Learners' Socio-Demographic Characteristics and Participation in Computer Conferencing

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Abstract

This article explores the relationship between learners' socio-demographic characteristics and their level of participation in computer conferencing. A quantitative study of participation among thirty learners in a non-credit, agricultural leadership development program provides the empirical data for this exploration. The relationships between learner participation and six socio-demographic variables are explored: gender, age, education level, occupation, residence in urban or rural areas, and region of residence in Canada. Holding a university degree and living in an urban area are found to be the strongest predictors of participation. Recognizing that a considerable amount of variability in learners' participation in computer conferences may reflect those learners' socio-demographic characteristics has important implications for the design and facilitation of such conferences.

Introduction

Computer conferencing is emerging as an important medium for distance education (Garrison, 1997). The relative advantages of this medium to facilitate learning at a distance include the opportunity for ongoing contact between participants, offsetting the isolation often cited as a primary disadvantage of traditional, independent study programs (Bullen, 1998). Computer-mediated communications technologies, creatively applied, can overcome the isolation of traditional distance education by "incorporating into the course activities which specifically require student initiative, student discussion, student reflection, or iterative attempts to improve one's work" (Davie & Wells, 1991, p.15). In addition to increased opportunities for learners to interact with one another, computer conferencing potentially reduces learners' dependence on an instructor. Harasim (1987) reports instructor contributions in a computer conference environment as low as 10% to 15% as compared to 60% to 80% of verbal interaction being monopolized by instructors in traditional face-to-face settings. Since learners talking more and instructors talking less has long been associated with increased student learning, a greater proportion of communication coming from learners likely indicates a positive development rather than an abdication of instructor responsibilities.

Opportunities for increased interaction through active participation in a computer conferenced learning environment have additional benefits. Empowerment, as described by Davie and Wells (1991, p.16), can be realized by "the expectation and enabling of a

student to take a visible and meaningful role in the electronic classroom." Benefits of such empowerment through active participation include increased potential for the development of critical thinking skills (Davie and Wells, 1991; Garrison, 1997), better access to group knowledge, and increased motivation (Harasim, Hiltz, Teles, and Turoff, 1997). Another benefit to be gained by using the opportunities for increased participation in computer conferences is the increased potential to build a "community of learners" (Palloff and Pratt, 1999). Designing on-line exercises that foster collaborative learning can help to establish an environment in which individual contributions are directed toward group efforts (Davie and Wells, 1991) and the establishment of a sense of belonging (Eastmond, 1995; Palloff and Pratt, 1999). Finally, the particular characteristics of the medium of computer conferencing create unique opportunities for participation not found elsewhere. For example, every learner has the opportunity to engage in the dialogue without regard for the structures of time and space (Harasim, Hiltz, Teles, and Turoff, 1997). Also, unlike the traditional classroom, more verbose participants are not as easily able to dominate the conversation. Some have speculated that less assertive and more reflective learners find it easier to participate in discussions and that the interaction that takes place in a computer conferenced learning environment is qualitatively better than in the traditional classroom (Harasim, 1987; 1990; 1995).

Since participation is a prerequisite to maximizing learning in computer conferenced environments, it is critical to examine the nature of online participation. It is obvious that computer conferencing design and facilitation need to incorporate strategies that increase overall rates of participation among learners (Paulsen, 1996; Mercer, 1994). However,

designers and facilitators also need to pay attention to the quality of learner contributions, and to the equity of contributions among different participants. This article is based on its authors' experiences designing and delivering the online component of the Canadian Agriculture Lifetime Leadership (CALL) program. As will be described more fully below, the computer conferencing component of the CALL program was characterized by a very uneven level of participation among its thirty learners. Since a fairly uniform degree of participation would seem to be more conducive to learning among all participants in a computer conference, we became very interested in understanding the variability in rates of online participation among our learners.

