

Motivation and Satisfaction in Internet-Supported Learning Environments: A Review

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ABSTRACT

Previous studies examined student motivation and satisfaction in Internet-Supported Learning Environments (ISLE) in higher education but none provided a comprehensive analysis of significant methodological and theoretical issues. To contribute toward filling this knowledge gap and then to better inform instructional systems development, practice, and further research, a qualitative review was conducted. The review was guided by these questions: How did ISLE overall impact student motivation and satisfaction? What specific motivation and satisfaction sources were identified? How was motivation measured in ISLE? What research designs were employed to investigate the phenomena? Studies on ISLE published in leading educational technology outlets between 1995 and early 2007 were analyzed. The analysis indicated that technology attributes, course quality, engagement, program format, and support services supported motivation and satisfaction. Studies used task choice, cognitive effort, persistence, skill, and achievement to measure motivation. Survey and experimental designs dominated research on ISLE. Implications for instructional design/system development, practice, and research are discussed.

Keywords

Higher education, Internet-supported learning environments, Motivation, Satisfaction

Introduction

Research on the impacts of Internet-Supported Learning Environments (ISLE) in higher education (HE) considered student achievement, motivation, satisfaction, thinking skills, online interaction, cost-benefit analyses, technology skills and attitudes, and dropout rates as success measures (Bekele & Menchaca, 2008a). Studies on achievement (Ibid) and critical thinking and problem solving skills (Bekele, 2009) were reviewed. These reviews analyzed studies published in educational technology outlets between 1995 and 2006. Another review (Boulay, Coultas & Luckin, 2008) considered effectiveness studies on e-learning in undergraduate, medical and work-based learning contexts published between 1999 and 2005. Generally, these reviews could bring a better understanding of ISLE than individual studies.

However, the overall motivational and satisfaction impacts of ISLE is unclear. Although individual studies reported what was effective about ISLE, none provided a comprehensive analysis of significant issues.

This review was required for the following reasons. First, our knowledge of the motivational and satisfaction impacts of ISLE is very limited compared to our knowledge of the impacts of older technologies. Second, research (Abel, 2005) indicated that *satisfaction* is the second success measure in ISLE after *achievement*. It is directly related to *achievement* and is negatively related to dropout rate, one of the main problems in ISLE (British Columbia College and Institute, 2003). *Satisfaction* also partly affects the sustainability and scalability of ISLE (Silktide, 2006).

Third, *motivation* is a critical condition for productive learning (Pintrich & Schunk, 2002) and it also affects the acquisition and demonstration of higher-order thinking skills (Facione, Facione, & Giancarlo, 2000; Paul & Elder, 2008). It may also affect the scalability and sustainability of ISLE (Silktide, 2006). Thus, motivation may partly explain learning and thinking in ISLE.

Fourth, reviews (Bekele & Menchaca, 2008a; Boulay, Coultas & Luckin, 2008) considered: 1) primarily other success measures, 2) a very limited number of motivation and satisfaction studies, and 3) no theoretical and methodological discussions. The specific motivation and satisfaction sources, motivation indices, and the extent of impact were overlooked. For a better understanding of ISLE, this review utilized a sound conceptual framework and considered a large number of studies published over a decade.

Purposes and questions

The main purposes of this study were to:

1. examine the overall motivational and satisfaction impacts of ISLE in HE. This would bring a better understanding of how and to what extent ISLE actually impacted the phenomena. The question posed to meet this purpose was: How did ISLE overall impact motivation and satisfaction?
2. identify key theoretical and methodological issues. This would spot strengths, weaknesses, and limitations of research needed to better inform instructional design, practice, and further research. The questions were: What specific motivation and satisfaction sources were identified? How *motivation* was measured in ISLE? What research designs were employed to investigate the phenomena? The conceptual framework of this study informed the formulation of these questions. To effectively answer the questions, a qualitative review methodology was employed.

Methodology

This review considered both quantitative and qualitative studies. It is thus not a meta-analysis, which analyzes quantitative studies only. Meta-analysis might not be appropriate for this study for several reasons:

- Examining overall motivational and satisfaction impacts and revealing key methodological and theoretical issues based on an analysis of quantitative studies only is inadequate
- Some qualitative studies examined the phenomena, where “a narrative literature review might be the best one can do” (Hoyle, Harris & Judd, 2002, p. 491)
- Even quantitative studies did not test similar hypotheses, a requirement in meta-analysis
- Research on ISLE in HE is generally limited (Bates & Poole, 2003; Bekele & Menchaca, 2008a; Hill, Wiley, Nelson & Han, 2004). Selecting quantitative studies only from this limited literature stock might itself be limiting.

