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The Effects of Technology on Urban High School Students' Sense of Classroom Community

Mervyn J. Wighting
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THE EFFECTS OF TECHNOLOGY ON URBAN HIGH SCHOOL
STUDENTS' SENSE OF CLASSROOM COMMUNITY

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A Dissertation submitted to the Faculty of Old Dominion University in Partial Fulfillment of the Requirement for the Degree of

DOCTOR OF PHILOSOPHY

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May 2002

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ABSTRACT

THE EFFECTS OF TECHNOLOGY ON URBAN HIGH SCHOOL STUDENTS' SENSE OF CLASSROOM COMMUNITY

Mervyn J. Wighting
Old Dominion University, 2002
Director: Dr. Robert A. Lucking

This study measured the sense of classroom community among students from two different grades in an independent urban high school (N = 181). A standardized instrument was used to compare sense of community in classes whose teachers used computers frequently and consistently in their instruction with others in which the teachers seldom or never included computer use in the classroom. Quantitative analysis revealed that there was a significant difference between the classes in terms of one of the sub-scales of the instrument; students whose teachers used computers frequently and consistently scored higher on the learning sub-scale of the sense of community. The data also showed a significant difference between grade levels as measured by the spirit sub-scale of the sense of community; the older students scored higher.

A sample of the participants was selected for interview. Qualitative analyses of students' responses revealed three factors that they considered important to their sense of classroom community and its importance for learning: a feeling of belonging; trust of peers and teachers; and use of computers. The analyses showed that students considered the most important variable in the development of a sense of classroom community was a sense of connectedness with their peers. These results suggest the following policy implications for urban education: (1) sense of classroom community is important and may plausibly be linked to academic success; (2) use of computers in teaching does not detract from, and may add to, that sense of community.
ACKNOWLEDGEMENTS

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The inspiration for this study came from Dr. Alfred P. Rovai. He was always available to offer help and advice during university classes and remained a patient and sage advisor throughout the course of this dissertation.

I am very grateful also to those friends and colleagues who listened patiently and sympathetically while I offloaded my frequent frustrations at different times throughout the dissertation process. Finally, my sincere thanks go to the students, faculty and administration at the school that was the setting for this study. They must remain nameless, but they all know who they are.
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been identified, each of which demonstrates a marked decline in civic associations within
the country over the last thirty years. Some inner-city communities have become
dysfunctional mainly as a result of high rates of crime and the exodus of many businesses
from the city center. Wilson (1987, 1996) illustrates how these changes have affected the
lives of many who traditionally inhabited urban areas, describing the detrimental effects
of urban change on the poor and on the disadvantaged. Urban schools all too frequently
have suffered from the changes that have taken place in inner cities. Kozol (1992)
describes the effects of funding inequities that often are found between schools in urban
areas and more affluent schools that are located in suburban districts. Authorities have to
decide the best way to allocate the funds that are available to them, and increasingly the
decisions include whether or not to invest heavily in expensive technology in preference
to other resources.

The suburban enclaves surrounding the inner city have little sense of community
within their boundaries. Suburban dwellers simply drive through the community in which
they live in order to work or to shop; many turn to television within their own homes for
their principal leisure pursuit and increasingly favor the concept of individualism
(Putnam, 1995). Paradoxically, as technology offers more and more opportunities for
communication and interaction, many communities appear to be increasingly insular and
isolate.

As a result of these observations, there has been an increase in research in the
sense of community. Despite the concern of some community psychologists over the
erosion of the sense of community, and its description by Sarason (1974) as the
"overarching value" of community psychology, it was not until the 1980s that McMillan
and Chavis (1986) put forward an operational definition of sense of community. Hill (1996) summarizes three main conclusions about the sense of community. First, psychological sense of community refers to variables beyond individual relationships. Second, it is an aggregate variable, and most useful when studied at the community level of measurement. Finally, a psychological sense of community appears to be setting specific, and aspects of the construct differ from setting to setting.

One such setting is the classroom. The sense of community within a classroom is important to the students who are there as learners. Schmuck and Schmuck (1971) describe the feeling that class members hold in relation to the entire classroom as the sense of cohesiveness. Learning is assisted if students feel that they belong to the community or group that makes up a class, and that they themselves contribute to that classroom community as well as benefiting from it. Interaction with others is an integral part of the learning process. Interpersonal relationships are also enormously important in a community of learners. The less a person understands the feelings and behaviors of others, the more likely he or she will act inappropriately or insecurely and fail to gain acceptance within the community (Gardner, 1983).

**Need for the Study**

In recent years, the use of technology in teaching has increased greatly. Computers are now commonplace in the classroom, and students are becoming more adept at using them to assist their learning. Teachers are increasingly using computers in their lessons, and it is certain that this increase in the use of technology will continue. School administrators are under increasing pressure to put more technology into schools, as some members of the general public view computers as the solution to all educational
needs. This pressure may be particularly acute in urban areas, where funds for schools might be less plentiful than in more affluent suburbs, and where additional computers may be thought necessary to assist with the needs of disadvantaged youths (Healy, 1998).

Different points of view exist regarding the influence of media on learning. Salomon (1979), Clark (1983, 1994), and Kozma (1994) each published papers that contribute to the debate. Saloman recommends the study of the "attributes" that media could contribute to the learning process, such as the ability to speed or to slow video in order to watch a flower grow or an animal run. Clark was skeptical, arguing that media merely delivered instruction, while others, such as Kozma, contend that technology can promote interactive learning. Research continues to be conducted on the role of technology in teaching and learning. Little is known to date, however, about the effects of the increased use of technology on the sense of classroom community, and it is not clear whether it is helping to bond learners or whether it might actually increase any feelings of isolation.

Research has been conducted to examine the sense of classroom community among undergraduate student populations (Rovai and Lucking, 2001). This research provided evidence to support the theoretical basis of classroom community and found that it could be reliably measured in a group (N=57) of undergraduate students. A further study (Rovai, 2001) found the sense of classroom community among members of a graduate-level distance learning course (N=20) grew significantly during the five-week course. The need to research the sense of classroom community among younger students was identified, and also the need to investigate whether their sense of classroom community is affected by the use of technology in instruction. Instructional technology
embraces a plethora of classroom tools, but this study concentrates on the use of personal computers in teaching and learning.

**Purpose of the Study**

The purpose of this study is twofold. First, it measures the sense of classroom community among urban high school students, and thereby adds to the body of knowledge concerning learning communities. Second, it determines the effect of technology on the sense of classroom community among urban high school students. An additional benefit is that this study adds to the body of knowledge concerning the instrument used. This instrument has been designed for use with a wide variety of subjects, ranging from middle school students to college undergraduates. It has not been used in previous research to measure subjects attending high school.

The following research questions are addressed, using both quantitative and qualitative methods.

1. Do students in grade nine and in grade eleven in an urban high school differ in their sense of classroom community?
2. How does the use of technology in their classroom affect the students' sense of classroom community?
3. Does the impact of technology use on their sense of classroom community differ for ninth grade students compared to eleventh grade students?
4. How do students describe classroom community and its importance for their learning?
5. What factors do students perceive to be important for developing a sense of classroom community?
Research Design

This study is a mixed design, incorporating both quantitative and qualitative data. In order to explain the results as fully as possible and to enrich the study, the quantitative results are augmented by qualitative data.

Quantitative Analyses

The quantitative element of this study incorporates a causal-comparative design. It contains two independent variables and one dependent variable, but the researcher did not purposefully manipulate either of the independent variables. Classification is made of high or low technology use in teaching, and this is the first independent variable. The second independent variable is grade level. The sample comprises 181 students from intact classes in grades nine and eleven. These students were studying a number of curriculum subjects taught by a variety of teachers, some of whom used a high degree of technology in their teaching, and others who did not. Twelve teachers were selected. Classes taught by teachers who used technology frequently and those who used little or no technology were selected for the study. The dependent variable is the sense of classroom community. The instrument used to measure the dependent variable was the Sense of Classroom Community Index (SCCI) (Lucking, Rovai, and Cristol, 2001).

Qualitative Analyses

Based on the analyses of the SCCI data, purposeful sampling was used to determine those students to be selected as the subjects for interviews by the researcher. Twelve interviews were conducted, six from high technology classes, and six from classes using little or no technology. The subjects were asked questions to help provide the rationale for responses to the SCCI, and the questions were based on the four
subscales that comprise the SCCI questionnaire. Each of these interviews was recorded using a process of detailed note taking, and a tape recording of the interviews was made as a backup to the written records. A content analysis was employed to identify any topics, categories of topics and patterns that emerged from the responses to the interviews in order to help explain the quantitative results.

