Identifying Factors Influencing Hybrid Self-regulated and Collaborative Learning: Toward an End-User Training Framework

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Abstract. The objective of this study is to undertake a systematic literature review to determine factors associated with End-User Training (EUT). The review analyzes 52 studies identified for primary studies from academic digital libraries published between 2003 and 2013. The results reveal 77 factors influciencing EUT that can be categorized into seven categories, which are organizational, individual difference, training methods, learning techniques, learning process and interaction, immediated learning outcomes, and long-term learning outcomes. These factors are used to propose a conceptual framework of hybrid self-regulated and collaborative learning for EUT that aims at improving performance of EUT.

Keywords: End-User Training, Self-Regulated Learning, Collaborative Learning, Factors.

1 Introduction

Nowadays Information Technology (IT) and the use of Information System (IS) in organizations are growing rapidly. In terms of software, End-User Training (EUT) is used for training and learning applications or ISs. Factors influencing EUT can be grouped into five categories, which consist of individual difference, needs assessments, training goals, training methods, and learning techniques [1]. However, it is important to study other factors that may be related to the hybrid of self-regulated learning and collaborative learning for EUT before designing and developing the EUT programs.

In this study, self-regulated learning is defined as self-managed learning behavior to acquire knowledge and skill for improving learning outcome. Collaborative learning is defined as collaborative knowledge sharing to achieve learning goal and facilitate transfer of training.

Accordingly, this review focuses on prior studies of EUT published between 2003 and 2013 to identify key success factors that influence hybrid self-regulated and collaborative learning for EUT, and to determine how to evaluate the effectiveness of EUT programs. This will be achieved through conducting Systematic Literature Review (SLR).

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2 Review Method

This study undertakes an SLR process based on the methods proposed by [2] and [3]. Initially, a review protocol was defined. The protocol provided a plan for the review in terms of the method to be followed, including the research questions, search strategy, inclusion and exclusion criteria, quality assessment, the data to be extracted, and data synthesis.

2.1 Research Questions

In our review, to investigate the effectiveness, evaluation and factors that influence EUT, we define three research questions as follows.

RQ1. What are training processes, training strategies, and training methods for end-user training and how are they applied?

RQ2. What are key success factors influencing hybrid self-regulated and collaborative learning for end-user training?

RQ3. What are measurements of hybrid self-regulated and collaborative learning for End-User Training?

2.2 Inclusion and Exclusion Criteria

In this phase, the criteria were identified to evaluated studies following the review by [2]. The inclusion criteria were as follows:

- The studies that were published between 2003 and 2013;
- Publications that describe empirical studies of any particular study design in EUT applied in any organization; and
- If several publications reported the same study, only the most complete publication was included.

The studies that met the following criteria were excluded from this review:

- Studies that did not report on the EUT;
- Theoretical studies related to the EUT; and
- Studies which have only an abstract available.

2.3 Data Sources and Search Strategy

Systematic search used keywords and search terms derived from the research questions. Strategies used to generate search terms in this review included:

- Major terms derived from the research question, i.e., population, intervention and outcomes;
- Keywords from the studies found;
- Alternative spellings and synonyms of key terms;
- Boolean OR was used with relevant terms; and
- Boolean AND was used to combine search terms from population, intervention and outcomes to limit search.

The designed search string for preliminary search was:

("end-user training" OR "training" OR "user training")AND ("training method" OR "factors") AND ("self-regulated learning" OR "collaborative learning") AND (year ≥ 2003 AND year ≤ 2013).

The search was conducted on seven digital libraries, namely: ACM Digital Library, SCOPUS, IEEE Xplore, ScienceDirect, ISI Web of Science, Emerald, and Google Scholar. Summary of digital library search is presented in Table 1.

Table 1. Digital library search

Digital library	Relevant	Not relevant	Total
ACM Portal	15	14	27
SCOPUS	13	46	59
IEEE Xplore	5	34	39
ScienceDirect	11	14	25
ISI Web of Science	1	10	11
Emerald	8	16	24
Google Scholar.	19	120	139
Totals	72 (52 excluding duplicates)	252	324

2.4 Selection of Primary Studies

Publication selection is a multistage process. At stage 1, the focus was on identification of relevant studies from the digital library search. At this stage, 324 studies that appeared to be completely irrelevant were excluded. Relevant citations from stage 1 were store in EndNote software to manage the number of reference that can be obtained from the literature search. The full list of studies was then import to Excel. At stage 2, initially selected primary studies were reviewed covering the title of each publication, the keywords associated with publication, and the abstract. At stage 3, the studies were reviewed again by applying the inclusion and exclusion criteria. At this stage, another 148 studies were excluded, which left 132 studies for the detailed quality assessment.

