

Evaluation of E-Learning in Higher Education from 1997 to 2007: A Review

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Abstract: The number of studies concerned with evaluating e-learning activities has been growing in recent years. Numerous studies from all continents focus on the evaluation of e-learning activities. These evaluation studies are very heterogeneous and focus diverse objectives. Comparison of these studies is therefore difficult. A review of the literature attempts to identify relations and contradictions of the results, thus improving transferability. The present review provides an overview to the current body of evaluation studies and focuses on evaluation objectives, evaluation methods, and on salient results of the studies relating to (1) collaboration and communication, (2) flexibility and self-directed learning, and (3) the role of faculty in online environments. Since the study is ongoing, at this point, the original results are presented.

The number of studies concerned with evaluating e-learning activities has been growing in recent years. Numerous studies from all continents focus on the evaluation of e-learning activities. These evaluation studies are very heterogeneous and focus diverse objectives. That is not surprising since e-learning activities and programs strongly differ in their didactical concepts. Settings range from add-ons to traditional methods up to complex blended designs and entirely online courses. Comparing these studies is therefore difficult.

One has also to consider that a large number of evaluation studies are descriptive case studies. These are without doubt important for improving specific programs and for developing theories regarding this specific setting, but generalizing the results to different settings is often problematic. A review of the literature attempts to identify relations and contradictions of the results, thus improving transferability.

The present review provides an overview to the current body of evaluation studies focusing on objectives, evaluation methods, and salient results. The analysis includes (1) publication type, year, country, (2) course type, (3) objectives of the study, (4) sample, (5) research design, (6) methods of data collection, and (7) pertinent results.

Search Procedures

The study was originally conducted in 2004 and an update to 2007 is currently in progress. In the following sections, the original and current search procedures are outlined.

Original search procedures and selection criteria (2004)

Most of the studies were retrieved from the AACE database (Association for the Advancement of Computing in Education) at <http://www.editlib.org>. All journals^[1] and proceedings^[2] of the database were included into the search procedure. The keyword-pairs *evaluation* and *e-learning* and *evaluation* and *online learning* were used. In order to confine the results, the additional search criterion *Search in Abstract* was added.

Second, a query of the databases *PsychInfo*, *PSYNDEXplus*, and *ERIC*, using the same keywords (in key phrase), was conducted. Third, the abstracts of the following journals were manually reviewed: The Internet and Higher Education, The Journal of Asynchronous Learning Networks, The American Journal of Distance Education, and The Canadian Journal of Learning and Technology. Finally, several studies were found by a non-systematic search and by an ad hoc selection of secondary literature.

The studies were selected according to the following criteria: (1) the evaluation objects are e-learning courses partially or exclusively utilizing the Internet as medium for teaching and learning (blended learning, distance learning, add-on to traditional teaching methods); (2) the studies were conducted in the field of higher education; (3) the samples were graduate and undergraduate students and faculty members; (4) the evaluation focuses not merely on technology, but primarily on pedagogical aspects.

Current search procedures and selection criteria (2006)

In November 2006, the literature database was updated, whereas queries of the following databases were conducted: AACE (<http://www.editlib.org>), ERIC, Education Index, PsychInfo, and SCOPUS <http://www.scopus.com>. The search terms were *evaluation* and *e-learning* and *evaluation* and *online learning*, search in title, abstract, or key phrase, according to the specific search options of each database. The criteria for the selection of the articles were the same as in 2004 (see above).

Search Results

In 2004, 78 papers accorded to the selection criteria outlined above. The database queries in December 2006 totally provided 610 new results, of which 201 papers were published in the years 2005 to 2007. Currently, the selection process according to the above mentioned criteria is in progress. So far, the results showed that approximately 20-30 percent of the query results meet the specified selection criteria. To give three examples: (1) According to the search terms, the AACE database query provided 119 new results, whereof 34 studies met the selection criteria; yet, out of

[1] International Journal on E-Learning (IJEL), Information Technology in Childhood Education Annual (ITCE), Journal of Computers in Mathematics and Science Teaching (JCMST), Journal of Educational Multimedia and Hypermedia (JEMH), Journal of Interactive Learning Research (JILR), Journal of Technology and Teacher Education (JTATE), AACE Journal, formerly Educational Technology Review (AACEJ), Contemporary Issues in Technology & Teacher Education (CITE), International Journal of Educational Telecommunications (IJET), WebNet Journal: Internet Technologies, Applications & Issues (WEBNETJ).

