Core French[1] Teachers and Technology: Classroom Application and Belief Systems

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ABSTRACT: This research reports results from a survey of 274 core French teachers across Canada to define teachers' belief systems towards computer technology, teachers' experiences with computers, and factors contributing to the use of computers in the core French classroom. Results revealed three principle constructs defining core French teacher belief systems towards computer technology, two representing affective perceptions towards computers and one representing a more cognitive perception of the educational utility of computers in core French teaching. A majority of teachers reported having used computers in their classes and felt computers enhanced their students' learning. In spite of this, a sizeable number of teachers reported not having used computers in their teaching, primarily due to lack of access and knowledge about how to integrate computers into core French curriculum.

RÉSUMÉ: La présente recherche examine les résultats d'un questionnaire rempli par 274 enseignants de français de base au Canada sur l'utilisation de la technologie. Le questionnaire comportait des questions en relation avec le système de croyances des enseignants et la technologie, les expériences des enseignants avec la technologie et les facteurs qui contribuent à l'emploi de la technologie dans des classes de français de base. Les résultats révèlent trois principes contribuant à définir le système de croyances des enseignants vis-à-vis des ordinateurs. Deux des facteurs représentent des perceptions affectives et l'autre facteur désigne une perception cognitive face à l'utilisation des ordinateurs. La plupart des enseignants mentionnent avoir utilisé les ordinateurs dans leur salle de classe et, selon eux, les ordinateurs facilitent l'apprentissage chez les élèves. Toutefois, plusieurs enseignants indiquent ne pas avoir utilisé les ordinateurs en classe

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en raison du manque d'accès aux ordinateurs, et du manque de connaissance sur comment intégrer la technologie au programme de français de base.

Introduction

The potential of computers to enhance educational systems by individualizing learning, improving students' cognitive skills, and empowering students in increasingly constructivist learning environments is recognized more and more by educators everywhere (Peck & Dorricott, 1994; Wellburn, 1996). Computers have been reported to increase student participation, involvement, and motivation in the learning process; provide learners with a rich source of global information, create a broader voice and audience for students inside and outside of the classroom, and ultimately increase the productivity and efficiency of schools (Warschauer, 1996b; Peck & Dorricott, 1994). In the field of second language education, computers and their applications have shown potential to enrich second and foreign language learning environments by providing interesting and dynamic communication mediums through which students can exercise and perfect their skills in the target language (Chun, 1994; Nagata, 1996). Benefits include increasing target language comprehension through the computer's multi-modal presentation of language, engaging a variety of learning styles, and encouraging learners to adopt more active roles in discourse management (Brett, 1997; Wen, 1996).

However, in spite of these potential pedagogical benefits, research, conducted principally in United States-based ESL and foreign language contexts, has demonstrated that the computer remains minimally integrated and used (Lawrence, 2000; Leh, 1995; Moore, Morales, & Carel, 1998). Despite the increasing recognition of the value and relevance of educational computer technology and increasing investment in educational computer infrastructure, computer-assisted instruction remains somewhat of a pipe dream, an unrealized potential that remains to be fulfilled. Even in classroom contexts that are adequately equipped with appropriate infrastructure where technology-enhanced learning is encouraged, computer-mediated educational approaches remain largely unexploited (Marcinkiewicz, 1994; Moore et al., 1998; Sofranova, 1993), illustrating a recurring resistance to computer use in education in general and more specifically in language teaching.

This article reports the results from a national study[2] conducted with core French teachers from across Canada. This research examined the issue of computer integration in core French from a range of

perspectives in order to understand the complexity of factors effecting successful integration of computer technology in core French and the fundamental importance of core French teachers' belief systems that direct teachers' choices about computer use in their teaching. The following research questions guided our study:

1. What are core French teachers' personal and classroom experiences with technology?
2. What factors contribute to core French teachers' use of computers in the core French classroom?
3. What are core French teachers' belief systems towards computer technology in core French teaching? What factors influence these belief systems?

As computer technology becomes increasingly recognized as a valuable tool in core French and in other second language classrooms, assessing the impact of teacher belief systems, their multi-faceted nature and the relationship between beliefs and practice will provide valuable information that can guide professional development initiatives, classroom practice, policy decisions, and future research. This is the first study, of which we are aware, to examine core French teachers' belief systems on any topic, let alone computer technology.

The remainder of this article includes a review of relevant literature related to teachers' beliefs about computer technology in second and foreign language contexts other than core French. This review includes an examination of the factors that explain teachers' resistance to computer-mediated language teaching and empirical studies focused on ESL teachers' belief systems about computer use. The literature review is followed by the study design, a profile of participants, the results, and a discussion of the study's limitations along with implications for teaching, teacher education, policy on computer use in core French, and recommendations for future research.