Limitations

The quantitative design of this study is non-experimental, causal-comparative. Causality cannot definitely be inferred from this design. There was no true control over the variable of technology use in the classroom due to the fact that the researcher was not able to interfere with intact classes in order to assign treatments. Consequently, it proved difficult to rule out plausible rival hypotheses, and the researcher considered other possible hypotheses as explanations for the obtained results. Ambiguity of causal inference is the main threat to the internal validity of this study. As there was no purposeful manipulation, there was concern regarding the timeline effects of the variables. The independent variables may not necessarily have preceded the dependent variable. For example, some students could have developed a sense of community through their membership of another group or organization before coming together as a class in this study. Qualitative findings helped to rule out this alternative explanation. The teaching styles and personal influences of the teachers are a limitation of the study, as these could have affected the students' sense of classroom community. This threat to validity was controlled as fully as possible by selecting from a pool of teachers who were as equivalent as possible. The school principal assisted in this regard, providing data on number of years of service and other personal information to estimate equivalency. The
principal also provided information showing categorization and ranking among teachers in terms of high and low use of technology in instruction. This categorization was derived from the principal's knowledge of teachers' classroom practice, and information from their performance evaluations.

Selection bias is a potential threat to the internal validity of any causal comparative study. Randomization was not possible in this study, as the subjects were all enrolled in intact classes. In order to minimize this potential threat to internal validity the intact classes were selected from only core curriculum areas (as opposed to electives), as the core curriculum classes include all students from within the appropriate grade level. The students were not grouped by ability in any of the core curriculum classes, and were essentially equivalent in terms of their range of academic ability. As a further measure of equivalency between the subjects, a standardized instrument was given to all classes in advance of the SCCI measurement to determine whether they were broadly equivalent in their degree of use of technology outside of the school. All data that was collected in advance of the SCCI measurements is made available in the results.

There is an additional threat to validity associated with the self-report nature of the questionnaires and interviews, a threat that is true of all self-reported data. Social desirability and reluctance to describe negative aspects of experiences may influence the results. The researcher minimized this threat by maintaining the anonymity of the questionnaires, and by administering the questionnaires personally rather than having teachers involved. Students being interviewed was reassured that their responses would remain confidential.
CHAPTER II
LITERATURE REVIEW

Introduction

The purpose of this chapter is to review the literature in order to provide a theoretical framework for the study and to summarize relevant research. The review examines definitions by various authors and gives their perspectives of what community actually means. It refers to the sense of community at large, the community that comprises the constituents of a whole school, and most importantly the sense of community that exists within every school classroom. The literature review reports on research to date that has been conducted on the effect that the increased use of technology has on secondary education and concludes with a review of the effects of technology on the sense of classroom community.

Sense of Community

Sense of community is a concept that is primarily psychological. It refers to the sense that community members have of belonging to a greater social community. Sarason (1974) offers an explanation of the difficulties in studying the concept of sense of community stating that it does not sound precise, it obviously reflects a value judgment, and does not appear compatible with "hard" science. McMillan (1976) defines a sense of community as a feeling members have of belonging and being important to each other, a shared faith that members' needs will be met by their commitment to being together. McMillan and Chavis (1986) propose a definition that encompasses four elements: membership, influence, integration and fulfillment of needs, and a shared emotional connection. These authors see the sense of community as a concept that empowers its
can trust the community, and equally the community needs to know that it can trust its members. Both elements are necessary for the community to be cohesive. McMillan (1996) identifies trade as the third principle of the sense of community. Trading is apparent when members discover ways they can benefit one another and the community. Real trading takes place when members have differing needs and different resources. The interaction benefits individuals and strengthens the cohesiveness of the community as a whole. The final principle recognized by McMillan (1996) is art, previously labeled by McMillan and Chavis (1986) as shared emotional connections in time and space. Art refers to the collective experiences of the community that come about through community contact. Art comprises events that are worthy of becoming community stories; stories that represent the community's values and traditions. The author concludes that art supports the spirit that was the first element and, therefore, completes a full self re-enforcing circle.

The psychological sense of community relies heavily upon its context for its description and can differ greatly from setting to setting. Hill (1996) suggests that researchers of psychological sense of community should utilize theories, methods, and techniques from as wide a variety of disciplines as possible. This suggestion is supported by Puddifoot (1996) who states that some aspects of community identity are best approached through quantitative techniques while others can be better sampled by qualitative elicitation techniques of a more open ended character. Puddifoot suggests that a full analysis requires the use of both of these approaches to some extent. His reasoning is that a combined approach allows for a comparative analysis of community on specific
That every individual becomes educated only as he has opportunity to contribute something from his own experience, no matter how meager or slender that background of experience may be at a given time, and finally that enlightenment comes from the give and take, from the exchange of experiences and ideas. (p. 362)

Dewey's writings on democracy and education were instrumental in leading to the development of group dynamics as a sub-discipline of social psychology. Psychologists such as Lewin and Moreno were in the forefront of spearheading practical research into group dynamics. Schmuck and Schmuck (1979) noted that Lewin and Moreno, although working independently, both concluded that group dynamics are a complex combination of science therapy, social reconstruction, and morality. For both of them the validity of group exercise was its usefulness in restructuring social relationships, and many subsequent researchers adopted this pragmatic approach to the study of groups in classrooms. Consequently, a substantial body of knowledge has been accumulated showing the importance of students working in groups, learning collaboratively, and exchanging ideas and information with one another.

Cooperative Learning

Cooperative Learning is an important component of the sense of classroom community. Johnson and Johnson (1992) contrast cooperative learning groups where students work together to maximize their own and each other's learning with a competitive learning situation where students work against each other to achieve a goal that only one or a few students can attain. A considerable body of research exists that supports the benefits of cooperative learning. In a meta-analysis that reviewed 122
analysis covered a range of subjects in a variety of settings; three examples are given here. Kniep and Grossman (1979) compared groups of elementary school children and found that those engaged in competitive learning and working in cooperation with other students performed better on tests than students in a control group. Garibaldi (1979) studied urban high school students, and reports that students who work in groups not only perform better on tasks but also express greater certainty about their answers (commitment) and more enjoyment of their tasks than do students who work alone. Beaman, Diener, Fraser and Endresen (1977) studied the effects of variations of peer-monitoring procedures on academic performance of college students. They report that mutual study groups performed at higher levels than control groups, but averaged no more total time studying than control groups. Another meta-analysis conducted by Othman (1996) examined the effects of cooperative learning and traditional mathematics instruction in grades k-12 across 65 studies. This meta-analysis concluded that peer tutoring was the best method for achievement change to occur, and team assisted instruction was the best method for attitude change towards learning the subject.

Kagan (1992) writes strongly in favor of cooperative learning. He highlights the importance of learning interpersonal skills, pointing out the reality of the job world, which demands increasingly that its member are able to cooperate and work interdependently with one another. He writes:

The social structure of schools is out of step with the reality of the work place. And without change, the schools will be further and further out of step because our economy is shifting towards high technology and information related jobs in which cooperative, interpersonal skills increasingly are at a premium. (p. 1:1)
Kagan (1992) also comments on the effects of the increasing amount of urbanization in society today. He writes that a large number of urban-rural comparisons of cooperativeness among children have revealed that almost without exception children developing in an urban environment place less value on behavior such as caring, sharing, helping and cooperating with others. He concludes that students in an urban environment increasingly need an interdependent educational experience in the classroom in order to prepare them for the workplace.

Slavin (1991, 1995) also supports cooperative learning, maintaining that it can have consistent and important effects on the learning of all students. He further maintains that it is possible to create conditions leading to positive achievement outcomes by directly teaching students structured methods of working with each other. In a synthesis of research on cooperative learning, Slavin (1991) examined sixty-seven studies that compared the effects of cooperative learning to those of traditionally taught comparison groups. He reports that in 41 of the studies significantly greater achievement was found in cooperative learning classes. Aronson and Patnoe (1997) draw an analogy between classroom cooperation and solving a jigsaw puzzle. They describe classroom situations where students have to work collaboratively as well as independently to research a problem and then come together again to share their results. The analogy shows how students have to depend on one another to learn their material. Each student possesses a single vital piece of the big picture, and just one missing piece would spoil the overall result.
Social Constructivism

Cooperative learning has been shown to be important in the constructivist psychology of how students acquire knowledge (Sharan and Sharan, 1992). Constructivist cognitive psychology maintains that children actively construct their own notions of reality from their experience. They add new information to pre-existing knowledge and modify their understanding of the concept in light of new data. Working in groups allows children to evolve their own cognitive map and to collaborate with one another in the process of constructing their ideas instead of laboring individually.

