Can Open and Distance Learning Courses Increase Student Teachers Motivation During Their Training ?

Introduction

Our changing society, now more and more depending, socially and economically upon information and communication technologies (ICTs), is giving rise to new educational needs as well as to new teaching methods. These new generations have modern needs and expectations which manifest themselves particularly in academic environments such as universities. In fact, at the dawn of the new millennium, teacher education faces numerous challenges: the growing diversity of student profiles, the arrival of new technologies, the multiplicity of university programs, as well as the preservice teachers' lack of interest or motivation to use technology in their own teaching. For example, although computer technology is quickly spreading to almost every part of our lives Zhao and Frank (2003) argue underline that the introduction of ICTs in schools has been less than successful.

> […] there were several waves of massive investment in technology to improve education, but none had a significant lasting impact on education. Despite the generous investment in, and increased presence of, computers in schools (Anderson & Ronnkvist, 1999; Becker, 2000a; Cattagni & Farris, 2001), computers have been found to be unused or underused in most schools (Becker, 2001; Cuban, 1999, 2001; Loveless, 1996; Zhao, Pugh, Sheldon, & Byers, 2002). (Zhao and Frank, 2003, p. 807-808).

As pointed out in the ImpaCT2 study1, little has change in the past 15 years with regard to teachers' use of ICTs : they are not confident about using ICTs in their own classrooms. Of course, there are indications in the report that teachers are considering taking on a new, more active role but teaching has yet to be significantly influenced by the use of ICTs. That is why Bullock (2004) highlights that the importance of better preparing teachers both to teach and use ICTs has gained national attention over the past three decades. Various studies and governmental reports such as the Teachers and Technology report (U.S. Congress, 1995) have strongly emphasized that teacher education colleges imperatively need to improve the effectiveness of their program so that preservice teachers who complete their degree know why, how and when to teach with ICTs. These recommendations are also found in Canadian and European studies and governmental reports (see for example : Scottish Board of Education, 2000 ; CSE, 2000). One global recommendation appears to emerge from this reports and studies : ICTs must be part of various (if not most) teacher education courses, and faculty members need to act as models with regard to technology integrated teaching.

In light of the challenges issued from university teaching, particularly those pertaining to the students' motivation to learn, the integration of technology into various teacher education courses, but also the importance of modeling teaching with ICTs by teacher education faculty (e.g. Moursund & Bielefeldt, 1999), it was decided to implement a compulsory, distance, open and distance learning course within the teacher training program of a Canadian (province of Quebec) university. The course, Introduction to Educational Research, was not a course technology, but rather an introduction to educational research or educational inquiry designed for student teachers. This was also a very difficult course for preservice teachers as few understand – before the course that is – why it is important to be introduced to educational research in a teacher education program. Nevertheless, this is a compulsory course in most teacher education programs in the province of Quebec because the ministry of Education believes that enlightened educators need to look to and understand education research for well-founded evidence to help them do a better job with the children they serve (e.g. Slavin, 2004). Finally, it should be noted that this was the first compulsory Open and distance learning course in any teacher education program in Quebec.

Objective

The goal of the present research was to study and better understand the motivational impact of the implementation of a compulsory Open and distance learning course in a teacher education program. Our starting hypothesis was that this course, with its nature promoting self-determination, feelings of competence and affiliation (Deci and Ryan, 1991 ; Ryan and Deci, 2000), would have a positive impact on the motivation of the students.

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1 These findings are available at: http://www.becta.org.uk/impact2

Theoretical Framework
Deci and Ryan's motivation theory (1985, 1991, 2005) seems more complete than others as, on the one hand, it emphasizes the dynamic relationship between the individual and his environment and, on the other hand, it is very relevant for educational research (Vallerand, Blais, Brière and Pelletier, 1989). According to the theory of cognitive evaluation (Deci and Ryan, 1991), an individual's motivation is mainly determined by his needs for self-determination and competence. Self-determination is defined as the hypothetical degree of freedom as perceived by the individual in the choice and execution of his actions (Deci and Ryan, 1991). The authors emphasize that there also exists in individuals an important need for affiliation complementing the need for autonomy, and which is also necessary for the development of self-determined motivation. In fact, Deci and Ryan suggest that everything which is likely to influence these three factors, that is to say the feelings of self-determination, competence and affiliation, would thus have an impact on student motivation.

