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Barriers to e-Learning in SMEs — Are they Still There?

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<http://dx.doi.org/10.5772/61131>

Abstract

Facing pressure from an increasingly competitive business environment, small and medium-sized enterprises (SMEs) are called upon to implement e-Learning strategies to support their organizational training and developmental efforts. The purpose of this study is to identify the barriers and constraints SMEs experience when they want to use e-Learning and to determine, through a multiple case study, if the barriers to e-Learning actually experienced by SMEs in Atlantic Canada are the same as those that larger organizations are experiencing, and if they remain the same after all these years. Another purpose of this study is to present different approaches, such as the need to develop an e-Learning culture in Atlantic Canada and Canada in general, to create greater awareness and promotion of e-Learning, to determine an overall learning strategy to upgrade the technological skills of the employees and the SMEs, that can assist SMEs in surmounting the barriers they face when they want to use e-Learning.

Keywords: Barriers, constraints, e-Learning, SMEs, training,

1. Introduction

Small and medium-sized enterprises (SMEs) are considered a source of economic growth and are seen as a key sector for creating employment in many countries around the world. Consequently, training and learning are considered critical to SMEs' growth in many countries. To this end, references [1, 2] consider that in knowledge-based economies, a firm's investment in training and updating its employees' skills is a key element of its growth. However, SMEs do not provide sufficient training mainly because they cannot spare time for employees to

attend external training programs and because internal training is too expensive. Therefore, SMEs should logically turn to e-Learning to provide training as the benefits associated with it are supposed to solve these problems. But the logic is not working. SMEs have not rushed to embrace e-Learning in order to train their employees. Why? What are the barriers and constraints they face?

In Canada, particularly Atlantic Canada, SMEs have played an important role in the economic development in various ways and their contribution towards a healthy economy has been recognized. They are defined as businesses having fewer than 500 employees and they represent the majority of businesses [3]. They are the fastest growing segment of the economy, and are considered the foundation of economic development [3–5]. Due to their great flexibility and adaptability, they represent the economy sector that creates the most employment [3, 6] and they remain critical to the economic prosperity of the region as in other parts of the world [see, for example, 7–9]. Yet, despite their great contribution to the region's economy, there are very few studies on them and even less on the training barriers they face, and this despite the fact that the most successful economies are those with the best trained individuals [1, 2, 10].

Capability development of small and medium firms remains critical to economic prosperity in Atlantic Canada as well as in other parts of the world [for example, see 3, 5, 7–9, 11–13]. It is therefore important to know the barriers faced by SMEs regarding training, more specifically e-Learning, in order to be in a position to help them ensure their growth and their sustainability.

The purpose of this study is descriptive and prescriptive. After having identified the barriers and constraints SMEs experienced when they wanted to use e-Learning using a survey of the literature on the issue, the first objective is to determine through multiple case studies if the barriers to e-Learning actually experienced by SMEs in Atlantic Canada are still the same after all these years. If so, the second objective is to introduce possible solutions to assist SMEs in surmounting these barriers.

Thus, the remainder of this chapter is arranged as follows. Section 2 presents the method used for the study. Section 3 presents a literature census on the various barriers and constraints to the use of e-Learning by businesses. Section 4 determines through multiple case studies the barriers and constraints to e-Learning actually encountered by SMEs in Atlantic Canada and proposes different approaches to overcome those barriers. The conclusion and discussion will be included in section 5. The references are in section 6.

2. Method

Given the present state of knowledge on training in SMEs and on e-Learning, the method used for this study includes a census of the literature on training and e-Learning combined with a qualitative and exploratory research approach, i.e. multiple case studies. The literature census covers more specifically the barriers and constraints businesses faced when they wanted to

use e-Learning. The case study method is well adapted in situations where theoretical propositions are few and field experience is still limited [14]. Multiple-site case studies allow one to understand the particular context and evolution of each firm in regard to e-Learning. Sixteen SMEs located in the Atlantic Region of Canada were studied in 2006, four in each of the provinces of New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland. In 2012, 6 years later, four other SMEs located in New Brunswick and Prince Edward Island have been studied to verify if the businesses were still encountering the same problems in regard to e-Learning. These 20 businesses were selected because they were sufficiently successful (at least 10 years in business) and representative in terms of industry and size, for theoretical generalization purposes. These manufacturing SMEs stem from various sectors such as: construction, textile, oil and gas, pulp and paper and processed food sector. Following North American research [4, 15], a small enterprise (SE) is defined as having 20 to 99 employees, whereas a medium-sized enterprise (ME) has 100 to 499.