Consequently, a qualitative review was presumed appropriate to reveal key issues embedded in multiple studies. The review process is outlined next.

Criteria development. For focus, four criteria were developed to select relevant studies for review. First, studies should be conducted in HE institutions where participants attend to online and blended courses. Studies conducted in military HE institutions were excluded for further focus. Second, studies should consider the Internet for its relative recency, rapid diffusion, technological diversity and potential impact breadth. Studies should examine the motivational and satisfaction impacts of Internet-based technologies for the reasons outlined in the introduction section, the third criteria. Fourth, studies should be published between 1995 and early 2007. Pre-1995 publications were excluded for they might be irrelevant for contemporary research given the dynamic nature of ISLE. Studies might be published on the web, in print academic journals, in book form, or as encyclopedic entries. For credibility, unpublished studies, personal reports, and commercial publications were excluded.

Source identification. The search for studies proceeded this way. First, an exhaustive list of educational technology, technology education, computing, the Internet, higher education, distance education/learning, and e-learning journals was prepared. Although research indicated most emerging scholars publish their research in some leading educational technology journals (Carr-Chellman, 2006), studies are also published in other outlets. Thus, outlets in education, learning, cognition, teaching, higher education, educational psychology/research, and medical and business education were identified. The ERIC database, and the *Sloan Consortium* and *the No Significance Difference Phenomenon* websites were important. Other sources included educational technology books and encyclopedias.

Manual and electronic searches. A manual search for relevant studies was then conducted meticulously. The search firstly considered journals, and then professional databases, books, and encyclopedias. The search also included studies from online databases that did not require search engines and keywords. The Google search engine and the *ERIC database* supplemented the manual search. The conceptual framework, see below, provided major keywords. A total of 30 studies examined the phenomena and were considered for analysis.

Analysis method. At this phase, analysis method was devised. Generally, the study questions and the conceptual framework guided analysis. Specifically, themes, which reflected methodological and theoretical significance, were identified for categorization and concept formation. Studies were then summarized against the themes identified.

Research design, for instance, is among the most debated issues in the social sciences. Participants are the concern of learning and research. Some demographic information about them and how they were selected/assigned are important for generalizability of findings. Studies were also summarized in terms of the courses studied to check the presumption that ISLE are not restricted only to technology-prone courses. Project duration was also important as motivation and satisfaction in ISLE might partly be explained by novelty effects. It was also important to see how purely online and blended settings affected the phenomena. Moreover, data collection instruments are also important for reliability and validity issues. For theoretical reasons, see below, motivation indices were also among the analysis themes identified.

A matrix was then formed and studies were summarized against the themes. The ‘coding’ was thus factually based; studies were summarized based on the presence/absence of a certain theme. Guided by the review questions, the analysis then looked for patterns/trends across selected themes. Percentages were sometimes used to indicate the extent to which a certain theme existed among the studies. Generally, the analysis themes provided important theoretical background to better understand ISLE. Some of the themes directly emerged from the conceptual framework expounded below.

Conceptual framework

This study examined how success measures (motivation and satisfaction) are impacted by success factors (ISLE). Studies (Bekele & Menchaca, 2008a; Menchaca & Bekele, 2008) indicated course, method, support, and technology-related factors jointly impacted successfulness. Others (Gilbert, Morton & Rowley, 2007; Pituch & Lee, 2006; Weaver, 2008; Yan, 2006) emphasized experiences with technologies. Some others (Abel, 2005; Baker & Schihl, 2005; Howell & Wiken, 2005; Salter, 2005; Weaver, 2008) capitalized on support services. Others (Martz & Reddy, 2005; Naidu, 2005; Novitzki, 2005) recognized course-related factors. Studies generally considered limited success factors. A comprehensive model was developed to conceptually scaffold this study. Compared to a single motivation or technology theory, the model better supports the study. Presumably, technology, course, and support factors mutually affect success measures. The model is succinctly described below.

