

SECONDARY ONLINE EDUCATION: A Review and Synthesis of Central Elements

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ABSTRACT

In this paper the authors illuminate the distance education field of endeavor to point out that online education can now be found at most educational levels (elementary, secondary, post-secondary) globally.

This enterprise requires a multitude of traits which are detailed herein in order to alert the new online educator and remind the veteran educator of the essential elements required to achieve desired outcomes. To instruct online clearly requires informed goal setting, clear processes, and predictable outcomes, from the onset. As well designers need to examine current research, conduct online research, and listen to feedback from online students to maintain and nurture both the program and the students. Some key factors of online education are laid out which include strategic intent (planning), content (curriculum), and pedagogy (incorporating current learning theories into delivery models).

As well several underpinning qualities are described that must be present such as the teacher's quality of online instruction, and level of expertise in distance learning. All online educators need to be aware of the student (profile of successful online learners, interaction), assessment/evaluation (rigorous, comparable and authentic), support (student support and training on using the technology), technical infrastructure, and the need to review program frequently which is key to the development and maintenance of successful online education efforts.

Keywords: Online education, Secondary education.

INTRODUCTION

A common challenge has been identified by education stakeholders involved in virtual learning which can be simply noted as a quest to "provide program to students no matter where they live or where they go to school" (Fried, 2002). The difficulty of meeting that challenge is complicated by the expansive geographical boundaries of educational bodies such as divisions, district school boards, and educational authorities with limited financial and human resources (Picciano & Seaman, 2007). Additionally, the effect of declining enrolment on the viability of small schools has increased the challenge and students attending small rural schools do not have the same educational opportunities as those in the larger centres.

Because remote small schools have limited resources, students have no opportunity to take many of the elective courses they need hence the decision to learn in a virtual environment is often the best alternative. Looking into online learning is both challenging and frustrating for both the student and the researcher who may choose to study such a process. For instance, a review of research on e-learning revealed the following:

- Most of the published research on e-learning is based on distance learning models for post secondary education
- Most of the research is based in the United States of America
- Most of the research occurred in the past decade

If we peer deeper into online learning research we see that in general terms the factors, which are identified as criterion for successful post-secondary distance learning initiatives, can be applied to secondary school education equally. Evidence to support this assertion is provided by two separate studies sponsored by the National Education Association (NEA) one for each of the high school and higher education panels, which identify similar benchmarks for success of internet-based distance education (NEA, 2000, 2002).

The only difference in scope of the secondary versus post-secondary distance education programs is based solely on the limited resources both financial and academic available to secondary school programs when compared to higher education initiatives. The observation that most of the research is based in the United States is not a limitation within this discussion however it needs to be stated. Moreover, educational reforms of this nature are not the exclusive realm of the U.S.A. and are found in most industrialized nations, who have invested in building a strong telecommunications infrastructure upon which e-learning initiatives can be built. It is documented that within most industrialized nations the infrastructure is predominately regionalized and limited to large urban centres. The reality that the research is American is a reflection of demographics and consequently on the greater number of e-learning initiatives already established.

If the underlying pedagogical foundation of curriculum delivery was different in the United States than it is in Canada, one may proceed tentatively by drawing parallels between e-learning initiatives. However, this is not the case and we find expectation-based curricula, similar assessment and evaluation practices, and accountability models that are essentially equivalent in all states and provinces.

In sum, if the limited research is only recent, it simply reflects the contemporary identity of the emergent technology we are examining (Picciano & Seaman, 2007). The only unfortunate corollary is that most research is limited to identifying "good practice" for successful online delivery, which has been born more out of necessity and very little comparative research has been done to address the question of whether or not e-learning is a good way to help students learn.

Nonetheless, there is considerable agreement in the literature concerning the principal factors which must be considered when planning, delivering or reviewing of virtual learning initiatives. Many of the factors seem obvious and would be identified by most educators as important without having to refer to the research literature however, there are elements that are covert and reflect the distinctive nature of the technology itself.