Data were collected through semi-structured tape-recorded interviews ranging approximately 2 hours each with the owner-manager or CEO and with the firm's HR manager or manager responsible for training. E-Learning users were also interviewed. The interviews consisted of a series of standardized open-ended questions related to e-Learning. The standardized open-ended interview, as explained by reference [16], is a structured approach in which participants are always asked identical questions designed to generate an open-ended response. This approach was utilized to solicit a variety of viewpoints based on individual experiences, but also to control researcher biases. All narrative interviews were transcribed, coded and analysed using open line-by-line coding to identify themes following reference [17] prescriptions with the assistance of the Atlas.ti application. For confidentiality reasons, fictitious names of individuals and firms participating in the study were used. For example, the first business interviewed is represented by the letter A, and a name starting with the letter A (Arthur, Andy) is given to the representatives of this business. The second business interviewed is represented by the letter B, and a name starting with a B (Bert, Bob) is used and so on. As presented in the research results section, these firms range in size from 60 to 490 employees and operate in industries whose technological intensity varies from low to high. All export except for one firm (M). The SMEs interviewed in 2006 were regrouped in four e-Learning profiles of increasing intensity based on the extent of their awareness and use of e-Learning (none, weak, average, strong). The four businesses interviewed in 2012 are grouped together, but not based on their e-Learning profiles of awareness and used of e-Learning. Three of these businesses were using e-Learning, and one was not.

3. Literature census

Some researchers such as references [18, 19] have identified the barriers to the traditional training taken up by SMEs. Some of the problems identified are lack of training time, delivery of tailored training programs, cost versus financial resources available for training, lack of knowledge on training opportunities available, returns on training offered and the fear of

poaching by other businesses or losing the employees to another business. The lack of employees' desire for training and learning combined to a lack of awareness by SMEs of the necessity of having more skilled employees for business success have also been identified.

Barriers to e-Learning as a method of training for learners, both for businesses and educational institutions, have also been identified by various studies. For example, reference [20] mentions that the main barriers to the use of e-Learning in Canada are learners and technical infrastructure. Among other barriers mentioned by reference [20], we find the lack of knowledge towards e-Learning, the accessibility, the lack of commitment from senior management, the lack of quality courses, the development costs and the priorities of investment. According to reference [21], the bandwidth, the access to the Internet, the reluctance of the employees to use the technologies, the lack of investment on the part of companies in technology and the lack of university-level courses and non-academic courses relevant to the needs of businesses are also some barriers to e-Learning. In addition to the lack of relevant courses, the reluctance of employees towards training, the lack of expertise or technical capacity of the employees, reference [22] also mentions the lack of realism of businesses towards what e-Learning can and cannot do. Businesses' lack of realism towards what e-Learning can and cannot do is also mentioned by reference [23]. The barriers to e-Learning seem to be perceived differently by working adults and full-time students, with working adults viewing technology access and time for studying their principal constraints [5].

A more recent report, the State of e-Learning in Canada, done by reference [24] also mentions the learners and the technology as some of the main barriers. Other barriers mentioned in the 2009 report are the lack of support for the learners, the lack of knowledge towards e-Learning by the organization and, the financial problems, in which the e-Learning project are underfunded and, therefore, could not produce the anticipated gains. Other challenges and constraints mentioned in the 2009 State of e-Learning report are the reluctance to use chat rooms and discussion groups by the learners, the fact that many Canadians discontinue use of the Internet and the difficulty to harness the potential of the Internet to enhance learning opportunities. A similar study conducted in seven European countries by reference [25] also mentions that technology and attitudes of managers and employees seem to form the main drawbacks to e-Learning initiatives in SMEs. For reference [26], learners and the necessity for them to be self-motivated and self-disciplined are also a barrier to e-Learning. They also noted the lack of desire to assign a specific amount of time to learn during the work day and the lack of a good human resources development policy towards learning as some barriers to e-Learning.

Other researches done on Canadian SMEs also mentioned that the barriers encountered by SMEs in the use of e-Learning are the lack of access to the necessary technology, the lack of training and support both for SMEs and for the employees and the lack of knowledge on the e-courses and the content relevant to the needs of SMEs including false expectations of SMEs as to what e-Learning can and cannot do. The purchase costs of tailored courses and internal development costs are also barriers for SMEs. Finally, the level of interaction in the e-courses and the learners are also problematic according to references [27, 28].

According to reference [29], organizations reported more barriers to adopting e-Learning in 2011 than in 2010 but the top barriers remain the same: the lack of skills among employees, the lack of knowledge of technology, the lack of skills by training staff to implement e-Learning, the reluctance by line managers and unreliable ICT. The barriers facing companies when they want to use e-Learning are summarized in Table 1.