Teachers' Resistance to Computer-Mediated Language Teaching

Research suggests that the causes of teachers' resistance to computers are numerous and variable, often contingent on specific constraints that vary depending on the specific teaching environment (Cuban, 1986; Lawrence, 2000). One of the principal factors perpetuating an underuse of educational technology includes limited computer access, preventing teachers from developing necessary familiarity with the computer medium. Increased access can serve to increase teacher confidence, thereby encouraging teachers to experiment with and explore this

technological tool and in turn expand their insights into its full potential (Lam, 2000; Lawrence, 2000).

Another factor contributing to teacher resistance towards computer-mediated educational approaches is the potentially threatening impact of the computer on the teaching and learning atmosphere. Computers can transform the teacher-learner relationship into a triadic one where the computer co-produces the learning, at times alienating the teacher from the valued teacher-learner relationship (Burnett, 1998).

Lortie's theory of apprenticeship of observation (1975) offers another explanation for teachers' resistance towards educational innovations, including computers. The teaching profession is one of the few where every new employee has learned first-hand, as a student, about the job for an estimated 13,000 hours, and has been conditioned into the culture of teaching. Moreover, computers were not part of most current teachers' schooling. As a result, many teachers are generally content with the status quo and over the past century, the nature of teaching has remained relatively immune to the continuous threat of change and innovation (Cuban, 1986).

Adding to this institutionalized resistance is the fact that much of today's curriculum has been designed to be delivered without computers, making their integration time-consuming for already overtaxed teachers (Lawrence, 2000). Training that would help these teachers overcome the challenge of integrating computer-mediated approaches into their curriculum has also been reported to be lacking in many contexts, further alienating teachers from technology-mediated approaches (Kassen & Higgins, 1997; Lawrence, 2000; Levy, 1999). Without adequate training, many teachers remain unacquainted with the computer's potential and see it as a substantial burden as opposed to a benefit, given the time necessary for adequate preparation and integration into learning environments.

Defining Teacher Beliefs Systems: Our Theoretical Framework

It is generally accepted that teachers' belief systems significantly affect teachers intended and actual classroom practice (Hargreaves & Fullan, 1992; Johnson, 1999; Kennedy & Kennedy, 1996; Nespor, 1987; Pajares, 1992). These belief systems guide teachers in their classroom behaviour.

As Pajares (1992) pointed out, however, the definitions of beliefs and curriculum knowledge have not been clear in the literature. We have found Ajzen's (1988) theory of planned behaviour useful in making clearer distinctions among teachers' beliefs, attitudes, and pedagogical

knowledge. For this study, we will draw on and develop interpretations made by Kennedy and Kennedy (1996, p. 354) and Lawrence (2000) of Ajzen's (1988) theory. We propose this framework for our study as a way to clarify the relationships among the interrelated factors that influence core French teachers' belief systems which direct, at least in part, the teachers' integration of computers into their core French teaching.

Ajzen's theory distinguishes between attitudes and beliefs. He argues that beliefs are cognitive and reflect the knowledge or information an individual may have about a specific teaching strategy or innovation (e.g., a teacher's knowledge of empirical research linking teacher use of computers to higher student proficiency in the target language). Attitudes reflect an individual's affective and evaluative response to that strategy or innovation (e.g., a teacher's feeling that computers motivate core French students). Beliefs form the foundations of not only attitudes, but what Ajzen refers to as subjective norms and perceived behavioral control. Subjective norms are an individual's perceptions of what authority figures and others believe about a particular teaching strategy or innovation (e.g., Ministry or Board guidelines to use computers in core French). Perceived behavioral control describes an individual's perceptions of one's degree of control over implementing the strategy or innovation. This perception of control can be internal, relating to one's confidence and/or skills necessary to implement the strategy or innovation (e.g., how a teacher perceives his or her computer skills), or can be external constraints limiting an individual's control over the strategy (e.g., time, student pressure, scheduling in the computer lab). These three factors – attitudes, subjective norms, and perceived behavioral control – all influenced by one's beliefs, together shape an individual's intentions, which eventually translate into specific classroom behavior.

Teachers' Beliefs and Computer Technology

A large body of literature has discussed teachers' belief systems and knowledge about curriculum (e.g., Clandinin & Connelly, 1996; Pajares, 1992; Sugrue, 1996; Wideen, Mayer-Smith, & Moon, 1998). However, only recently has the field of second language education examined teachers' thoughts, beliefs, and past curriculum experiences to assess how these influence the nature of classroom practices (e.g., Freeman, 1989; Freeman & Richards, 1996; Grenfell, 1998; Johnson, 1999; Kennedy & Kennedy, 1996; Richards, 1998, Woods, 1996). The following literature review summarizes key studies that have examined teachers' beliefs systems related to computer technology.