Social constructivism can be traced back to the ideas of Vygotsky, a Russian psychologist and philosopher who wrote in the 1930s, but whose work was not translated into English until the 1960s. He emphasizes the roles that society plays in the development of an individual, and supports model of learning based on discovery. Strommen and Lincoln (1992) describe the focus of constructivism being the child as a self-governed creator of knowledge. Tudge and Hogan (1997) show how social constructivism relates to the classroom, and highlight the importance of the dialectical relationship between the individual and the cultural environment. The authors stress that the essential feature of learning is that it creates what Vygotsky termed the zone of proximal development, and that social constructivism allows children to develop their own ideas based on a scaffolding of personal and shared experiences. Clements (1997) maintains that students do not construct knowledge alone, even though each has to modify his or her own way of interpreting information. The author stresses the importance of communication among students and between students and teacher, and points out the importance for the teacher to structure the social climate of the classroom.
accordingly. Salomon and Perkins (1998) suggest that acquiring knowledge and participating with other learners are interrelated and interact synergistically. Social constructivism clearly requires a sense of classroom community in order to succeed. Learners need to be actively engaged in a synergistic exchange of information, collaborating, sharing and building together a true understanding of the subject matter.

Wilson and Lowry (2000) maintain that learners need to develop individual competence, but in a context of effective participation within groups and communities.

Recent dissertations appear to support the philosophy of social constructivism in the classroom, although the verdict is still not conclusive. In a study to compare traditional and constructivism-based instruction of high school biology courses, Saigo (1999) found that longer-term retention was greater in the constructivist group (N=86). Research by Ziegler (2000) examined relationships between the perceptions of constructivist practices contained in the National Education Longitudinal Study of 1988, which investigated the factors influencing students' educational development from eighth grade onwards. Ziegler's results support the positive effect of constructivist learning practices, and he reports how an emphasis on problem solving was related positively to student achievement in mathematics.

Classroom Cohesiveness

The cohesiveness of a classroom of students is determined by the strengths of the bonds that bind the individuals together into a classroom community. Members of cohesive groups view themselves not as individuals working independently, but rather as operating as part of the class. Cohesive groups have strong morale, team spirit and strength of attraction towards the group and an interest in what the members of the group
are doing. According to Schmuck and Schmuck (1979), members of cohesive groups invest in strong interpersonal relationships, share their expectations with other members of the group and are more goal directed than non-cohesive groups. A cohesive group does not have to suppress individual differences and individual ideas. The opposite is frequently the case, with members taking strength from the group's cohesiveness to allow them to express their own ideas freely and without inhibition.

Schmuck and Schmuck (1979) identify three types of cohesiveness that are found in a school's community. First, there is cohesiveness formed by attraction of students to other students in the group. For example, in extra curricular clubs or in cohesive groups that tend to meet together for lunch everyday. Second, cohesiveness can form through a common interest in the activity or task. For example, the cohesiveness that forms through participation in a school play or a choral group. Third, cohesiveness can develop through the prestige that membership of a group can bring. An example of prestige is the cohesiveness in a cheerleading squad. The authors point out the value for teachers of being able to identify cohesiveness and help to create a higher level of the construct in the classes they teach, and recommend it to be a useful exercise to gather data about cohesiveness. O'Connor and Fish (1998), in a study that investigated differences between classrooms of expert and novice teachers, found there was no difference between the groups studied on the dimension of cohesion, implying that cohesiveness is established by students themselves. Bandura (1986) puts forward an additional social dimension, maintaining that of the many cues that influence behavior, none is more common than the actions of others. A strong sense of social glue in the classroom is required for this sort of interactive modeling to take place. Chin, Salisbury and Gopal (1996) took a perceived
cohesion scale developed by Bollen and Hoyle (1990) for the community scale, and adapted it to the small group context. In their study, which sampled seventy small groups of students (N=330), Chin et al. report that the most important components of cohesiveness in small groups are a sense of belonging and a strong feeling of morale.

**Sense of Classroom Community Index**

Cohesiveness is clearly a strong component of the sense of classroom community and questions relating to it are built into the Sense of Classroom Community Index (SCCI) developed by Rovai, Lucking, and Cristol (2001). The SCCI was developed from earlier work conducted by McMillan and Chavis (1986), and McMillan (1996). The instrument designed by McMillan and Chavis was designed for measuring a general sense of community, but not intended for use in the classroom. The SCCI, however, incorporates constructivist philosophy in its design, and Rovai and his colleagues have developed it specifically for classroom use. The authors identify the four essential domains of classroom community as being spirit, trust, interaction, and learning.

**Scales of the Sense of Classroom Community Index**

The first of the four scales of the SCCI is spirit. Spirit is the feeling members have belonging to the group and a feeling of security that the group has accepted them as full participants. In a cooperative community, all members need to feel included. Forest (1998) expresses the importance of a sense of belonging:

> In such a community I know I have a place in the group that only I can fill; that I contribute something that is necessary to the group and which is valued by other members. I also know other members well enough to value and respect their unique contributions. Together we define who we are as a group. (p.292)
The second domain, trust, is a feeling of alliance in the group, a feeling of safety and comfort in a community that will welcome individual input. Goleman (1995) maintains that expertise alone is not sufficient to be a successful member of a community; trust is also necessary for true acceptance and complete membership.

Interaction, the third domain, describes the cooperation and collaboration between the members leading to a sense of cohesiveness of the group. Schofield (1995) conducted a longitudinal study at an urban high school to research the effects of instructional use of technology on students and on classroom social processes. She reports that her study showed interaction among members of a classroom community to be more productive than competition between them.

Learning, the final domain, is the feeling that members have that the community they belong to is acquiring knowledge and understanding, both collectively and individually. In describing the learning dimension, Rovai and Lucking (2001) state:

Research on thinking and learning supports the proposition that people learn through interaction with others although learning is a matter of personal and unique interpretation, it takes place within a social context. Interactive learning can lead to deeper learning than is possible without interaction. (p. 8)

Effects of Technology

The Increasing Effects of Technology in Secondary Education

Technology that is used in education can include a wide variety of mechanical gadgets and instructional aids, but in this study the focus is on the use of computers in the classroom. This study defines educational technology as being a process in addition to being a product. The process of applying technology in the classroom community is just
as important as the hardware and software that comprises the technology. Computers have been used in the classroom in this country since the 1950s, but research results have not made a strong case for their impact on teaching and learning. Clark (1983, 1994) criticized research that had been done to compare computer-based and traditional methods, maintaining that many of the studies contained confounding variables. He argues the research had not been controlled for either the instructional method or for novelty effect. Clarke’s article attracted controversy, particularly with his statement that compared technology that delivers information to students with vehicles that deliver groceries to neighborhood stores.

Walker (1984) is a strong advocate of technology in the classroom, maintaining that the computer has greater potential for improving education than any previous invention, including books and writing. Bork (1987) predicted that microcomputers would revolutionize our schools. Kozma (1994) argues that learning is not just the receptive response to an instructional delivery truck but rather the interaction between the learner and the media, writing:

Enabled by its capabilities, liberated by new models of design, and informed by media theory and research, designers may find new ways to engage students in interactions within these technological environments, interactions that may tip the balance in favor of learning. (p. 18)

Clarke (1994) maintains that most research into the effects of technology is a triumph of enthusiasm over close examination of the structural processes in learning and instruction. He writes: “The media and their attributes have important influences on the
cost and speed of learning but only the use of adequate instructional methods will influence learning.” (p. 27)

Several aspects of computer use in the secondary classroom have been the subject of research and have shown beneficial results. The effects of computers on motivation studied by Kozma & Croninger (1992) describes several ways in which technology might help to address the cognitive, motivational and social needs of at-risk students. Pask-McCartney (1989) reports that the visual and interactive nature of technology resources may help to attract students and capture their attention. Relan (1992) describes the value to students of having a recognizable element of control over their learning. Learner control can motivate some students through an awareness and realization that they are learning. Computers in the classroom can facilitate a substantial degree of learner control and consequently increase the motivation of some students. Geisert & Futrell (2000) caution that one problem with the learner-controlled system is that many students do not know how to control their own learning very well, and schools all too seldom focus adequately on teaching students how to learn. Kozma (1991) reports findings that show the value to students of using technology to link them to information sources, and he also describes the value of helping learners visualize problems and possible solutions through the medium of computers.