Much existing literature on computer conferencing participation focuses on pedagogical interventions and counseling strategies for improving participation rates (Davie, 1989; Feenberg 1993; Paulsen, 1996). However, this literature does not adequately explain the factors influencing differential participation rates among learners (Bullen, 1998). In his review of such literature, Bullen (1998, pp. 4-5) identifies three categories of factors affecting learners' computer conferencing participation: the inherent attributes of computer conferencing; the design and facilitation of computer conferencing; and student dispositional and situational factors. Bullen's list of dispositional factors includes learners' attitudes toward computer conferencing and the subject of the conference, computer and computer conferencing skills, degree of comfort with the medium of communication and the epistemological orientation of the course, and motivation. His list of situational factors include learners' access to needed hardware and software, time available for study, and general (home) learning environment. An earlier study by Ross,

Crane and Robertson (1995) also identified computer skills and technical problems as key barriers to equity of access to computer conferencing.

While dispositional and situational factors are undoubtedly important, do they really give distance education practitioners and scholars a full understanding of why different learners vary so much in their participation? Are differences between learners the result of personal differences in things such as motivation, learning style or skill level? Or, do the cultural and pedagogical structures of computer conferencing favour the participation of learners having certain social or demographic characteristics? This article uses an empirical study of thirty learners in a twenty-month computer conference to explore the relationships between learners' socio-demographic characteristics and their varying levels of computer conferencing participation.

The range of socio-demographic variables considered in this article is limited by the characteristics of the learners in the computer conference that served as its focus. As will be described more fully in the subsequent section, the thirty learners whose computer conferencing participation is explored in this essay shared a number of important characteristics. They were all actively employed in agriculture or the agri-food industry. They all had the social and economic resources to take part in a two-year leadership development program whose annual tuition fee was $2,500, and they all had the intellectual and social skills to have been selected to a program whose competitive recruitment process attracted over 140 applicants from across Canada. In addition to these common characteristics which were defined by the parameters of the CALL

program, all thirty participants also happened to be Canadian citizens of European ethnic heritage.

Despite similarities of occupational sector, socio-economic status and ethnicity, this group of learners presents an interesting opportunity to explore the influence of a range of other socio-demographic characteristics on learners' computer conferencing participation. Are there differences between the participation rates of male and female learners; younger and older learners; learners with relatively more or less formal education; learners residing in rural or urban areas; farmers and learners with other principle occupations; learners from the different regions of Canada? These are important questions for computer conference designers and facilitators, since if such socio-demographic characteristics shape learners' levels of participation, then the design and facilitation of computer conference learning environments should be sensitive to such characteristics. For example, if individual learners' level of active participation in computer conferencing can be predicted from their socio-demographic characteristics, then more intensive facilitation techniques can be designed for those learners at the start of a course or program.

The unique group of learners that provide the subjects for our empirical research enhances this article's focus on the relationships between socio-demographic characteristics and computer conferencing participation. Many existing studies exploring the pedagogical application of computer conferencing use university students enrolled in degree-credit courses as the subjects of their research. For example, Bullen (1998, p. 7)

suggests that gender, age and education level were observed to have an impact on the level of participation among learners in his study. However, he was unable to rigorously analyze the impact of such variables because of the small number of participants in his study (n=13), and because the participants were fairly homogenous. The thirty subjects of the current study were neither conventional university students nor homogenous. The CALL participants were adult learners enrolled in a non-credit leadership development program. Therefore, beyond the moral suasion of peers and facilitators, there was virtually no compulsion for anyone to take part in the computer conference. Participating more or less in conferencing activities did not have the instrumental benefit for participants – such as a higher grade in their course –often associated with distance education for traditional university students. In other words, while participation in the computer conference was understood to be an expectation of the program, there was no extrinsic motivation to participate actively. It should be noted that the participants in this computer conference were all fully employed, adult learners; their computer conferencing activities were undertaken in the context of already very busy lives. Understanding the determinants of participation of such groups of adult learners is important, because as Kanuka and Anderson (1998, p. 73) assert, computer conferencing is rapidly becoming a popular tool for continuing professional education.

In the next section, we briefly describe the objectives and structure of the program whose learners form the subjects of this article. We then describe the computer conference and its participants in more detail. After describing our research methods, we discuss our findings with regard to participation in the computer conference. We document that there

was substantial variability in the range of participation between learners, and then we explore the extent to which such variability reflected those learners' socio-demographic characteristics. We conclude by identifying implications for the study and practice of computer conferencing applied to learning contexts.