For example, in an examination of college-level English as a second

language teacher belief systems towards computer-mediated language learning, Lawrence (2000) found that teachers' perceptions of the effectiveness of computers in second language education combined with overall attitudes towards computers in general were the two principal factors shaping second language teacher belief systems. Lawrence also found that teachers with increased regular exposure to computers had increasingly positive attitudes towards them. These teachers also tended to have more favorable perceptions about the potential of computers to enhance second language teaching and learning.

Similarly, Lam (2000) in her analysis of second language teachers' use of technology found that the more teachers held a positive view of the benefits of computer technology, the more they were willing to use such technology in their teaching. In an attempt to clarify the nature of perceived *technophobia* among second language teachers, Lam interviewed ten second language teachers to establish a rationale for teachers' decisions to use technology in their practices. The main reasons identified related to the teachers' beliefs in technology's benefits or lack thereof, rather than a general and largely undefined resistance to technology.

A study by Moore, Morales, and Carel (1998) examining 388 public elementary and high school foreign language teacher's use of technology in teaching foreign language culture found that teachers of Japanese, who had used networked computer applications in their pre-service training, had developed a more positive awareness of the potential of computer technology and as a result had used computers more frequently in their teaching practices than other foreign language teachers who had not received the same training.

In more general educational research, similar findings have been reported; the more teachers use computer technology in their lives and teaching, the more positive their perceptions towards computers become and the more they value the potential pedagogical benefits of this tool (Green, Kluever, Lam, Staples, & Hoffman, 2000; McCain, Morris, Green, & Al-Najaran, 1999; Mitra, Hazen, LaFrance, & Rogan, 1999). Michael Levy (1999) in his survey of 104 computer-assisted language learning (CALL) practitioners from 18 countries, concluded that it is crucial for teachers to develop a real appreciation for the potential of computer-mediated approaches in order to ensure the successful use of computers in the classroom. Teachers, he proclaimed, are the most important factor in the success of CALL approaches. In fact, researchers such as Cuban (1986, 1993), Dwyer, Ringstaff and Sandholz (1991) and Hargreaves and Fullan (1992) argue that teachers' attitudes towards

any educational innovation are among the most critical factors determining the success of these innovations.

Design

We adopted survey methodology because of its suitability for obtaining both quantitative and qualitative data from a relatively large sample, on issues such as attitudes, beliefs, and behaviour, as well as the measurement of intensity of feelings towards educational innovations (American Statistical Association, 1998). Five hundred surveys were sent to core French teachers in all provinces and territories in Canada. The number of surveys sent to each board corresponds to the ratio of the enrolment figures in core French programs in each province or territory, according to figures available from the Commissioner of Official languages (see Canadian Parents for French, 2000). The breakdown of the number of surveys sent to each jurisdiction is presented in Table 1.

Due to the difficulty of obtaining teachers' names and school addresses because of privacy legislation in Canada, our sampling procedures were purposive and convenient. With considerable assistance from the executive and provincial representatives of the Canadian Association of Second Language Teachers, we negotiated ethical clearance with one large school board in each province or territory (except in Ontario and British Columbia where we worked with two medium-sized school boards that resembled those from other jurisdictions in terms of relative size). All chosen boards included both urban and rural regions. Surveys were sent to a random sample of elementary (k-8) and secondary (9-12) teachers in the identified school board(s) in each jurisdiction (see Table 1 for details).

We contacted potential participants by mail three times. First, the identified teachers received a package containing an invitation to participate in our project, including consent information, the short survey, a stamped, return envelope as well as an invitation to participate in an incentive draw.[3] About one month after receiving the first survey, we mailed a first reminder letter. Two weeks later, we mailed a second reminder, along with a second copy of the survey and a stamped return envelope. Unfortunately, telephone reminders were not possible because of limited funds.

Table 1. *Number of Surveys Sent by Province or Territory and by School Level*

Province or territory	No. elementary teachers recruited	No. secondary teachers recruited
Alberta	19	14
British Columbia	48	34
Manitoba	19	13
New Brunswick	8	7
Newfoundland	8	7
Northwest Territory	3	3
Nova Scotia	8	8
Ontario	199	34
Prince Edward Island	8	7
Quebec	12	11
Saskatchewan	19	13
Yukon Territory	3	3

We created our survey[4] by adapting existing instruments (e.g., Lawrence, 2000; McFarlane, Hoffman, & Green, 1997) used for studies with similar objectives. Our survey consisted of four principal sections. Part one was descriptive in nature including background and demographic information on the participants. The second section asked participants to respond to a series of statements (Likert scale) designed to elicit the participants' belief systems relating to educational computer use; this section was shaped around Azjen's theory of planned behavior (1988) as described above. Part three consisted of questions related to the participants' experiences with computer use in core French. In the final section, participants had the opportunity to share further comments relating to the research project in general.