Predictors of Successful Online Programs

Several factors are necessary elements of a successful online program. These include;

- Strategic intent (planning)
- Content (curriculum)
- Pedagogy (incorporating current learning theories into delivery models)
- The teacher (quality of instruction, level of expertise in distance learning)
- The student (profile of successful online learners, interaction)
- Assessment (rigorous, comparable and authentic)
- Support (student support and training on using the technology)
- Technical infrastructure
- Review

Strategic Intent

Strategic intent should be addressed first and foremost in any e-learning initiative (NEA, 2002; Sims, 2002; Moore & Kearsley, 1996). These same researchers advise that if you cannot provide an explicit answer to why you are attempting to place resources and activities into an online context that stakeholders may have erred by not considering a rationale for such an initiative and consequently initiatives may achieve limited success (Sims, 2002). The success of the distance-learning program at Jacksonville State University for example is attributed to having followed an evolutionary process, which started small and evolved slowly to be the modest program it is today. The first stage of the process would be the development of goals (King, 2002). The usual market driven "fill the need" model common in North America should not be the driving force behind the e-learning initiative. Careful planning should be the hallmark for this type of reform.

Canada: Ontario

Unfortunately, in Ontario in the absence of leadership in the area of e learning by the Ontario Ministry of Education and Training, it became necessary for one district school boards to take the initiative. The technology was available to explore new and creative ways to deliver curriculum to students who were unable to enroll in the courses they needed to graduate.

The result has been the adoption of varied e-learning solutions, most of them incompatible with each other and has created a situation where Ontario district school boards, anxious to follow suit, enter the fray unprepared without a clear vision. Only after considerable resources have been committed to such projects is a conversation taking place as to what e-learning should look like. There has been anticipation that some policy directives from the Ontario Ministry of Education will be forthcoming. Unfortunately for some Ontario district school boards the option of changing direction at this time and the possibility of exploring a uniform platform is impossible given the investment made so far in choosing a proprietary software platform and in the cost of developing courses that are compatible with the platform.

Many smaller school Boards such as the District School Board Ontario North East, although early in its exploration of virtual learning because of its size and limited financial resources, cannot devote much time to defining a vision for its initiative, preferring to build on the experience of other Canadian boards.

The virtual learning initiative expands as a result of a need articulated by a group of school Principals who recognize that because of declining enrolment and fewer classroom teachers they will not have the number of sections they need to offer choice to their students.

The vision although articulated by a few principals, program staff and senior administrators has left out, not by choice but by a need to move quickly, many of the important stake holders of the virtual learning initiative.

In general, many teachers perceive online courses as an economic solution to an inadequate provincial funding formula and are suspicious of the motives of the board of trustees and senior administration especially as the possible impact virtual learning may have on small schools. A clearly articulated vision of the virtual learning initiative would have gone a long way in alleviating some of those concerns.

Content

Once the strategic intent has been articulated, the choice of courses to be written for online delivery must be made. Practicing Secondary teachers who can see the value or difficulties of teaching certain courses online often make this determination effectively. Early studies for example have shown that courses requiring extensive mathematics are difficult to convert to an Internet instruction format (Neil, 2001). Videoconferencing formats with same-time instruction would be a better alternative if the course must be delivered in a distance education setting. In addition the involvement of Secondary subject specialists and a broad peer review process will help alleviate the misconception that online is easier (NEA, 2000). This applies equally to the student's perception: "I don't want to give them the impression that because it is convenient, it's also easy" (Carnevale, 2000). This view may also explain the initially high attrition rates for online learning in the first year of operation.

Many online projects have focused on simply converting existing paper-based resources into HTML (the digital equivalent for posting material online). Although they are "online" they should not be considered online education, as they do not take advantage of the capabilities and benefits of the technology (Sims, 2002). In fact, static content online has no benefit over simply giving a student a textbook to study from. The content should be engaging and expand on the curriculum expectations allowing for exploration of online resources, which would not be available in a paper-based traditional correspondence course as well as promote interaction between the online students and between the student and teacher as well. Taking advantage of the technology, however, does disadvantage some learners if the focus is on developing content using only the latest technology. Bandwidth, processor speeds, the use of digital cameras and scanners or other peripherals may not be available to all students equally. In addition competency with the tools themselves such as typing speed has contributed to the "hidden curriculum", which puts some students at a disadvantage (Anderson, 2001).

It becomes important to promote at least at the school level equality of access to technology and where this is neither possible, nor practical, alternatives should be found. For example, assignments should be flexible and provide a choice of activities so that all students may participate using the technologies available to them. Where bandwidth is a problem, student compact discs could be included in the student package to allow the student to gain essentially the same experience as those using more expensive and sophisticated equipment and access.

It must be pointed out however, that new communication technologies use streaming data delivery, which uses less bandwidth than earlier versions of online media delivery. Courses using electronic online textbooks should make hardcopies of the textbook available to students using dial-up access to the Internet.