CALL and its Computer Conference

The mission of the Canadian Agriculture Lifetime Leadership (CALL) program is to develop effective leaders for the Canadian agriculture industry. The University of Saskatchewan Extension Division, in partnership with the Canadian Farm Business Management Council and Agriculture and Agri-Food Canada, delivered the initial pilot cohort of the CALL program from September 1997 through May 1999. Thirty learners from across Canada were selected for the program, whose curriculum was built around three pillars: broadening horizons of knowledge in leadership and agricultural issues; practicing the arts of leadership; and building effective networks. Six face-to-face seminars and an ongoing computer conference were the basic delivery strategies used in the program. The face-to-face seminars were distributed between November 1997 and March 1999, and took participants to six Canadian provinces, three American states, and Mexico.

While the face-to-face seminars required learners to take part in about forty-five days of full-time study, the CALL computer conference expected learners to devote about five hours of work per week throughout the eighteen months of the program. Computer

conferencing served the CALL program in three ways. First, it supported the face-to-face elements of the program by providing opportunities for ongoing learner interaction between the in-person seminars, and a forum through which to orient learners to forthcoming seminars and to debrief past seminars. Second, it served as a medium for participants to build knowledge and skills related to agricultural leadership. Third, the act of participating in the conference itself served to enhance learners' abilities to use new information technologies for purposes of leading organizations.

The CALL computer conference, which used the FirstClass conferencing software, was structured into a number of sub-conferences. For purposes of our analysis in this study, we categorized the various sub-conferences into three types: social, academic, and information exchange. The "social" function of the computer conference revolved around the "Café." The Café sub-conference operated throughout the entire duration of the program, and was designed to encourage the building of interpersonal rapport and strengthen the development of a network of learners. Learners were encouraged to use the Café sub-conference for a wide range of personal and professional information sharing.

Five "academic" sub-conferences operated at different times. The "Issues Analysis Project" sub-conference existed over virtually the entire duration of the program. The three core goals of this project were to build knowledge of important issues in the Canadian agriculture industry, to practice key leadership skills such as communication, working in groups, and critical thinking, and to share the results of the exercise through

both oral and written reports. At the initial face-to-face seminar of the program, the thirty learners divided themselves into seven working groups organized around an issue of national importance for agriculture in Canada. Each group worked together on its chosen issue, such as education, public policy, globalization, biotechnology or marketing, through a process of gathering and assessing information, creating and critiquing ideas, and preparing and revising reports. Each group had its own "working sub-conference," and all groups shared an "IAP Forum" where they could post information and progress reports of interest to other groups. In addition to on-line work, some time was devoted at each of the face-to-face seminars for groups to work on their Issues Analysis Projects.

The "Current Events Forum" and the "Leadership Challenge Discussion Area" operated from November 1997 through June 1998. The Current Events sub-conference was designed to raise awareness of contemporary agricultural and non-agricultural issues from different regions and sectors of Canadian agricultural activity. For purposes of this sub-conference, learners were grouped into four regional teams (Atlantic, Central Canada, Prairie Provinces, and West). On a rotating, weekly basis, each team was responsible for posting information and facilitating discussion concerning key regional issues facing the agri-food industries. Each regional team had a "working sub-conference" in which to organize their postings, and the four teams shared the "Current Events Forum" for postings and public discussion. The "Leadership Challenge Discussion Area" was a sub-conference to which all learners were encouraged to contribute their reflections and insights about the core leadership textbook used in the course (Kouzes and Posner, 1995). The discussion in this sub-conference was structured

in part by questions posted by the CALL Program Manager concerning each of the chapters in the textbook.

After a mid-summer break in computer conferencing activities, and as a result of feedback from a formative evaluation instrument, a "Key Issues Forum" replaced the Current Events Forum. From September 1998 through the end of the program, the Key Issues Forum provided a sub-conference for individual learners to post information and discuss issues which they thought were important to agriculture in Canada. The major difference between the key issues discussion and the preceding current events discussion was that the Key Issues sub-conference was not structured by regional teams with formal responsibilities for posting messages according to a defined schedule. The final "academic" sub-conference in the CALL computer conference was the "Visioning Project," which began in October 1998 and ended in March 1999. The Visioning Project challenged the CALL participants to define and communicate a shared vision for the future of the agriculture industry in Canada. On-line work made a modest contribution to the successful completion of this project, with the most intensive visioning work accomplished at the three face-to-face seminars in the second year of the program.