Profile of Participants

Two hundred seventy four (274) of the 500 surveys were completed and returned to the researchers, yielding a response rate of almost 55%.[5] Of the 223 respondents indicating their gender, 70% were female, while 11% were male.

Table 2 reports the breakdown of responses by province or territory, including the total number of respondents from each jurisdiction, the response rate in each jurisdiction and the proportional representation of each jurisdiction in the total sample of 274 completed surveys.

Table 2. *Number of Respondents by Province or Territory*

Province/ Territory	No. of respondents	Response rate by province or territory	Percentage of total sample of completed surveys
Alberta	16	48	6
British Columbia	44	54	16
Manitoba	10	31	4
New Brunswick	10	67	4
Newfoundland	9	60	3
Northwest Territory	3	50	1
Nova Scotia	10	67	4
Ontario	128	55	47
Prince Edward Island	9	60	3
Quebec	10	43	4
Saskatchewan	19	59	7
Yukon Territory	6	100	2

While our sample of respondents includes teachers from all grades (1-12), 60% of them reported that they were teaching core French in Grades 4-6 at the time of the study. A majority of these teachers reported average class sizes of 26-30 students. Our sample also includes teachers with a good range of teaching experience (from beginner to very experienced).

Results

Our results are divided into the following five descriptive sections:

1) Computer use in general;
2) Training;
3) School and Board policy about technology;
4) Computer use in core French teaching;
5) Respondents who had not used computers in core French.

The results section is followed by a summary of the findings from an exploratory factor analysis designed to explain and interpret the teacher beliefs data from our survey.

Computer use in General

When participants were asked to describe their personal weekly computer use, reports ranged widely among participants, with the most commonly reported amount being between one and three hours a week (37% of participants). Word processing was indicated as the most commonly used computer application, followed by email and Internet use.

Training

About a fifth of respondents reported they had received some form of training for using technology in their core French classes; a quarter of respondents reported having received training and having taught themselves, while another fifth of respondents said they had received no formal training but had taught themselves about computers in core French. Two fifths of participants reported not having received any form of training at all. Slightly more than a third of respondents who had received some form of training reported having received it from school or board-sponsored workshops, 7% indicated having paid for the training themselves, a quarter of participants reported having learned from colleagues, while 16% received training from friends and/or family and 9% stated that they had received training from students.

School and Board Policy About Technology

About a third of respondents indicated that their school administration encouraged computer use in core French teaching, slightly less than a third reported no administrative support, while another third did not know whether their administration was supportive or not. One fifth of respondents reported knowing that their school board had a policy on integrating technology into the core French curriculum, another fifth said there was no such policy, while the majority of participants (60%) were unaware of any such policy.

Computer use in Core French Teaching

58% of the 274 respondents (N=160) reported having used computers in core French teaching, while 42% reported having not used computers in core French.

Of those teachers reporting computer use, 61% had used computers in a computer lab, separate from their classrooms. Eleven percent (11%) reported having used computers in their classroom while 27% indicated that they had used computers in both a lab and classroom setting. A

majority (60%) reported a preference to use computers in both a laboratory and classroom context. About one quarter of respondents reported preferring to use computers in a lab only whereas 15% reported a preference to use computers only in their classroom.

Table 3 summarizes the 160 participants' reported uses of computers in their core French classes. Word Processing (69%), the Internet (66%), projects using technology (54%), and CD-Roms (30%) figure amongst the most common applications reported.

Table 3. *Reported Uses of Computer Applications in FSL Classes*

Computer application	Percentage of teachers (N=160)
Word processing	69
CD-Rom	30
Making Web pages	10
Internet	66
Projects using technology	54
Hypertext	4
Live online chats	3
Email	19
Powerpoint	13
Other	18

About 90% of the respondents reporting computer use in their core French classes offered a rationale for their choice of computer applications, including affective reasons, curriculum enhancement, the improved appearance of student work, remedial support for students, variety in lesson planning, and development of students' technology skills in general.

Of those respondents reporting computer use in core French, 87% felt computer technology helped their students learn French in a variety of ways, as follows:

- Computers motivated students and improved their attitudes towards French class;
- Computers enhanced lesson content;
- Computers were useful for remedial support;
- Computers helped students develop autonomy;
- Computers helped students prepare more professionally looking work;
- Computers added variety to lessons;
- Students acquired computer and French skills at the same time.