[2] International Conference on Mathematics / Science Education and Technology (MSET), Society for Information Technology and Teacher Education International Conference (SITE), World Conference on Educational Multimedia, Hypermedia and Telecommunications (EDMEDIA), World Conference on E-Learning in Corp., Govt., Health, & Higher Ed. (ELEARN), World Conference on the WWW and Internet (WEBNETC).

those 34 studies, only one study was published later than 2004. (2) The database query of ERIC provided 93 new results, whereof only 13 studies met the selection criteria and out of those, again only one study was published later than 2004. (3) The query of Psychinfo provided 48 new results, whereas four studies met the selection criteria and thereof, two studies were published in 2005 and 2006. As the selection of papers is currently in progress, at this point, the original results of the analysis in 2004 are outlined.

Publication type, year, country, course type

Up to 2004, 38 published conference proceedings papers (48.7 %), 30 journal articles (38.5 %), and 10 chapters of books compiled by editors (12.8 %) were reviewed. To a large extent, the studies were published from 2002 up to 2004. Only 13 studies were published in the years 1997 to 2001. For details see Table 1. Most of the studies were found in the USA (47.4%) and in Europe (38.5%), but also in Canada, Australia, Asia, Central America, and South America were represented.

The course types were classified into entirely online courses (29 studies, 37.2 %) and blended (hybrid) models (21 studies, 26.9 %). In many cases, a set of courses was evaluated (22 studies, 28.2 %) and three studies evaluated e-learning within a whole institution. Three studies did not contain information about the course type.

Year	Frequency	%
1997	2	2.5
1998	2	2.5
2000	7	8.6
2001	2	2.5
2002	25	32.1
2003	22	29.6
2004	18	22.2
Total	78	100

Table 1: Studies by Publication Year

Samples

The studies were conducted in the field of higher education. The participants were graduate and undergraduate university and college students. In several studies, faculty members were included. Several authors also assessed experiences of instructional designers. The sample size of the studies was highly diverse and ranged from small-scale case studies with about 20 participants or less up to large-scale evaluations of multiple courses with 100, 200, or more participants.

Evaluation Objectives, Research Designs, and Methods of Data Collection

The purposes and objectives of the evaluation studies were multifaceted. Most studies examined several objectives and conducted an overall course evaluation, but several studies also investigated targeted issues. The most frequent objectives are summarized in Table 2. As can be seen from the summarized objectives of the studies, the assessment of students' perceptions, attitudes, and experiences with the online learning activity were the most prevalent goals. Students' satisfaction and students' learning (outcomes and processes) were also investigated frequently, as were online communication, online collaboration, and online interaction. A large number of studies intended to optimize the course or program (formative evaluation), whereas only a few specified this purpose explicitly.

The research designs of the selected studies ranged from descriptive case studies up to randomized field experiments. However, the majority of the studies (47 studies, 60.3%) were exclusively descriptive in nature. In most of the selected studies, descriptive methods were used at least as a supplement to more elaborate research designs. Frequencies of the used research designs are presented in Table 3.

Out of a total of the selected 78 studies, 39 (50%) used both qualitative and quantitative methods, 14 studies (17.9%) were exclusively qualitative, and 25 studies (32.1%) exclusively used quantitative methods. The common methods

of data collection were questionnaires, student performance measures, interviews, focus groups, observations, content analyzes, feedback sheets, verbal student feedback, and learning diaries. In the most instances, a multi-method method approach was used and different methods were combined (43 studies, 55.1%). These methods mostly combined quantitative and qualitative data collection.

