they allow ample opportunities for online and offline note taking and tagging, and thus develop observation and summarizing skills; they can be paused and restarted for a prediction of the evolution of the action sequence; the separate shutdown of

audio and video features supports the reading of vocal and iconic clues; through the integration of the video in a learning material, the visualisation level of the content is enhanced far beyond ordinary, static illustrations. During the PE lesson, the video can serve as an introduction or motivator for the hands-on activity to come. Video segments help focus on relevant details of a game or a movement. “By charging students with specific viewing responsibilities, teachers can keep students "on task" and direct the learning experience to the lesson's objectives. Be sure and follow-up during and after viewing the tape. When students have viewed the video consider: what interested them? What didn't they understand? How can they relate the program to their experiences and feelings?” (Duffy, 2008, 23)

Students can use several other social media platforms to enrich their YouTube experience. They may add comments / blog on the video, evaluate content on site (using the scoring device provided) or on a separate blogging environment the teacher develops. Therefore, video is an effective catalyst and facilitator for in- and off-classroom discourse and analysis. YouTube allows the learner to experiment in new media to convey information and knowledge. “Coupled with hands-on learning, a new media, video-enhanced curriculum can be invaluable for expanding the learning experience and by incorporating a medium that is as popular, forceful and familiar educators can tap into the existing enthusiasm towards this form of new media. Allow your students to create a short video as part of an assessment item instead of the traditional essay. Becoming involved in the creation of a video heightens a student's visual literacy, an important skill in today's electronic culture. The act of creating content, in virtually any form, is a valuable learning exercise” (Educause Learning Initiative, 2006, 37). Within higher education, Jenkins, (2007) introduces the ‘YouNiversity’ metaphor and suggests an intellectual network where students interact not only with professors, but with industry and community representatives. YouTube can also be used as a virtual library to support classroom lectures by providing students with access to video clips. (Conway, 2006)

Encouraged by case studies of successful educational use of YouTube and our own successful efforts with the introduction of Web 2.0 technologies in higher education, (Kárpáti, 2009), we decided to set up a community of practice for PE teachers and engage in the use of YouTube for the improvement of the quality of Physical Education. As a first step, we performed an assessment of relevant YouTube videos.

Case study: YouTube videos for Physical Education – evaluation of content and quality

Constructing the sample

When selecting our sample, we used a random sampling method employed by a recent large scale study on usage patterns of YouTube. (Xu Xheng et al., 2008) A search word structure was developed and discussed with an expert panel, and relevant for PE search words were used to retrieve 9754 YouTube video items. These were in turn analysed by genre, topic and student population to establish the setup of the sample. Out of this large collection, a sub-sample of 50 films was constructed. This sub-sample reflected the structure of the big collection as it included different film genres, production types and student protagonists in the same proportion.

If a teacher decides to look for some content related to Physical Education, the most obvious thing to do is using 'physical education' or 'sports' as key words to activate the search engine. In this case, we can easily get several million hits. With such an open search, we find that sports events dominate, PE content is scarce. However, this first impression may be misleading, because inappropriate tagging makes educationally relevant content hard to find. The research literature on YouTube has observed this lack of sharing intent with uploaders (Brouwers et al., 2008) and indicates that users have to be educated in making their content recognisable if YouTube was going to be employed for a specific purpose, for example, community building or teaching. If we use a combination of key words, the number of hits is reduced drastically, see Table 1.

Table 1: Search phrases and hits about Physical Education

Search phrase	Number of English language videos	Number of Hungarian language videos
Physical education	more than 5 million	64
Physical education + lessons	877	23 (+299 hits for the student slang version of the term)
Physical education + teacher	1270	18 (+25 hits for the student slang version of the term)
Physical education + games	678	0
Physical education + activities	1180	7
Physical education + in school	3210	
Physical education + class	1040	
Physical education + dance	622	
Physical education + teaching	877	

The Hungarian sample included all types of contents from advertisements to highly sophisticated methodological sequences and student experiences. In the Hungarian search, we found that a considerable number of student videos about PE activities can be found if we use the student version of the name of the discipline. These videos may equally be used for teacher training as they document interesting and pedagogically relevant classroom events. Also, student interest in making and uploading films about PE classes shows the motivational value of this resource for teaching adolescents – and being taught by them, while watching their keen observations about our methods and style.

After several filtering turns, we found the following content types that may be relevant for pre- and in-service education in PE:

- Notable moments of a game (e.g. a tennis match or the most beautiful goals at a football match, the demonstration of the playing style of a well-known sportsmen etc.)
- Games recorded in full (uploaded mostly in several parts)
- 'Funny moments' of sports activities
- Interviews with professional sportsmen or coaches
- 'Fan videos' about a team or a player
- Educational videos, e. g. 'How to play soccer?'
- Demonstrations of PE lessons; e.g. teaching different skills, how to teach different types of fitness movements

A peculiar thematic difference was observed at the first glance among the English and Hungarian language samples: the latter did not include items about sports activities for people with physical handicaps. A search with combined key words (PE and handicaps), however, resulted in an equal proportion of such films for the Hungarian sample.