Technology factors. These are linked to technology attributes and user (student) skills, experiences, or views. The Technology Acceptance Model (TAM) conceptions (Davis, 1989) are helpful here. Although TAM was primarily developed to explain how people accept and use technology, it could also be used to examine factors that affect motivation and satisfaction in ISLE. The presumption is that if students perceive technologies as easy/friendly, they would accept and use them, which then might affect their motivation and satisfaction. Perceived or actual use/function of technologies might also affect success. If users have dependable access to different technologies, that should have a favorable impact. Moreover, online collaborations and communications are possible only when one has multiple tools at hand. Thus, a/synchronous technologies and multimedia presumably impact successfulness along with skill/experience factors. Technology factors could also impact course factors.

Course factors. These refer to elements needed in course design: course relevance, organization, goal clarity, flexibility, and other quality elements. Course factors also refer to the *how* of learning. Presumably, success would be achieved if learning is student/problem based, and process oriented. Flexibility is also important to ISLE. Course factors presumably affect and are affected by technology and support factors.

Support factors. These denote technology leadership and support provided by faculty/tutors, administrators, and peers. Technology leadership provides logistics crucial for success. Presumably, *support factors* directly affect and are affected by success and technology and course factors.

Several behavioral indicators explain *motivation* in education. Commonly known indices such as *task choice*, *effort*, *persistence*, and *achievement* (Pintrich & Schunk, 2002) presumed relevant for ISLE too. The indices are succinctly described next.

Task choice. Student free selection of a task indicates their motivation to perform the task (Pintrich & Schunk, 2002). But *task choice* was not considered a useful index because students normally have few options to choose from (Brophy, 1983). This makes sense in contexts where learning is not student-centred and where course activities and materials are limited. *Task choice*, however, seems a very helpful index in ISLE because of the availability of ample activities, resources, and technologies to freely choose from. Ideally, students are also free to choose the time and place of learning. Thus, *task choice* is presumably a useful motivation index in ISLE.

Effort. Learning requires a lot of cognitive effort particularly on challenging tasks. A high effort indicates high motivation (Pintrich & Schunk, 2002). This is particularly important in ISLE for students are expected to manage their learning. Although they are normally free to choose from a lot of issues, they are constantly challenged and they expend a reasonable amount of effort. The student/project-oriented approach common in ISLE requires constant effort.

Persistence. This refers to “time spent on a task” (Pintrich & Schunk, 2002, p. 14). Students who work longer despite they encounter obstacles do normally have a higher motivation (Ibid). *Persistence* is also presumably relevant for students for obstacles related to technicalities, support systems, group dynamics, and thinking skills must be dealt with.

Generally, students who: freely choose from tasks, expend cognitive effort, and persist longer in face of challenges are motivated in their learning. Motivation is positively related to *achievement*, an indirect index. Thus, *task choice*, *effort*, and *persistence* would raise ones level of *achievement*. The first three indices are directly related to motivation whereas *achievement* is an indirect index (Pintrich & Schunk, 2002). These indices presumably measure motivation in ISLE as reported by previous studies, which are summarized next.

Review findings

Of the 30 studies summarized in Table 1, the first 11 examined motivation whereas the last 19 studied satisfaction. Two studies (Gao & Lehman/2003 and Kim et al./2004) appeared twice for they studied both constructs. Given policy-practice emphasis on ISLE, 30 seems a lower figure. Review studies, see page 2, indicated research on ISLE in HE is generally limited. Specifically, “motivational factors are rarely in the focus of research on educational technology” (Reber, 2005, p. 93). This does not mean the 30 studies are the only ones conducted so far. Some studies might be 1) missed because of the tedious review process, 2) published in more ‘local’ outlets, or 3) unpublished at all. However, the studies reviewed appropriately represent research on ISLE in HE and well support the analysis.

Table 1 presented relatively detailed information about studies. Because the review aimed at revealing patterns and not particulars, analysis focused on significant thematic issues that are directly related to the study questions. Other themes serve as important ‘backgrounds’ to better understand how ISLE were examined. The last column of Table 1 summarized findings related to motivational and satisfaction impacts and sources *as reported by studies*. Few studies did not explicitly identify motivation-satisfaction sources. In such cases, only the impact issue is presented although some information could be gleaned from the motivation indices identified.