Objective	Number of studies
students' perceptions of and attitudes towards the course ^[3]	16
perceptions of instructors	3
students' experiences with various elements of a course and experiences with using virtual learning environments	6
student satisfaction and student acceptance	12
learning outcomes	11
learning processes	4
comparison of online learning and face-to-face learning in respect of various issues	10
optimizing and redesigning the course (formative evaluation) ^[4]	10
online communication, collaboration, and online interaction	14
online community and social presence	4

Table 2. Objectives of selected studies

Design	Frequency
Exclusively descriptive (qualitative/quantitative)	47 ^[5]
Pre-post: one group, two measuring points	8
Quasi-experimental: one group, three or more measuring points	4
Quasi-experimental: comparison of different groups	9
Randomized field experiment	3
Cross-sectional design (correlational study)	6
Total	77 ^[6]

Table 3. Research design of selected studies

Pertinent Results of the Evaluation Studies

Due to divergent didactical designs, objectives, and technical realisation of the courses, as well as heterogeneous samples and research designs, comparing the present studies is problematic. However, the results are relatively consistent. In the present paper, the most pertinent results are summarized focusing on the following aspects: (1) communication and collaboration, (2) the role of faculty, and (3) flexibility and self-directed learning.

Communication and collaboration

These results of the studies focusing on communication and collaboration indicated that computer mediated communication lacks important elements of communication related to social contact. Yet, the results pointed out that online discussions are more task oriented than face to face interaction and can promote reflective in-depth thinking (e.g. Voderwell, 2003; Sumner & Hostetler, 2002; Serce & Yildirim, 2003; Murphy, Drabier, & Epps; 1998). Moreover, it was reported that once personal face to face contact with fellow students has been established, online interactions seem to be easier and misunderstandings are less likely to occur (e.g. Schmidt, 2000; Brunn & Frank, 2002; Viitala, 2003). Furthermore, it was pointed out that the process of community building can be enhanced by face to face contacts (e.g. Song et al, 2004; Brown, 2001). A few studies also reported that computer mediated

[3] In these studies, the authors focused their investigation on students' perceptions and attitudes explicitly as a purpose of the study. Considering the used research methods in the selected studies, it is safe to say that evaluation studies of online learning activities largely assess students' attitudes and perceptions

[4] In these studies, the purpose of optimizing the course was stated explicitly. Considering the research methods of the selected studies, it is evident that the majority of studies aimed at collecting data in order to optimize the learning activity or program.

[5] 60.3%

[6] One paper did not contain information about the research design

communication improved the communication between the students and the instructor (Vonderwell, 2003; Chester & Gwynne, 1998). Generally speaking, the evaluation results indicated that combining face to face and online communication is the best way to use the advantages of both methods.

The role of faculty in online environments

The results of the evaluation studies indicated that faculty in a collaborative online environment is expected to give immediate feedback and to be more promptly available than it is expected from instructors in a traditional environment (e.g. Serce & Yildirim, 2003; Garreck et al., 2002; Keeton, 2004; Vonderwell, 2003; Thomas & Whittington, 2004). Also, the social and pedagogical presence of the instructor seems to be essential for improved communication and learning (Vonderwell, 2003). In this respect, accessibility, responsiveness, and being organized in terms of communicating with students are pertinent aspects (Keeton, 2004). Moreover, the results pointed to the importance of a clear definition of goals and tasks and clear instructions (e.g. Hara & Kling, 2000; Song et al., 2002; Garreck et al., 2002; Keeton, 2004).

Flexibility and self-directed learning

Flexibility was one of the most frequently mentioned advantages of online learning. Plenty of articles reported that students liked the flexibility of the online course and perceived this as an advantage (e.g. Yang, Lohr & Ku, 2003; Valenta et al., 2001; Stokes, 2000; Song et al., 2004; Konradt & Krebs, 2000). However, the results indicated that, in order to benefit from the flexibility of an online environment, students need to have well-developed time-management practices and possess the skills for independent learning (Richardson & Turner, 2000; Song et al., 2004; Stokes, 2000). Yet, students' self-regulated learning skills often seem to be poorly developed (e.g. Horz et al., 2003; Stokes, 2000; 2003; Holley, 2002).

Conclusion

Since 2002, the evaluation of e-learning scenarios and its effectiveness rapidly gained in importance. While issues relating to the technology have taken a back seat, the focus has moved towards pedagogy and didactics. A number of the studies focus on online communication and collaboration. The focus of the discussion has moved from the teacher to the learner. An increased attention is paid to the learning process and key-skills like teamwork and self-directed learning. In this respect, the importance of changed roles of teachers and students and an active engagement with the content are emphasized.

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