Developing the assessment framework

We used expert rating as an evaluation method to assess a set of the video content relevant for educators' qualities: the *technical quality* of the film that is decisive for its usability in an educational setting, *professional content* that makes it a valuable learning resource, *methodological aspects*, that influence the way the film can be introduced before, during or after a PE lesson, and *aesthetic qualities* that contribute to the motivational effects and general appeal of the film. Scoring was conducted by three

jurors with different professional backgrounds: a PE specialist, a teacher trainer and an educational researcher with no teaching experience. Scores given ranked from 1: low quality, to 5: excellent quality.

The selection of assessment criteria was influenced by our final objective of constructing a learning resource repository. The content of videos most useful for us always includes movement, so our first evaluation criterion was *technical quality:* Good PE resources have to capture the characteristics of movement in a sharp and clearly visible way. Our second criterion was *professional quality*. Images and narration have to convey a clear explanation of the sports event filmed, including both technical and tactical elements of the sports or games documented. To qualify as professionally relevant, methodology had to match the age group and a relation to the PE curriculum in the country where the video will be used (in our case, Hungary) was also an important point. Therefore, we introduced a third criterion, *educational usability*. As with digital learning resources, intercultural relevance (potentials for understanding the film in another country or culture, Blamire and Karpati, 2008) was an important factor in deciding over the use of the film strip for education. Finally, every communication act has to include an element of aesthetics to be appealing and motivating, so we also assessed the *aesthetic quality* of the films.

For each criterion, we defined levels of excellence from 1 to 5 and assigned points accordingly. For example, 1 score was given for *technical quality* of the film if both sound and image were barely intelligible, 2 if either sound or image were useful, 3 if both could be comprehended and the action followed with only some disturbances in between, 4 if the image was good and the sound mediocre or vice versa, and 5 if both were excellent. When judging *professional content*, we identified genres and content types that we found relevant for pre- and in-service PE education:

1. Simple tasks developing basic skills
2. Complex tasks developing special skills
3. Tasks to develop basic techniques of a sport
4. Complex technical tasks
5. Tasks involving tactics
6. Irrelevant content

Educational usability was defined according to the dominant methodological models characterising Physical Education today. One model focuses on working with small

groups and devoting attention to individual skills development while presenting a sport or game in full, with all its rules and moves ("*global" methods*), and another that works both with small and large groups and teaches the sport or game in segments first and in full only if all elements have been sufficiently acquired ("*partial methods*"). Use of these methodological models depends on the phase in the learning process and the ability and previous experiences of students. We developed an evaluation system that integrates both approaches and makes it possible to reveal positive and negative aspects of films for both models. We gave 5 scores for the best documentation, 1 for an insufficient or misleading representation and 0 if we did not find the methods represented in the film appropriate for educational use.

Aesthetic quality was also considered in our assessment. Here, we evaluated the communicative power and the appealing, expressive execution of the films. 1 or 2 scores were given for random, amateur shots with no or very little postproduction, 3 for partially edited and 5 for fully edited, narrated short films or accompanied by music. To our surprise, YouTube has a wide selection of even the highest level!

Assessing YouTube videos

Our reduced sample that reflected the content types of the large selection included 50 English and Hungarian films. Table 2 shows the assessment of English films.

Table 2: Assessment of English language videos

Film title	Technical quality	Professional content (PE)	Educational usability	Aesthetic quality
Volleyball Serves	2	III.	2	3
Teaching Balls Skills, and Fitness	5	III.	5	5
Baseball: Crow Hop Technique	5	III.	5	4
School Events – Physical Education: Swimming Lessons	1	VI.	3	4
Physical Education Weights Training Lesson	3	IV.	3	4
Math+PE=Fun	5	I.; II.	3	4
SAQ® SCHOOLS Physical Education Solutions	3	I.; II.	4	3
PE O Level 100m Sprint Lesson	1	I.	0	3
Quality Physical Education Lesson – Effective Teaching Strategies	3	III.	3	4
Ultimate Instructional Video – Backhand	5	III.	3	3

Most films in the selection are about basic techniques (cf. film No. 1; 2; 3; 9; 10, see details of access in the Appendix). This shows the efforts of uploaders to provide content that most PE teachers need. In the English language sample, we found several examples for interdisciplinary films that featured the relevance of physical education for other disciplines. An example: film No. 6 shows how mathematics education can be supported by PE activities. The English sample shows excellent examples of work with an integrated class where children with physical handicaps work together with healthy children, often using the same tools (cf. Film No. 7). In Hungary, – and perhaps in many other countries in the world – integration is a difficult issue in PE, so YouTube videos may serve as a unique learning resource for this area. Several films are clearly student uploads that document funny or exciting moments of a PE class. These films may also be employed in the training of PE teachers in other countries as they offer cross-cultural comparisons in the organisation of lessons, discipline, motivation and student assessment. (Cf. Film 4 and 6).

Table 3 shows the evaluation results of the Hungarian language sample. (Not all films originate from Hungary as this language is spoken in the Diaspora of the neighbouring countries as well.)