Motivational impact and sources. All studies indicated ISLE supported student motivation. Purely online courses better motivated students than traditional courses (Hiltz et al., 2000; Rovai, Ponton & Wighting 2007; Sankaran & Bui, 2001). Some studies (Ali & Franklin, 2001; Aragon, Johnson & Shaik, 2001; Delialioglu, 2005; Frederickson, Pickett, Shea, Pelz & Swan, 2000; Waschull, 2005; Sankaran & Bui, 2001) reported positive correlations between motivation and achievement. They consequently predicted performance based on motivation. Others (Almeda, 1998; Gao & Lehman, 2003; Kim, Lu, Le, Bonk, Marquika et al., 2004; Reber, 2005; Rovai, Ponton & Wighting, 2007) identified motivation sources. Generally, most sources were related to:

- engagement (accomplishing tasks, knowledge acquisition, website construction, and online interaction)
- course quality (relevance, quality content, and organization)
- technologies (friendliness and usefulness: synchronous, asynchronous, and multimedia), and
- program format (flexibility or convenience).

The remaining motivation studies acknowledged these sources through the motivation indices they used, see below. Generally, technologies, contents, activities, and program flexibility reportedly motivated students in ISLE.

Motivation indices. A further research pattern was related to motivation indices and data collection instruments. Motivation and satisfaction studies predominantly used researcher-developed tools. Most (80%) used questionnaires, interviews, or observations. Some (Aragon et al., 2001; Gao & Lehman, 2003, Johnson et al., 2000; Rovai et al., 2007) used standardized instruments or their revised versions. The instruments in motivation studies collected data mostly on *task choice, effort, and persistence*, see Table 1. Moreover, eight of the 11 studies additionally considered *achievement* whereas six of them considered technology *skills* to indirectly measure motivation.

Satisfaction impact and sources. Nearly all studies reported ISLE supported student satisfaction. Some (Black, 2002; Gray, 1999; Irons, Keel & Bielema, 2002; Paechter, 2004; Rivera & Rice, 2002) reported satisfaction in blended settings. Others (Allen & Seaman, 2004; Black, 2002; Hiltz, 1997; Hiltz et al., 2000; Johnson, Aragon & Shaik, 2000, Koory, 2003; Paechter, 2004; Rivera & Rice, 2002) compared satisfaction in online and oncampus contexts. Higher satisfaction was reported for online than for oncampus settings (Hiltz et al., 2000). No significant satisfaction difference was found between these groups in some studies (Black, 2002; Koory, 2003; Paechter, 2004). Online learners were less satisfied than classroom ones (Johnson et al., 2000). In this study, groups were matched on demographic factors and instructor and projects were kept similar. Other studies examined satisfaction in purely online settings, see Table 1. In some cases, student satisfaction from previous records was used for comparison and in others, pre- post course satisfactions were compared. Almost all studies reported favorable results.

Several studies identified satisfaction sources in ISLE. Generally, satisfaction was:

- *Technology driven.* Technology attributes such as software quality, screen layout, structure, friendliness, and flexibility satisfied students
- *Engagement driven.* Satisfaction with course activities and interactions with students, instructors/tutors; web experience, and degree of technology use
- *Course driven.* Quality courses reportedly better satisfied students
- *Support driven.* Support provided by instructors/tutors, peers and administrators.

Designs. Surveys, quasi-experiments, and experiments made 77% of the studies. Surveys followed by experiments dominated other research designs both in motivation (82%) and satisfaction (73%) studies. Case studies were also reported (Johnson et al., 2000; Kim et al., 2004; Reber, 2005). This classification of studies by designs was primarily based on authors' description of their studies. Generally, quantitative approaches dominated research. Several studies, however, used qualitative data to augment quantitative analyses. The major findings of the review are discussed below.

Table 1. Motivation and Satisfaction Studies Summarized

Study	Design	Participants	Selection/assignment	Courses	Delivery	Course length	Instruments	Impacts and sources
Almeda/1998	survey	91 working adults	self-assignment	thinking, systems analysis, materials management, and others	online	over a year	questionnaires (C ¹ , E ² , P ³ , S ⁴)	content, technology and program format as motivators
Frederickson et al./2000	survey	1406 under/graduates, working adults		different	online	over three years	questionnaires (C, E, P, S, A ⁵)	motivated by course flexibility
Aragon et al./2001	experiment	38 graduate students		instructional design	online and f2f ⁶	semester	questionnaires (C, E, P, A)	motivation reported, it influenced learning
Ali & Franklin/2001		22 undergraduates		educational technology			interviews, observation, questionnaires (C, E, P, S, A)	motivation improved