Barriers	Explanation of barriers
Accessibility	Difficulty for the learner and trainer to acquire or have access to the necessary technology (hardware, software, bandwidth) [5, 20–25, 27–44].
Training and support not available	Teachers and learners do not always understand how to use the technology required for the course (computers, software, Internet, TV, etc.) [5, 21, 27–30, 36, 38, 40–42, 44–47]. Support service not available or inadequate for teachers and learners [24, 26–29, 36, 40, 41, 44, 46, 47]. Lack of support from senior administration [5, 20, 21, 24–29, 36, 40, 41, 44]. Lack of involvement of different stakeholders and lack of strategic plan [25, 26, 36, 44, 48, 49].
Course and course content	Determine the purpose of the course: learning through technology or learning technology [26, 50]. Determine the course content and the order of the presentation of content [27, 28, 32, 44, 51–53]. Align the course's objectives with the course content and assessments [27, 28, 32, 34, 44, 46, 52]. Choose the method of training (an active method, which allows the learner to construct their learning, and have access to a teacher if necessary, is a better method than an affirmative one) [27, 28, 40, 45, 47, 52]. Determine the duration and cost [26–28, 34, 38, 46, 54]. Lack of university-level courses and non-academic relevant to businesses [20, 21, 27, 28, 41]. Lack of knowledge on e-Learning and e-courses and what e-Learning can and cannot do [22–24, 27, 28].
Interaction	Lack of human interaction (face to face) [27, 28, 31, 33, 35, 49, 55].
Learners	The profile of the learner may not always match the desired profile (including lack of skills of the learners) [21–25, 27–29, 37, 43, 52]. The following characteristics are desirable in order to ensure the success of the training: self-motivated [5, 20, 26–28, 31, 32, 45, 46, 51, 55, 56], able to work alone [27, 28, 45, 56], self-disciplined [5, 20, 26–28, 32, 44, 51, 55, 56], 'focused' [20, 27, 28, 32, 44, 51, 55].
Environment	The political, social and economic forces which may influence the choice of courses offered, the quality of courses and the place [23, 32, 41, 49].
Costs	Costs (infrastructure, development and/or purchase of course) required to support e-Learning [23, 27, 28, 31, 32, 38, 40, 44, 57–59].

Table 1. Barriers to the use of e-Learning

4. Research results

The majority of SMEs who participated in the 2006 case were well aware of e-Learning, but it remained to be defined for some. A detailed study of these SMEs stated knowledge about e-Learning and their use of it enables us to qualify their level of use. This analysis also allows us to categorizing SMEs into four distinct profiles of e-Learning users. There are SMEs that use e-Learning a great deal (strong use), those that use it quite a bit (average use), those that don't use it much (weak use) and those that don't use it at all (non-existent use) as indicated in Table 2.

The four SMEs who participated in the 2012 case study were all aware of e-Learning even the one who was not using it (profile V in Table 2). One of the SMEs in profile V was using e-Learning a great deal (strong use – SME name Q), one SME was using it quite a bit (average use – SME name R), one didn't use it much (weak use – SME name S) and the last SME didn't use it at all (non-existent use – SME name T).

Year	2006				2012
	Profile I	Profile II	Profile III	Profile IV	Profile V
	Strong	Average	Weak	Non-existent	Mixed
	(C, D, K, L)	(B, E, M, O)	(A, F, I, J)	(G, H, N, P)	(Q, R, S, T)
Size					
Number of employees	300 to 485	60 to 280	150 to 350	75 to 400	150 to 490
E-Learning					
Utilization	Strong	Average	Weak	Non-existent	Mix

A 'strong' use means that the business regularly uses e-Learning to train its employees. An 'average' use means that the business has developed at least two courses in e-Learning format and that the production employees must take these courses. A 'weak' use means that only a few employees use it in the business and a 'non-existent' use means that the business does not use e-Learning to train its employees and that they do not use it to develop their knowledge. A 'mixed' use means that there is an SME for each of the above criteria.

Table 2. Profiles of e-Learning's utilization by SMEs.

SMEs encounter some barriers when they want to use e-Learning as a means of training. Even SMEs who rarely or never use e-Learning are aware that certain barriers may be encountered with e-Learning.

4.1. Perceived barriers of e-Learning by SMEs

The barrier which was most often mentioned in the 2006 case study (for more details on the 2006 case study, see references [27, 28, 60]), in fact which was mentioned by all SMEs inter-

viewed, was the one connected with the bandwidth, which is part of the accessibility. The capacity to download e-Learning courses was not available because the required bandwidth was not always available in the workplace or in regions where employees reside. This problem was illustrated by the comments of Gérôme, who said at the time: « *The bandwidth is insufficient. It takes an eternity to download an e-mail, forget videos and other sophisticated things. It would be difficult to administer training of this style with the system such as it operates at present. By the time a course would be online, the employees would have left home* » (G:181–186). The bandwidth problem was never mentioned in the 2012 study. This may be due to the fact that several initiatives have been undertaken during the last years, both by the provincial government and the federal government, to improve access to the Internet across Canada and especially in remote areas.