Table 3: Assessment of English language videos

Film title	Technical quality	Professional content (PE)	Educational usability	Aesthetic quality
PE lesson in Lajosmizse town	5	I; III; IV	4	5
An irregular PE lesson	5	I	5	5
Lab school PE lesson for 2. graders (ages 7-8 years)	3	I; II	4	3
P.E. Hungary	3	I.	3	3
„have a look at our PE class!"	4	I; III	5	4
Adventure Park – an advertisement	5	I	3	5
Picking carrots at the Waldorf School of Szolnok town	3	I	3	3
Judo	1	IV	0	1
Matt jumps the bench	1	III	0	1
Physical education	5	-	3	5

As we compare the two samples, we may realise that there are no big differences either in technical or in professional quality, or in aesthetic appeal among the video uploads in the two languages and two (three, four, – with English language videos, it is hard to tell!) different educational cultures. In terms of content, more information about how to work efficiently and in an enjoyable manner with students suffering from handicaps

may be found in the English collection. Otherwise, videos in both languages may be used in any country to improve the teaching of PE through the introduction of this openly accessible and immensely rich visualisation tool.

Further research: tagging the collection, facilitating the use of YouTube videos in education

With considerable effort, we found enough valuable content on YouTube to start our learning resource collection for Physical education. However, this effort could be considerably reduced if social knowledge construction on YouTube would include a *more sophisticated tagging operation*. Most films we encountered needed re-tagging to clearly indicate its content and scope. The importance of appropriate tags for YouTube has been emphasized in research efforts that try to identify ways of further development of this exemplary Web 2.0 site. YouTube's popularity lies in its creative opportunities to share, respond to and author content. When compared with another genre of social knowledge creation, we find YouTube more flexible and playful. Wikis emphasise task-oriented collaborative editing of content and development of "collective" interlinked knowledge. Blogs, in turn, are language based and may not readily be understood by non-native speakers. The power of the image overcomes linguistic difficulties as most YouTube videos we assessed could be easily interpreted even if the sound was only partly comprehensible. Blogs, YouTube and wikis provide a means for the social construction of knowledge – but only if their use is easy enough for teachers and learners to use them regularly.

The introduction of the Hungarian Core Curriculum in 1995 that replaced a detailed syllabus, the character of Physical education has also been altered. Before, techniques of different sports were taught one after the other, now it is the development of skills and competences and not the acquisition of a set of rules in the centre of attention. During the last 15 years, however, very few learning materials have been developed to assist this shift of focus. Existing resources still focus on teaching traditional sports, and offer little guidance for skills development for new fitness sports and free time activities that parents demand. YouTube resources and an (inter)national community to collect, select and evaluate them would be extremely helpful for the modernisation of the discipline.

YouTube seems to have great potentials as a social site – in many respects, it belongs to web 3.0, the fully social web. "We have found that YouTube videos have noticeably different statistics compared to traditional streaming videos, ranging from length and access pattern, to their growth trend and active life span. We investigate the social networking in YouTube videos, as this is a key driving force toward its success. In particular, we find that the links to related videos generated by uploaders' choices have clear small-world characteristics. This indicates that the videos have strong correlations with each other, and create opportunities for developing novel techniques to enhance the service quality. (Xu Cheng et al., 2000, 1)" Research reported here intends to monitor and use this potential. Not just for teaching and learning, but also for motivating people to do sports "in the real world". An interesting research question is, if YouTube videos are used to present sports techniques, the mood of a game and a sporting lifestyle, will students be more willing to go out to the fields and courts and actually engage in sports? Does watching peer-produced videos develop a desire to be part of the action? Can YouTube content be an active protagonist of sportsmanship? These questions will be answered when the YouTube PE community is formed and video learning resources find their way into many Hungarian classrooms.

The problem of retrieval: inappropriate tagging

The variety of videos found in YouTube is really impressing, though the uploaders of films do not pay enough attention for tagging their content correctly. *Tagging is crucially important* for making any kind of content retrievable on the World Wide Web. If it is not done the right way, the 'audience' may never find the video even if they seek for the exact content type. There are several possible solutions for this problem. The first is that YouTube should provide a description or a help function for those who would like to upload something on YouTube. The description should contain guidelines about how to tag the videos effectively and should also motivate the uploaders to think for a moment with the users' mind when they are to seek for some content. Some examples should be found also such as videos that the uploaders can watch and after it some recommendations or guidelines with some extra discussion forum about tagging. This would provide the basis for creating the YouTube community the same way as the well-functioning Wikipedia community.

If the videos are tagged in the right way, users can find the related contents more easily and they can even detect connecting videos as well. At tagging the contents, we should use the name of the sport documented, the character of the video (e.g. PE lesson, match, notable moments etc.) and the main topic. Further tagging words are up to the

uploaders' professional experiences. It would be also a good way to build educational repositories using YouTube videos if different channels were created dedicated to the different type of sports, the aim of the content and the target audience. Tagging and commenting on thematic collections shared as a YouTube "channel" may be an authentic way to consult colleagues who may have more experience in a given sport type or activity. Thus, young PE teachers, novices to the profession but not to internet use, might collaborate in a Social Web environment similar to those they frequent in their free time. Legal issues, however, also should be considered. In Hungary, copyright law regulates the use of internet based content, and similar international regulations should also be considered when developing a thematic channel and sharing it with trainee teachers and in-service colleagues.

A solution for making tagging more functional is the use of *professional 'You Tube taggers'*. Their job is to provide the already uploaded contents with the proper or recommendable tags in order to give more chance for the users to find the desired video in reality as well. The taggers could be hired by YouTube or they could be voluntaries who invest work in making the film collection a more accessible resource. Such a tagging enterprise may be the first step in the creation of a knowledge building community of teachers intending to make use of this free, vast and expanding learning content repository.