Sankaran & Bui/2001	pre/post-test design	116 undergraduates	self-assignment	business information systems	online and f2f	four weeks	questionnaires (C, E, P, A)	motivation found, motivation and performance strongly correlated for online class than for f2f
Gao & Lehman/2003	post-test experiment	95 students at various levels	selection availability, assignment random	educational technology module	online	part of a semester	instructional materials motivation survey/interview (C, E, P, A)	reactive group more motivated than control group
Kim et al/2004	survey	102 undergraduates	availability	27 MBA courses	online	two years	interviews, questionnaires, and postings (C, E, P, S)	high motivation with course quality, program flexibility and convenience
Delialioglu/2005	survey	25 undergraduates		computer networks/communications	blended	semester	interviews (C, E, P, S, A)	Motivation with engaging with tools
Waschul/2005	survey	57 undergraduates	voluntary	three psychology courses	online	semester	questionnaires, assignment/test/exam scores (C, E, P, S, A)	motivation reported and is correlated with performance
Reber/2005	case study	23 undergraduates		language development	blended	part of a semester	questionnaires (C, E, P, A)	web site construction more motivating
Rovai et al/2007	causal-comparative	353 graduate and undergraduates	voluntary	different	online and f2f	semester	Academic Motivation Scale-College (C, E, P, A)	e-learning students stronger intrinsic motivation than f2f
Hiltz/1997	experiment	390 students		sociology, communication, English composition, management, computer science, mathematics, statistics	online plus video, on-line, video, f2f	two years	questionnaires, observations, interviews, and test scores	satisfied with technology use
Picciano/1998	survey	17 working adults	voluntary	school principalship	online	14 weeks	student logs, questionnaires, exams/tests, comments	high satisfaction reported
Thompson/1998	survey	600 under/graduate/certificate students	availability	information system, business, customer relations, management, educational technology	online	two semesters	interviews and questionnaires	satisfaction with flexibility, content, career hope, university prestige, interaction, technology use
Gray/1999	action research	84 graduate students		four educational leadership courses	blended	two semesters	interviews and questionnaires	generally satisfied with their courses
Mason & Weller/2000	survey	150 undergraduates		information and communications technology	online	32 weeks	interviews, student logs, and questionnaires	satisfaction with online support, time, match between content and presentation, expectations and learning styles
Hiltz et al/2000	survey	1406 undergraduates	not indicated	different	online and f2f	semester	questionnaires	higher online group satisfaction

Johnson et al/2000	exploratory	38 graduate students	not indicated	instructional design	online and f2f	semester	revised instruments and course evaluation	lower satisfaction for online class than for f2f
Arif/2001	action	26 undergraduates	not indicated	module in construction technology	online	part of a semester	questionnaires	satisfied with software, screen layout, information structure, online calendar, assessment
Ocker & Yaverbaum /2001	experiment	74 under/graduate students	selection convenience, assignment balanced	two programming courses	blended	four weeks	questionnaires	more satisfied with their f2f collaborations
Black/2002	survey	116 students		business administration	online, blended, & f2f	semester	questionnaires	Higher satisfaction blended setting than in the other two. as satisfaction with course quality and enrolment prospect
Irons et al/2002	survey	666 under/graduates	stratified random sample of students and courses	not indicated	blended	semester	questionnaires	degree of technology use predicted satisfaction
Rivera & Rice/2002	survey	134 undergraduates	whole population. Random assignment assumed	management information systems	online, blended, f2f	semester	multiple-choice exams and questionnaires	onliners were not completely satisfied whereas blended and f2f found satisfied
Gao & Lehman/2003	post-test experiment	95 students at various levels	selection voluntary, assignment random	a module in educational technology course	online	part of a semester	instructional materials motivation survey and interviews	reactive interactive group more satisfied than control group
Stokes/2003	survey	145 undergraduates	self-select	two educational computer technology courses	blended	semester	web-based satisfaction survey	web-experience and gender predict satisfaction
Koory/2003	experiment	50-200 undergraduates, professionals, and advanced high schoolers	voluntary selection	literature	online and f2f	two years	questionnaires, and online and f2f course evaluations	comparable high satisfaction in both groups
Allen & Seaman/2004	survey	1170 academic officers		different	online and blended	one year	web-based survey	40% reported satisfaction, 52% kept neutral, only 3% disagree
Kim et al./2004	case study	102 undergraduates	availability	27 MBA courses	online	one year	Questionnaires, interviews, and postings	high satisfaction with quality courses, online facilitation, and case-based learning
Paechter/2004	experiment	96 undergraduates	selection availability, assignment random	learning	online, blended, and f2f	nine weeks	questionnaires	newsgroup students less satisfied than the other groups
Kim & Moore/2005	action research	82 graduate students	convenience	various courses	online	semester	questionnaires	more interaction leads to more satisfaction