2.5 Quality Assessment

In the quality assessment phase, each primary study was assessed according to the 11 quality criteria based on a systematic review of empirical studies [3] presented in Table 2. Each of the 132 studies that remained after stage 3 was assessed with criteria covering three main issues: rigor, credibility, and relevance. We accepted a study graded "yes" or "1" on studies that pass our quality assessment.

Table 2. Summary of the quality assessment criteria [3]

Main issues	Quality criteria	Description
Minimum Quality Threshold	1. Is the paper based on research? 2. Is there a clear statement of the aims of the research? 3. Is there an adequate description of the context in which the research was carried out?	The publication appropriately describes the aims and the detail of research.
Rigor	4. Was the research design appropriate to address the aims of the research? 5. Was the recruitment strategy appropriate to the aims of the research? 6. Was there a control group with which to compare treatments? 7. Was the data collected in a way that addressed the research issue? 8. Was the data analysis sufficiently rigorous?	The publication appropriately research design and data analysis.
Credibility	9. Has the relationship between researcher and participants been considered to an adequate degree? 10. Is there a clear statement of the findings?	The publication describes a clear relation between researchers and participants and clearly presents findings.
Relevance	11. Is the study of value for research or practice?	The publication describes values for research and/or practice.

2.6 Data Extraction and Synthesis

In this step, a data extraction form was design based on [2] and [3] to extract data from the publications. The 52 publications that passed the quality assessment were reviewed to record details into the form for further analysis. The results from all the finding of primary studies were tabulated and summarized to answer the research questions. Tabulated results are also useful to identify current research gaps. These results are presented in the next section.

3 Results and Discussion

The following sections present the findings, discuss the results in the context of the research questions, identify gaps and point directions toward future research. Totally, 52 studies remained after the quality assessment process and data were extracted to answer our three research questions.

3.1 Research Question 1

Our first research question is "What are training processes, training strategies, and training methods for End-User Training and how are they applied?" Training and learning process can be developed for specific training methods involves with technology-support learning [4] and technology-mediated learning [5, 6] . It was found that individuals learn in different ways. Self-regulated learning strategies let to better outcomes in learning to use systems [7]. Training and learning strategies are an important part of the training method, which is composed of types of IT tools and types of trainees [8]. Learning techniques that applied to End-User Training are behavior-modeling method [9] , vicarious and enactive learning [5].

3.2 Research Question 2

Our second research question is "What are key success factors influencing hybrid self-regulated and collaborative learning for End-User Training?" In relevance to this question, some studies proposed a number of other factors related to EUT. They can be grouped into seven categories, which are organizational, individual difference, training methods, learning techniques, learning process and interactions (i.e., virtual interaction), immediate learning outcomes, and long-term learning outcomes Summary of factors influencing to EUT from the review are presented in Table 3.

Organizational factors refer to factors that are related to the improvement of organizational performance through training. Individual difference factors refer to the difference of capability of each individual that affects to EUT. At present, training methods consist of training methods based on social cognitive theory and technology-mediated learning to improve learning outcomes. Learning techniques factors refer to human learning behaviors. Learning process and interactions refers to the enhancement of learning system emphasizing on individual aptitude that can increase learner's satisfaction. Immediate learning outcomes refer to perceived knowledge and skill after training. Finally, long-term learning outcomes refer to the expected outcomes of the training that may also lead to further transfers of skill and knowledge acquired from the training.

Table 3. Factors of EUT from the review

Categories	Factors	Studies
Organizational	Organizational support, Perceived benefits/cost, Organizational readiness, External pressures , Firm's management support, Supervisory support, Training needs/requirements, Training organization, and organizational training efforts	[4, 10-16]
Individual differences	Self-efficacy, Computer self-efficacy, Mastery orientation, Computer anxiety, Learning goal orientation, Learning styles, Attitudes towards the system, Pre-training motivation, Prior experience, Motivation to Transfer, Self-regulated learning, Outcome expectancies, Motivation perspective, Traits	[5, 7, 9, 10, 12-15, 17-37]
Training methods	Instructor-led training, Online training, Technology-mediated Learning, Web-based training, Exploration-based training, Behavior modeling training, Technology training, Simulator, Mentor, and Hybrid	[4, 5, 7, 9, 14, 19, 20, 27, 30, 31, 36, 38-43]
Learning techniques	behavior-modeling method, self-regulated learning, vicarious learning, enactive learning, cooperative or collaborative learning	[5, 7, 9, 30, 32, 33]
Learning process and interaction	learner interface, interaction, learning climate, faithfulness of technology use, meta-cognitive activity, faithfulness, attitude, attitude-respect of technology, learning effects, assessment skills, assessment process, learning process, training process	[6, 18-20, 24, 25, 30, 31, 34]
Immediate learning outcomes	satisfaction, learning performance, technology self-efficacy in ERP system usage, learning achievement, declarative knowledge, procedural knowledge, level of knowledge, skill, cognition, affection	[5, 7, 18-20, 22, 30, 44]
Long-term learning outcomes	perceived ease of use, perceived usefulness, enjoyment, intention to use, transfer of training, adoption, perceived skill retention, transfer implementation intentions, transfer-enhancing activities, technical support, system usage, post-training support, training utilization, performance expectancy, effort expectancy, learning and skill transfer	[5, 12, 17, 18, 27-30, 34, 40, 45-49]