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Appendix: List of YouTube videos in the sample analysis

English language films:

1. Teaching Physical Education UL, Lafayette KNES 350 Volleyball Serves 7:32 video.wm http://www.youtube.com/watch?v=R2DNFZKTpR0
2. Physical Education, Teaching Balls Skills, and Fitness 3:42 http://www.youtube.com/watch?v=We2p5sdrV9M
3. Teaching Physical Education UL, Lafayette KNES 215 Baseball: Crow Hop Technique http://www.youtube.com/watch?v=6Ejp2dim_ng
4. School Events - Physical Education: Swimming Lessons 9:02 http://www.youtube.com/watch?v=in-EF_tdXdM
5. Physical Education Weights Training Lesson 3 Mar 09 http://www.youtube.com/watch?v=W68l8fQnxDE
6. Math+PE=Fun http://www.youtube.com/watch?v=pZ1lWQMaS1Q
7. SAQ® SCHOOLS Physical Education Solutions http://www.youtube.com/watch?v=h_r2ZglCNB0 (This video has been removed by the user.)
8. PE O Level 100m Sprint Lesson http://www.youtube.com/watch?v=rs6gxX6hbps
9. Quality Physical Education Lesson – Effective Teaching Strategies http://www.youtube.com/watch?v=kO2E9Fm9rVc
10. Ultimate Instructional Video – Backhand http://www.youtube.com/watch?v=lBRQyBHGWLs

Hungarian language films:

1. A testnevelés. http://www.youtube.com/watch?v=Pwpio_W0sXU
2. Máté szekrényt ugrik (tesi óra) http://www.youtube.com/watch?v=15y2zh4h6D8
3. P.E. Hungary tesi óra http://www.youtube.com/watch?v=ifbZ3Z-Noz4
4. Nézz be hozzánk 2. http://www.youtube.com/watch?v=BFh5RFJPjDo
5. Osztály testnevelés óra http://www.youtube.com/watch?v=S6hFuDhEx3I
6. Testnevelés óra, Lajosmizse http://www.youtube.com/watch?v=pzMaKhGW_7A
7. Rendhagyó testnevelés óra, Dienes Valéria Ált. Iskola. http://www.youtube.com/watch?v=YIqwIQAyjY8
8. Hirdetés: Bemutató: Kalandpálya http://www.youtube.com/watch?v=lT9RtUuqRpU
9. TF III/1 csoport judo óra http://www.youtube.com/watch?v=he3geSR1P_M
10. Répaszedés. Szolnoki Waldorf Iskola. http://www.youtube.com/watch?v=-Mor7c9LUL4

Online Support for Online Graduate Students: Fostering Student Development through Web-based Discussion and Support

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Abstract

While participation in online graduate study is on the rise, questions remain about the outcomes of online graduate school (Rourke & Kanuka, 2007). This research documents student reaction to a web-based support site for online graduate research students, entitled the Research Exploration and Discussion Site (READS). This site was designed to support research skill and knowledge development, and thus role identity formation as a scholar and researcher, for graduate students in an online distance education Master's degree program. Student interest in, and visitation to, the site was very high, but participation in site activities quite limited. Participation patterns and interviews with students posting to the site suggest that, while interests vary widely, students are looking for general support around usual student issues: relationships with faculty, career choices, access to financial and other student supports, academic resources and library information.

An earlier version of the paper was presented at the EDEN Research Workshop, October 2010, in Budapest, Hungary.

Key words: online learning, graduate study, student support, role-identity

Introduction

Graduate students are participating in online graduate study in increasing numbers (Allen & Seaman, 2007). However, neither the graduate student experience nor the student characteristics are the same for online students as traditional face-to-face students (Cleveland-Innes, Garrison & Kinsel, 2007; Coleman, 2005; Edmonds, 2010; Mullen & Tallent-Runnels, 2006; Song, Singleton, Hill, & Koh, 2004). The opportunity for informal social and academic interaction (Pascarella & Terenzini, 1991) that occurs in hallways and graduate student lounges is not readily available to online graduate

students. This limitation means that a fulsome graduate student experience may not be readily available online, and must be carefully crafted.

While online graduate students, and their online learning experience, may be distinguishable from graduate students studying face-to-face, they also share the need for specific outcomes of graduate school. One of these outcomes is the development of a professional and scholarly identity as a researcher. Such an outcome is referred to as role-identity formation (Callero, 2003; Collier, 2001). It is plausible that this identity formation occurs, to some extent, during academic courses and formal leaning. However, the Canadian Association for Graduate Studies (CAGS) has identified the need for professionalism through activities which complement discipline-based formal learning (CAGS, 2008). This need, in combination with the unique needs of online graduate students and their required adjustment to online learning environments (Cleveland-Innes & Garrison, 2009), means that support services are of equal or greater importance for online students.

In response to this need, an online, web-based environment was created for students in a Masters program in distance education. The purpose of this support environment was to provide a central virtual location for research students to access resources, information, direction and advice regarding distance education research. This study reports on the student reaction to this web-based support environment.