Only 10% of the respondents who had used computers in core French felt that computers did not help their students, citing technical difficulties as the principal barrier between computer use and student learning.

Respondents who had not Used Computers in Core French

One hundred fourteen respondents (42% of the total sample) reported that they had not used computers in their core French classes. Table 4 summarizes the respondents' reasons explaining this non-use. Lack of access (62%) and knowledge about how to integrate computers into core French (43%) were the two most common reasons reported by these respondents. About a quarter of respondents also indicated (a) that they had not seen enough examples of effective computer use in core French teaching, and (b) that computers take too much time. A further 15% of these respondents were not convinced that computers help students learn.

Table 4. Reasons for Computer Non-Use

Reason	Percentage of respondents (N=114)
No access	62
Computers won't help student learning	15
I don't feel comfortable using computers	14
Students are not interesting in using computers to learn French	3
I haven't seen enough examples of effective computer use	23
Using computers takes too much time	23
I don't know how to integrate computers in my FSL teaching	43

Respondents who had never used computers in core French were asked how likely they would be to use a series of computer applications, in the next three years, if there were no barriers or challenges such as those reported in Table 4. In Table 5, it is clear that these respondents had a general openness to computer use. A large majority of respondents reported that they would be either likely or very likely to use computers for word processing, email, the Internet, CD-Roms, and student projects.

When asked to explain this general openness to using computers in core French, 60% reported a feeling that students need to learn computer skills in all school subjects, 76% said that computers motivate

students to learn and 68% reported that they wanted the challenge of learning how to integrate computers into their core French teaching.

Table 5. *Likeliness of Using Computer Applications in the Next Three Years*

Computer application	Very Likely	Likely	Not Likely	Not Sure
Word Processing	59	24	13	4
E-mail	40	21	22	7
Www (The Internet)	47	33	16	4
Powerpoint	15	21	34	29
Hypertext	16	6	31	47
Cd-roms	43	43	8	6
Live Online Chats	11	11	68	9
Making Web Pages	21	18	49	13
Projects Using Technology	43	28	19	10
Other	40	60	0	0

These same participants reported that they would be more likely to use computers in their core French teaching if access increased (82%), with more training (77%), with more time (55%), and with more support (58%). A majority of these respondents reported that they would prefer to use computers with their core French students in a laboratory setting *and* in their own classroom; 35% reported a preference for a laboratory and 17% preferred their own classroom for computer use.

Teachers' Beliefs Toward Computer Technology

In the section of the teacher survey related to the belief systems toward computer technology, participants were asked to react to 21 statements about technology use in general, and specifically in core French teaching. The results from this section of the survey are found in Table 6. To facilitate the summary of these results, we have divided the statements into the following categories: affective, pedagogical, and technical.

Table 6. *FSL Teacher Belief Systems Toward Computer Technology*

	Cat 1 %	Cat 2 %	Cat 3 %	Cat 4 %	Cat 5 %	N/A
I enjoy using computers	0.4	2	15	46	36	0.4
CT makes me nervous	22	34	22	18	4	0.4
CT can enhance FSL learning	1	2	17	53	26	1
Computers help teach FSL students more effectively	0.4	9	34	38	17	2
Computers help motivate students to learn French	1	5	27	44	23	0.4
CT gives students more control over second language learning	2	12	43	29	13	1
Students learn better if they have control over FSL learning	0.4	1	13	56	29	0
Feel threatened using CT if my students more CT-literate than I	30	43	15	10	2	0
Computers distract students from language learning	17	50	26	5	1	1
Not enough proof that computers help FSL students learn	6	21	35	27	8	3
Feel pressured to use CT in my French teaching	27	54	11	5	0.4	3
Important for French teachers to know how to teach using CT	2	8	22	48	19	0.4
Everyone should know how to use computers	1	3	7	47	42	0
Confident of my ability to integrate CT into my Fr. teaching	3	25	16	43	13	0.4
Enjoy the challenge of integrating CT into teaching	2	12	35	36	12	4
More willing to use computers to teach Fr. if more training	1	6	19	48	24	2
FSL students unfamiliar with CT make it difficult to use CT	26	53	14	3	0	3
Would miss student-teacher interaction if I used computers in teaching.	12	47	18	17	5	1
I am excited about potential of CT in FSL teaching.	2	6	33	42	17	4
Lack of accessible computer equipment discourages use of computers in FSL classes	6	13	11	31	39	0.4
Lack of adeqate CT support in teaching environment discourages computer use in FSL classes.	5	24	19	27	25	2

NOTE: Category 1 - Strongly disagree; Category 2 - Disagree; Category 3 - Neither Agree or Disagree; Category 4 - Agree; Category 5 - Strongly Agree.
* CT refers to computer technology/technical.