Computers increased in use in schools during the early 1980s, fueled in part by a public perception that if they could be useful in the business world, they must be useful in the classroom. Many educators consequently felt a need to include them in their teaching, regardless of how their use might fit in with other methods of instruction. As Jonassen (2000) reports, an unfortunate consequence was that many educators considered it
important to teach high school students about computers (i.e. hardware and software knowledge) and computer literacy rather than how to use them for acquiring knowledge. Schofield (1995) captures the frustration felt by many educators, writing:

In spite of the rapid proliferation of microcomputers and related technology in schools, and the very significant amount of money spent on them, many schools and school systems appear to have given little thought to how to utilize these machines once they have them. Further, when such thought has occurred it has often been focused narrowly on issues such as what software to purchase or how to keep the machines from being physically damaged or stolen. (pp. 4-5)

The introduction of the World Wide Web in the 1990s led to an even greater number of schools putting computers in the classroom. Stoll (1999) notes that the President of the United States announced that it was an educational goal of his administration for every classroom in the country to possess a computer. The interactive power of the Internet gave ready access to a wealth of information. Access to a greater number of computers gave students the ability to network in order to exchange data both within their own classroom and also with students in foreign countries. Interactive software and the introduction of realistic simulation opened up new areas of learning for many secondary students. Supporters of constructivist theory supported this use of computers, maintaining that it enabled students to build upon previous knowledge and experience. As Morrison, Lowther & DeMeulle (1999) write:

Technology and a constructivist approach to education do not, however, need to be at odds with one another. If we change our view of computers from merely a means to deliver instruction to one of a tool to solve problems, then the reform
movement can influence the use of technology, and technology can influence the
reform of education. (p.5)

Some notes of caution have been sounded concerning the rapid proliferation of
computers in the classrooms of secondary schools. Oppenheimer (1996) is representative
of the anti-technology movement, warning against cutting programs such as music and
art in order to fund new computers. Others, dubbed Luddites by their critics, point to the
unregulated Internet as a potential source of inappropriate and violent material that
should not be available to adolescents. Huff & Finholt (1994) express a skeptical view of
the mass introduction of computers in the classroom:

There is, of course, a danger in viewing everything as a passing fad; recognizing a
permanent and dramatic shift in practice becomes almost impossible when the
metaphor of a pendulum or cycle dominates the conventional view of change in
public schools. (p. 523)

Stoll (1999) cautions that some school administrators may view computers as a panacea
for all that needs improvement within a school district, and could be tempted to spend
increased funds on technology and less money on curriculum development or on
employing additional teachers.

The literature is not definitive concerning the effects of computer technology on
student achievement. In a study (N=146) that focused on high school technology
implementation, Combs (2000) found that although students and teachers had positive
attitudes towards computers, there was no significant difference in academic achievement
between classes using computers frequently and classes using little technology. The
tremendous pace of change in computer technology has hindered such assessment, with
software and hardware developments being introduced in rapid succession before
evaluation of effectiveness has taken place. O'Donnell Dooling (2000) reports that in
many instances, considerable funding has been expended on computer equipment,
leaving insufficient finance for professional development of teachers and the
development of appropriate assessment tools. The need for computer programs to be
designed according to sound learning theory and pedagogy, and not introduced into
schools arbitrarily, is stressed by Schacter and Fagnano (1999).

Another factor that hinders measurement of achievement using computers is the
overwhelming importance attached to student performance on standardized tests.
Schofield (1995) notes that traditional tests of this nature may not be the best instruments
to measure computer effectiveness, particularly if computers are being used in innovative
ways. Schulz (1992) describes one example where all technology was removed from a
school after only one year because it had failed to increase test scores.

Many studies report the beneficial effects of using computers in the classroom for
a specific purpose. Oweson & Wiseman (1997) conclude that word processors
contributed to an improvement in children's writing quality, and Siegle & Foster (2000)
demonstrate that anatomy students learned more when they had access to laptop
computers. Studies that research the wider effects of using computers in the classroom,
however, are not so conclusive. In a meta-analysis of more than 800 articles reporting on
use of technology in the classroom, Jones & Paolucci (1998) report that support given to
technology is largely based on unfounded and anecdotal evidence, and make a strong
recommendation for further research in this area. Kosakowski (1998) writes:
To be effective, classroom technology cannot exist in a vacuum, but must become part of the whole educational environment. New measures of evaluating effectiveness are under development that would help to better define the role of technology in its wider context. (p. 4)

An observation that technology can supplement schooling but not replace it is made by Ravitch (2000), who comments that even the most advanced electronic technologies are incapable of turning their words of information into mature knowledge.

Kearsley (2000) concludes that technology can have a significant impact at the school or school system level, but the nature of that impact will depend on the particular circumstances of the schools involved, and he too recommends further research be conducted.

**Effects of Technology on the Sense of Classroom Community**

In comparison to the body of knowledge concerning the effects of technology on teaching and learning, there is relatively little research that reports on the effects of technology on the sense of classroom community. McConnell (1994) comments on the paucity of research into the effects of technology on the community of learners and recommends an agenda for further research using qualitative analysis techniques and specifically cites the value of qualitative ethnographic and phenomenological case studies. Maddux, Johnson and Willis (1997) make a strong argument for the introduction of constructivist theories of learning into the classroom through the use of technology but are unable to cite empirical findings from research in support of their case. In a study that found no significant differences found between two teams of students engaged in problem solving, one team using technology and the other not, Yaverbaum and Ocker
(1998) state that it is critical that existing research in this area be expanded. A small-scale study by Sherman (1999) showed that differences existed among groups of eighth grade students who worked on the World Wide Web using instructionist (navigational, functional) methods compared to other groups who were given a constructionist (adaptive) environment. The latter group is reported to have spent more time with the material, and had a higher degree of learner control, a higher perception of interactivity, and an increase in the amount of positive interpersonal interactions. A meta-analysis by Susman (1998) compared cooperative learning using computers with individual computer use across 23 studies. Susman reports a significant difference was found in favor of cooperative learning using technology.

While some empirical research supports the use of technology, an opposing school of thought contends that using technology in the classroom may have a negative effect on the sense of classroom community. Stoll (1995) writes scathingly of the negative aspects of technology, suggesting that teachers who try to engage young minds with conventional methods such as reading and discussion but without the use of powerful computers and flashy video displays, now face a distinct disadvantage because youngsters desire the excitement available through technology. Stoll argues that teachers should not be so seduced by the virtual world of technology that they forget that they have real students asking real questions requiring real answers, and suggests that when technical problems occur, the whole class is often totally disrupted. Winner (1997) writes that there is a danger that the high-technology classroom might infringe upon the vital interaction that takes place in a student-teacher relationship. Winner also notes that when the evidence of successful learning is hidden quietly away within a young person's mind,
not perform any better on the NAEP reading test than students who have less or no computer instruction. Roblyer and Edwards recommend that more research is needed in newer technology uses, particularly those linked to constructivist theory or reflected in instructional practice.

The literature shows that sense of classroom community is an area that requires further research. This literature review has also highlighted the need for more research into the effects of technology on teaching and learning. There is sufficient evidence in the literature to predict that the impact of technology will have an effect on sense of classroom community, but there is not enough empirical support to determine direction. This study adds to the body of knowledge in both these areas by addressing the following two non-directional hypotheses:

Hypothesis 1: The use of technology in teaching affects the sense of classroom community among high school students in an urban independent high school.

Hypothesis 2: The impact of technology use on sense of classroom community differs for ninth grade students in an urban independent high school compared to eleventh grade students.
lessons. Twelve teachers participated in the study. The determination of high or low
technology use by teachers was made by the principal, using information compiled from
professional evaluations, discussions with department chairs, and from personal
classroom observations. Equivalency of the groups in terms of students’ achievement was
determined before the study began using data provided by the school principal.
Equivalency in terms of student ethnicity was considered also.

Instrumentation

Computer Attitude Questionnaire

All subjects were asked to respond to a pre-study measurement of their attitude
towards computers as another indicator of equivalency. The standardized instrument that
was used was developed by Todman and File (1990) for students in high school, and
shows whether equivalent groups exist in terms of attitudes towards computers. The
questionnaire that was administered is reproduced at Appendix A. The scale shows an
acceptable level of reliability. The authors report the internal consistency index
(coefficient alpha) for the 20-item scale based on the responses from 364 subjects as .82.
The instrument’s concurrent validity was considered in a small-scale study in which it
was administered to a group of 33 undergraduates immediately following completion of a
questionnaire designed specifically for college students. The correlation between scores
on the two scales was .85. The authors report that a deliberate attempt was made to
provide a broad scale. Nonetheless, to confirm a uni-dimensional construct they describe
the results of a factor analysis of pilot data as showing that the instrument encompasses a
fairly coherent construct with some support for the existence of a general factor.
**Sense of Classroom Community Index**

The Sense of Classroom Community Index (SCCI) developed by Rovai, Lucking and Cristol (2001) is the instrument that was used to measure the dependent variable. The survey questions are shown at Appendix B. The survey was administered to all subjects in this study during the spring semester of 2001. Subjects were asked to respond to the questions with reference to the specific (subject) class in which the instrument was administered. For example, answering with reference to their membership in a ninth grade English class.