In the 2006 study, some SMEs pointed out that they didn't have a training room equipped with the necessary equipment for this type of training, and some employees didn't have a computer at home. This barrier was not mentioned in the 2012 case study. However, one SME brings up the point that they only have computers in the 'office'.

Another barrier mentioned by the majority of SMEs, in both 2006 and 2012 cases, is the level of knowledge of employees towards computers. There are several employees whose level of knowledge is not sufficient, and some even have no interest in computers. The comments of Jules illustrate the problem; he says: « *There are some employees who are fascinated by computers and there are others who don't want to touch them... Is that the medium that is most suitable for these people to learn* » (J:652–654). Stan's comments give us another example of this persisting barrier; he says: « *Many of our employees have not finished their high school... they are not interested in computers... well, not learning on a computers* » (S:427–430). The lack of motivation and discipline to take a course online, and the lack of knowledge and capacity to support e-Learners by the organization were also mentioned in both studies. Theresa gives us an example of the lack of capacity to support e-Learners; she says: « *We don't have computers technicians here, we only have computers in the office...* » (T:223–224).

The lack of knowledge about the courses available is another barrier highlighted in both studies. It is not known what courses are offered, where they can be found, what their level of interaction is, what the possibilities of mentoring are, what the possibilities for evaluation are and what level of security is necessary in order to avoid problems and to ensure that it is the right person participating in the course. Hector gives us an example of the lack of knowledge about what is available; he says: « *There's no directory, or if there is one, I am not aware of it* » (H:145–146). Quynh give us another example; she says: « *There was no college or university-level courses relevant to our business... we develop a partnership with a private college to fulfill our needs* » (Q:328–331).

The lack of human interaction in some courses was mentioned in the 2006 study and is still mentioned as a barrier in the 2012 study. Ron gives us an example of how the lack of interaction is a barrier that made it difficult to stay focused on the subject covered by the e-course. He says: « *You know, sometimes with some of these webinars, it gets so boring... The guy is speaking and speaking... I leave my computers on and I work on others things... I still hear what they are saying* » (R:221–223). Denise gives us another example where interaction in e-Learning courses is important and the lack of it could be a barrier; she says: « *I prefer interaction in e-Learning. I prefer when*

there are discussions, and it is more my learning style to have conversations and discussions. I learn better when I can discuss and exchange ideas » (D:803–805: 816–817: 869–870).

Another barrier stated by the SMEs in both studies is the profile of the learners and the SMEs. It appears that the profile of the learner and the profile of the SME do not always match the desired profile for e-Learning. Jules gives us an example of how the profiles of the SME and the employees could be barriers; he says: « *The 'learning by doing' method is frequently used to learn certain jobs. It is our preferred manner of training and we've used it since the beginning of the company in 1964... Some employees have chosen e-Learning, but it is usually on an exception basis, to develop their work knowledge and it was suggested by the employee and not the employer... They have to be self-disciplined and motivated to finish the course on-line and get their diploma » (J:447–449: 989–919: 954–955). Quynh gives us another example how the profile of the employee could be a barrier; she says: « *The employees have to be dedicated, they have to be motivated and self-disciplined... it is not easy to find the time when you are working full time » (Q:656–658). Denise gives us another example of barrier to e-Learning if the employee is not self-disciplined and self-motivated; she says: « *Since I have a three year-old daughter and that my work schedule is rather full, I can complete the work (course) at 3:00 AM... » (D:82–83).***

Finally, the cost of e-Learning was and is still an important barrier for SMEs. Denise, from the 2006 study, gives us an example; she says: « *The costs for a course like an MBA (on-line) are very high » (D:687–693). Edna, also from the 2006 study, gives us another example of how the cost is a barrier; she says: « *The cost and time of development in-house are high » (E:419–423). Lastly Quynh, from the 2012 study, is telling us how cost of e-Learning is affecting their business and is a barrier. She says: « *It costs us a lot of money to have courses developed and tailored for us... We could easily have done something else with that money » (Q:917–918: 921–923).***

The barriers cited by SMEs in the use of e-Learning, during the 2006 study and 2012 study, are illustrated in Table 3. These barriers, as shown in Table 4, can be grouped into broad categories, namely: lack of access to computers or the Internet (accessibility), the lack of training and support both for SMEs and for the employees (training and support), lack of knowledge on the courses and content relevant to the needs of SMEs including false expectations of SMEs as to what e-Learning can and cannot do (course and content), the level of interaction (interaction), the cost of purchases or development (costs) and the learner himself (learners). The barrier of the environment was not mentioned during the study conducted in 2006 nor during the study conducted in 2012. It is important to reiterate that the barrier associated to the bandwidth doesn't seem to be there anymore. The barriers faced by SMEs are similar to those found in the review of the literature.

