

Strengthening deeper learning through virtual teams in e-learning: A synthesis of determinants and best practices

FINAL REPORT Executive summary

E-learning has transformed traditional ways of learning in higher education. Its flexibility and accessibility are recognised as key to fostering a lifelong learning society that contributes to social and economic development. However, Canada, and its post-secondary institutions are trailing behind other countries in terms of a national e-learning strategy.

The importance of a coherent framework for e-learning in Canada, addressing gaps in research that reflects the needs of learners, is urgently needed. A stronger understanding of online learning is therefore essential for the future success of education and training. One of the key factors for e-learning success is an understanding of the social component of learning. Social aspects of peer learning are argued to build student motivation, enhance social connections, and increase student access to feedback about their learning. Most professional training and graduate teaching in e-learning environments utilize group work, which is said to foster "deeper" learning, in a co-production of knowledge model; this approach also provides skills that professional programme students require in the workplace, where teams are the norm today.

Virtual teams have potential implications for e-learning, but have not been empirically studied in the academic sphere, and little is known about their effectiveness as a learning mechanism in e-learning. Are virtual teams in the e-learning space effective in producing better student outcomes? What can be learned from the literature? To address these questions, an in-depth meta-review of findings in the literature on virtual teams was undertaken, examining impacts/results from virtual teamwork, which could be transferred to general e-learning.

The knowledge synthesis methods utilised included a systematic search of the literature for virtual teams and for e-learning across multi-disciplinary fields in higher education, and an interpretive synthesis of existing research. A systematic search and review identified key determinants of effective learning in an e-learning educational delivery model, and for effective virtual teams. The objective was to include many different forms of evidence with the aim of generating a comprehensive framework. Thus, an interpretive synthesis of all types of evidence relevant to an understanding of the mechanisms that underlie effective e-learning and virtual team environments was undertaken, with the aim of allowing the definition of the phenomenon of virtual teams and e-learning to emerge from the analysis of the literature.

The literature review progressed in four steps: (1) identifying relevant studies, (2) selecting studies for inclusion through a relevancy rating process, (3) classifying and rating selected studies, and (4) analysing and synthesizing the studies.

The team searched for relevant evidence in electronic databases, reference chaining, searching grey literature websites, and contacts with experts. Combinations of search strategies were applied to electronic databases: ERIC, ABI/Inform, Business Source Complete, Web of Science, Academic Search Premier, Science Direct, and Research Library.

A total of 12,802 references were generated, some 262 of which were identified as the study progressed. Purposive sampling was used initially to include studies published within the past ten years that investigate (e-learning OR virtual teams) AND (success* OR effective* OR best practice*) in multidisciplinary environments. The articles were organized in RefWorks.

All titles and abstracts of potential articles were screened by the researchers independently, and in duplicate for inclusion. Working by consensus, the researchers applied the inclusion and exclusion criteria to all the retrieved citations by reading the abstracts. The objective was to prioritise papers that appeared to be relevant, rather than particular study types or research that met specific methodological standards. A bibliometric analysis was used to describe the structure and dynamics of the research literature. A data classification form was designed to assist in systematically identifying characteristics of each article. A fundamental issue in reviewing qualitative and quantitative research is the appraisal of study quality. The research team gave the articles a quality rating using two quality rating matrices, one for empirical and one for non-empirical articles, that were developed by the researchers. A 15-point scale was used for empirical articles that included assessment of the quality of the literature review, research questions and design, population and sampling, data collection and capture, and analysis and results reporting.

The systematic search of nine key databases yielded 12,802 studies identified as relevant; of these, 1,577 were selected as potential relevant studies. On the basis of examining the abstracts and full text of all these 1,577 articles during the classification process, a further 720 articles were eliminated. The final sample included 857 studies, comprised of 500 empirical studies, 275 non-empirical (e.g., editorials) and 22 dissertations. Data handling and analysis was facilitated through the use of Dedoose, an on-line qualitative analysis software that facilitates coding, sorting, and displaying mixed methods data. Line-by-line coding of the texts resulted in 635 excerpts abstracted into 133 preliminary codes and sub-codes.

As described by the researchers, a core phenomenon of deeper learning in e-learning and virtual team environments involves a “conversation”, which, in turn, encompasses 3 fundamental domains or dimensions: contexts; behaviours; and resources. These dimensions were distilled and organized through a deductive process from the 133 codes

identified. While these three domains are certainly interrelated and have some overlap, the following section highlights and describes these domains in greater depth.

Context includes a variety of intrinsic factors, such as: learning preferences, technological familiarity and experience; task design; task complexity; goal clarity; delivery methods, and others. The literature brought to light that task design is important, as is clarity of mandate. Early and focused goal setting and preparation are important, as are team agreements and group regulation policies. Intentional course design fosters peer-interaction, and collaborative and socially-negotiated learning that contributes to active learning and critical reflection.

Behaviour characteristics which were identified include self-reflection, individual accountability, commitment to task, motivation, and sense of community; these are considered key to establishing trust in a virtual team. Research has shown that the early collaborative phase is the most important in virtual teams for establishing the trusting relationship among its members. Trust is a mediating role in team performance. Establishing a strong sense of community~ high team cohesion~ has been shown to result in higher levels of motivation, satisfaction among team members, persistence, engagement, and higher order thinking. Socio-emotional interactions among team members, establishing socio-personal relationships, are the glue that holds virtual teams together and allow for the risk-taking that enables the joint creation of knowledge.