The SCCI has been developed to evaluate the overall sense of classroom community, as well as the component dimensions of SPIRIT, TRUST, INTERACTION and LEARNING. The questionnaire contains forty items, with ten questions for each of the four components or subscales. Subjects are asked to rate the extent to which they agree with each item on a five point Likert-type scale ranging from “strongly agree” to “strongly disagree”. The instrument was designed for use by a wide population, ranging from middle school students to college undergraduates.

In describing the SCCI's reliability, Rovai and Lucking (2001) report that Cronbach's coefficient alpha was estimated for SCCI scores obtained from 511 undergraduate and graduate university students to determine instrument reliability. Resultant coefficients of internal consistency were .96 for the overall SCCI score, .90 for the spirit sub-score, .84 for the trust sub-score, .84 for the interaction sub-score, and .88 for the learning sub-score. These findings provide evidence that classroom community and each of its dimensions have high internal consistencies and can be reliably measured in a group of post-secondary students using the SCCI.
The SCCI has been assessed for its validity by its authors. In order to maximize content validity, the items comprising the forty questions were developed to measure the sense of classroom community over the content domain (i.e. spirit, trust, interaction and learning) identified in the theoretical and empirical literature. The blueprint for scale development is based on the components of classroom community identified by McMillan and Chavis (1986). Rovai and Lucking (2001) took care to ensure that (1) the definition of classroom community is based on the definition of psychological community, (2) that classroom community is seen as a type of psychological community applied to an educational setting, and (3) that the SCCI captures the dimensions of classroom community. The authors also report that the instrument possesses high face validity, and that on face value the survey items appear to measure what is needed to assess a sense of classroom community. The survey items are worded suitably for use with the target population, having a Flesch Reading Ease score of 81.1 on a 100-point scale (the higher the score, the easier it is to understand). Rovai and Lucking (2001) report that a factor analysis was conducted on the SCCI, using the scores obtained from 511 college students. The four factors of spirit, trust, interaction and learning were well defined by the factor solution. The loadings represent correlations of .30 or larger between SCCI items and factors. Sixty-two percent of total variance was explained by the four factors.

**Open-ended Interviews**

Subjects who were selected to participate in the qualitative analysis of this study took part in standardized semistructured interviews. Subjects selected were those who obtained the highest and the lowest SCCI scores from classes determined to have high
computer use in both grades, and similarly from classes with low computer use. The principal questions that the researcher used are shown at Appendix C, and follow-up questions were used to probe for additional information.

The reliability of the interview questions were assessed initially by conducting a pilot study in advance of the actual interviews with a sample of students from grade eight (N = 20) and a sample from grade ten (N = 21). The pilot study was conducted to determine whether the questions were clear and unambiguous, and also to show whether the questions were easily and fully understood by a sample of subjects similar to the participants. Following the interviews a sample of the analyzed responses were provided to an independent third party to assess them for reliability of scoring. Additionally, a peer review was conducted to provide an external check of the research process.

Content validity was determined by ensuring that the interview questions were constructed around the content domain of the SCCI and the use of technology in the classroom. A blueprint showing how interview questions relate to the scales of the SCCI and to technology use is shown at Figure 1.

<table>
<thead>
<tr>
<th>Technology</th>
<th>Spirit</th>
<th>Trust</th>
<th>Interaction</th>
<th>Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>How does the use of computers affect your sense of belonging to this class?</td>
<td>How does using computers affect your sense of trust in this class?</td>
<td>How does using computers in this class affect the way you work with other students? How does using computers in this class affect the way you work with the teacher?</td>
<td>Describe what it is like using computers to learn in this subject.</td>
</tr>
</tbody>
</table>
General

Describe your sense of belonging to this class.

How does trust play a role in the learning that takes place in this class?

In what ways do you think other students help you to learn in this class? Please describe your classroom interactions with other students in your class. Please explain how groups work together in this class?

How much do you think you learn in this class compared to other classes? In what ways do you think you help other students learn in this class?

Figure 1. Blueprint showing content validity of interview questions.

Validity of the interviews was enhanced using the following procedures recommended by Creswell (1998). First, writing with rich, thick description enables the reader to transfer information to other settings and to determine whether the findings can be transferred to a similar population. Second, taking the data, analyses, interpretations and conclusions back to the participants ensured that they could judge the accuracy and credibility of the account.

Procedure

Selection

The intact classes of participants were selected using criteria supplied by the school principal that related to the use of technology in their teaching. The criteria used to determine high or low technology use by teachers included information compiled from professional evaluations, discussions with department chairs, and personal classroom observations. Equivalency among the classes was determined using school records of achievement. The age and ethnicity of the participants was also considered. All participants received permission from a parent or guardian to take part in the study using documentation shown at Appendix D. The researcher ensured that the participants...
understood that all their responses would be confidential, and would not be reported to any teacher or administrator. The researcher guaranteed anonymity of all students' responses by assigning an original and unique code to each student. This code was known only to the researcher and to each participant, and was not released to any other person. The researcher personally administered all questionnaires, and all data gathered was analyzed away from the school campus in order to safeguard confidentiality.

Achievement and ethnicity information on students that was supplied by the principal was safeguarded using the same system of coding to ensure that it remained private and confidential. Following the quantitative data analysis, selection was made of participants to take part in the qualitative part of the study. This selection was made equitably from within grades nine and eleven by purposeful sampling, and specifically by maximum variation sampling. Six participants who achieved the highest and the lowest SCCI scores were selected from classes with high technology in their instruction, and six from classes using little or no technology. This particular sampling technique was chosen as any common patterns that emerged from great variation would be of particular interest and value in capturing the core experiences and central, shared aspects (Patton, 1990).

**Administration of Measures**

A standardized computer attitude questionnaire (Todman & File, 1990) was administered as another determination of equivalency; this instrument was administered to all participants at the outset of the study. The researcher subsequently administered the SCCI (Rovai, Lucking & Cristol, 2001) during the spring semester of the 2000-2001 school year. Students selected for the qualitative study were interviewed separately and privately, and the confidentiality of the process was assured. Each interview lasted
analyses, interpretations and conclusions were taken back to the participants so that they could comment on the accuracy and credibility of the account.
CHAPTER IV

RESULTS

Introduction

This chapter presents the results of the data analysis and reports on the following: (a) the results of measurements taken to determine equivalency among subjects and their teachers; (b) the results of the quantitative analysis of SCCI scores; and (c) the results of the qualitative analysis of student interviews.

The following research questions are addressed:

1. Do students in grade nine and in grade eleven in an urban independent high school differ in their sense of classroom community?

2. How does the use of technology in their classroom affect the students’ sense of classroom community?

3. Does the impact of technology use on their sense of classroom community differ for ninth grade students compared to eleventh grade students?

4. How do students describe classroom community and its importance for their learning?

5. What factors do students perceive to be important for developing a sense of classroom community?

Measures of Equivalency

The first section of this chapter reports on the measures taken by the researcher to determine the equivalency of the students who participated in this study (N = 181). This step was particularly important as intact groups of students were being measured. This chapter also reports on equivalency among the teachers involved. The areas of equivalency that were considered for all participants are detailed, and data relating to
each area are presented. In each of the tables, n is the number of students in each of the intact classes. The class designator shown in the tables indicates grade level (i.e. grade nine or eleven) followed by an identification letter assigned by the researcher that relates to computer use in teaching. In both grade levels, classes with suffixes A-C are those with high levels of computer use in their instruction; suffixes X-Z denote those classes experiencing little or no technology in their teaching. An alpha level of .05 was used for all statistical tests.