Students should have the choice of typing, faxing or mailing handwritten material to the course instructor. Stating the obvious, the content must be based on the learning outcomes, which are clearly articulated to the student as well as the expectations for each of the lessons presented. In addition many pedagogical considerations should guide the development of the course content.

Pedagogy

Surprisingly, much of the literature makes reference to pedagogy and to the importance it plays in determining the content of online courses, however, very little is said on how this should be expressed. An evaluation of many of the online courses for higher education have shown that although identified as an important factor, very little consideration of pedagogy in a systematic way has been shown (Scott, 2002).

Many references suggest that the lessons must be presented in such a way as to address the varied learning styles of students (King, 2002 ; NEA, 2002; Sims, 2002). Sims (2002) reminds developers that online resources are presented in a learner-centred environment and it is important to conceptualize the development of the course from the student's perspective rather than be solely driven from the teacher's perspective, which traditionally is content driven. Sims (2002) states that,

This does not preclude developers from adopting an instructivist or presentational strategy compared to a constructivist or generative approach, but does require careful thinking about the learner and the options provided for interacting with the content and their learning partners. (p.140)

Clearly, the content and available resources should dictate the presentation, and developers must always be mindful to take advantage of the opportunities to allow exploration, and interaction for the online learner.

The application we have considered so far has been limited to the content whether it be static or dynamic, instructivist or constructivist, however, it must also be recognized that there must be a human element in the delivery of online learning. Zucker (1999) a researcher who has been studying virtual high schools since 1996 has found that there is less interaction between students and teachers via online courses and admittedly this is a weakness of online courses. Educators must then consider how to maximize interaction (dialogue) between the student and teacher online because we know that increased dialogue leads to improved learning, (helping the student to organize knowledge in the Zone of Proximal Development–ZPD - Vigotsky learning theory) (Picciano, & Seaman, 2007). Although some software developers have claimed to incorporate intelligent dialogue systems in their courseware it has been shown that although “they had good semantic and syntactic language properties, they had limited shallow strategic knowledge” (Ravenscroft, 2001).

Curriculum reform in the province of Ontario (Canada) has introduced a number of pedagogical modifications especially in the area of assessment and evaluation. A new emphasis on the use of rubrics, which describe proficiency levels rather than raw percentile scores as well as the importance of discerning between formative and summative evaluation are two examples. The “design-down deliver-up” model of curriculum design (Wiggins, McTighe, & McTighe, 1998), and the importance of authentic assessment, which are to be reflected in the preparation of lessons for the classroom teacher, (Ryan, 2006a) should apply equally to online course development.

Teacher Quality

In the matter of teacher quality the literature is unanimous. Teachers involved in the delivery of online courses must be trained in the nuances of communicating online in the absence of visual or oral clues, which are so helpful in classroom teaching (NEA, 2000, p.7). Teachers must also be provided with adequate training and technical support in the use of the software. It has been found that teachers who are already proficient in communication technology are better online teachers as they can address the other subtleties of communicating effectively rather than spend an inordinate amount of time wrestling with the technology. Teachers should be invited to participate in online learning, rather than be assigned or feel obligated to moderate a course online.

When writing a course, teachers should be chosen on their strength as curriculum writers and not based on their comfort level with the technology. You want your best writers developing the content.

Technicians, graphic artist and the technologically adept can be responsible for mounting the course online. Writing teams should be employed rather than individual authors and every teacher on the writing team regardless of their technological profile must understand the features of online learning so as to incorporate features, which exploit the technology. The involvement of teacher federations in discussions of staffing and compensation is essential for the support of virtual learning initiatives. District School Boards across the province of Ontario, involved in virtual learning, are beginning to feel pressure from teacher federations with respect to workload. Presently online teachers are categorized as unstructured assignments and are likely to be asked to work a full timetable without consideration for preparation time. This is not a current concern for District School Board Ontario North East as it has secured sections from several schools for marking, where teachers have been freed from other duties.

However, a recent move to have teachers in one of the smaller schools assigned to virtual learning courses is proving problematic. The initiative is seen as a means to ensure the school's viability, however, no financial compensation or time has been provided. The argument that these teachers have small sections in their regular assignment cannot completely justify assigning the additional online courses, which are time consuming.