Background information

The experience of online graduate students has developed ahead of the research required to ensure a fulsome, appropriate graduate student experience is available in these relatively new, virtual education environments. According to Deggs, Grover & Kacirek (2010), online graduate students identified "access, communication, and feedback as essential to maintaining their level of comfort" (p. 697). Students identified timeliness of teacher response as important feeling connected online; "this type of teacher responsiveness is critical not only on assignments but in all aspects of learning engagement" (Cleveland-Innes & Garrison, in press, p. 12). Fostering a sense of online graduate student community can be enhanced via Web site's with social networking features, opportunities to meet synchronously via teleconferencing and networking-related events (Exter, Korkmaz, Harlin, & Bichelmeyer, 2009).

Other aspects of the learning engagement normally include activities outside formal program requirements and course activities; informal academic and social interaction

and activity. The same high level of support and engagement is required across the range of experiences for online graduate students as those studying face-to-face (Exter, Korkmaz, Harlin, & Bichelmeyer, 2009). Online students hold expectations about this extra-curricular activity and the support that will be available when needed (Deggs, Grover & Kacirek, 2010).

An important part of graduate school, the attitudes and skills associated with scholarly research are central processes and outcomes. An applied program, a central outcome of graduate study in distance education is to prepare some students for the role of practitioner-researcher (Jones & Cleveland-Innes, 2004). Development as a researcher, for graduate students online or face-to-face, requires training and experience; engagement in a socialization process that prepares students to act in the role of researcher is a key aspect of graduate study.

To foster this opportunity, a web-site was designed to increase time spent interacting with faculty and other graduate students to improve socialization opportunities. In this instance, socialization is more than straightforward social time; here socialization is a "process by which people learn the characteristics of their group … (and) the attitudes, values and actions thought appropriate for them" (Kanwar & Swenson, 2000, p. 397). Through this process, students take on new roles and practice the required behaviours and activities of that role. In other words, students to engage in 'role taking', the trying of new behaviours exhibited and modelled by others, and 'role making', the creation of new behaviours and actions based on new ways of knowing and thinking (Blau & Goodman, 1995).

Given this, graduate education is more than a "simple extension of coursework beyond the bachelor's degree" (Gullahorn, 2003, p. 204). It requires emotional and social growth along with enhanced cognitive skills. For Van Maanen & Schein (1979), this includes the acquisition of a new socially–based identity and membership in an elite community (Anderson & Swazey, 1998). This is as much so for graduate students online as it is for those in traditional programs, where socialization occurs in the classroom and beyond.

For Gardner (2007), the graduate student experience involves socialization processes in five different areas:

1. dealing with ambiguity in program guidelines and expectations;
2. balancing graduate school responsibilities with those external to school;
3. developing the independence required in the role of scholar;
4. understanding the major cognitive, personal, and professional transition that is part of the graduate experience; and
5. offering and receiving support needed during this transition.

How can these socialization opportunities be afforded to online graduate students?

This pilot study is a test of one possible answer to this question. The web-based support piloted in this study is to promote "students' active involvement in the learning and discovery process (through) frequent interaction between faculty and students as well as among students in … informal settings" (Gullahorn, 2003, p. 204). By design, it provides a central virtual location for research students to access resources, information, direction and advice regarding distance education research broadly or the process of designing and implementing research on the topic of distance education and all its sub-fields. The objectives are as follows:

- Provide opportunity for students and faculty to develop a community of inquiry regarding research in distance education.
- Provide a source of advice, information, and encouragement in a moderated environment to student researchers.
- Provide peer interaction opportunities for participants.
- Allow identification and pursuit of special interests by participants.
- Provide students an opportunity to moderate and participate in informal online interaction.

Structure of the web-site

The READS web-site is hosted on an open-source platform called Moodle, a Learning Management System (LMS) used normally to develop and deliver courses. The READS Moodle site is only accessible to those currently registered in programs. The site consists of eight sections in which students can access information. The first section contains an introduction and the objectives to the site. This includes a sound file of Dr. Marti Cleveland-Innes formally introducing visitors to the site, a news forum, a general research discussion forum, a suggested additional resources forum

and a welcome forum. The second section of the site incorporates the weekly discussion sessions, where students can engage in asynchronous conversations about topics of distance education and/or research. The third area focuses on research grant opportunities, where updated postings and newsletters for research grants are advertised.

The fourth section is the professors' corners, where six faculty members maintain their own forums to share their research interests and assist students with similar research goals. The fifth, sixth and seventh sections act as a reference area, subdivided into categories: library & reference information, research ethics and conduct, research societies and journal and online magazines. Each provides links, documents and/or information to each subject.

The final section of the READS site is an area where terminated discussion sessions are situated. These are left open so students can retrieve pertinent information from past dialogues.

Research design

The research question guiding this phase of our research is: Are online graduate students interested in web-based support for extra-curricular activity and discussion with faculty and students? Our argument in support of this question is that extra-curricular activity, online or face-to-face, plays a role in the development of research and scholarly identity and expertise for graduate students.

A mixed methods approach was employed to collect data (Creswell & Plano-Clark, 2007). This mixed methods approach, also known as multi-method design, allows for rigorous, methodologically sophisticated investigations. In this investigation, a mix of methods provides the opportunity to measure student activity via numerical counting; this provides a report of what the students actually do through quantitative measures. In addition, mixed methods allow one to ask the students questions that illuminate the numerical count of activity; what benefit does this activity provide and how can we continue and/or improve the activity options to provide further benefit.

The open-source LMS Moodle provides tracking opportunities to measure student activity. Student activity data comes from the reporting functions embedded in Moodle infrastructure. Reports were accessed regularly, and combined for reporting to administrators and the wider academic audience.