Academic achievement

Standardized test scores were used to determine whether there was academic achievement equivalency among the groups of subjects. The scores used were the Selection Index scores of the Preliminary Scholastic Achievement Test (PSAT), a national standardized test administered annually in the majority of high schools. All students from grades nine, ten and eleven in the participating school routinely take this test. The Selection Index is the composite score of the two principal sections of the PSAT, mathematics and English. Mathematics and English in the PSAT both have a total possible score of 120, and the composite Selection Index score has a maximum value of 240. The researcher used PSAT scores obtained for all students in grades nine and eleven from the tests administered in October 2000. Table 1 shows the descriptive statistics relating to level of achievement for all participating classes in the study as measured by the Selection Index score of the PSAT.
Table 1

Mean Standardized Achievement Test Scores

<table>
<thead>
<tr>
<th>Class</th>
<th>M</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>9A</td>
<td>145.72</td>
<td>15.71</td>
<td>119</td>
<td>181</td>
<td>18</td>
</tr>
<tr>
<td>9B</td>
<td>156.51</td>
<td>23.33</td>
<td>110</td>
<td>190</td>
<td>12</td>
</tr>
<tr>
<td>9C</td>
<td>146.47</td>
<td>17.64</td>
<td>119</td>
<td>180</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>148.84</td>
<td>18.77</td>
<td>110</td>
<td>190</td>
<td>45</td>
</tr>
<tr>
<td>9X</td>
<td>141.53</td>
<td>21.77</td>
<td>113</td>
<td>193</td>
<td>15</td>
</tr>
<tr>
<td>9Y</td>
<td>133.41</td>
<td>15.87</td>
<td>110</td>
<td>170</td>
<td>15</td>
</tr>
<tr>
<td>9Z</td>
<td>145.51</td>
<td>18.58</td>
<td>114</td>
<td>190</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>140.26</td>
<td>19.16</td>
<td>110</td>
<td>193</td>
<td>46</td>
</tr>
<tr>
<td>11A</td>
<td>145.53</td>
<td>19.73</td>
<td>115</td>
<td>193</td>
<td>15</td>
</tr>
<tr>
<td>11B</td>
<td>156.06</td>
<td>21.57</td>
<td>115</td>
<td>190</td>
<td>16</td>
</tr>
<tr>
<td>11C</td>
<td>161.85</td>
<td>22.61</td>
<td>115</td>
<td>211</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>155.24</td>
<td>21.67</td>
<td>115</td>
<td>211</td>
<td>51</td>
</tr>
<tr>
<td>11X</td>
<td>163.69</td>
<td>13.64</td>
<td>137</td>
<td>187</td>
<td>16</td>
</tr>
<tr>
<td>11Y</td>
<td>150.46</td>
<td>23.26</td>
<td>110</td>
<td>189</td>
<td>13</td>
</tr>
<tr>
<td>11Z</td>
<td>162.81</td>
<td>24.36</td>
<td>128</td>
<td>203</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>158.54</td>
<td>20.48</td>
<td>110</td>
<td>203</td>
<td>39</td>
</tr>
</tbody>
</table>

Note: Maximum possible score for the Selection Index of the PSAT is 240.

Inferential statistics were used to determine if any significant differences existed among the achievement scores of classes in grade nine. Levene's test showed that the assumption of homogeneity of variance was tenable, and the Kolmogorov-Smirnov test showed that normality was tenable. One-way analysis of variance showed no significant differences among the classes in terms of their achievement scores, \( F(5, 85) = 2.18, p = .06 \). The same statistical process was applied to the achievement scores of classes in grade eleven, and no significant difference was found among the classes, \( F(5, 84) = 2.04, \)
analysis of variance showed no significant differences among the classes from grade nine, $F(5, 85) = 1.40$, $p = .23$. The same statistical process was applied to the ages of subjects in grade eleven classes, and no significant differences were found among the subjects in those classes, $F(5, 84) = .87$, $p = .53$. These results show that the subjects' ages were not significantly different either among the students in grade nine or those in grade eleven.

Diversity

Students participating in this study were also similar with respect to diversity. Diversity among all students at the school in grades nine and eleven for the academic year 2000 - 2001 is shown in Table 3. The intact classes that participated in this study were all selected from grades nine and eleven, and no one class differed significantly from another in terms of diversity among its students.

Table 3

<table>
<thead>
<tr>
<th>Diversity of Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diversity</td>
</tr>
<tr>
<td>-----------------------</td>
</tr>
<tr>
<td>African-Americans</td>
</tr>
<tr>
<td>Hispanic-Americans</td>
</tr>
<tr>
<td>Asian-Americans</td>
</tr>
<tr>
<td>Native-Americans</td>
</tr>
<tr>
<td>Multi-racial</td>
</tr>
<tr>
<td>People of Color</td>
</tr>
<tr>
<td>Foreign Nationals</td>
</tr>
<tr>
<td><strong>Total Diversity</strong></td>
</tr>
</tbody>
</table>
Attitudes towards Computers

Standardized survey scores were used to determine equivalency among the groups of subjects in terms of their attitude towards the use of computers. The scores used were obtained from a computer attitude questionnaire (Todman & File, 1990). The researcher used the questionnaire to measure all subjects in grades nine and eleven during the spring semester of 2001.

This standardized instrument was designed specifically to measure computer attitudes of students in the middle years of high school, and its reliability and validity as reported by its authors are detailed fully in Chapter 3 of this study. In order to estimate its reliability in this study, Cronbach's coefficient alpha was applied to the attitude scores. The coefficient of internal consistency was .86 for the overall score. This finding provides additional supporting evidence that the attitude towards computers survey instrument has high internal consistency and can be reliably measured in a group of urban high school students.

Table 4 shows the descriptive statistics relating to the subjects' attitude towards computers, and presents data obtained from all subjects in classes drawn from grades nine and eleven. The attitude scores were analyzed to determine whether there were any significant differences among the classes in grade nine. Levene's test showed that the assumption of homogeneity of variance was tenable, and the Kolmogorov-Smirnov test showed that normality was tenable. One-way analysis of variance showed no significant differences existed among the classes in grade nine, \( F(5, 85) = .29, p = .95 \). The same statistical process was applied to the attitude towards computers scores of classes in grade eleven, and no significant differences were found, \( F(5, 84) = 2.19, p = .06 \). These results
indicate that the classes in both grades were similar in their attitude towards using computers.

Table 4

**Mean Standardized Computer Attitude Scores**

<table>
<thead>
<tr>
<th>Class</th>
<th>M</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>9A</td>
<td>56.44</td>
<td>11.56</td>
<td>23</td>
<td>72</td>
<td>18</td>
</tr>
<tr>
<td>9B</td>
<td>56.25</td>
<td>6.97</td>
<td>43</td>
<td>69</td>
<td>12</td>
</tr>
<tr>
<td>9C</td>
<td>53.81</td>
<td>16.52</td>
<td>13</td>
<td>74</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>55.51</td>
<td>12.33</td>
<td>13</td>
<td>74</td>
<td>45</td>
</tr>
<tr>
<td>9X</td>
<td>57.13</td>
<td>11.98</td>
<td>40</td>
<td>76</td>
<td>15</td>
</tr>
<tr>
<td>9Y</td>
<td>57.93</td>
<td>8.88</td>
<td>46</td>
<td>78</td>
<td>15</td>
</tr>
<tr>
<td>9Z</td>
<td>56.73</td>
<td>8.33</td>
<td>44</td>
<td>71</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>57.17</td>
<td>9.62</td>
<td>40</td>
<td>78</td>
<td>46</td>
</tr>
<tr>
<td>11A</td>
<td>50.73</td>
<td>9.58</td>
<td>28</td>
<td>62</td>
<td>15</td>
</tr>
<tr>
<td>11B</td>
<td>56.88</td>
<td>7.74</td>
<td>43</td>
<td>68</td>
<td>16</td>
</tr>
<tr>
<td>11C</td>
<td>52.11</td>
<td>8.69</td>
<td>36</td>
<td>64</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>53.19</td>
<td>8.89</td>
<td>28</td>
<td>68</td>
<td>51</td>
</tr>
<tr>
<td>11X</td>
<td>50.94</td>
<td>8.53</td>
<td>36</td>
<td>69</td>
<td>16</td>
</tr>
<tr>
<td>11Y</td>
<td>58.15</td>
<td>6.47</td>
<td>49</td>
<td>70</td>
<td>13</td>
</tr>
<tr>
<td>11Z</td>
<td>53.31</td>
<td>9.23</td>
<td>37</td>
<td>63</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>53.95</td>
<td>8.49</td>
<td>36</td>
<td>70</td>
<td>39</td>
</tr>
</tbody>
</table>

**Note:** Maximum possible score on the instrument is 80.
Equivalency among participating teachers

The principal of the school selected the teachers to participate in this study after consultation with all heads of department. Factors that were considered in the selection process were number of years of teaching experience and performance rating obtained from professional evaluations. The teachers selected were judged to be equivalent in these respects. The principal also assessed the amount of technology incorporated in the teachers' classroom instruction, and selection was made of six who used computers frequently in their teaching, and six who did not. The names of the teachers selected to participate and the intact classes that they instructed were then made available to the researcher, but the supporting data used in the selection process were not released due to confidentiality considerations.