The final category of sub-conferences in the CALL computer conference related to the exchange of various types of information that could not easily be categorized as specifically academic or social. The "Preparation / Debriefing" sub-conferences were designed to enable learners to maximize their benefits from the six face-to-face events through providing information about forthcoming events, and creating a forum for the

discussion of past events. The "CALL Web" sub-conference was designed to encourage the development of effective skills in accessing and assessing information from the Internet, and to broaden learner awareness of contemporary issues and available online resources relevant to agriculture. The "Info Depot" sub-conference was a bulletin-board space for the posting of information of interest to CALL participants, and it included a "help" function. Finally, the general "CALL Conference" area was used to post announcements.

Research Methods

Data for this study were obtained through an unobtrusive review of the archive from the entire CALL computer conference. Informed consent was obtained from all participants prior to the start of data collection. The conference itself took place from October 1997 through May 1999. Over the course of the computer conference, regular "housekeeping" was conducted to delete trivial messages (such as one-word responses to existing messages) and archive all other messages. In the summer of 1999, each individual message that had been archived over the course of the entire conference was categorized according to (1) the identity of the sender; (2) the month in which it was sent to the conference; and (3) the sub-conference to which it was sent. This categorization was then transferred to a spreadsheet, and the data were compiled and analyzed using the Statistical Package for the Social Sciences (SPSS). Contributions from program facilitators and organizers were excluded from data analysis.

The research methods used in this study have several limitations. First, we have only a quantitative indication of participation levels in the computer conference. We use the number of messages written and sent by individuals as the measure of their participation in the conference. Such an approach cannot capture meaningful qualitative differences in length, thoughtfulness, or other characteristics of different individuals' participation. Despite our deletion of "trivial" messages from the conference archive, substantial variation exists between the quality of different messages whose submission counts as one message in our analysis. Second, we have included only messages sent to "public areas" in our analysis. We were not able to measure two other important types of participation in this computer conference: private e-mail messages sent between participants, or between participants and the conference facilitators; and synchronous "chats" between participants. Third, we have made no effort to measure "lurking," or the extent to which learners participated in the conference by reading other participants' messages, but not responding with messages of their own. Despite these limitations, we are confident that the crude number of messages sent by learners provides a reasonable estimate of their level of participation in the CALL computer conference.

Although levels of statistical significance are reported in the findings from this study, readers should use caution when generalizing our results to other populations of learners. The thirty participants were not randomly selected. Rather, they were purposively selected because of their potential to contribute significantly to the leadership of businesses and organizations in agriculture. In addition, the relatively small sample size (n=30) limits the power of the tests of statistical significance used in the analysis.

Therefore, we will comment on both relationships which have statistical significance, and on those that would appear to have a practical importance, although not statistical significance in the analysis.

Findings and Discussion

Learners and their Socio-Demographic Characteristics

Sixteen men and fourteen women participated in the first CALL cohort. Six of these participants were from Atlantic Canada, four from Ontario, three each from Quebec, Manitoba and British Columbia, six from Saskatchewan and five from Alberta. Most major agricultural commodities produced in Canada were represented by at least one participant in the CALL program: grains and oilseeds; cattle; dairy; hogs; poultry and eggs; greenhouse production; specialty crops; and potatoes. While the CALL participants had diverse backgrounds, they shared in common past experience and current commitment to serving as leaders with farms, agri-businesses, non-governmental organizations and rural communities. Farming was the principal occupation of sixteen of the participants, while the other fourteen worked for businesses or non-governmental organizations in the agriculture sector. Six learners resided in cities, while twenty-four lived in rural areas.

Table 1 indicates the level of formal education obtained by the thirty learners in the CALL program, and Table 2 indicates their approximate age.

Table 1. Learners' Formal Education Level

	Frequency	Percentage
Less than high school	2	6.7%
High school diploma	2	6.7%
Some post-secondary	10	33.3%
University degree	10	33.3%
Graduate degree	6	20.0%
Total	30	100%

Table 2. Learners' Approximate Age

	Frequency	Percentage
Under 30 years	1	3.3%
30 to 34 years	2	6.7%
35 to 39 years	6	20.0 %
40 to 44 years	6	20.0 %
45 to 49 years	7	23.3%
50 to 54 years	6	20.0 %
55 years or more	2	6.7%
Total	30	100.0%

Sixteen learners in the program had graduated from university, and fourteen had not. One-half of learners were younger than forty-five years of age, and one-half were older.