Feeling of Self-determination : the Determining Principle of Motivation
For to Ryan and Deci (2000), feelings of self-determination correspond to individuals' perception of the origin of their actions. If students believe that they have chosen their behavior, their feelings of self-determination will be heightened. The context in which the task is achieved is then perceived as promoting autonomy. Conversely, if students believe that their behavior is a result of external induction, their feelings of self-determination are weakened and the context in which the task was accomplished will be perceived as controlling. A stronger feeling of self-determination will have a positive impact on the development of a student's academic motivation, whereas the opposite will have a negative impact.

Feeling of Competence : Second Determining Principle of Motivation
According to Ryan and Deci (2000), the second determining principle of motivation is the perception or feeling of competence. This element may be defined as a complex affective state, which is relatively stable, lasting and linked to an individual's representation of his aptitude, of his competence in regards to a given activity. Events which help individuals to feel competent increase their self-determined types of motivation. On the contrary, events which undermine an individuals' feelings of competence decrease their self-determined types of motivation. Many contextual factors can affect students' perception of competence and, consequently, their academic motivation "curriculum, class structure and the teacher represent the sources of influence which may influence motivation.'' (Vallerand, 1993, p. 267)

Intrinsic motivation, extrinsic motivation, and amotivation
In general, intrinsic motivation (IM) refers to the fact of doing an activity for itself, and to the pleasure and satisfaction derived from participation (Deci, 1975). Contrary to IM, extrinsic motivation (EM) pertains to a wide variety of behaviors in which the goals of an action extend beyond those inherent in the activity itself. They are behaviors which are engaged in as means to an end and not for their own sake (Deci, 1975). Originally, it was thought that EM referred to behaviors performed without self-determination and thus could only be prompted by external contingencies. However, Deci, Ryan and their colleagues (1985, 1991, 2000) have postulated a self-determination theory. This theory seems particularly relevant for the present study as it stipulates that perceptions of self-determination, competence and affiliation are important determinants of motivation. Also, according to Deci and Ryan, various types of EM exist, some of which are self-determined and may be performed through self-regulation. From lower to higher levels of self-determination, they are: external, introjected, identified and integrated regulation (Figure 1).
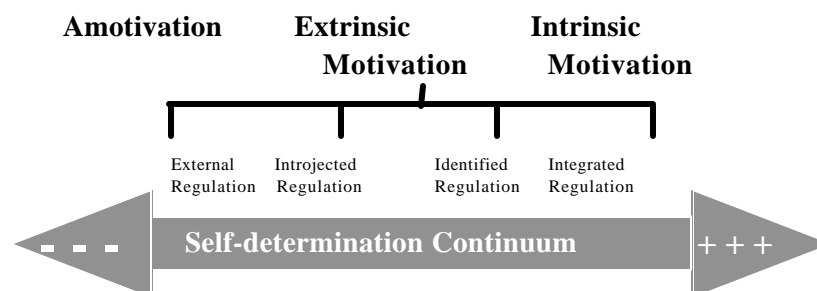

FIGURE 1. *Representation of the Self-determination Continuum Developed by Deci and Ryan (1985, 1991, 2000).*

External regulation corresponds to EM as it generally appears in the literature. That is, behavior is regulated through external means such as rewards and constraints. With introjected regulation, the individuals begin to internalize the reasons for their actions. However, this form of internalization, while internal to the person, is not truly self-determined since it is limited to the internalization of past external contingencies (Vallerand, Blais, Brière and Pelletier, 1989). To the extent that the behavior becomes valued by the individual, and especially that it is perceived as chosen by the individual himself, then the internalization of extrinsic motives becomes regulated through identified regulation. The most self-determined form of EM is referred to as integrated regulation. According to Deci and Ryan (1991), integrated regulation occurs when the individual's action is perceived as personally valued and freely done. However, it appears that this type of motivation is difficult to assess in an educational context (Vallerand, 1993).

An increasing amount of research has been undertaken to evaluate Deci and Ryan's EM formulation. The results consistently support the basic premises of the formulation. For instance, results from confirmatory factor analyses on the motivation scales have supported the presence of three types of EM in education (Ryan and Connell, 1989; Vallerand et al., 1989).

Along with intrinsic and extrinsic motivation, Deci and Ryan (1985, 1991) have posited that a third type of motivational construct is important to consider in order to fully understand human behavior. This concept is termed amotivation (AMO). Individuals are amotivated when they do not perceive a link between outcomes and their own actions. They are neither intrinsically nor extrinsically motivated. They are non-motivated. Amotivation can be seen in many ways as similar to learned helplessness (Abramson, Seligman and Teasdale, 1978) since amotivated individuals experience feelings of incompetence, and expectancies of uncontrollability.