According to reference [31], many SMEs may be more willing to engage in the use of the Internet and e-Learning if they can overcome the barriers that are preventing them from moving forward in this digital economy. Therefore, in order for e-Learning to be a doable and viable solution for all SMEs, we must eliminate or at least mitigate some of these barriers. Activities to promote e-Learning, at all levels of the firms, also have to be undertaken by different stakeholders. The various approaches presented below are a step in that direction.

- « The necessary bandwidth is not available in all regions. » Gérôme (G:264–267)
- « The necessary bandwidth is not available everywhere. » Ivan (I:886–896)
- « Some employees do not have access to the Internet at home. » Jules (J:1055–1064)
- « We don't have the facilities for such courses. [...] They were conditioned to receive training in a certain way, with a teacher. It will be difficult to change this. » Arthur (A:509–513: 613–617)
- « Not all of our employees have a computer at home. We will have to organize a class with computers and give the employees some free time in order to get trained. There are costs associated with that. » Jules (J:1086–1107)
- « The employees don't have computers access here. » Theresa (T:336)
- « Employees do not have all the necessary knowledge. » Ivan (I:822–830)
- « As mentioned earlier, many of our employees don't have their 12th grade. » Stan (S:477–477)
- « First we would have to know what is available [...] The information is missing. There is no directory of what is available or, if there is one, I don't know about it. » Hector (H:140–147)
- « It is difficult to find courses relevant to what you need and it takes time. » Bert (B:719–726)
- « We had too many employees who were not studying but surfing on the Internet ... We had to restrict access to the Internet. » Bert (B:531–543)
- « There are people who need to be in class in order to learn. It depends on the type of learner you are. If you are able to learn alone and you do not need interaction, it is OK. » Monique (M:637–647)
- « It's scary when you do not know what it is. » Gilbert (G:264–267)
- « Some of our employees have done some courses over the Internet. [...] They are motivated ... they needed the courses for their job. » Ron (R:826–829)
- « The cost and time for development at the internal are high. » Edna (E:419–423)
- « The costs for a course like an MBA(on-line) are very high. » Denise (D:687–693)
- « It is expensive to develop courses in-house and it takes a lot of time. We need a champion to lead the case. [...] It took us a while to find the right platform. » Bert (B:576:581–584:1044)
- « It will be too expensive ... too expensive for what we need. » Theresa (T:773–775)

Table 3. Illustrations of the barriers encountered by SMEs in the use of e-Learning

Barriers	SME (2006)																SME (2012)			
	Profile I				Profile II				Profile III				Profile IV				Profile V			
	Strong				Average				Weak				Non-existent				Mixed			
No. of employees	300 to 485				60 to 280				150 to 350				75 to 400				150 to 490			
	C	D	K	L	B	E	M	O	A	F	I	J	G	H	N	P	Q	R	S	T
Accessibility	x				x						x	x	x			x				
Training and support					x			x	x	x	x		x				x	x	x	x
Course and content					x		x				x		x	x	x	x	x	x	x	x
Interaction		x	x								x		x			x	x	x		
Learners	x			x	x		x			x	x						x	x	x	
Environment																				
Costs	x	x		x	x	x		x		x	x						x	x	x	x

Table 4. Barriers to the use of e-Learning according to SMEs

4.2. Approaches to overcome barriers to the use of e-Learning by SMEs

As mentioned earlier, the investment of a company in the training and update of the employees' skills is a key element of growth in the knowledge-based economies [1, 2]. Consequently, SMEs need to exploit e-Learning to address their training needs in order to ensure their growth and their sustainability [1, 2, 28, 61–63]. However, if we want businesses to use e-Learning, barriers need to be removed or at least reduced [24, 27, 28, 57, 59]. In addition, a culture more favourable to e-Learning must be developed [21, 24, 27, 28, 62, 64]. The culture change must also be transmitted and adopted by all stakeholders, i.e. by SMEs, governments and the various players in economic development and society in general [23, 24, 27, 28, 65]. Therefore, the approaches to incite SMEs to use e-Learning must include both actions to develop a culture more conducive to e-Learning and actions to remove or reduce barriers in using e-Learning [27, 28].