Sense of Classroom Community

The researcher conducted all measurements of the sense of classroom community using the SCCI during the spring semester of 2001. This standardized instrument was designed for use by a wide population, ranging from middle school students to undergraduates. The instrument's reliability and validity with an older population as reported by its authors are detailed fully in Chapter 3 of this study. This was the first occasion on which the SCCI had been administered to high school students, however, and in order to add to the body of knowledge the researcher investigated its reliability with this sample population. The results of this analysis of the instrument are reported below.

Reliability of SCCI

Cronbach's coefficient alpha was applied to SCCI scores obtained from 181 high school students to determine instrument reliability. Resultant coefficients of internal
consistency were .95 for the overall score, .86 for the spirit sub-score, .80 for the trust sub-score, .82 for the interaction sub-score, and .87 for the learning sub-score. These findings provide evidence that classroom community and each of its components have high internal consistencies and can be reliably measured within a group of urban high school students using the SCCI.

**SCCI Data**

Descriptive analyses were conducted on the scores obtained on the SCCI, and are presented in Tables 5-7. Table 5 shows the mean overall scores for the SCCI scored by each class in grade nine and in grade eleven. The table shows that classes designated 9X-Z (low technology) had the lowest mean total score on the SCCI, and that the mean totals for the other classes were similar to one another. The standard deviations show that the classes had similar levels of variability. Box plots revealed that the distributions were approximately normal.

**Table 5**

**Mean SCCI Scores**

<table>
<thead>
<tr>
<th>Class</th>
<th>M</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>9A</td>
<td>110.28</td>
<td>19.75</td>
<td>77</td>
<td>148</td>
<td>18</td>
</tr>
<tr>
<td>9B</td>
<td>98.67</td>
<td>17.15</td>
<td>78</td>
<td>137</td>
<td>12</td>
</tr>
<tr>
<td>9C</td>
<td>101.81</td>
<td>18.51</td>
<td>73</td>
<td>143</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>104.36</td>
<td>18.93</td>
<td>73</td>
<td>148</td>
<td>45</td>
</tr>
<tr>
<td>9X</td>
<td>106.93</td>
<td>20.55</td>
<td>55</td>
<td>142</td>
<td>15</td>
</tr>
<tr>
<td>9Y</td>
<td>95.01</td>
<td>19.59</td>
<td>63</td>
<td>129</td>
<td>15</td>
</tr>
<tr>
<td>9Z</td>
<td>75.88</td>
<td>23.82</td>
<td>34</td>
<td>118</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>92.24</td>
<td>24.69</td>
<td>34</td>
<td>142</td>
<td>46</td>
</tr>
</tbody>
</table>
### Table 6

**Mean SCCI Sub-Scale Scores - Grade 9**

<table>
<thead>
<tr>
<th>Sub-Scale</th>
<th>M</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPIRIT</td>
<td>24.21</td>
<td>6.18</td>
<td>9.00</td>
<td>38.00</td>
<td>91</td>
</tr>
<tr>
<td>TRUST</td>
<td>23.79</td>
<td>5.57</td>
<td>9.00</td>
<td>35.00</td>
<td>91</td>
</tr>
<tr>
<td>INTERACTION</td>
<td>24.04</td>
<td>6.65</td>
<td>3.00</td>
<td>38.00</td>
<td>91</td>
</tr>
<tr>
<td>LEARNING</td>
<td>26.19</td>
<td>6.84</td>
<td>11.00</td>
<td>40.00</td>
<td>91</td>
</tr>
</tbody>
</table>

**Note:** Maximum score obtainable on each sub-scale is 40.
Table 7

Mean SCCI Sub-Scale Scores - Grade 11

<table>
<thead>
<tr>
<th>Sub-Scale</th>
<th>M</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPIRIT</td>
<td>26.60</td>
<td>6.00</td>
<td>9.00</td>
<td>39.00</td>
<td>90</td>
</tr>
<tr>
<td>TRUST</td>
<td>24.72</td>
<td>6.11</td>
<td>11.00</td>
<td>37.00</td>
<td>90</td>
</tr>
<tr>
<td>INTERACTION</td>
<td>25.10</td>
<td>6.76</td>
<td>5.00</td>
<td>39.00</td>
<td>90</td>
</tr>
<tr>
<td>LEARNING</td>
<td>28.20</td>
<td>6.22</td>
<td>11.00</td>
<td>40.00</td>
<td>90</td>
</tr>
</tbody>
</table>

Note: Maximum score obtainable on each sub-scale is 40.

Inferential Analyses

Analyses were conducted on the data to address the research questions and to test two non-directional hypotheses:

Hypothesis 1: The use of technology in teaching affects the sense of classroom community among high school students in an urban independent high school.

Hypothesis 2: The impact of technology use on sense of classroom community differs for ninth grade students in an urban independent high school compared to eleventh grade students.

Box plots showed that the data for each dependent variable in each condition of the independent variables were approximately normally distributed. There were equal sample sizes, so it was concluded that there were no major violations of the assumption of multivariate normality. Cochran's C and Box's M tests indicated that there were also no violations of the assumptions of homogeneity of variance and homogeneity of the variance-covariance matrices respectively. Error bar charts showed that the differences
the first step of the analysis, the sub-scales of trust, interaction and learning were all removed from the analysis, leaving the sub-scale spirit. The analysis showed that 55.8% of original grouped cases were classified correctly.

Univariate analyses were conducted using the results that had been identified through discriminant analysis procedures, and the two sub-scales of spirit and learning were investigated further. The first analysis considered the independent variable of grade (nine or eleven) and its effect on the dependent variable spirit sub-scale, and an independent samples t-test was conducted. Levene's test for equality of variances revealed that the variances were not significantly different. Grade nine students scored lower on the spirit sub-scale (M = 24.21, SD = 6.18) than students in grade eleven (M = 26.20, SD = 5.99). Effect size was calculated: $d = .32$. The independent samples t-test result was $t(179) = 2.20, p = .03$. This result provides an insight into research question 1. There is no evidence to show that a significant difference existed between grade nine and grade eleven as measured by the combined sub-scales of the SCCI. The data does show, however, that a significant difference existed between grade levels nine and eleven as measured by the spirit sub-scale of the SCCI.

A factorial analysis of variance was conducted to examine the independent variables of computer use in teaching (high or low) and grade level (nine or eleven) and their effects on the dependent variable learning sub-scale. The interaction between the two independent variables, however, was not statistically significant. This result provides insight into research question 3. There is no evidence that that the impact of computer use on their sense of community differs for ninth grade students compared to eleventh grade students, and consequently hypothesis 2 is not supported. No further analysis was
conducted concerning the difference that had been identified between the grades in respect to the spirit sub-scale, as there was no evidence of interaction with the use of technology, and the focus of this study is the effect of technology.

An independent samples t-test examined the independent variable of high/low technology use in teaching and its effect on the learning sub-scale of the SCCI. Levene's test for equality of variances revealed that the variances were significantly different. Students in classes that had high use of computers in their teaching scored higher on the learning sub-scale \((M = 28.30, SD = 5.84)\) than those in classes with low use of computers in teaching \((M = 25.93, SD = 7.18)\). Effect size was calculated: \(d = .36\). The independent samples t-test result was \(t(162) = 2.42, p = .02\). This result provides insight into research question 2, and shows that hypothesis 1 is supported partially by the data analysis. There is no evidence to show that a significant difference existed between high and low computer use in teaching as measured by the combined sub-scales of the SCCI. Analysis of the individual sub-scales, however, reveals that a significant difference existed between high and low computer use in teaching as measured by the SCCI sub-scale of learning.