Resources are important to effective virtual teamwork. Resources may be institutional, technological, or course-specific. Clearly, teams need supporting and effective communication technology to allow them to communicate seamlessly. In addition, training as to how to use this technology will allow for more effective and more rapid integration of the team. Teams also need to learn to work as virtual teams – preparation and training about how to work on virtual teams has also been shown to derive important benefits in establishing cooperative patterns and behaviours. Processes that emphasize and support the motivational dimension; those that initiate, guide and maintain goal-oriented behaviours (clear instructions, planning and training) are key design functions which support team efficacy and achievement.

The Knowledge Mobilization strategy, included a research project website and social media, and an E-learning Colloquium held at Dalhousie University on September 15, 2015. The Colloquium, with about 50 participants from government, universities and colleges in Atlantic Canada, was an important means of both disseminating our findings and obtaining the feedback from knowledge-users about the study and its findings. In addition, Colloquium participants exchanged ideas on e-learning and deeper learning, and discussed promotion and incorporation of best practices across government departments and institutions of higher learning.

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FINAL REPORT Key Messages

Context and Implications

E-learning has transformed traditional ways of learning in higher education. Canada is trailing behind other countries in terms of a national e-learning strategy. A stronger understanding of online learning is essential for the future success of e-learning education and for continuous learning..

Approach

A systematic in-depth meta-review of the literature was undertaken across multi-disciplinary fields in higher education. Studies were screened for year of publication (2005-15), and language (English). A data classification form was designed to screen out articles – 857 were chosen. Using an interpretive synthesis, grounded approach the definitions of virtual teams and e-learning emerged from the literature. Dedoose, a qualitative analysis software, was used for data handling and analysis. (Appendix A)

Results

The final sample included 857 studies - 500 empirical studies, 275 non-empirical, and 22 dissertations. Using 133 codes, 3 dimensions for successful e-learning were distilled from the data: contexts; behaviours; and, resources. Social interaction facilitates 'deeper learning' that improves successful e-learning. From the analysis of the data, an e-Learning Framework was also developed (Appendix B). The framework will assist instructors to develop evidenced-based programs for online environments and the results will add to the professional development literature for educators who use e-learning in higher education.

Further research and research gaps.

The next stage will be to seek funding to test our e-Learning Framework in the e-learning environment.

Only studies published since 2005 and written in English were used in the analysis.

Knowledge Mobilization (KM)

KM included: a research project website; social media; and, an E-learning Colloquium held at Dalhousie University on September 15, 2015. Participants from government, universities and colleges in Atlantic Canada attended to listen to the results, share ideas and provide feedback.

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Appendix A – Methodology

METHODS

Our methods were underscored by rigor and transparency (Mays et al., 2005) so as to enable the study to be replicated by others. We conducted a systematic search and review of the literature that identified the key determinants of effective learning in an e-learning educational delivery model, effective virtual teams, and the additional impact of an e-learning framework that incorporates a virtual teamwork component within the program model. One of the key advantages of a systematic over a narrative literature review is that it allows for the synthesis of the research in a systematic, transparent, and reproducible manner. In other words, adopting a systematic review methodology helped in counteracting bias by making explicit the values and assumptions underpinning our review process. In addition, comparative and thematic synthesis methods, rather than quantitative analysis, were selected so as to uncover contextual issues identified in the studies and provide educators and policy-makers with a reliable basis to formulate program model frameworks and take evidence-informed action. In other words we adapted an interpretive review method, an approach that provides a useful structure within which to conduct a synthesis of the literature. Notably the goal of the synthesis was not to produce an aggregations of data, but theory grounded in the studies included in the review (Dixon-Woods, et al., 2006). Our focus was to include many different forms of evidence with the aim of generating a comprehensive framework, thus we conducted an interpretive synthesis (Sandelowski *et al.*, 1997) of all types of evidence relevant to our understanding of the mechanisms that underlie effective e-learning and virtual team environments, and for whom virtual teams work and in what circumstances.

Further, it was not possible nor desirable for us to specify in advance the precise review question, *a priori* definitions, or categories under which the data would be summarised. The precise formulation of review questions in advance of the synthesis, as Dixon-Woods et al, (2006) noted, is successful in instances “where the phenomenon of interest, the populations, interventions, and outcomes are all well specified – i.e. if the aim of the review is aggregative”. For our study the aim was to allow the definition of the phenomenon of virtual teams and e-learning to emerge from our analysis of the literature (Jensen & Allen, 1996). However, it should be noted that , although at the outset

we did not have a specific hypothesis that we were going to explore, we had some general project review questions which could best be described as “tentative, fuzzy and contested” (Greenhalgh *et al.*, 2005). The questions were: What drives effective e-learning? What makes virtual teams effective? What lessons can be learned from the literature on virtual teams which can be applied and used within e-learning environments? We then employed a highly iterative approach to specify our review questions, i.e., we modified the questions in response to search results and findings from retrieved items. The multidisciplinary nature of our research team was of great benefit to this process of refining the questions, as it allowed a range of perspectives to be incorporated into the process.

Appendix B – e-Learning Framework