Affective Issues

A large majority of respondents agreed that they enjoy using computers in general and about 60% of participants indicated that they were excited about the potential of computer use in their core French teaching (although a third of respondents neither agreed nor disagreed with this statement).

A majority of participants disagreed that computers make them nervous whereas a large majority of participants reported feeling pressured to use computers in their core French teaching. A large majority also disagreed that they feel threatened when using computers because students are more computer-literate than they are.

Pedagogical Issues

A majority of respondents agreed that (a) computer technology can enhance FSL learning, (b) computers help motivate students, (c) computers would help teachers teach more effectively, (d) it is important for French teachers to know how to teach using computers, and (e) everyone should know how to use computers these days.

A majority of respondents disagreed that (a) computers distract students from their language learning, (b) students are unfamiliar with computers, and (c) as teachers, they would miss the student-teacher interaction by using computers in core French.

Slightly more than a third of respondents indicated that they agree that they have not seen enough proof that computers can help core French students learn; another third reported that they were not sure about the existing evidence to support computer use in FSL teaching.

Technical Issues

A majority of respondents agreed that the lack of accessible computer equipment and the lack of adequate technical support discourage computer use in core French classes. A large majority of respondents also agreed that they would be more willing to use computers in core French if they had more training.

Factor Analysis Results: Defining Belief Systems

In order to determine whether the variables measuring belief systems in the questionnaire can be explained by a smaller number of constructs, an exploratory factor analysis was conducted on the data obtained from the Likert scale statements in Part 2 of the teacher survey. As the data was of a categorical, ordinal nature, the one to five Likert scale measures were treated as scores for these specific analyses. Although this may not be seen as a conventional statistical approach to analyze non-continuous, ordinal data, it is an approach that has been used in a similar number of studies examining teacher belief systems and attitudes in survey research (Lawrence, 2000; McCain et al., 1999; McEneaney, Soon, & Linek, 2000; Mitra et al., 1999; Moore et al., 1998).

An exploratory factor analysis was conducted to identify underlying factors that link variables together, revealing three significant factors, explaining a cumulative total of 48.5% of the variance in the data. These three factors were identified as the most significant to account for the variance of the data, as their Eigenvalues were 5.933, 2.518, and 1.724 respectively, well exceeding the standard accepted value of Eigenvalues of 1.0 that are commonly deemed significant (Spearitt, 1988, p. 649). The defined factor loadings of each of the 21 Likert scale variables from the analysis are shown in Table 7.

As illustrated in Table 7, all the proposed variables are more positively associated with one of the three factors, having a factor loading greater than 0.3, which is generally recognized as demonstrating a significant relationship between the variable and factor (Hatch & Lazarton, 1991, p. 494). Variables loading onto Factor 1 generally deal with perceptions of the educational effectiveness of computers in FSL instruction. Factor 2 variables on the other hand address either positive or negative emotional reactions towards computer use in FSL teaching. Variables loading onto Factor 3 address issues of control that is externally directed over computer use in FSL teaching.

Variables loading negatively onto a factor indicate a logical opposition to the meaning of the factor. For example, variables loading positively onto Factor 2 generally indicate a negative emotional response or attitude towards computer use in FSL teaching, resembling a sense of discouragement. Those variables loading negatively onto this factor indicate a positive emotional response, opposing the negative meaning of the factor. For example, the variable, "Computers make me nervous," loads positively on this factor at 0.768, indicating a positive relationship to this negatively oriented factor. On the other hand, the variable, "I

enjoy using computers" loading negatively at -0.720 indicates an opposite relationship to this negatively framed factor.

Table 7. Factor Loadings for Belief System Variables

Factors	1	2	3
Computers help me teach FSL more effectively	0.808		
Computers help motivate FSL students	0.789		
Computers enhance FSL learning	0.763		
Computers give students more control over second language learning	0.745		
I am excited about the potential of computers in FSL teaching	0.69		
I haven't seen enough proof that computers help FSL students learn	-0.61	0.355	
It is important for FSL teachers to know how to use computers	0.596		
I would be more willing to use computers in FSL teaching with more training	0.567		
FSL students with more control learn better	0.52		
Computers distract students from their learning	-0.49		0.315
I would miss the student-teacher interaction if I used computers in my teaching	-0.47		0.361
Everyone should know how to use computers	0.309		
The increased computer literacy of my FSL students threatens me		0.778	
Computers make me nervous		0.768	
I enjoy using computers		-0.720	
I feel confident of my abilities to integrate computers in FSL teaching		-0.700	
I enjoy the challenge of integrating computers into my FSL teaching	0.473	-0.573	
I feel pressured to use computers in FSL teaching		0.331	
The lack of adequate technical support in my teaching environment discourages my use of computers			0.831
The lack of accessible computer technology discourages my use of computers in FSL teaching			0.713
My FSL students are unfamiliar with computers making it difficult for me to use them			0.498

Extraction method: Principal Component Analysis.
Rotation method: Varimax with Kaiser Normalization.