Currently, meetings of teachers and administration are looking for solutions to address the concerns. If no solution is forthcoming, the entire initiative may be jeopardized. One suggestion, which has been advanced by one teacher federation, is to deliver the courses as correspondence courses and contract the same or other teachers within the school board to do the marking. Although this may provide a reprieve of union grievances, it diminishes the importance of the instructional opportunities of online course delivery (the current collective agreement defines correspondence courses as courses in which the instructor evaluate the student work, but do not provide feedback or instructional support).

The Student

If not all teachers are suited to be online instructors; similarly, not all students should be enrolled in online courses. Some researchers have tried to define the profile of a student likely to be successful in an online environment. Roblyer (2003) has listed the following characteristics as likely indicators of a successful online student:

- **Self motivated**
- **Able to structure one's own learning**
- **Previous experience with the technology**
- **Good attitude towards the subject matter**
- **Learning and temperament styles**
- **Self-choice, rather than forced choice**

The closer the student fits the profile the more likely they are to succeed. Unfortunately, the context for offering distance education in a higher education setting differs greatly from the virtual learning initiative of most secondary schools. Whereas post secondary students often fit the profile of the successful student, the secondary student or alternative student does not. This requires the need to provide additional supports for students who are unlikely to succeed without them. District School Board Ontario North East encourages the use of a key teacher at the local school to track student progress for regular day school students. Adult learners are also provided with occasional one on one instruction as needed by teachers at the local school or alternative education centre. It should be noted however that these arrangements are informal and need to be formalized and applied consistently across the district.

Assessment

Assessment has been shown as a vital part of good instructional practice. No longer should assessment be seen as a summative grade awarded at the end of a unit of study, but rather as an ongoing formative component of the learning process (Gronlund & Cameron, 2004). Formative assessment provides important feedback to the student. Assessment is seen as a means to improve student learning and less on the simple ranking of students by providing a grade (Ryan, 2003). The necessity of teacher feedback throughout the learning process is just as vital in an online environment as it is in the classroom. Since volumes have been written on the subject of assessment we can summarize the important features as follows:

- **Assessment is to be ongoing and mostly formative in nature;**
- **clear expectations and the assessment tools are given prior to the start of an assignment;**
- **where practical, exemplars are given as models of good work;**
- **feedback should be positive in nature;**
- **assignments should be returned in a timely fashion;**
- **opportunities to improve should be given so that the student meet the expectations;**
- **students are given a variety of assessments and when possible choice in assignments that reflect various learning styles;**
- **assessments should reflect to the extent possible authentic tasks which are based on real world experiences (Gronlund & Cameron, 2004).**

In addition, there are some concerns that online courses must address that are unique to it. As mentioned earlier the perception of course rigor must be maintained by providing assessments that are comparable to classroom-based courses (NEA, 2000, p.13). Steps must also be taken to limit academic dishonesty in a distance education environment. In a secondary school setting this may be addressed by providing the student with proctored access to the course or at a minimum a proctored final assessment or interview to ensure that the student has the understanding and skills demonstrated earlier in the course.

Support

One of the reasons given for high attrition in distance learning is the lack of support of the learner. We have many students who are enrolled in the wrong courses, who have enrolled for the wrong reasons, or do not have the prerequisite skills to succeed online. In our haste to enroll numbers, whether it is financially motivated, or simply an inability to say no we have created our own attrition problem. Compounding the problem is the very thing that brings new students to a virtual school-word of mouth. A good first experience will promote your distance learning initiative, a poor one the opposite. In a recent study, it has been shown that secondary students who are provided support at the local school fair better and complete their course in a more systematic way than do students who are left to complete the course independently of any local supports (Beaulieu, 2003).

The level of support may need only be ensuring that the online course be timetabled, with attendance being taken. These students also are accountable to report their progress to a key teacher identified as responsible for virtual learning courses. Research has listed several supports that will enhance a virtual learning initiative:

- Because online learning is a new experience for most students, an initial class meeting is beneficial. It provides an opportunity to put a face to the instructor and become acquainted with the course logistics (Cooper, 2000).
- All first-time distance education learners should be given a clear statement of course requirements in advance. (This includes pre-requisite courses, time commitment, required skills, a list of software and hardware requirements) (NEA, 2000, p. 9).
- Students will require reliable, extended-time technical support. (p.10).
- Study guides, reviews and student manuals should be made available in hard copy as a quick and easy reference to (Cooper, 2000).