Text-based responses to open-ended survey questions represent the qualitative data; the voice of students participating on the site. This data were collected at two points of time over the two year trial; the first occurred four months after the site was opened and the second at the end of year one. Students were asked to reflect and respond regarding three general concepts related to participation on the site: perceived **benefits** in the activity, **interest-level** in discussion topics and further **requests for online extra-curricular activity.**

Findings

READS was first available to graduate students in August 2008 in a program that includes approximately four hundred Masters level students. The site was advertised to students on the main department web-page, and email invitations were sent to all program students. To access the site, a participant has to hold an identification code and password registered with the institution. While program students are the target for the support site, non-program students taking courses in the program also have access to the site.

In the two years since the site was opened, **18,192** viewings of the site were made. Over this time a total of 447 student contributions were made to the site in the form of discussion forum postings or other information items. Figure 1 represents the main page of the site.

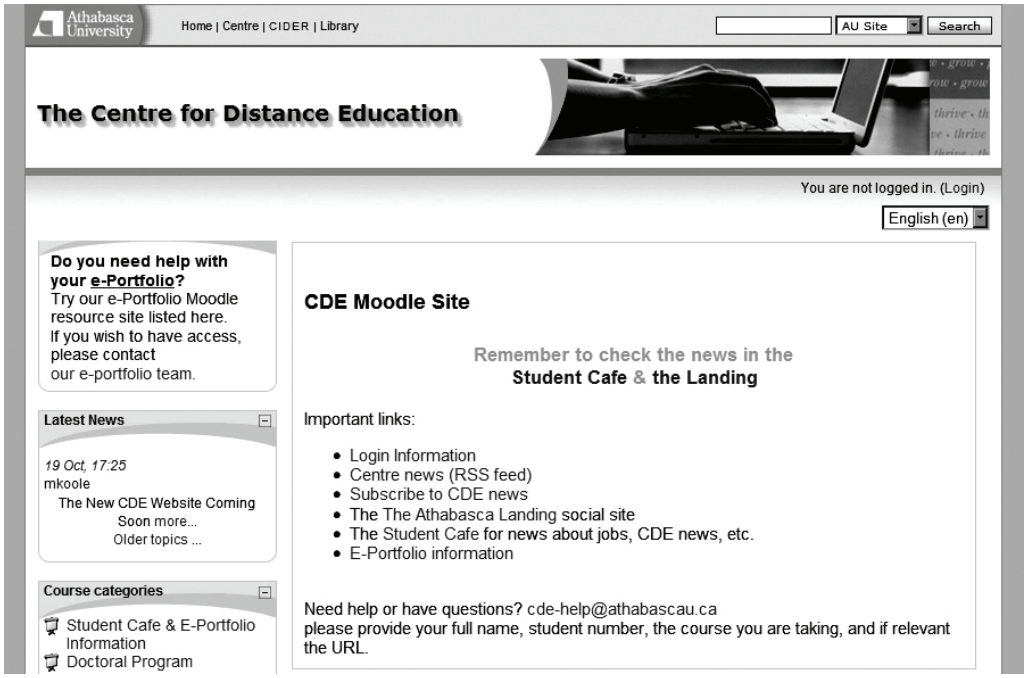

Figure 1.

The most popular features, as indicated by student traffic, are the Welcome Forum and the Professors' Corners.

Weekly discussion forums offer graduate students a place to discuss current topics of research. An article, resource and/or introductory post from the site administrator is provided to initiate debate and dialogue. Forum topics are open for one week and then replaced with a new topic, encouraging students to participate in asynchronous communications. Here students could post their thoughts/opinions and reflect/respond to others at their convenience. A variety of topics were discussed with varying amounts of reading and posting. Figure 2 provides a list of topics discussed in the first year of operation, and visually represents the relationship between the number of viewings and number of postings.

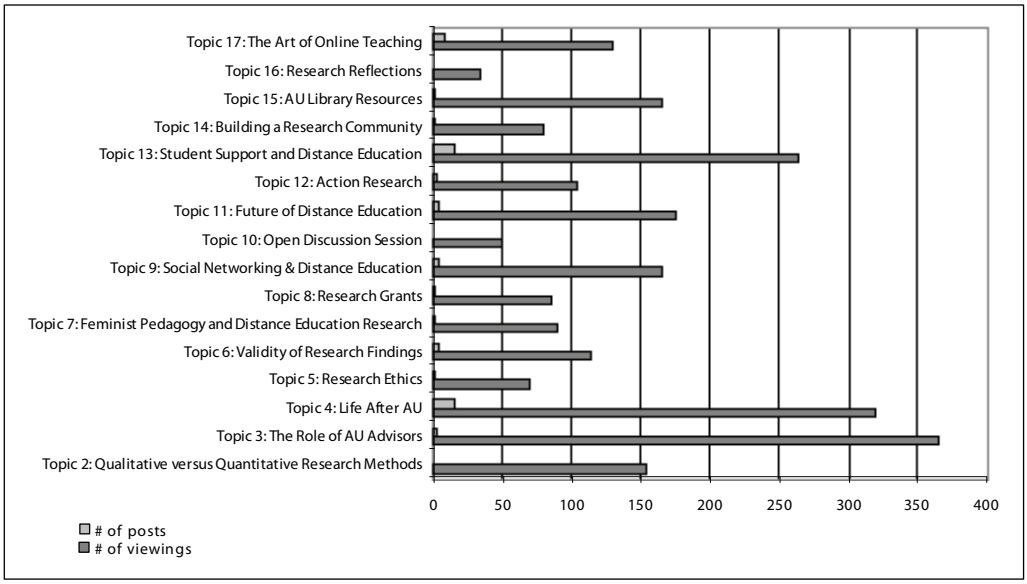

Figure 2.