This analysis suggests that the proposed variables used to determine teacher belief systems towards computer-mediated language learning fall under three significant constructs, one defining a perception of the effectiveness of computers in FSL teaching, another defining emotional response or attitude towards computers, and a third representing issues of externally directed control over educational computer use. A more detailed analysis of the factor definitions, their relationship to our theoretical framework, the limitations of our study and analyses, as well as the implications of our results for future research, core French teaching, teacher education, and policy decisions about computers in core French are discussed in the next section of this article.

Summary and Discussion

This is the first study of its kind, of which we are aware, to examine teachers' perspectives about the use of computer technology in core French education in Canada. A majority of the core French teachers surveyed in this study, from all grade levels, were open to using computers in core French and reported having used computer technology in their core French classes. Many indicated an eagerness to learn more about integrating technology into their second language classrooms. A majority of teachers also expressed an interest in doing some of this professional development using technology.

However, a sizeable number of teachers we surveyed (42%) had never used computer technology in their core French classes. They cited lack of access as well as a lack of training and knowledge about how to integrate computer technology into their teaching as the two principal reasons for this inexperience. Nevertheless, a large majority of non-users reported an openness to using computer technology in their teaching and hoped to gradually do so in the near future. Not surprisingly, a large majority of these non-users also reported that they would be more willing to use computer technology in their classes if there were more training, increased access, more time, and support.

About a quarter of the teachers surveyed in our study indicated they would like to see more research evidence that computer use in core French teaching actually helps students learn French more effectively. Future research, both experimental and qualitative, should aim to demonstrate the learning benefits of using computer technology in core French and other second language classes. Research comparing teacher and student perceptions towards specific uses of computer and multimedia technology in a variety of educational contexts may also prove to be useful in identifying the pedagogical benefits of technology-enhanced language learning.

Defining Core French Teacher Belief Systems Toward Computer Technology

A primary focus of this research was to define the factors that influence teacher belief systems toward computer technology in core French teaching, drawing on interpretations made by Kennedy and Kennedy (1996, p. 354) and Lawrence (2000) of Ajzen's (1988) theory of planned behaviour. Using an exploratory factor analysis of Likert scale survey questions, three significant factors were identified as the principal constructs contributing to these belief systems: perceptions of the educational effectiveness of computers in FSL teaching, emotional responses towards computer use, and perceptions of control over educational computer use.

The first factor consisted of teachers' perceptions of the utility of computer technology in its ability to enhance FSL learning. This factor is largely cognitive-based and represents a teacher's intellectual understanding of the effectiveness of the computer as a second language teaching tool; a belief in Azjen's terms. Statements largely associated with this factor such as "computers enhance FSL learning" and "computers help me teach FSL more effectively" address a teacher's beliefs about how functional the computer tool is in enhancing FSL teaching practice. The second factor represents a much more affect-focused construct and addresses negative or emotional responses toward computer use in FSL teaching; an attitude in Azjen's terms. The factor analysis revealed that variables loading positively onto this factor consisted of statements identifying negative emotional responses toward computer use such as "computers make me nervous" or "the increased computer literacy of my students threatens me." Variables loading negatively onto this factor generally represent positive attitudes or emotions toward computers including enjoyment and confidence toward computers. The third factor emerging from the factor analysis relates to externally directed control over access to educational computer technology (perceived behavior control in Azjen's terms). This construct exhibits some degree of affect and emotion, expressed in the form of frustration towards computer access issues that are externally dictated within the educational context and are out of the teacher's control. Issues such as accessibility to computer equipment, technical support for computer integration, and student computer illiteracy are expressed in this construct and prompt discouragement and a reduced use of computer technology.

These identified constructs defining teacher belief systems corroborate findings in earlier research examining computer beliefs and

attitudes among teachers (McCain et al., 1999; McEneaney et al., 2000; Lawrence, 2000; Mitra et al., 1999; Woodrow, 1991) that found two similar conceptual dimensions defining teacher belief systems toward educational computer technology. These studies found one construct that is generally affective in nature and one that is more cognitive-based, specifically representing a teacher's perception of the utility of the computer in education. For example, McEneaney et al. (2000) examined computer attitudes among pre-service teachers. These researchers identified four significant factors defining belief systems: three representing affective dimensions that included positive and negative feelings towards computers (attitudes) and a fourth more cognitive factor, representing an understanding of the effectiveness of computers (beliefs). Woodrow (1991) also identified affective components to belief systems along with a perception of the educational impact of computers.

