



Relationships Between Online Motivation, Participation, and Achievement: More Complex than You Might Think

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Abstract

With the increasing importance and rapid growth of online courses, diversification of the student population, and the growing concern over retention rates, exploration of learner online participation and possible relationships with motivation and achievement behaviour is becoming increasingly relevant in higher education. Previous studies (Gerber, Grundt, & Grote, 2008; Picciano, 2002) have tended to explore links between learner activity and performance in online environments. But the relationships that may exist between motivation and participation (both in terms of quality and quantity of activity) in online contexts are not well understood. Indeed, participation, particularly active participation such as posting messages to online discussions, is frequently used as a proxy for motivation, with more active learners being perceived as more motivated.

This paper presents findings of one aspect of a larger study (Hartnett, 2010) that explored the motivation of pre-service teachers situated within two separate and distinct online distance learning contexts. Self-report motivation data, achievement, and online usage statistical data, in conjunction with asynchronous discussion-forum transcripts, were used to explore possible relationships between motivation, participation, and achievement in these contexts. Analysis revealed important differences between and within the two cases (e.g., nature of the task and assessment approaches) that indicated situational factors played a key role in determining whether any significant relationships were present. In other words, various factors within the specific learning environment combined in complex ways to influence motivation to learn and the nature of student participation. In an age of increasing exploration and interpretation of online learner behaviour via automatically collected systems statistics (Beer, Jones, & Clark, 2009), these findings highlight the need to be cautious about using online activity as the only gauge for assessing student motivation in online contexts.

Keywords: motivation; online participation

Introduction

Over the last decade and a half, distance education has undergone a period of considerable change (Larreamendy-Joerns & Leinhardt, 2006; Moore & Kearsley, 2011). The growth of the internet and related technologies has resulted in a merging of online teaching and learning into the routine practices of universities (Roy & Schumm, 2011). At the same time, it has given distance education a new appeal (Tallent-Runnels et al., 2006). Following Bates (2005), online learning is viewed here as a subcategory of distance education that specifically uses the internet

and the World Wide Web. Online learning is one increasingly popular method used by institutions in various countries to provide opportunities and meet the needs of a growing and increasingly diverse student population (Moore & Kearsley, 2011).

Online learning has a number of potential benefits, not least of which is the ability to overcome the temporal and spatial restrictions of traditional educational settings (Bates, 2005). Notwithstanding the advantages offered by online learning, a variety of factors have been identified as crucial to the success of online courses (Andresen, 2009). Motivation is one such factor (Bekele, 2010). Just as motivation is a key factor in learning, engagement, and achievement in face-to-face educational contexts (Brophy, 2010), so it is in online learning environments (Jones & Issroff, 2007).

Poor motivation has been identified as a decisive factor in contributing to the high drop-out rates from online courses (Muilenburg & Berge, 2005). Although concern about student motivation and engagement in technology-mediated environments has been evident for some time (Rovai, 2003), research in this area is limited both in quantity and scope (Artino, 2008; Bekele, 2010).

Literature review/theoretical framework

Motivation and learning online

Brophy (2010, p. 3) defines motivation as “a theoretical construct to explain the initiation, direction, intensity, persistence, and quality of behaviour, especially goal-directed behaviour”. Motivation can influence what we learn, how we learn, and when we choose to learn (Schunk, 1995). Research shows that motivated learners are more likely to be actively engaged, exhibit enhanced performance, undertake challenging activities, and display resilience in the face of difficulties (Schunk, Pintrich, & Meece, 2008). Contemporary views link motivation to individuals’ cognitive and affective processes such as thoughts, beliefs, and goals, and emphasise the situated, interactive relationship between the learner and the learning environment (Brophy, 2010).

Existing research in online contexts has tended to adopt a limited view of motivation that does not acknowledge the complexity and dynamic interplay of factors underlying and influencing motivation to learn. Instead, designing motivating learning environments has received attention (ChanLin, 2009; Keller, 2008). More frequently, research has focused on identifying traits of successful online learners where motivation is seen as a personal characteristic that remains relatively stable across contexts and situations (Wighting, Liu, & Rovai, 2008). Such studies indicate that intrinsic motivation is an important characteristic of successful learners (Shroff, Vogel, & Coombes, 2008).