Discussion forum activity is made up of more viewing than posting. There is no systematic relationship between viewing and posting but, in general, topics that received highest viewings had more postings. Table 1 provides activity numbers of discussion topics over two years during Fall and Winter semesters. Another noticeable pattern was the variation of activity by day of the week. Mondays were by far the most popular activity day on the site, with as many as 120 viewings per day on Mondays. Activity diminished after Wednesday, with the least amount of site activity on week-ends.

Table 1:

Topic	Viewings			Number of Postings (excluding those made by admin)
	As of Oct. 10, 2009	As of February, 20, 2010	As of April 11, 2010	
Topic 2: Qualitative versus Quantitative Research Methods	156	173	179	0
Topic 3: The Role of AU Advisors	362	386	398	3
Topic 4: Life After AU	318	345	358	12
Topic 5: Research Ethics	71	78	79	1
Topic 6: Validity of Research Findings	116	116	116	3
Topic 7: Feminist Pedagogy and Distance Education Research	87	90	92	1
Topic 8: Research Grants	82	89	94	1
Topic 9: Social Networking & Distance Education	168	170	174	2
Topic 10: Open Discussion Session	50	51	51	0
Topic 11: Future of Distance Education	179	181	185	4
Topic 12: Action Research	104	106	113	2
Topic 13: Student Support and Distance Education	264	266	268	10
Topic 14: Building a Research Community	86	86	86	1
Topic 15: AU Library Resources	165	166	168	1
Topic 16: Research Reflections	32	39	39	0
Topic 17: The Art of Online Teaching	71	71	73	5
Topic 18: Virtual Show & Tell	131	200	206	4
Topic 19: CDE READS Goes to Florida!		52	58	0
Topic 20: Historic Research in Distance Education		75	86	2
Topic 21: DE Research Topics to Avoid?		60	73	2
Topic 22: The Current State of Research in DE		66	69	1
Topic 23: A New Path to DE Research?		30	34	0
Topic 24: Review of Distance Education Research		150	155	3
Topic 25: Research Interests		91	99	5
Topic 26: Are you Ready for Research?		93	104	4
Topic 27: Becoming Part of the Research Community		86	91	6
Topic 28: Taking the Next Step Towards Research		84	92	6
Topic 29: Organising Yourself as a Researcher Part 1			60	0
Topic 30: Organising Yourself as a Researcher Part 2			50	0
Topic 31: Organising Yourself as a Researcher Part 3			89	1
Topic 32: Creating a Research Question Part1			93	2
Topic 33: Creating a Research Question Part2			54	0
Topic 34: Creating Research Methodology			58	1
Topic 35: Creating a Dissemination Plan			26	0
Grand Total:	**2442**	**3400**	**3970**	**78**

Findings from the collection of qualitative data were analyzed by two researchers. The text data was outlined as 50 complete concepts or ideas. Selective coding centred on the concepts of benefits, or lack of, realized from the site, interest in various aspects of the site and requests for new structures or activities. Coding yielded an inter-rater reliability score of 62%. Table 2 is a summary of the topics distilled from text-based responses, within each conceptual category:

Table 2:

Benefits (23)	**Interaction opportunities** Students identified the value of discussing issues with peers, and the creation of documents and resources specific to their needs. The value of peer exchange was emphasized multiple times; "networking and connecting with others" was mentioned often. Interaction benefits span social support and professional development, with references to sharing research ideas with other students and getting advice from experienced researchers. **Awareness of and access to valuable scholarship activity** Students use the site to identify conferences and publishing opportunities of value. Students share articles and books of perceived value as well. The available information on any subject can be overwhelming. Students use READS to help them determine what valuable and credible information is. **Clarification of expectations, responsibilities** Questions were raised about expectations and what is acceptable and what is not; knowing the rules of "academic etiquette" was the phrase used. Another said the site makes him/her "feel more comfortable …. returning to school and doing research." **General support** The need for, and benefit from, support during graduate school was noted many times. Students want assistance "balancing work, school and home life" and ways to make graduate school enjoyable.
Interests (16)	**Facilitated discussions** Students expressed interest in continued weekly discussions, in relation to research and other issues. **Information resources** Access to information about funding sources and research design evaluation is of great interest. There is interest in any network, journal, blog, presentation, etc. that relates to the field. Desired information on the following were noted: SecondLife, data analysis software, video, learning motivation, design-based research, teaching presence, publication peer review processes, adult learning, neurobiology and instructional design.
Requests (11)	**Community boundaries** Online interaction is readily available to students on a course by course basis. Thesis students who have finished courses are without this valuable, albeit temporary, community. Students report that READS provides the opportunity to continue this dialogue and ask for increased facilitation to create and sustain community for thesis students. Multiple questions were raised about who can participate and for how long. Looking ahead, students asked if they could continue to participate after the thesis project was complete, and after graduation. It was suggested that discussion formats that are longer than one week would garner more activity and generate more4 in-depth discussion. **Description of site activities** Students requested clear explanations of the purpose/reason for certain areas of the site. Some referred to the "professors' corners" and asked for more activity and an understanding of how these areas would operate.