At the end of article, Tables 1 and 2 present a summary of selected studies and reports on the role of student supports on student perception and performance in online courses. Support should not be limited to the student alone. Online teachers should be provided with the same level of technical support afforded the student. In addition online teacher should be encouraged to attend professional development opportunities, and become members of professional associations for distant learning. It must also be recognized that institutional support at the school board level is necessary to the success of a virtual learning initiative (Picciano, & Seaman, 2007).

Finally the role of student supports must also consider the special circumstances of the secondary school student, who can most often be described as unable to work independently and subject to the problems of procrastination. In particular these students would perhaps benefit from local supports, provided at the school in addition to the supports provided by the course instructor. Ensuring that the course is placed on the student timetable and taking attendance can in itself provide the necessary structure to encourage course completion.

Technical Infrastructure

"The interface between learner and computer is one of the most neglected aspects of online learning" (Sims, 2002 p.141). The infrastructure sometimes referred to as the platform must provide interactive elements, be aesthetically inviting but most of all must be robust and stable.

It is in this very area where in Ontario at least there may be the greatest obstacle for a collegial model. Many school boards have adopted platforms, which are not compatible with the platforms of other boards. The marketplace has no limit on the number of e learning software solutions and for some it becomes an exercise of evaluating the features against the costs of running a platform. Another consideration aside from the software is the Internet infrastructure available. Whereas this is not usually a concern for students enrolled in virtual courses at school where bandwidth is not an issue the opposite is equally true for the home student accessing the Internet on a dial-up package with limited bandwidth. The availability of hardware and peripherals, discussed earlier remains problematic. District School Board Ontario North East adopted a Learning Management System (LMS) software solution developed by Intralearn. The Intralearn system is a complete virtual school package. It gives students immediate, anytime access to course materials. Students can access live and asynchronous learning. Instructors can interact with students using a variety of communication tools.

E-MAIL

The Intralearn e-mail system includes all of the standard features of most web-based e-mail clients. Students can send and receive messages and electronic files as attachments. The system is designed to encourage the sharing of mail with students within the course using a drop-down menu, which lists the class roster and course instructor. It is not apparent to the students, what their actual e-mail address is, to deter students from adopting the account for personal e-mail traffic outside of the Intralearn platform, which would expose the mail server to unwanted e-mail messages [spam] and to possible attack of malicious e-mail viruses.

DISCUSSION FORUMS

Each course has a separate conference folder or discussion area which allows the posting of messages in threaded discussion groups. These discussions are public areas and allow for collaborative work. In addition the course instructor can create teams, which have private discussion areas for smaller group discussions, with one member of the group responsible for posting a summary to the main discussion area.

CHAT

A synchronous chat feature is included, which allows the students and instructor to interact in real-time. An electronic whiteboard is also featured, which allows the use of a tablet to post examples. The chats in the Intralearn platform are public and there is not a private chat feature. In addition a script or history of the chat area is kept in the instructor's database to allow the course instructor to review the scripts. Students are reminded that the chat area is a public forum and although socializing is encouraged it must be used appropriately. Students and instructors are governed by the school district's acceptable use policy.

In addition to access to course materials and communication features, the Intralearn platform also has a grade book for the posting of student marks as well as feedback on the assignment. Students can be paced in the course, which requires the student to pass a module quiz before being allowed to move onto the next module. This and many other features can be enabled or disabled by the course instructor.

REVIEW

The final factor under consideration is the need for periodic review of the online learning initiatives. Much of the literature cited, are in fact reviews of existing programs with recommendations for improvement. Reviews ought to be done in collaboration with all of the stakeholders and not limited to the program coordinators. Whenever possible, reviews should be completed by a third party such as independent consultants who have experience in the area of distance education such as Picciano & Seaman, 2007 of the Sloan Consortium. In the absence of an independent review, a collective review should be constructed by a group of online providers in order to learn from the experience of others. Online students have earned the opportunity to evaluate the program. Useful information gathered from these reviews will make it possible to make changes to individual courses as well as to the program as well. Regular review creates an opportunity to begin the process of establishing new goals and a new vision in light of the experience gained during the previous initiative