Justification for and context of experimentation
In the present study, Deci and Ryan's construct has permitted us to assess student motivation in a multidimensional fashion. Their theory goes beyond the usual intrinsic/extrinsic distinction and allows for a more accurate analysis of motivation, thereby opening the door to innovative research. In the theoretical perspective of Ryan and Deci (2000), it seems that a student's academic motivation is modulated by his feelings of self-determination, competence and affiliation, and that what influences these three factors may also have an impact on motivation.

Many researchers, such as Relan (1992), have shown that using virtual learning environments can be a determining factor in promoting feelings of self-determination. Shin's works (1998) suggest that a Web course stimulates students' feelings of competence. As for Christoph, Schoenfeld and Tansky (1998), they have shown that university students registered in a virtual course (n= 164) had acquired a significantly greater feeling of self-efficiency than students registered in the same class taught the traditional way (control group, n = 231). In their conclusions, these authors also highlight the fact that students registered in the Web course generally felt more competent that their colleagues in the control group.

Method
The results presented are drawn from quantitative measures (a motivation scale was administered three times as pre, post and "post post" measurement to all students who were participating in the project). Qualitative measures (semi-structured interviews conducted with preservice teachers after the course [n = 40] and transcripts of focus groups held in *chat* rooms) were also used but are not presented in this paper. It appears important to mention that, according to Krathwohl (1998) and Moss (1996), the combination of both qualitative and quantitative data generally allows for a more complete understanding of a research problem.

Subjects
A total of 429 preservice teachers (331 females and 98 males) enrolled in a four-year teacher education program were selected to participate. Subjects had a mean age of 21 years old.

Quantitative measures and analyses
An adapted version of a motivation scale developed and validated in Canada, the Motivation in Education Scale by Vallerand, Blais, Brière and Pelletier (1989), was administered three times to all students who were participating in the project. The results of the analyses conducted indicate that the internal consistency of all subscales of this scale is excellent , ranging from .73 to .91. With respect to validity, the present results are also very encouraging. A factor

analysis highlights the five-factor structure ((1) Amotivation, (2) External regulation, (3) Introjected regulation, (4) Identified regulation, (5) Intrinsic motivation) and thus provides some support for the factorial validity of the scale. The first measure of motivation took place at the beginning of the first class, before the students were fully aware of the technologically enhanced learning environment. The second measure was taken after the third week of the course, when students were more familiar with the particular nature of their learning environment. The third measure was taken just after the twelfth week of the course. A series of single sample paired t-tests procedure was used to measure significance of the difference between the means at T1 and T2, T1 and T3, as well as T2 and T3. The choice of the t-test instead of a repeated measures ANOVA was done since the control of the inequality in time laps between measurements was an important feature under our experimental conditions (Zimmerman & Zumbo, 1993). Moreover, David and Gunnink (1997) highlight that timely unequal pairing of measurement results application should show reasonable robustness.

Presentation and Analysis of Results

As shown in Table 1, the students' average score for self-determined types of motivation on the second motivation test, at a time when they were completely aware of the organization of the Open and distance learning course, is significantly lower than the average score obtained in the first motivation test ($p < 0,0001$). As well, the students' average score for non self-determined types of motivation is significantly higher than the one on the first motivation test.

Table 1
Average score of students' motivation Change between Week 4 and Week 1 (n = 429)

	Non or little self-determined types of motivation			Self-determined types of motivation	
	Amotivation	(EM) External Regulation	(EM) Introjected Regulation	(EM) Identified Regulation	Intrinsic Motivation
Motivation change (Week 4 – Week 1)	+ 0.51	+ 0.60	+ 0.36	- 1.56	-1.58
Significance of gain (betweenWeek 1 and 4)	t = 5.11 $p < 0,0001$	t =6.87 $p < 0,0001$	t =8.01 $p < 0,0001$	t = 15.76 $p < 0,0001$	t = 20.58 $p < 0,0001$

As shown in Table 2, the average score obtained by the students in the third motivation test, administered just after the twelfth week of the course, highlights a significant increase in self-determined types of motivation, when compared to the average score on both test 1 (week 1) and test 2 (week 34). As well, the results highlight a significant decrease in non self-determined types of motivation, also when compared to the average score on tests 1 and 2.