Notes. 1 = task choice, 2 = effort, 3 = persistence, 4 = skill, 5 = course performance, 6 = face-to-face learning environment

Discussion

This review examined a) motivational and satisfaction impacts of ISLE, and b) major methodological and theoretical issues embedded in previous research. The major findings included:

- quantitative designs dominated research on ISLE
- ISLE supported motivation and satisfaction
- motivation and performance were positively related
- *task choice, effort, persistence, achievement, and skill* were motivation indices
- motivation sources included technologies, contents, engagements and interactions, and program format and flexibility
- software quality, screen layout, structure, flexibility, interaction, web experience, degree of technology use, support, and quality content were satisfaction sources.

Impact findings are discussed first followed by the discussion of the major methodological and theoretical issues. Each sub-section, where appropriate, provided recommendations for instructional design, practice, or further research.

Impacts. As presumed, ISLE supported student motivation and satisfaction in various courses. In some cases, ISLE were more effective than traditional learning. Except one case (Johnson et al., 2000), all studies documented ISLE were *at least* as effective as traditional settings. This corroborates with the findings of recent studies. A study (Menchaca & Bekele, 2008) indicated students were satisfied with ISLE. Blended learning students were better satisfied (Bekele & Menchaca, 2008b) and more intrinsically motivated and ascribed more significant value to course activities and contents (Bekele & Menchaca, 2008c) than traditional students. Thus, ISLE could be *at least* as effective as traditional learning.

This may have several implications. First, motivation and achievement were positively related. Students in ISLE do have the required precondition to perform *at least* as well as students in traditional classes. This is affirmed by a review study (Bekele & Menchaca, 2008a). Second, motivation facilitates ones acquisition and demonstration of thinking skills (see p. 1). Consequently, ISLE could be of help in this regard too. A review (Bekele, 2009) revealed ISLE were at least as effective as traditional settings to support critical thinking and problem solving skills. Third, that ISLE did support motivation and satisfaction could partly justify investment on ISLE. Fourth, these findings might also reward the sustainability and scalability of ISLE.

The findings should, however, be considered only cautiously. ISLE are as effective as traditional settings in most cases. The finding that the former is more effective than the later is limited and inconclusive. Moreover, some studies considered *imagined* satisfaction and motivation. Others used previous student records for comparison. More importantly, not all reported results are statistically significant. More ‘experimentation’ is needed before drawing conclusive findings. Equally important is uncovering specific motivation and satisfaction sources in ISLE.

Sources. What actually motivated and satisfied students in ISLE? Was it technology, content, method, support, or a combination of these variables? This was among the most debated issues in educational technology research literature. The debates reflected dissectionist or holistic viewpoints (Bekele, 2009). The former conceives that methods, contents and contexts, not media or technologies, might positively affect success whereas the later asserts that any attempt to separately study such factors is futile though possible. Studies on ISLE reflected the holistic viewpoint

Motivation and satisfaction sources could roughly be grouped in to: technology attributes; course elements; engagement and interaction; program quality and flexibility; and support services. The first four impacted both constructs whereas the last one additionally impacted satisfaction. Although motivation studies did not explicitly acknowledge their roles, support services were provided to students. Generally, content, technology, method, and support jointly impacted success. These factors were provided to learners as elements of a ‘package’, ISLE. Yet, technology factors appeared most visible. The flexible nature of courses/programs, support services, and interactions with people and contents were all possible through the use of synchronous and asynchronous technologies that support multimedia. It is probably vain to study the distinctive impacts of each success factor in the real world of learning. Generally, research on ISLE echoed the holistic view.

The indication is that most motivation and satisfaction sources are ‘external’ to the learner; they refer to technologies, contents, methods, and support services. However, students’ internal processes might also be important. Motivation is “the process where goal-directed activity is instigated and sustained” (Pintrich & Schunk, 2002: p. 5). Hence, students’ personal goals might have affected their choice of technologies, contents, or methods. Moreover, students exerted effort and persisted longer online probably because they wanted to meet their goals. For a robust understanding, further research should relate internal processes to external conditions.