A further, though relatively sparse, area of research has explored relationships between learner online participation and motivation (Dawson, Macfadyen, & Lockyer, 2009; Hartnett, 2010; Martens, Gulikers, & Bastiaens, 2004). In contrast, relationships between online participation and achievement behaviour (where achievement is used as an indicator of motivation) have been studied more extensively, in terms of both quantity (Bures, Amundsen, & Abrami, 2002; Gerber et al., 2008; Rovai & Barnum, 2003) and quality (Gerber et al., 2008) of participation.

Self-determination theory of motivation

Various frameworks have been used in studies of motivation in online contexts (Artino, 2008; Bures et al., 2002), including intrinsic–extrinsic motivation theory (Martens et al., 2004; Xie, DeBacker, & Ferguson, 2006). Self-determination theory (SDT) (Ryan & Deci, 2000) is an influential contemporary theory that explicates intrinsic–extrinsic motivation in greater depth and is built on the fundamental premise of learner autonomy. It argues that all humans have an

intrinsic need to be self-determining or autonomous (i.e., experience a sense of agency and control), as well as competent (i.e., feeling capable) and connected (i.e., feeling included and linked to others), in relation to their environment. If the environmental conditions are such that they support an individual's autonomy, more autonomous (i.e., higher quality) forms of motivation will be promoted (Ryan & Deci, 2000).

When intrinsically motivated, outside incentives are unnecessary and may even be counter-productive (Brophy, 2010), because the reward lies in carrying out the activity. In contrast, students who are extrinsically motivated undertake activities for reasons separate from the activity itself (Ryan & Deci, 2000); for example, gaining good grades, avoiding negative consequences, or because the task has utility value (such as passing a course in order to earn a degree). Alternatively, the activity may be seen as relevant to a future career. Extrinsic motivation processes are explained in terms of external regulation because the reasons for undertaking the task lie outside the individual. However, the degree to which an activity is perceived as externally controlled can vary, and therefore different types of extrinsic motivation exist (see Hartnett, St George, & Dron, 2011, for further explanation).

Research in both face-to-face (Lepper, Henderlong Corpus, & Iyengar, 2005) and online settings (Hartnett, et al., 2011) has shown that multiple types of motivation can and do co-exist. The ways in which a student is intrinsically or extrinsically motivated are important, with more self-determined students experiencing positive learning outcomes even when extrinsically motivated (Brophy, 2010).

Results presented here relate to one aspect of a larger study (Hartnett, 2010) that explored the motivation of pre-service teachers situated within two distinct online distance learning contexts. Here, relationships between motivation, engagement (i.e., online participation), and achievement are explored.

Methodology

Case studies

Case-study methodology was used to explore the complex phenomenon of motivation in a manageable way (Yin, 2009). Purposive sampling methods (Patton, 2002) were used to select two information-rich cases. Although the broader institutional context was beyond the scope of the wider study, the effect such influences can have at the situational level have been noted previously (Vallerand & Ratelle, 2002). Potential cases were therefore identified from the same programme within the same institution in order to reduce differential contextual influences at the institutional level. Cases were chosen based on predetermined criteria of importance to ensure relevance to the research question. In particular: (a) courses were required to be predominantly web-based, with only limited resources provided by alternative methods such as print; and (b) students were required to participate in the online learning community as an integral part of their assessed coursework.

Procedures

Ethical consent to undertake the study was gained prior to the collection of data. Data comprised self-report motivation data, achievement data, and online usage data, in conjunction with questionnaire data and asynchronous discussion forum transcripts.

Learner motivation was measured with the self-report situational motivational scale developed by Guay, Vallerand, and Blanchard (2000), which operationalises several of the motivation types identified within the SDT framework. The scores reported for each motivation type were then

used to calculate a single motivation score called the self-determination index (SDI) for each participant (see Hartnett et al., 2011, for further explanation).

Online statistical data comprised the number of times each student accessed any tool or a content page (hits), the number of messages each student opened across all discussion topics (messages read), and the number of messages each student posted across all discussion topics (messages posted). These were used as a measure of the quantity of online participation, both active (posts) and passive (hits and reads).