Table 2
Average score of students' motivational profile for week 1, 4 and 13

	Non or little self-determined types of motivation			Self-determined types of motivation	
	Amotivation	(EM) External Regulation	(EM) Introjected Regulation	(EM) Identified Regulation	Intrinsic Motivation
Week 1	1.41	2.11	3.04	5.61	5.30
Week 4	1.92	2.71	3.40	4.05	3.72
Week 13	1.14	1.94	2.77	5.94	6.11
Sig. of gain (Week 1 vs 4)	t = 5.11 $p < 0,0001$	t =6.87 $p < 0,0001$	t =8.01 $p < 0,0001$	t = 15.76 $p < 0,0001$	t = 20.58 $p < 0,0001$
Sig. of gain (Week 1 vs 13)	t=6,28 $p < 0,0001$	t=4,77 $p < 0,001$	t=4.99 $p < 0,0001$	t= 7,08 $p < 0,0001$	t= 13.99 $p < 0,0001$
Sig. of gain (Week 4 vs 13)	t= 15.57 $p < 0,0001$	t=17.02 $p < 0,0001$	t=15.42 $p < 0,0001$	t= 21.90 $p < 0,0001$	t= 29.11 $p < 0,0001$

The students' results on the motivation tests seem to highlight the resistance felt and hardships encountered at the beginning of the implementation of the course held on the Web. Nonetheless, these results also show that the motivation of students at the end of the course was much higher than when the course first began or in the second week when a certain effort was required simply to get adjusted to this new kind of "Web-based university teaching".

Qualitative measures

After reading all of the data collected (transcripts of interviews, transcripts of focus groups held in *chat rooms*) various concepts emerged. We then tested out these concepts by coding all the data. Finally, another group of research assistants, familiar with our research topic, proceeded to test out the first coding of all the data by coding it again. This process is called "constant comparison" by Glaser by Strauss (1967) was put in place to verify all codes. The reiterative verification of coding enabled us to further adjustments and refinements of both the concepts and the segments coded. As previously mentioned, we used NVivo 2.0 to code all the qualitative data. All 40 interviews and 24 focus groups (in *chat rooms*) were coded. An average of 172,3 segments were code for each interview, whereas an average of 105,5 were coded for each focus group. Both for interviews and focus groups, many of the segments coded contained more than one code. With the interviews, 89,3 % of the segments coded were grouped into concepts. For the focus groups, 90,2 % of all segments coded were grouped into concepts. Table 3 presents the list of all concepts used to code the data, as well as a quantification of the data coded.

Conclusion

We believe that our study can be considered as a welcomed addition to the role and value of integrating ICTs in teacher education programs. Our results could also help teacher educators innovate in their teacher training programs by providing them with insight into one effective way (Web-based course) to prepare future teachers to use ICTs for teaching and learning.

While the analysis of the results reveal the positive impact of a Web-based course on students' motivation to learn, the analyses conducted also unveil the fact that all students may not be ready to handle such autonomy or self-determination, and that the gap between the university classroom and the virtual classroom is substantial, possibly difficult to bridge without adequate preparation. This gap is particularly evident when we observe the significant decrease in the students' motivation after only four weeks of the course.

However, despite the obstacles students faced, analysis of the interviews and *chat rooms* focus groups (not presented in this paper) exposes the advantage of integrating Web-based courses in teacher education programs. The pilot-project experienced in Canada has enabled us to note the change which occurs among future teachers when they are confronted with information and communication technologies (ICTs) in their practical training: a change in terms of their motivation to learn. The experience they underwent as learners, when they were faced in a compulsory situation with the integration of technologies in the context of a university course, is likely to shed a positive light on the integration of ICTs in general in teacher education programs. In addition, it may, quite possibly, create favorable conditions and incentive for further integration of ICTs in their own teaching, either during an internship (field practice) or during their professional teaching endeavors. Technologies are then perceived as learning tools with which the learners become more autonomous, more analytical in the face of dilemmas.

The integration of ICT in teacher education programs still presents an enormous challenge and the disruptions inevitably entailed must be faced with both dynamism and caution. The pilot-project implemented in Quebec have allowed us to ascertain that there are substantial advantages in integrating Web-based courses in teacher education programs, although there remains a large and considerable gap between the "real" university classroom and the virtual, technology-enhanced university classroom.

Further research into the impact of Web-based courses on the actual use of ICTs by preservice teachers during their field practice would be required. Does learning with ICTs via Web-based courses during teacher education training programs make a difference in the elementary or secondary-school classroom ? Finding answers to such a question could definitely provide valuable insight into the effectiveness integrating ICTs into teacher education programs. It could also provide suggestions into effective ways to prepare future teachers to use technology.

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