Overall Participation

Table 3 indicates the overall level of participation by the thirty learners in the CALL computer conference.

Table 3. Overall Participation in the Computer Conference

(n = 30)	Total Messages	Mean / Participant	Standard Deviation	25th Percentile	Median	75th Percentile

Participation in the Café	1,000	33.3	36.6	11.5	18.0	41.3
Participation in Academic Sub-Conferences	1,424	47.5	48.7	14.8	32.0	68.5
Participation in Information Exchange	539	18.0	20.9	5.8	12.5	21.8
Overall Participation	2,963	98.8	102.1	33.5	66.0	114.8

The final row in Table 3 refers to all of the messages that were sent by learners to the computer conference. The first three rows divide this overall participation into the three categories of sub-conferences defined above. The two columns at the left of Table 3 indicate the overall number of messages sent to each category of sub-conferences, and the mean number of messages sent by each of the thirty learners to these sub-conferences. Of the total number of messages, 48.1% were sent to academic sub-conferences, 33.7% to the Café, and 18.2% to information exchange sub-conferences. Given that the CALL computer conference lasted for twenty months, the average level of participation was just under five messages per month per learner.

The number of messages exchanged varied somewhat each month, but participation in the computer conference was relatively stable over time. The highest concentration of messages (888, or 30%) was sent during the last four months of the program. There was a strong correlation between learners' participation in each of the three categories of sub-conferences. The Pearson correlation coefficients with regard to overall participation were .953 for the Café, .972 for the academic sub-conferences, and .956 for the

information exchange sub-conferences. The lowest correlation between any two types of sub-conferences was .864 for the participation in the Café and the academic sub-conferences. This means that there was a strong likelihood that those learners who contributed relatively few (or many) messages to any one type of sub-conference would also have sent relatively few (or many) messages to the other sub-conferences. For purposes of presenting further data, we use only the overall participation rates, since these rates are such strong predictors of the rates of participation in each of the three different categories anyway. We found no meaningful differences with regard to specific socio-demographic characteristics being associated with differential participation across the three categories of sub-conferences.

The four columns at the right of Table 3 indicate substantial variability between the level of participation of different learners in the computer conference. The 25th and 75th percentile scores indicate that one-quarter of participants sent less than 34 messages, while another one-quarter of participants sent more than 114 messages. The large size of the standard deviation scores in comparison with the means, and the fact that each median score is substantially lower than the mean, indicate that a relatively small number of highly active participants contributed many messages, while most participants contributed fewer than the mean number of messages. Table 4 divides the thirty learners into three categories, based on their overall level of participation.

Table 4. Three Levels of Participation in the Computer Conference

	Definition	Number of Learners	Total Messages	% of All Messages	Mean # of Messages	Mean / Month	Range

Low	Less than 2 messages per month	8	160	5.4%	20.0	1.0	4-34
Med.	2 - 5 messages per month	15	1,071	36.1%	71.4	3.6	54-104
High	More than 5 messages per month	7	1,732	58.5%	247.4	12.4	147-479
Total		30	2,963	100%	98.8	4.9	4-479

Table 4 clearly indicates substantial differences in the level of participation of different learners. Seven "high-end" users contributed nearly sixty per cent of all messages to the computer conference, and sent on average over twelve messages per month. At the other extreme, eight "low-end" users sent an average of only one message per month. How can we understand the vast differences between levels of participation in this computer conference? Are such differences merely the reflection of idiosyncratic differences in motivation, learning styles, or receptivity to computer-conferencing as a medium of education? Or are there socio-demographic characteristics that predispose certain individuals to higher or lower rates of participation? The following section explores the possibility that learners' socio-demographic characteristics can explain, in part, their differing levels of participation in the CALL computer conference.

Participation According to Socio-Demographic Characteristics

Using analysis of variance procedures to compare the mean level of participation by learners with different characteristics, Table 5 provides a basic picture of the importance

of different socio-demographic factors for participation in the CALL computer conference.