COMPUTER MEDIATED COMMUNICATION: LIMITATIONS

In sum, research has shown that communication tops the list along with student supports as the two factors which most contribute to student attrition (Ludwig-Hardman; Dunlap, 2003). Many studies suggest distance education with its the loss of community is an obstacle to overcome and many suggest that instructors need to give students timely feedback that is of a high quality (Picciano & Seaman, 2007; Picciano, 2002; Richardson, 2003; Carnevale, 2000). In addition to instructor-student communication researchers also extol the importance of student-student communication to foster collaborative learning (Hiltz, 1998; Thorpe, 2002; Harvey, 2002). This requirement has resulted in a call to move online pedagogy in the same direction as the constructivist perspective now popular in most North American classrooms (Bostock, 1998; Huang, 2002; Hung, 2001; Jonassen, 1994). Most would agree that no matter the quantity or quality of online communication it remains inferior to face-to-face exchanges. The most common reason cited for this is the lack of non-verbal clues (McQuillen, 2003). However, the common use of emoticons, punctuation, acronyms, letter case and the use bold fonts have introduced a layer of emotion to text (Carter, 2003). For example the use of UPPERCASE LETTERS is considered inflammatory and BOLD UPPERCASE LETTERS even angrier. Emoticons such as the happy face or sad face and surprise or wink are also used to convey feelings. There are also some dissenting views on the ability of computer mediated communication to overcome the loss of community. In particular Carstens and Worsfold (2000) see online learning as a threat to liberal learning and to student literacy. Woods (2002) found that the frequency of personal e-mails by an instructor did not affect student perception of overall satisfaction with their online experience and in summary Table 1 and 2 display an outline of selected research studies and reports concerning the importance of computer mediated communication on student perception of program effectiveness.

CONCLUSION

Teaching online is different from teaching in the classroom. It requires careful, informed discussion, of goals, processes, and outcomes, in order to achieve desired results. Stakeholders need to examine current research, conduct online research, and listen to feedback from online students.

Admittedly there are many factors beyond the few presented herein that can and should be attended to in order to realize educational success online. We have briefly addressed strategic intent (planning), content (curriculum), pedagogy (incorporating current learning theories into delivery models), the teacher, (quality of instruction, level of expertise in distance learning), the student (profile of successful online learners, interaction), assessment/evaluation (rigorous, comparable and authentic), support (student support and training on using the technology), technical infrastructure, and the need to review program frequently. However, by addressing technologic concerns in the educational arena, we suggest to others that we ought to be cautious while working towards our vision for the use of technology in education.

After all, "the use of technology should not drive the vision. The vision should drive the use of technology ..." (Surgenor, 1992, p. 137). Our human capacity to take and shape technology is of prime importance as a creative, inventive energy within education. Energetic educators with vision are likely to be involved with discovery teaching (Whittier & Hewit, 1997) as they make use of multiple and varied means to move students towards pre-planned outcomes in a manner guided by values, beliefs and ethics. The paths chosen are very much personal matters for teachers that often are endorsed by larger organizations such as teacher unions, government bodies, or school Boards.

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APPENDIXES

Table : 1
Selected Articles Examining the Importance of Computer Mediated
Communication (CMC) in Online Courses on Student Perception of Program Effectiveness
- Studies

Investigators/ Year of Study	Data Collection Procedures	Sample	Site	Results
Woods, Robert H. (2002)	e-mail survey	40 doctoral students Aged 26-60	<i>Organizational Communication</i> course at Regent University	Perceived sense of community & overall satisfaction with the learning experience were not affected by the number (frequency) of personal e-mails.
McIsaac, Blocher, Mahes and Vrasidas(1999)	Electronic First-Class e-Discussion / e-mail Mixed method Qual. Erickson's interpretive method(1986)	Doctoral students	6 web-based cours at Arizona State University	Communication is goal- orientated Lack of immediate feedback contributes to the feeling of isolation among students. Face-to-face meetings before meeting online seemed to help establish a sense of community <i>Collaborative learning</i> strategies should be used to encourage interaction.
Vrasidas and McIsaac (2000)	CMC Computer mediated Communication	1 online courseEMC503 at Arizona State University	Instructor to participate in the discussions and provide modeling Provide immediate feedback Promote interaction and social presence Do not minimize the front-end analysis phase.	
Hiltz R. S. (1998)	Post-course questionnaire	600 responses	New Jersey Institute of Technology	Degree of <i>collaborative learning</i> correlated significantly ($p < .001$) with scales measuring overall course outcome, and overall rating of the virtual classroom experience.
Downs M and Mo Leslie (1999)	Documentation review, observations and interviews	19 secondary schools students in an online Calculus course (synchronous)	3 high schools 1 in small city and two in rural areas	Loss of time with the technology negatively impacted perceptions Scheduling is a challenge Small class size is important Attendance-no major difference Motivation was the single most important feedback related