The development of a culture of learning and e-Learning passes, among other things, by valuing learning and having a better understanding of the e-Learning [2, 27, 28, 64, 66]. The comment issued by Denise illustrates indeed the need to develop a culture of learning and enhance learning. She says: « *We must develop a learning culture in society in general because without education or training, businesses cannot survive* » (D:985–999). For its part, the comment issued by Jules illustrates the need to learn more about e-Learning. He says: « *It is important that SMEs see practical examples of e-Learning, things that are already used by another company if you want them to invest or move in that direction. The best way to educate a group is to present the success of customers or other SMEs and to recommend them to verify this with them. [...] It is also necessary to develop success stories* » (J:1546–1551: 1557–1565: 1582). Developing a culture of learning and e-Learning is also about building and sustaining an environment that inspires and supports employees to pursue learning [67]. The comment issued by Quynh illustrates the need for a business to create an environment that motivates and supports employees to pursue learning; she says: « *In our field, it is very important for us that our employees keep their skills up-to-date. This is why we develop a partnership with a private college in order to develop e-Learning courses to fulfill our needs. [...] We also reimburse some university courses taken by our employee* » (Q:991–993:997–998).

Champions of learning and e-Learning are another way to develop a culture of learning and e-Learning [27, 28, 67]. Champions, at every level of the organization, can help towards the promotion and awareness of e-Learning. This promotion and awareness can be done by internal champions of e-Learning [27, 28, 67–70] as well as by external champions [1, 27, 28, 71, 72]. However, champions must have credibility and knowledge of e-Learning [27, 28]. The comment issued by Bert clearly illustrates the need for internal champions of e-Learning. He says: « *Developing courses in-house is expensive and it takes a lot of time. We need a champion to lead the case* » (B:576: 581–584). Ron's comment illustrates how internal champions can have an impact on the choice of taking or not an e-Learning course. He says: « *Word of mouth is important. Some of our employees have taken some e-Learning courses because someone else has taken the course and given a good review. Some of our employees lead the show in regards of e-Learning* » (R:946–949). For its part, Edna illustrates the need for external champions of e-Learning. She says: « *I think it should be up to someone like an economic development agency to tell SMEs about what is available* » (E:613–615). Monique's comment also illustrates the need for external champions. She says:

« *The information spreads quickly around here. If a person is satisfied with e-Learning, it won't take long for everyone to know. You can use agencies or groups to circulate the information. [...] I think we should encourage suppliers to give seminars to show what they have as courses. They could provide examples of people or businesses that use their courses. [...] They could show the different possibilities of e-Learning for various industries* » (M:423–427: 848–851: 861–866).

As previously mentioned, in addition to actions in developing a culture more conducive to e-Learning, actions should be undertaken to remove or reduce barriers in using e-Learning if we want to encourage SMEs to use e-Learning. To this end, various actions including the improvement of the accessibility to e-Learning, the upgrading of SMEs' and employees' skills in technology and e-Learning and the offering of technical support must be undertaken.

Accessibility has been one of the major barriers to e-Learning in the 2006 study. The lack of bandwidth in some regions was reducing the ability of companies and employees to download training courses in e-Learning format. Ivan's comment goes in this direction. He says: « *The Internet is the Internet. There are places where it is not fast [...] We need more bandwidth* » (I:886–898). G  r  me also mentions the need for more bandwidth; he says: « *The speed of the line (bandwidth) has to be greater, we should have a better network* » (G:268–270). For its part, Jules says: « *Some employees may not have access to the Internet at home* » (J:1055–1064).

Initiatives have been undertaken in the last years to overcome the accessibility barrier and in the 2012 case study, none of the SMEs mentioned this barrier, which tends to support references [26, 29] findings. According to reference [26], technological improvement and the design of high-capacity networks for sharing data have allowed for solving most of the limitations of the traditional learning methodology both by facilitating access to information and by adapting programs to individual needs. According to reference [29], the increase in bandwidth is now achieved.

One of the factors which also discourage businesses to use e-Learning is the lack of support available [27, 28]. The lack of support was a barrier to the use of e-Learning in the 2006 study and is still a barrier. Thus, in order to ensure that SMEs and learners do not drop out or refuse to use e-Learning, they must be given the necessary support to use e-Learning [2, 23, 24, 27, 28, 57, 59, 64, 73, 74]. To this effect Ivan said: « *It will take some support. There are some people who do not know how to download and install the necessary software* » (I:886–901). He adds: « *Universities or another organization should make resources available by e-mail or telephone to provide a consulting service for SMEs. They could also leave a phone number that people could call, say between 4:00 pm and 6:00 pm, if they have questions. The questions would be answered by students. This would be part of their training, and this would be an improvement for the business community. This would be a way to get people interested* » (I:1086–1098). For its part, Denise says: « *It is necessary to speak the language of SMEs and employees* » (D:1020). Theresa gives us another example of the need of some support in order to use e-Learning; she says: « *We will need some external support. As I have said earlier, we don't have computers on the floor and we don't have computers technicians here* » (T:442–443).