Table 5. Analysis of Variance in Computer Conferencing Participation according to Socio-Demographic Characteristics*

	Mean	Stand. Deviation	(n)
Gender (F=.001, sig.=.973)			
Female	98.1	80.6	14
Male	99.4	120.5	16
Total	98.8	102.1	30
Age (F=.149, sig.=.703)			
Under 45	106.1	119.1	15
Over 45	91.5	85.4	15
Total	98.8	102.1	30
Education (F=.8.039, sig.=.008)			
No degree	48.1	28.3	14
Univ. degree	143.1	122.4	16
Total	98.8	102.1	30
Residence (F=9.373, sig.=.005)			
Rural	73.6	59.2	24
Urban	199.3	170.9	6
Total	98.8	102.1	30
Occupation (F=1.916, sig.=.177)			
Farmer	75.0	65.2	16
Non-farmer	125.9	129.9	14
Total	98.8	102.1	30
Region (F=.440, sig.=.727)			
Atlantic	76.5	60.1	6
Central	78.0	77.4	7
Prairie	100.7	102.6	9
West	131.5	146.2	8
Total	98.8	102.1	30

* Note: Separate ANOVA "F" scores and statistical significance coefficients have been calculated for each of the six independent variables in this table.

Learners' average level of participation in this computer conference did not vary according to gender. Men and women had virtually identical mean levels of participation. However, there was a difference, indicated by the standard deviation scores, in the variability of participation of men and women. Men were disproportionately represented at either the high or low end of participation, while women were clustered more strongly in the middle. Of the eight low-end users, six were men. Of the seven high-end users, four were men.

Learners' age did not have a strong relationship with their average level of participation. Those learners younger than forty-five sent an average of fifteen more messages than did those learners older than forty-five. Regression analysis also failed to reveal any meaningful relationship between age and level of participation. As with gender, age more strongly predicts variability in learners' rates of participation than it predicts their level of participation. Those learners over the age of forty-five were more likely to be at the high or low end of the participation spectrum, while those learners under forty-five were more likely to be in the middle.

The relationship of formal education with level of computer conferencing participation was both statistically significant and practically important. Learners with university degrees sent nearly three times the number of messages as did learners without degrees. The very low standard deviation score for non-degree holders indicates that not having a university degree was a very strong predictor of relatively low participation in the computer conference. All seven high-end users had university degrees.

Whether a learner lived in an urban or rural area also had a strong and statistically significant relationship with his or her level of participation. The gap between rural and urban dwellers was the largest absolute gap identified in our study. Learners living in cities sent an average of ten messages per month to the conference, while learners outside of cities sent an average of fewer than four messages per month. Of the eight low-end users, only one lived in a city.

Both occupation and region of residence had modest but not statistically significant relationships with participation. Non-farmers contributed an average of about fifty more messages to the computer conference than did farmers. Residents of Atlantic Provinces or Central Canada contributed fewer messages than did residents of the Prairie Provinces (Manitoba and Saskatchewan) or the West (Alberta and British Columbia).

From Table 5, it appears that gender and age had no impact on participation, that occupation and region of residence may have had minor impacts on participation, and that education and residence in rural or urban areas had major impacts. However, these initial appearances may reflect the interrelated character of different socio-economic characteristics. Do interrelationships between the various socio-demographic variables in our study influence the appearance of relationships between individual variables and learner participation? Table 6 investigates this possibility, by documenting average levels of participation while controlling for learners' level of formal education.

Table 6. Analysis of Variance of Socio-Demographic Characteristics with Participation – Learners with or without University Degrees

	Mean		Stand. Deviation		(n)		ANOVA* F, Significance	
	Non-degree	Degree Holder	Non-degree	Degree Holder	Non-degree	Degree Holder		
Gender							*Female*	*Male*
Female	48.7	135.1	27.2	88.8	6	8		
Male	47.6	151.1	30.9	155.1	8	8	F=5.22	F=3.43
Total	48.1	143.1	28.3	122.4	14	16	S=.041	S=.085
Age							*Young*	*Older*
Under 45	45.8	146.2	21.4	141.5	6	9		
Over 45	49.8	139.1	33.9	103.5	8	7	F=2.90	F=5.36
Total	48.1	143.1	28.3	122.4	14	16	S=.112	S=.038
Residence							*Rural*	*Urban*
Rural	48.1	109.4	28.3	73.2	14	10		
Urban	n/a	199.3	n/a	170.9	0	6	F=8.23	n/a
Total	48.1	143.1	28.3	122.4	14	16	S=.009	
Occupation							*Farmer*	*Other*
Farmer	50.6	115.7	31.7	140.8	10	6		
Non-farmer	41.8	159.6	19.5	88.3	4	10	F=4.63	F=2.65
Total	48.1	143.1	28.3	122.4	14	16	S=.049	S=.129
Region							*Atlan.*	*Central*
Atlantic	50.3	129.0	43.7	63.6	4	2	F=3.38	F=.059
Central	59.0	81.2	n/a	84.3	1	6	S=.140	S=.817
Prairie	32.0	186.5	22.3	98.6	5	4	*Prairie*	*West*
West	63.3	199.8	10.2	193.3	4	4	F=11.9	F=1.99
Total	48.1	143.1	28.3	122.4	14	16	S=.011	S=.208