A few comments noted that some READS discussion replicates course-based discussion.

Discussion

Student interest to the web-based research exploration and discussion site has been notable; high numbers of students are accessing the information and discussions available on the site. However, a small proportion of those visiting the site were motivated to interact with others. The population of students who are posting is uncharacteristic and dynamic; a few of the same students are posting but otherwise the group who posts is unique. In other words, a cohort of students within an integral community is not forming around the site.

This might give one the sense that this is not of interest to the students, and the idea of connecting to such an informal community is of little importance. However, the Welcome Forum on the site has the greatest number of viewings (n=1460) and the greatest number of posts (n=113). Students are willing to come to the site and make themselves known to others. This keen interest then dissipates; the next highest number of postings is 12, to the Life after University discussion forum, with 318 views.

None of the discussion topics generated a rousing discussion. Of 35 discussion topics over two years, nine topics had no postings and views from mid-30s to 60. There was one exception to this pattern. The topic "Qualitative versus Quantitative Research Methods" had 179 views but no posts. It is likely that, in this case, a failure to post had to do with confidence issues rather than lack of interest. In cases where there were relatively few views and no posts we assume limited interest, but acknowledge that these topics at times landed in weeks where academic activity may have taken precedence.

In the survey, some students pointed out that some of the topics READS covers are also discussed in their courses, therefore it is redundant and they don't participate. Furthermore, with many courses having a participation mark of 10%, many students concentrate in participating in their course forums, where they receive marks, rather than an external site.

Student feedback from survey data identified numerous benefits and keen interest. A more active site with discussion on student experiences as well as research topics was requested by participants. Many topics of interest were suggested on both personal and professional issues. Multiple students spoke of the value of the site and some listed various benefits.

Conclusions

The web-based support site for online graduate students has offered online students increased opportunity to develop as a student and a researcher. It provides increased engagement and connections to other developing research students and faculty researchers; support requested and required online (Cleveland-Innes & Garrison, in press; Deggs, Grover & Kariek, 2010; Jones, 2009) However, the two-way interaction identified as so critical in web-based distance education (Gunawardena & Mclsaac, 2004) may be less critical than attention and validation. The opportunity to read what we were suggesting students do was of significant value to many, as evidenced in the thousands of hits on the site from a group of approximately four hundred students.

Findings in this study suggest that there is great interest in the information provided but less in participating in discussions. This lack of student postings was noticed by respondents. This issue may have a recursive effect; increased student activity will feed on itself and postings may increase exponentially.

Most remarkable is the number of viewings to the site. In a program with approximately four hundred students at any one point in time, 18,192 viewings of the site demonstrates significant interest in such web-based support. Students provided some postings and some of the resource material available on the site. This is a demonstrable case of peer construction. Timing and topic interest, as indicated by number of viewings, had an effect on student participation. While still in its pilot phase, the site is generating enough participation to warrant continuing the site, with some changes.

The most notable evidence is the interest in non-research related topics regarding the graduate student experience. This does not refute our concept of role-identity formation in graduate school, but supports it. A need for support in multiple areas can be attributed to adjustments made during graduate school; adjustments that may provide for new ways of acting, coping and knowing about oneself and one's place or role in a field of study.

Role-identity formation evidence can be extrapolated from many comments and the types of interests identified. While students did not refer specifically to an evolving sense of identity, this is reflected in comments made, particularly regarding the benefits offered on the site and requests for further information and interaction. This preliminary assessment provides enough evidence to move to a second phase of the research, and evaluate role identity formation in longitudinal studies of READS participants.

There is a relationship between number of viewings and number of postings. As a general rule, topics that generated the greatest number of viewings also produced more postings. This is true of all topics with a few exceptions. For example, the topic regarding student faculty advisors garnered more viewings than most others but generated only 3 postings. A key finding is the interest among students to discuss topics of general interest – outside of the issue of research activity. Issues that are problem-based and of general interest to all students generated more activity than those focused on questions about research. This is in keeping with findings that suggest that online graduate students expect and respond to support in relation to the broader graduate student experience Graduate student development and skill building will complement discipline-based learning and are seen as "behaviours that can be learned, improved upon with practice, require reflection and benefit from on-going coaching" (Canadian Association of Graduate Study, 2008, p. 1). Our web-site is designed to offer this opportunity for online graduate students, particularly in the area of research skill and researcher identity, in parallel with academic program knowledge.

In sum, we set-out to support research skill and knowledge development, and thus role identity formation as a scholar and researcher, for graduate students in an online distance education Master's degree. The lack of postings on topics regarding research may be an indicator of developing identity; students do not have the confidence to discuss research with peers. It may be that students were looking for the support required by all graduate students on general student issues, as suggested in other research findings. Participation patterns and interviews with students posting to the site suggest that, while interests vary widely, students are looking for general support around usual student issues: relationships with faculty, career choices, access to financial and other student supports, academic resources and library information. Revisions to our web-based discussions will now include a more complex mix of topics related to graduate studies, as expected in historical and still more common face-to-face experiences, and the online learning environment.

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