In firms where the availability of resources is limited, e-Learning based on cloud computing could be an interesting alternative since it creates virtualized resources (hardware and

software) that can be made available to users [75–81]. Users connect their devices (computers, tablets, smart phones, etc.) to the server where applications have been installed and use them to train themselves [75, 79, 80]. There is no burden of maintenance. Software and hardware updates are done by the providers [81]. Users can also receive external computing support from the cloud supplier [77, 78]; which is an important aspect for smaller firms [77]. Nevertheless, top management commitment and support is still a requirement for cloud e-Learning [77].

The lack of knowledge towards e-Learning and the technology is among the factors that discourage SMEs and employees from using e-Learning [2, 24, 25, 27–29, 74]. The comment of Hector is an example; he says: « *First, it is necessary that SMEs are equipped with people who can prepare the material for e-Learning. The IT equipment and the applications have to work. [...] People who do the promotion have to know what they are talking about. It will take trained people to promote e-Learning to other businesses* » (H:386–398: 410–412). Thus, in order to ensure that learners do not drop out or refuse to use e-Learning, we must ensure that employees have the equipment, the software, the skills and the necessary knowledge needed to use e-Learning [24, 31, 64, 69, 74]. Reference [58] suggests offering training seminars in IT skills to people working in SMEs in order to help small firms integrate information and communication technologies in their business activities and improve their competitiveness. Ivan gives us an example of the necessity to train employees; he says: « *Employees do not have all the necessary knowledge. We might have to train them before they can use computers and e-Learning* » (I:822–830). It is also necessary to provide basic courses to those who do not know how to use computers. Jules's comment goes in this direction; he says: « *Some of our employees do not have the knowledge and skills necessary [...]* » (J:654–658). Stan's comment also expresses the need for better-trained employees. He says: « *Some of our employees don't have what's needed... we will have to offer them some training* » (S:611–612). For her parts, Theresa expresses her firm's incapacity to support e-Learning; she says: « *We don't have computers technicians here...* » (T:223).

Cloud-based e-Learning could be an alternative to the lack of knowledge on technology since the SMEs and the employees don't have to be knowledgeable on the necessary technologies because the technology itself is being offered by the provider [77–80]. Moreover, since the e-Learning applications run on provider's infrastructure, the need to keep high-end computers and highly qualified technicians is eliminated with cloud-based e-Learning [81].

The lack of information about what is available on the Internet is one of the barriers identified in the use of e-Learning [27] by both authors and SMEs themselves despite references [73, 82] showing a large number of courses available on the Internet. To overcome this barrier, some researchers [for example, see 82–84] suggested using tools to explore the availability of e-Learning, and thus better understand what is available on the Internet. For their part, references [27, 28, 69] suggest creating and distributing tools to help companies use e-Learning. Reference [58] also suggests the development of information counters in order to provide information and empirical evidence to SMEs. The comment of Gérôme illustrates well the need of a toolbox; he says: « *The most interesting way would be to bring me a catalogue and to tell me what is available as training [...]* » (Gérôme G:595–597). Edna also expresses the need for a toolbox for SMEs or access to different resources. She says: « *I think if the economic development agencies have*

libraries of courses pertinent to SMEs to train their employees, SMEs would see e-Learning as a very effective way to provide training. I think that it is necessary to develop inventories of existing courses or to give access to portals such as 'Soft Skill' where there is a library that contains hundreds of useful courses to SMEs to train their employees » (Edna E:615–625: 627–643). Ron's comment also expresses the need for help finding what is available in terms of e-Learning. He says: « *If someone could tell us what is available as training [...]. Which courses are good ones [...]. It would be very helpful »* (R:974: 977: 980).

Costs are also a barrier to e-Learning. In-house development or external tailored development of e-Learning courses and/or buying general e-courses can cost a lot of money [27, 28, 31, 32, 38, 40, 44, 58, 59, 64]. Ron is giving us an example how in-house development can cost a lot of money to a small business; he says: « *It takes a lot of time to develop courses in-house and it is expensive »* (R:815–816). The comment of Quynh is an example of how buying external courses could be expensive; she says: « *An on-line MBA costs a lot of money, especially one with a good university such as... »* (Q:717–719). To overcome this barrier, reference [2] suggests ensuring that the costs of education and training be shared. Reference [2] also suggests that governments can design financial incentives and tax policies that encourage individuals and employers to invest in education and training. For reference [64], some changes in the supports available to e-Learning funding are required for Canada to 'leapfrog' to a stronger adoption of e-Learning. Facilitating SMEs' access to funding will also help improve SME's access to training interventions, according to reference [58].