- Note: The ANOVA "F" scores and statistical significance coefficients are reported to indicate the extent to which there is an observed difference between participation of degree and non-degree holders within each of the sub-groups indicated by the five other variables.
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Table 6 enables a more complete understanding of the relationships between socio-demographic characteristics and learners' participation in the CALL computer conference. When level of formal education is held constant, gender and age still do not appear to have had any impact on learners' level of participation. Men and women without degrees had virtually identical rates of participation. Among learners with

university degrees, men contributed slightly more messages, although the difference had neither practical nor statistical significance. Among learners with university degrees, those under the age of forty-five participated slightly more, while among those without university degrees, those under the age of forty-five participated slightly less.

Table 6 reveals that even under the control condition, both education level and residence in rural or urban areas still make a meaningful difference in the average level of learner participation. Comparing across every other variable (i.e. gender, age, occupation, residence and region), learners with university degrees were substantially more active than learners without degrees. As Table 6 documents, the influence of education on participation is statistically significant (at the .05 level) among women, those over forty-five years of age, rural residents (all urban residents had university degrees), farmers and residents of Manitoba and Saskatchewan. Among degree holders, urban residents were still much more active than their rural counterparts, but the difference between the two groups was not statistically significant. Though not reported on Table 6, comparing across the variable of education, there were no statistically significant relationships found by gender, age, residence, occupation, or region.

An interesting observation from Table 6 relates to the decreased size, relative to Table 5, of the apparent relationships between occupation, region and level of participation. Among those with degrees, non-farmers contributed somewhat more messages than did farmers. However, among learners without degrees, farmers actually contributed slightly more messages than did non-farmers. Thus, the apparent, modest relationship between

occupation and participation reported in Table 5 can be interpreted, in part, as a reflection of the fact that non-farmers in this group of learners were more likely, than farmers, to hold university degrees. Likewise, the East – West gradient of participation reported in Table 5 largely disappears in Table 6. Differences of participation between regions existed among learners with degrees, but were very small among learners without degrees.

In Tables 3 and 4, we identified substantial variability between the levels of participation of different learners in the CALL computer conference. In Tables 5 and 6 we identified education and residence in rural or urban areas as the key socio-demographic variables which might help explain why so much variability of participation existed within the CALL computer conference. What is the relative importance of education and rural or urban residence when explaining the overall variability in learner participation in this computer conference? Are these socio-demographic characteristics actually important, in comparison with other factors, such as Bullen's (1998) list of dispositional and situational factors? With such a small number of learners, such questions cannot be answered authoritatively. However, despite its limited usefulness with such a small (n=30) and not randomly selected sample, regression analysis provides a rudimentary estimate of the relative strength of education and residence in urban or rural areas as predictors of learners' participation in the CALL computer conference.

Table 7 presents the basic regression equation for education and residence in urban or rural areas with overall level of participation in the CALL computer conference.