Generally, these motivation and satisfaction sources were presumed by the conceptual framework and are consistent with recent findings. The framework stipulated success factors at course, technology, and support levels. The findings seem to support this assertion. The course factors included contents, activities, methods and organization whereas technology factors included use of synchronous and asynchronous tools and multimedia. Easy-to-use softwares, friendly screen layouts, and flexibility also belong to the technology factors. The perceived/actual easiness and use of technologies played a role along with support services. Thus, the framework chosen reasonably supported the findings. These hosts of factors also impacted achievement (Bekele & Menchaca, 2008a), critical thinking and problem solving skills (Bekele, 2009), and faculty and student satisfaction (Menchaca & Bekele, 2008). Consequently, ISLE are provided as packages and hence all the elements contained therein account for success.

This finding cuts across several studies and could have implications for the development, implementation, and evaluation of ISLE. At policy and practice levels, focus is given to technologic factors alone. However, successful ISLE holistically considered factors at technologic, course, pedagogic, and support levels. Underestimating one or more of these would impact success unfavorably. Yet, the specific factors that *substantially* impact learning in different contexts are unclear and warrant further research. Studies should also investigate the relationships among success factors and the extent of their relations with motivation indices.

Indices. The conceptual framework stipulated that research should have used *task choice, effort, persistence, and achievement* to measure motivation. Studies actually used these indices. Some studies reported positive correlations between *motivation* and *achievement*. *Effort* and *persistence* were the most significantly used indices. Students exerted effort on challenging online tasks for a longer period of time. *Task choice* was also fairly reported in terms of the ample opportunities available to choose from tasks, materials, or technologies. Technology and interaction *skills*, which were not stipulated by the framework, were also assessed by some studies. Nearly similar indicators were used to measure motivation both in traditional learning and ISLE.

Achievement is arguably an inappropriate motivation index in ISLE. Technologies are integrated at high cost not to bring mastery but to foster generic skills. Students in ISLE often work on problems in groups. They also have to be critical in dealing with massive amount of information. Students should initiate and maintain meaningful interactions with ‘online communities’. Skill is also required to optimally use technologies. Such competencies may indicate student motivation probably better than *achievement* or *technology skills* as such. Thus, *competence* is presumably the fourth motivation measure after *task choice, effort, and persistence*. Further research should examine to what extent and how each index is related to the construct. To that end, triangulating research designs might be helpful.

Designs. Surveys, experiments, and quasi-experiments dominated research on ISLE. These designs also dominated studies on achievement (Bekele & Menchaca, 2008a) and higher-order thinking skills (Bekele, 2009). However, quantitative designs alone might not bring a holistic understanding of ISLE. Motivation and satisfaction sources included pedagogical, technological, course, and support factors, which might be better understood by triangulating research approaches. A more robust analysis could be made by complementarily using the qualitative and quantitative traditions. The nature of problems however should dictate whether to ‘major’ or ‘minor’ either research approach.

Conclusion

Compared to classroom learning environments, ISLE are relatively less structured, student focused, and process oriented. Consequently, adequate level of student motivation is key to success. Plus, students may enroll for more online courses if they get satisfied with their first encounter with ISLE. That is partly why previous studies considered motivation and satisfaction among the success measures in ISLE in HE. Generally, ISLE impacted the phenomena favorably. Students were satisfied with blended and online learning environments. They also: chose

tasks, materials, or technologies freely; made high cognitive effort on difficult tasks; and persisted for a longer time despite challenges. Although limited and inconclusive, ISLE better supported motivation and satisfaction than traditional settings. Conclusively, ISLE are *at least* as effective as traditional settings as far as student motivation and satisfaction are concerned. Developing, sustaining, and scaling up ISLE seem to reflect a rational choice. Instructional designers and practitioners might thus consider ISLE as an alternative strategy to improve educational access and quality.

Opposed to public conception, technologies per se neither motivated nor satisfied students. Contents, methods, and support services were also reportedly crucial. These were considered interdependent key factors required for success. Consequently, the design/development, implementation, and evaluation of ISLE should systematically include these factors holistically. Undermining one or more of them might compromise success. Using triangulated methods and data sources, further research should, however, examine the specific course, technologic, pedagogic, and support factors that *substantially* impact learning across contexts. Moreover, examining how and to what extent these factors affect each other would substantially inform instructional systems development, practice, and further research.

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