Online discussion transcripts provided a source of data that enabled the quality of online participation to be explored in relation to reported levels of motivation. Given the focus of this investigation and methodological issues associated with the rigorous, in-depth analysis of online discussions (Garrison, Cleveland-Innes, Koole, & Kappelman, 2006), existing online transcript content analysis models were not used. Instead, themes that emerged from the online transcripts, and that were also supported by the literature (Dillenbourg, 1999), were used as indicators of the quality of engagement. These themes were negotiation of understanding, collaboration, and contribution to meaningful dialogue.

These procedures comprised data generated *after* the completion of coursework in each case study, namely the questionnaires; and data generated *during* this period as part of normal online course administration processes (i.e. online asynchronous discussions and student usage statistics) but collected *after* all coursework was completed and graded, and results submitted. Downloaded discussion transcripts were refined by removing any messages posted outside the assignment timeframe, and only those messages posted by study participants were included for analysis purposes.

Context and participants

The two courses that provided the context for the case studies were situated within the larger context of a pre-service teacher education programme within a New Zealand tertiary institution. Students in this programme were preparing to teach in New Zealand primary (i.e., elementary) schools. These courses were considered to be internet-based rather than fully online, because students received some print material (study guide) and digital resources (CD-ROM—see Case study 1) at the beginning of their course. The online learning platform used for online communication and most content delivery was the WebCT Learning Management System. The boundary for each case study centred on one assignment and its associated online activities. In both case studies, all participants had similar prior experience of online learning and group assignments.

While both cases were chosen from courses within the same programme, the instructional design of each was different. Case study 1 was situated within a compulsory integrated science and technology course. Teaching staff consisted of a course coordinator with science expertise and a tutor with technology expertise. The tutor was responsible for most of the online teaching and management of the course, and focused on use of online resources and facilitating related asynchronous discussions. Students usually took this course in the third and final year of their degree. The case study itself focused on a problem-based learning (PBL) assignment worth 60 percent of the final mark. It was undertaken over a 6-week period in which students were required to work collaboratively in small groups. Problem-based learning is an instructional approach built around authentic, ill-structured problems that are complex in nature (Schmidt & Moust, 2000).

Case study 2 was positioned within an introductory social studies curriculum course that formed a compulsory component of the same programme. Students usually took this course in the second year of their degree. An individual micro-teaching and reflection assignment (with associated

online activities), which required students to plan and teach two consecutive lessons in a school of their choice and then reflect on their experience, formed the boundary for Case study 2. Students completed this assignment over a 4-week period and it was worth 40 percent of the final mark. The course coordinator was responsible for all online teaching throughout the semester.

A total of 21 student participants took part in the two case studies (12 in Case study 1 and nine in Case study 2). They were recruited from the Semester 1 (February–June) 2008 online offering of each course. Participants were located throughout New Zealand and undertook their courses at a distance from the main campus. The respondent group comprised two males and 19 females (one male in each case study). Participants' ages ranged from 18 to 55, with 90 percent in the over-24 age group. It is important to highlight that the wider study was predominantly qualitative in nature and that the information and statistical data reported here helped to illuminate the findings. The intention was not to generalise to the wider population of online learners.

Results

Motivation, online participation, and achievement

Several non-parametric correlations were calculated to explore relationships between the SDI score as a measure of overall motivation, online participation (active and passive), and achievement (at assignment and course level) for each case study. Student online usage statistics data were captured over the course as a whole for both case studies.

Case study 1

A highly significant relationship was found between SDI scores (i.e., motivation) and the number of messages posted (i.e., active participation) over the course (see Table 1). This means that the higher the motivation reported by a student, the more active the student was, in terms of the number of messages posted, within the discussion topics. No such relationships existed between passive online participation indicators (i.e., messages read or hits) and motivation.