Lawrence's (2000) thesis research which examined ESL teacher belief systems toward computer-mediated language learning also identified two similar constructs defining teacher belief systems. The first construct consisted again of the perception of the educational effectiveness of computers in second language teaching and the second represented attitudes, defined as affective in nature, toward educational computer technology.

It has been increasingly recognized that teachers' beliefs toward the purpose of technology has an important impact on their decisions to use an educational innovation such as computer technology in their classrooms (Mitra et al., 1999, p. 3). A study by Lam (2000) analysing reasons why second language teachers refrain from using technology in their practices, concluded that it is the teacher's perception of the usefulness of technology in his or her teaching practice that governs the use of technology. In addition to this, a teacher's access to and perceptions of support using computers in second language teaching will also largely govern technology's use, consequently influencing teacher beliefs towards computers. Research (Akbaba & Kurubacak, 2000; Armstrong, Yetter-Vassot, College, & College, 1994; George, 1996) has also shown that attitudes and perception of effectiveness of computers used in educational contexts depend on an individual teacher's ability to use the computer successfully and his or her sense of confidence using the technological tool – perceived behavioral control in Azjen's terms. A study by Davis (cited in McFarlane et al., 1997) found two components affecting attitudes toward technology in the business world, one representing the ease of use of the technology and the second reflecting perceptions over the effectiveness of the technology in enhancing job performance. The Technology Acceptance Model developed in this study

was supported by results of Davis' study and validated in another study by Szajna (cited in McFarlane et al., 1997).

Given these similarities among teacher belief systems research examining belief systems towards educational technology, it appears that teacher belief systems can quite reliably be determined to consist of two principal dimensions. One dimension of belief systems can be described as affective in nature, representing attitudes of an individual towards that technology combined with one's sense of control over that technology. A second construct of belief systems consists of a more cognitive dimension of one's perception of the educational utility of that technological innovation.

Despite the identification of isolated factors contributing to teacher belief systems, it is however important to note the fluidity and interrelatedness of such defining factors in belief systems research and the inherent difficulty in attempting to isolate discrete factors in a largely holistic system. Examining the factor analysis results from this study, it is quite easy to see the fluidity and interrelated nature of these three defined constructs. For example, a number of variables loaded onto more than one factor, demonstrating the fluid nature of belief systems and the inherent difficulty in isolating distinct, independent factors defining belief systems. The statement, "computers distract students from their learning," loaded negatively onto Factor 1, suggesting a negative relationship to this construct representing a teacher's perception of the educational effectiveness of computers in FSL learning. At the same time, this variable loaded positively onto Factor 3, reinforcing the potential loss of control a teacher would feel should students become distracted. Nevertheless, it has been valuable to conduct this factor analysis to explore underlying constructs that define teachers' belief systems towards computer technology in core French. Future research might draw on these results as a basis for qualitative studies, for example, that examine individual teachers' experiences with technology in core French to help understand the cognitive and affective responses to this technology and to explore how technology effects student learning. Qualitative case studies with teachers and students who have achieved success with computer technology in core French would be valuable contributions to the research and pedagogical literature.

The results from this study also point to a need to examine educational policy, curriculum, teacher education, and professional development related to computer technology, particularly related to core French programs. Are school boards adopting policy and curriculum

related to the integration of computer technology in core French? Do core French classes have equal access to computers compared to other subject areas? Are schools keeping up with rapid changes in computer technology? Are core French teachers adequately trained and supported for integrating computers into their classes? Are teacher education programs for core French teachers preparing pre-service candidates to use computer technology in their teaching? So many questions and so few answers; this study has obviously just scratched the surface of a complex and fascinating area of inquiry.

NOTES

1. Core French teaching across Canada resembles foreign language teaching in many countries internationally. Core French in Canada consists of regularly scheduled classes for short periods of time over an established minimum number of years where students focus on developing communicative competence, knowledge, and understanding of francophone cultures. For more information, see LeBlanc, 1990; Turnbull, 2000.
2. We are grateful to the Canadian Association of second Language Teachers for sponsoring this study.
3. Participants who completed and returned their survey by a specified date were eligible for a draw for gift certificates to either Chapters Bookstore or to Staples/Business Depot. Draws were held in six regions in Canada.
4. Our survey was piloted amongst a sample of CASLT members before distribution.
5. Some may consider this a low response rate and therefore generalizing results may be limited. However, some experts in survey statistics (e.g., Wiersma, 2000) do accept response rates as low as 50%, depending on the population. We argue that it understandable that core French teachers who often teach hundreds of students, in many different classrooms, under stressful conditions, are reluctant or do not find time to respond to surveys.

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