Since cloud e-Learning's task is to ensure that users, such as SMEs, can simply use the computing resources (infrastructure, software, platform) and e-Learning resources (courses) on demand and pay money according to their usage [75–77, 79, 81], cloud computing is a cost alternative for providing training in SMEs [75, 78–80]. By lowering operation costs through cloud computing, a firm can redirect the saved money towards the development of in-house content or purchase content developed by other organizations [80].

5. Conclusion and discussion

In recent years, e-Learning has grown into a widely accepted learning model by larger organizations and to some extent by SMEs. The technological advances along with a reduction of their costs allow SMEs to reconsider the e-Learning model in order to train their employees.

In Atlantic Canada, a growing number of SMEs are aware of e-Learning, and use it to train their employees. During this study, three quarters of the SMEs participating used e-Learning to various degrees to train their employees. Nevertheless, they encounter numerous barriers when they want to use e-Learning.

The barriers that need to be addressed and are preventing SMEs in using e-Learning are the same as those which larger organizations are facing. The lack of training and support for both SMEs and employees is a major barrier. There is no support service regarding technology and e-Learning in some firms and the technical infrastructure is inadequate in others. The learners'

lack of skills is another problem. There is a large number of employees whose level of knowledge is inadequate for e-Learning and who don't have any interest in computers, even less in e-Learning. The lack of knowledge on e-courses and content relevant to the needs of SMEs including false expectations of SMEs as to what e-Learning can and cannot do is another barrier. The level of interaction of e-courses is also a challenge for SMEs. E-courses where there is some level of interaction are judged more interesting and appropriate for effective learning. The cost of purchases of e-courses or the cost of in-house development is an important barrier. Finally, the culture towards learning and e-Learning is also an obstacle. The accessibility which was a barrier in the 2006 study doesn't seem to be a barrier anymore for SMEs, nor for the employees/learners at home.

Therefore, in order for e-Learning to be a viable and feasible solution for all SMEs and for the full potential of e-Learning to be achieved by SMEs, conditions favourable to e-Learning must be created and maintained. Efforts are required to eliminate or at least alleviate some of the barriers SMEs run into while using e-Learning. Activities to promote e-Learning have to be undertaken at all levels of the firms as well as different stakeholders if we want SMEs to fully engage in the use e-Learning. The various actions presented below to alleviate and to eliminate some of these barriers are a start in that direction.

Indeed, a number of actions could facilitate the adoption of e-Learning by SMEs and address the barriers they face in its adoption. The first set of actions should focus on the need to develop an e-Learning culture within the SMEs: an e-Learning culture where managers and employees are truthfully committed and motivated to lifelong learning using e-Learning because they believe it is essential to their individual development and their firm's growth. This requires greater awareness and promotion of learning and e-Learning's value through the dissemination of knowledge among SMEs as to the nature, possibilities and advantages of e-Learning for workplace training. It also requires a better awareness and promotion of the supply and appropriateness of e-Learning services and products available.

A second set of actions should focus on eliminating or at least alleviating the barriers to the efficient and effective use of e-Learning by SMEs. Inadequate infrastructure, technological problems and lack of support services are major barriers to e-Learning and can eliminate the motivation to learn through e-Learning. Inadequate or lack of necessary skills of the employees to learn through e-Learning is also a barrier faced by SMEs. This implies that employees must possess the computer knowledge and skills required to use e-Learning effectively, and that they should be provided with computers and e-Learning software at work that are user-friendly and appropriate to the task at hand if we want to eliminate these barriers. This also implies better management and technical support of employees in regard to e-Learning, support which was found lacking in a number of SMEs. Cloud-based e-Learning could be a solution since it can alleviate some of these barriers. Finding relevant courses to the need of SMEs is also a barrier. This implies a need for a better dissemination of information on existing e-courses and other possibilities. Finally, the cost of in-house development of e-courses and of purchases of external tailored e-courses is another major barrier to the use of e-Learning. Cloud-based e-Learning could be a solution here and at the same time lower the burden of cost.

Considering the limitations of our research, it should be noted that our sample includes 16 SMEs in the first case studies and 4 SMEs in the last case studies. This constrains the possible generalization of results; thus further research is needed in order to confirm our conclusion. Nevertheless, this research sheds light on the barriers faced by SMEs when they want to use e-Learning to fulfil their training needs and introduces some ideas on how to address these barriers.

For e-Learning's full potential to be achieved, favourable conditions to learning must be created and maintained in Atlantic Canada and Canada in general. Stakeholders such as governments, economic development agencies, SMEs, employees, learning institutions and society in general have an important role to play in developing a culture more conducive to learning and e-Learning. Stakeholders also have a role to play in facilitating access to e-Learning in order to ensure the growth and sustainability of SMEs.

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