Table 1 Case study 1 - Spearman rho correlation coefficients (r_s) between SDI, achievement, and participation

	No.	Course online participation		
		Messages posted	Messages read	Hits
SDI	12	0.77**	0.48	0.28
Assignment mark	12	0.58*	0.63*	0.40
Course mark	12	0.49	0.51	0.42

* $p < 0.05$ ** $p < 0.01$

Relationships between online participation and achievement (as an indicator of motivation), for both the PBL assignment and the course as a whole, were also explored. The relationship between the number of messages posted during the course and the assignment mark was found to be moderately statistically significant (see Table 1). This suggests that the higher the number of messages posted—that is, the more visibly active online a participant was during the course—the higher the mark achieved for the PBL assignment. In terms of passive participation, a moderately

significant relationship was also found between the number of messages read throughout the course and the assignment mark. In other words, the higher the number of messages accessed by a participant, the higher the mark achieved for the assignment. No significant relationships were found between participation (active or passive) and achievement for the course as a whole.

A reason for these differences may be that the nature of the PBL activity (i.e., collaborative and high stakes) needed greater active online participation to achieve good marks, in comparison with the course as a whole. In other words, the nature of the task has influenced the motivated behaviour of participants.

Case study 2

No significant relationships were found in this context (see Table 2). That is, no relationships exist between a participant's online activity (active or passive), level of motivation, or their achievement. It is interesting to note, however, that the relationship between the SDI score and messages posted over the course approached significance ($r_s = 0.64$, $p = 0.06$, *ns*). While caution must be taken when interpreting these results, they are not unexpected given that online participation was not critical to doing the assignment or completing the course.

Table 2 Case study 2 - Spearman rho correlation coefficients (r_s) between SDI, achievement, and participation

	No.	Course online participation		
		Messages posted	Messages read	Hits
SDI	9	0.64	0.55	0.46
Assignment mark	9	-0.24	-0.40	-0.13
Course mark	9	0.02	-0.43	-0.05

All coefficients are statistically non-significant

Using the number of messages posted is, however, only a rudimentary measure of participation, as the quantity of messages does not necessarily equate to quality of engagement (Andresen, 2009). To determine whether any differences existed in the nature of online engagement and motivation, online transcripts were explored in both case studies. As mentioned previously, themes that emerged from the qualitative data that were also supported by the literature (Dillenbourg, 1999) were used as indicators of the quality of participation.

Quality of online participation and motivation

Case study 1

High-quality participation in terms of input, negotiation of meaning, and development of understanding was apparent among students that reported high motivation (i.e. positive SDI scores). For participants reporting low motivation (i.e., negative SDI scores), individual approaches were more evident. The former approach is evident in the example that follows. Here, students discuss and seek clarification about the results of the science experiment carried out by one member of the group.

Hi everyone

If you could just clarify the impact results Elizabeth so that we have all got it around the right way!! (i.e., was it bark that absorbed the most impact?)
(Asydisc CS1: Irene,¹ 19 March, 2008)

Elizabeth responds:

Hi Irene

Under the investigation of a 1-metre drop where all four samples were placed on the same foundation, bark absorbed the most impact and wet-pour rubber the least.
(Asydisc CS1: Elizabeth, 19 March, 2008)

Wendy is still unclear about what the results mean, and seeks further information.

Hi Elizabeth

I was just wondering if you could clarify what type of bark you used for the test . . . Can you also please clarify the results of the impact test as to which is the best as I think we are a bit muddled in that department? . . . (Asydisc CS1: Wendy, 19 March, 2008)

Again Elizabeth provides additional information to help the group's understanding of the experimental results:

Hi Wendy

The bark was straight from the playground and was 3 months old. It had been sold as certified playground bark, which means no piece is larger than 30 mm diameter and there is little dust.

As for the impact testing. We dropped a cricket ball from 1 metre and measured the bounce. The wet-pour rubber produced the highest bounce, followed by pre-pour rubber matting, followed by artificial turf, then bark. I believe this means that rubber absorbs the least impact and bark the most. I believe this makes bark the recommended material. However, all samples were trialled on top of a wooden deck and possibly in situ the ground under the material may play a large factor . . . (Asydisc CS1: Elizabeth, 19 March, 2008)

This line of questioning and negotiation of meaning continued until a common understanding was reached.