variable influencing student satisfaction (quoting Olsen 1991)				
Zafeiriou & Nunes J.M.B. and Ford N. (2001)	Qualitative- Grounded Theory	50 students taking courses in Information Studies	University of Sheffield	Quality of communication more important than quantity. Message analysis more important the use of quantitative data of frequency of message postings.
Parker A. (1999)	Rotter's (1966) locus of control instrument and Student Information Sheets Correlational analysis	94 students in 3 community college courses	Maricopa Community College District in Pheonix Arizona	Student's locus of control and source of financial assistance were the greatest predictors of drop out.
Benigno & Trentin (2000)	Mixed –method Quantitative analysis of communication frequency and qualitative analysis of content (Henri, 1992) Questionnaire		The paper is a summary for a method to evaluate online courses tested in various environments from in-service teacher training (Trentin 1997) to distance training for small and medium-sized enterprises.(Trentin, 1996)	
Scifres E.L Behara R.S	Anonymous survey 7 point Likert scales analysis t-test of 6 hypotheses	116 Senior level undergraduate students 36 online 80 traditional delivery	Several universities collaborating in the Internet In the Classroom Project Canada, US, Mexico Argentina	The electronic group reported a significantly lower quality of communication, higher perception of the gap between their own and other group members' efforts and less satisfaction with fellow group members. Electronic groups spent less time communicating and were more likely to be dominated by one or two members. The electronic group were less satisfied than the conventional group on the overall project.
Anderson (2002)	Action research Written reports, activity logs, group interview.	11 students in 3 groups Wimba-asynchronous	Athabasca University	Web-based group communication systems can support case-based teaching There was no one

voice system; MSN messenger, synchronous text system, and Tutor's Edge, a synchronous voice system.		communication system which is more effective than another as all groups broke from the fidelity of using the assigned communication mode in favour of using various modes for various tasks. Ie. A synchronous e-mail would be used to schedule synchronous chats on MSN or Tutor's Edge.		
Picciano A. (2002)	Student survey	23 graduate students enrolled in an Education Admin an Supervision course	Hunter College NY	Strong relationship between student perceptions of the quality and quantity of their interactions and perceived performance. Student perception of social presence significant relationship on the performance on written assignments but not significant on final examinations.
Richardson J.C. (2003)	Student survey Using a correlational design	97 students in an online course	Empire State College	Students with a high overall perception of social presence scored high in terms of perceived learning and perceived satisfaction with the instructor.

Table: 2
Selected Articles Examining the Importance of Instructor-Student Communication in Online Courses on Student Perception of Program Effectiveness – Reports

Investigators year of study	Discussion Topic	Findings and Conclusions
Thorpe M. (2002)	The use of CMC raises challenges about course design and learner support	CMC allows for a constructivist approach used inherently builds a sense of community providing student supports that were often missing in Distance Learning. (ref. Salmon 2000)
National Education Association (2002)	Research of benchmarks for successful online courses for post-secondary are applied to a secondary school setting.	Rubrics offered as an assessment tool to review current online initiatives against factors identified as "best-practices" in online pedagogy. Communication skills & student supports are recognized as two such factors.
Harvey D. (2002)	An OP/ED piece Technology created an increase in D. Most courses are designed to use the technology which recreate the classroom	Too much emphasis of current online pedagogy on having students interact with the material often individually. The need for the technology to drive the pedagogy is needed towards <i>collaborative learning</i> in more constructivist pedagogy.
Carstens & Worsfold (2000)	An OP/ED piece Dissenting view on e-learning D.E.	The authors see the elimination of liberal learning, interpersonal collaboration and student literacy.
McQuillen J.S. (2003)	OP/ED	CMC may assist in the development of interpersonal relationships, however, the relationship is inferior to Face Face relationships due to the highly selective nature of self presentation in CMC.
Carter K.A. (2002)	OP/ED Literature review and field observations	Nonverbal behaviours play a critical role in interpreting interpersonal interactions. Quasi non verbal clues are appearing in CMC with the use of emoticons and the use of punctuation and use of upper and lower case letters and bold font to express emphasis.
Bannan-Ritland (2002)	Literature review	45 cited references. Common research conclusions are given as well as gaps identified in the research. Appendix A summarizes major conclusions. Excellent summary.