3.3 Research Question 3

Our last research question is "What are measurements of hybrid self-regulated and collaborative learning for End-User Training?" According studies relevant to this question, end-user training evaluation classifying into five levels, which consist of technology (usefulness of technology i.e., the delivery and the presentation of training materials and communication tools), reaction (the satisfaction toward training i.e., relevance of the course to the trainee's job and quality of instruction), skill acquisition (acquisition of knowledge or skills), skill transfer (the ability to apply skill learned at work for improving job performance), and organizational effect (improvements in individual or organizational outcomes and trainers) [49]. These five levels help to explicitly distinguish between skill acquisition and skill transfer [44]. In addition, training effectiveness involve post-training support [46], and measurement of learning process [5].

4 A Proposed Framework

A proposed conceptual framework of hybrid self-regulated and collaborative learning for EUT consists of three processes, which are pre-training, training and learning, and post-training as presented in Fig. 1. The proposed framework aims at supporting software/application learning by self-regulation and collaboration.

In Fig. 1, the pre-training process is composed of the analyses of the characteristics of the software and of the end-users participating in the training. The analyses of factors, including computer self-efficacy and other individual's factors affecting computer self-efficacy, are to determine the training goals and the factors for the training and learning process.

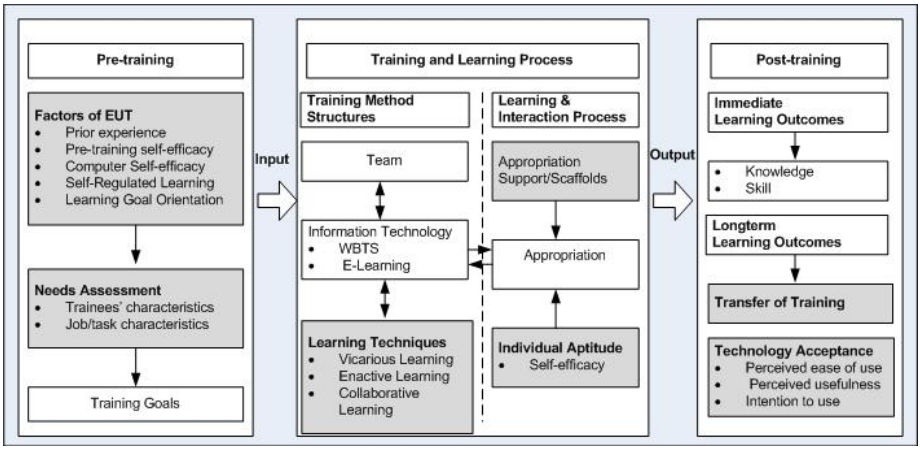

Fig. 1. The proposed conceptual framework (applied from [30])

The training and learning process is composed of training methods involving organizing team and information technologies appropriate for the training. For example, training may utilize technology to support the learning techniques such as vicarious learning and collaborative learning. The learning and interaction process utilizes a support system for appropriation by prioritizing individual aptitude.

The post-training process involves the improvement of learning methods and interaction processes based on immediate learning outcomes and long-term learning outcomes. The technology acceptance model is finally used to evaluate the proposed hybrid self-regulated and collaborative learning framework.

5 Conclusion

This paper presents an SLR on factors influencing hybrid self-regulated and collaborative learning for EUT. In conclusion, 324 studies were identified from the literature search, of which 52 satisfied the quality assessment. The results show 77 influential factors that help when developing training support tools to increase the effectiveness of IT/IS applications and their impacts on the work of personnel within organizations. These factors are groups into seven categories and used to propose a conceptual framework of hybrid self-regulated and collaborative Learning for EUT. The framework aims at contributing to the improvement of EUT performance. The next step of this study is to build the framework.

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