In contrast, Hazel's comment below highlights a more individual and isolated approach. Review of the group's asynchronous transcript confirmed periods where little online activity occurred between her and the other members:

After [developing] the initial [problem] . . . statement full online activity rarely occurred due to the varying demands of our commitments. So the assignment tended to be done by the other two members . . . with me adding my bits as and when completed. (Hazel, questionnaire CS1)

Case study 2

Quality participation was evident in the online activities that occurred concurrently with the micro-teaching assignment. The following example is representative of the quality and depth of engagement from a variety of participants that had no clear association with the level of motivation they reported. This discussion focuses on a relevant social issue at the time (the

¹ Pseudonyms are used

changing of New Zealand legislation relating to parental control, dubbed the ‘anti-smacking’ legislation).

I’m one of the minority completely in favour of the amendment of s 59. I agree that it won’t stop child abuse overnight, but I think it will have a big impact on future generations and their attitudes to smacking. The argument that “it won’t stop child abusers anyway” seems pretty weak to me—on that basis we shouldn’t bother having laws for anything, because the baddies never pay attention to them.

I’m pretty surprised at how few people have actually read the amendment for themselves—I know facts get in the way of a good argument :), but I can’t help thinking that a lot of parents would be quite reassured to know that restraining their child from harm is not illegal (contrary to popular belief).

I thought Sean’s US gun control analogy was right on the money—people aren’t really signing petitions in great numbers because they **want** to smack their kids, they are indignant because they perceive the amendment as infringing on their personal rights. (Asydisc CS2: May, 25 March, 2008)

The wider study found that all participants perceived the environment to be supportive of learner autonomy, including the online discussions (which were seen as dynamic, interesting, and engaging), and participants tended to regulate their participation depending on their interests and needs. Based on this, it appears that although participation was expected there was sufficient flexibility to allow participants to determine the level of engagement that met their own learning needs.

Discussion

Motivation and amount of online participation

The only significant relationship between online participation and motivation occurred in Case study 1 (for active participation only). In other words, participants reporting high levels of motivation were more visibly active within discussion topics.

Support for the Case study 1 finding is available from previous research studies into motivation and participation in online environments. For example, Xie et al. (2006) and Bures et al. (2002) both found that active participation by learners in online discussions was related to their level of motivation. The motivation literature also highlights that autonomously motivated learners are more likely to be actively engaged in learning (see Brophy, 2010, for reviews).

Support for the lack of any significant relationship between motivation and active participation in Case study 2 is also available. For example, Martens et al. (2004) found that more intrinsically motivated students do not necessarily do more. Rather, they do different things and specifically engage in more exploration. Similarly, the study by Dawson et al. (2009) showed no differences in learners’ online participation based on their motivation.

The lack of any significant relationship between motivation and passive participation was consistent across the case studies. This differs from findings from Dawson et al. (2009), who found that passive participation was significantly positively related to student intrinsic motivation.

Possible reasons for the significant positive relationship between motivation and active online participation in Case study 1 and the lack of a relationship in Case study 2 may be found in the differing nature of the tasks within each case study. While no grade was assigned to online contributions in either context, a factor that some argue is necessary in order to provide learners

with an incentive to participate in online discussions (Andresen, 2009; Rovai, 2007), expectations for online participation were made very clear to students at the commencement of each course.

The collaborative nature and high percentage of the final grade (60 percent) associated with the PBL assignment in Case study 1 meant that students were not just expected to contribute—they had to do so to successfully complete the assignment and, in turn, the course. The number of messages posted in this context (or lack of them) may therefore be a more accurate indication of a participant's motivation to learn. In contrast, the more independent nature of the Case study 2 micro-teaching task, as well as the course as a whole, allowed learners greater flexibility. In particular, the completion of the micro-teaching assignment did not depend on participation in the online activities that accompanied it, as it did for Case study 1.

In Case study 2, therefore, learners reporting lower motivation, *and* those who reported higher motivation but preferred to exercise more independence and chose to regulate their online activity, could both potentially access and contribute to online discussions to a lesser degree. Differences in communication patterns (i.e., independent and interdependent) have been previously noted in the online literature (Rovai, 2001), as has interaction selectiveness (B. Anderson, 2006).