Table 7. Regression Equation of Residence and Education with Participation

(n=30)	Slope (b)	Standard Error	Sig. of b
Education	61.3	36.0	.100
Residence	89.9	44.9	.056

Constant: 48.1, sig. = .049
ANOVA for the model: R Square = .323, F = 6.451, Sig. = .005
Education: non-degree = 0, degree = 1
Residence: rural = 0, urban = 1

In addition to indicating (by reported "slopes") the influence of education and residence on participation when holding the other key independent variable constant, Table 7 estimates the strength of these two socio-demographic variables' relationship with participation. The R Square value of .323 suggests that nearly one-third of all variability in levels of participation in the CALL computer conference can be attributed to the influence of education and residence in rural or urban areas. In other words, using this regression equation to predict the level of learners' participation results in predictions that are 32.3% more accurate than simply using the mean (98.8) for predictive purposes. For example, a rural learner without a university degree would be expected to have sent about 48 messages to the conference, while an urban learner with a university degree would be expected to have sent about 199.3 messages. Adding the other four socio-demographic variables in this study to the regression equation does not appreciably strengthen the predictive power of the model. With all six independent variables included in the model, the R Square value only increases to .356, and the statistical significance of the model drops to .09. About two-thirds of the variability in learners' participation in this study

cannot be attributed to the socio-demographic variables included in the analysis. This variability can be understood as reflecting situational and dispositional factors, random differences, and other structural variables that are not included in the analysis.

Conclusions

This article explored the influence of six socio-demographic variables on the level of participation in a computer conference: gender, age, education level, residence in urban or rural areas, occupation, and region of residence in Canada. Of these six variables, only education and residence in urban or rural areas were significantly related to rates of participation. Somewhat surprisingly, gender and age were not associated with overall rates of computer conferencing participation. Learners with university degrees participated more than did learners without degrees, and learners residing in cities participated more than did learners residing in rural areas. Intuitively, these findings make sense. Holders of university degrees likely have certain skill sets (typing, computer use, etc.) less common among those without degrees. Learners with university degrees may also have a higher level of interest or motivation for computer conferencing, since such work has parallels with the structures of university study. Our findings with regard to the differences between urban and rural residents may be less valid than our findings with regard to education. Only six learners in our study lived in cities, and selection bias may explain these individuals' relatively higher rate of participation. The urban learners in this study were all professionals whose daily responsibilities required them to practice the skills required for successful computer conferencing participation. However, there

are potential explanations for rural – urban differences in learner participation. Internet connectivity may be slower and more expensive in rural areas. Rural learners may face longer commuting times for work, recreation and shopping. Such time demands may give rural learners less frequent proximity to their computers, and thus reduce their practical level of opportunity to participate.

Implication for Practice

In this modest empirical study, we have provided support for the argument that learners' computer conferencing participation is related to socio-demographic characteristics. Of all the variability between learners in the CALL computer conference, nearly one-third can be attributed to education and residence in urban or rural areas. In practical terms, the recognition that educated, urban learners may be more likely to participate actively in computer conferencing has important implications for the design and facilitation of such forms of distance education. For example, differential attention may be necessary for the orientation and counseling of learners to ensure successful participation in an online environment. It may be appropriate, given scarce resources for computer conference facilitation, to focus more energy and attention on rural learners and learners with relatively less formal education. This may mean more intensive orientation, training, and support regarding the use of the technology for learning.

Implication for Research

While this study has provided an analysis of participation rates as they relate to certain socio-demographic characteristics of online users in an application of computer conferencing to adult leadership development, further exploration is needed to determine the causal factors linking socio-demographic characteristics with differential participation in online learning environments. How do socio-demographic variables relate to dispositional and situational factors? How do learners with different dispositions and situations respond to different approaches of design and facilitation in an online learning environment? How do learners' socio-demographic and individual characteristics predispose them to respond differently to various facilitation styles, online learning task designs (e.g., cooperative vs. competitive), the use of team or group projects, and alternative forms of administrative or technical support? While it is relatively straightforward to show that unequal computer conferencing participation is influenced by both individual and socio-demographic variables, it is a greater challenge to sort out how such variables interact with one another to determine learners' participation rates. Dealing with this greater challenge is essential for the practical removal of barriers to equitable participation.

We encourage further studies to explore the complex variables affecting participation in online learning environments, and we hope that the current article will lead such studies to be sensitive to the role of socio-demographic characteristics in computer conferencing participation. We also encourage further studies of socio-demographic variables that we were unable to include in this analysis, such as ethnicity and social class. Finally, while our study shows no significant relationship between either gender or age with

participation, it is entirely possible that such socio-demographic characteristics might be very important in other contexts. Indeed, May (1994) and Burge (1998) document substantial qualitative evidence for the position that men and women experience distance learning technologies in very different manners.

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