Based on these results, it is difficult to draw definitive conclusions regarding relationships between motivation and participation in online environments. Notwithstanding this, results from both case studies are supported by prior research, although the extensive motivation literature provides strong support for the Case study 1 findings (e.g., Deci & Ryan, 2000). However, taken together the results indicate that the nature of the task (e.g., collaborative versus individual, task completion independent versus dependant on participation), individual differences (for autonomy, competence and relatedness support) and other considerations (e.g., time constraints and high-stakes assessment) are important factors that influence participation in a particular context in complex ways. It also highlights the limitations of using quantity as a measure of participation, as prior research has noted (Andresen, 2009).

Motivation and quality participation

Quality online participation was evident across both case studies. Findings from Case study 1 showed that participants who reported higher levels of motivation also demonstrated more collaboration, negotiation of meaning, and development of understanding with their peers. For participants who reported lower levels of motivation, collaboration and negotiation were less evident. This finding suggests that there is an association between the motivation of participants and the quality of engagement evident in the asynchronous online discussions. This is in line with research undertaken in traditional educational settings that has consistently shown a link between cognitive engagement and the quality of motivation (see Schunk et al., 2008, for a review).

Quality engagement was also evident in the online activities in Case study 2. Contributions from several participants clearly demonstrated engagement in meaningful dialogue as well as depth of understanding that had no clear link to the level of motivation reported by these learners. In other words, cognitive engagement in online discussions was evident from learners who reported lower motivation levels as well as those who recorded higher levels. This finding is supported by other studies that have shown that the quality of online interaction is influenced by numerous factors within the learning context, such as the role of the instructor (Andresen, 2009; Rovai et al., 2007), a sense of connectedness with the instructor (Gerber et al., 2008), sense of community (T. Anderson, 2008; Rovai, 2007), prior knowledge and interest in discussion topics (Cheung, Hew, & Ling Ng, 2008), time constraints (Xie et al., 2006), differing communication patterns (Rovai,

2001), clarity of expectations (Rovai, 2007), requirements in terms of contributions (mandatory or otherwise), and the awarding of grades (Cheung et al., 2008; Xie et al., 2006).

Once again, the conclusions that can be drawn from the cross-case findings are tentative and appear to be situation dependent. Case study 1 results suggest that within the context of a collaborative PBL assignment there was a connection between the quality of online engagement and the motivation experienced by students. This was not apparent within the context of the individual micro-teaching assignment in Case study 2. Here, quality participation was evident from students reporting varying degrees of motivation, ranging from moderate to high. Taken together, these results highlight the complex relationships that exist between an individual's motivation and their behaviour in terms of their participation in an online learning context.

Achievement and online participation

The only significant relationship between achievement and active online participation (messages posted) occurred in Case study 1 (at the assignment level). This finding is indicative of the available research. For example, several earlier studies have shown relationships between the numbers of messages posted by learners and their subsequent achievement (Beer et al., 2009; Gerber et al., 2008; Rovai & Barnum, 2003). On the other hand, support for the lack of a relationship between active participation and achievement (at both assignment and course level) by learners in Case study 2 is also available (Picciano, 2002).

A moderately positive relationship was also found between achievement (at the assignment level) and passive participation (messages read) in Case study 1. A similar association between student participation 'behind the scenes' and their achievement has been noted by Webb, Jones, Barker, and van Schaik (2004). Similarly, the lack of any significant relationship between passive online participation and achievement data in Case study 2 is also supported by prior research (Rovai & Barnum, 2003).

These mixed results point to complex relationships between achievement (an indicator of motivation) and online participation that are sensitive to contextual influences. In Case study 1, the nature of the assignment task and the high weighting towards the final mark were particularly important factors. Online participation was essential to do the assignment and, ultimately, to complete the course successfully. This was not the case in the Case study 2 context, where assignment (and course) completion, and therefore achievement, were not directly linked to participation with others. It also highlights the limitations of focusing only on the quantities of activity and the importance and relevance of exploring the actual quality of the activities themselves to gain a clearer picture of participant engagement, as others have argued (Rovai & Barnum, 2003).

Conclusion

The mixed results point to complex relationships between motivation, online participation, and achievement that are sensitive to situational influences. The lack of conclusive results indicates the need for online teachers to carefully consider the relevance of using the number of messages posted by a student as a default indicator of online participation and, in turn, motivation. As shown in this research, high numbers of postings by learners do not necessarily equate to more motivated students, and vice versa.

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