In order to investigate student reactions to the two sub-scales showing significant differences identified by inferential statistics, a further examination was made of responses to individual items within the spirit and learning domains of the SCCI. The mean scores of all student responses \((N = 181)\) to questions relating to the subscales of spirit and learning are shown below. Scores for the SPIRIT sub-scale are categorized according to grade level (nine and eleven) and are shown in Table 8. The LEARNING sub-scale scores are categorized according to level of technology use in Table 9.
Table 8

**Mean Scores for SPIRIT Sub-Scale items**

<table>
<thead>
<tr>
<th>Question #</th>
<th>GRADE 9 M</th>
<th>SD</th>
<th>GRADE 11 M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.12</td>
<td>0.95</td>
<td>2.54</td>
<td>1.12</td>
</tr>
<tr>
<td>5</td>
<td>2.52</td>
<td>0.94</td>
<td>2.67</td>
<td>0.92</td>
</tr>
<tr>
<td>9</td>
<td>2.33</td>
<td>0.79</td>
<td>2.43</td>
<td>0.95</td>
</tr>
<tr>
<td>13</td>
<td>2.43</td>
<td>1.01</td>
<td>2.71</td>
<td>1.08</td>
</tr>
<tr>
<td>17</td>
<td>2.15</td>
<td>0.99</td>
<td>2.31</td>
<td>1.05</td>
</tr>
<tr>
<td>21</td>
<td>2.19</td>
<td>1.09</td>
<td>2.43</td>
<td>1.02</td>
</tr>
<tr>
<td>25</td>
<td>2.01</td>
<td>1.01</td>
<td>2.36</td>
<td>1.01</td>
</tr>
<tr>
<td>29</td>
<td>2.73</td>
<td>0.94</td>
<td>2.76</td>
<td>0.89</td>
</tr>
<tr>
<td>33</td>
<td>2.46</td>
<td>1.03</td>
<td>2.66</td>
<td>0.96</td>
</tr>
<tr>
<td>37</td>
<td>2.69</td>
<td>0.93</td>
<td>2.97</td>
<td>0.81</td>
</tr>
</tbody>
</table>

Table 9

**Mean Scores for LEARNING Sub-Scale items**

<table>
<thead>
<tr>
<th>Question #</th>
<th>LOW TECHNOLOGY M</th>
<th>SD</th>
<th>HIGH TECHNOLOGY M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>2.73</td>
<td>0.97</td>
<td>2.99</td>
<td>0.85</td>
</tr>
<tr>
<td>8</td>
<td>2.65</td>
<td>1.04</td>
<td>2.85</td>
<td>0.88</td>
</tr>
<tr>
<td>12</td>
<td>2.43</td>
<td>1.07</td>
<td>2.57</td>
<td>0.99</td>
</tr>
<tr>
<td>16</td>
<td>2.77</td>
<td>0.94</td>
<td>2.81</td>
<td>0.97</td>
</tr>
<tr>
<td>20</td>
<td>2.86</td>
<td>0.81</td>
<td>3.02</td>
<td>0.75</td>
</tr>
<tr>
<td>24</td>
<td>2.59</td>
<td>1.06</td>
<td>2.91</td>
<td>0.88</td>
</tr>
<tr>
<td>28</td>
<td>2.29</td>
<td>1.05</td>
<td>2.93</td>
<td>0.99</td>
</tr>
<tr>
<td>32</td>
<td>2.71</td>
<td>0.98</td>
<td>3.04</td>
<td>0.81</td>
</tr>
<tr>
<td>36</td>
<td>2.62</td>
<td>1.11</td>
<td>2.97</td>
<td>0.85</td>
</tr>
<tr>
<td>40</td>
<td>2.21</td>
<td>1.08</td>
<td>2.31</td>
<td>1.04</td>
</tr>
</tbody>
</table>
Descriptive analysis of the mean scores of these two sub-scales was conducted, and items that revealed a mean difference of $>0.3$ were identified. Two such items were identified from within the SPIRIT sub-scale of the SCCI and categorized by grade level as shown in Table 8. These items were:

1. "I feel excited about this course."
25. "I feel close to others in this course."

The instrument is designed so that positive responses to any of the items receive higher scores. Responses to the two questions from the spirit domain indicate that the students from grade eleven classes felt more excited about their particular course of study and also felt a stronger spirit of community with their peers.

Four items with mean differences $>0.3$ were identified from within the LEARNING sub-scale, and categorized by technology level as shown in Table 9. These items were:

24. "I feel that this course provides valuable skills."
28. "I feel that there is no need to think critically in this course."
32. "I feel that this course does not meet my educational needs."
36. "I feel that I learn a lot in this course."

The responses to questions from the learning domain suggest that students from the high technology classes recognized that they were learning valuable new skills and that they were being encouraged to think critically. These students also responded more positively to the item asking whether their educational needs were being met.

Examination of the differences in means also indicates that a greater number of students
from the high technology classes considered that they were learning a lot from their particular class.

Qualitative Results

Analysis

A content analysis was used to identify themes in students' responses, to develop categories based on the themes, and to tabulate the number and percentage for each category. Reliability in coding the responses was assessed by having another researcher independently code the responses. There was a 93% agreement in categorization between the two researchers across the responses to the twelve questions. Validity of the responses was determined by conducting a participants' review. The data and its analysis were taken back to the participants so they could judge the accuracy and credibility of the account. There was full agreement by the participants that the analysis reflected a valid account of their responses to the interview questions.

Interview Results

The most frequently stated responses by category for each of the twelve interview items are reported in Tables 9 - 13. The interview questions and the students' responses are categorized according to the SCCI sub-scales and to use of technology. Some individual responses contained more than one topic, and these were coded and counted in more than one category. Consequently the percentages shown in Tables 9-13 were calculated based on the number of responses coded into each category, and not from the number of students who were interviewed.

The results of questions relating primarily to the spirit sub-scale are shown in Table 10. The table shows that eight out of the twelve students interviewed felt a sense of
belonging to their class and of being wanted by their peers (37%). Conversely, only two students felt out of place in their class. Comments were made relating to students working together as a team (18%). Students responded that one of the most important factors for them concerning classroom community and its importance for learning was the sense of belonging to a class (37%). A student commented "I feel comfortable in this class. I feel wanted by the students and they like me. I've always felt comfortable in that class." The teacher's influence upon the classroom environment was also voiced by students (18%). One responded "I very definitely belong. She does a really good job of relating things, and there's a good identity among the students. I've never felt that I didn't belong to that class." Another student commented "There's a good sense of belonging. There's an even amount of questioning too -- it's not like one person answering questions all the time." The effect of technology on their sense of classroom spirit was also addressed in the interviews and the results are reported in Table 10.

Table 10

Students' Most Frequent Responses to Interview Questions: Spirit Sub-Scale

<table>
<thead>
<tr>
<th>Item / Category</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Describe your sense of belonging to this class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel wanted</td>
<td>8</td>
<td>37</td>
</tr>
<tr>
<td>We all stick together</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>The teacher creates a warm environment</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>I feel like an outsider</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>2. How do computers affect your sense of belonging?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Little or no effect</td>
<td>7</td>
<td>61</td>
</tr>
<tr>
<td>They help me feel more comfortable</td>
<td>4</td>
<td>23</td>
</tr>
</tbody>
</table>
Responses to the interview questions relating principally to the trust sub-scale of the SCCI are shown in Table 11. Nine out of twelve of the participants replied that they trusted the other students in their class. One student replied "We have a good friendship level in this class, and we all trust each other too. That's what I like about that class." Another commented "Trust between students is pretty strong. We all work together and would know if anything bad was going on." The same number included trust of their teacher in their answers, and each of these responses accounted for 28% of the total in that category. Commenting on the importance of trusting the teacher, a student remarked "The moment we walk into that class we know she is not going to dominate. We can trust her, and she trusts us too. It's a question of honor as well." Responses indicated that several students also felt it important for their teacher to trust them (25%). Table 11 also shows that none of the students interviewed felt that technology affected the sense of trust that they experienced in the classroom.

Table 11

Students' Most Frequent Responses to Interview Questions: Trust Sub-Scale

<table>
<thead>
<tr>
<th>Item / Category</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How does trust help learning?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The students trust each other</td>
<td>9</td>
<td>28</td>
</tr>
<tr>
<td>I trust the teacher</td>
<td>9</td>
<td>28</td>
</tr>
<tr>
<td>The teacher trusts us</td>
<td>7</td>
<td>25</td>
</tr>
<tr>
<td>Trust does not affect learning</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>2. How do computers affect your sense of trust?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Little or no effect</td>
<td>12</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 12 shows the responses to interview questions relating mainly to the interaction sub-scale of the SCCI. Many students replied that they interacted and helped one another in the classroom (37%). An additional 28% commented on interaction outside of the class. One student replied "We do a lot of work outside the class too, and that is when people really do help each other." Collaborative work was identified by the students as an area of interaction among themselves. Some of the responses related to group work (35%), and other answers related to interaction through combined review sessions (30%). One student commented "It's so much easier when we work together. We share everything with each other. It's not like one does more than the others. We work together on all the problems." Another student responded "We ask a lot of questions and help each other by asking some and sometimes being able to answer them for other people. We can vocalize anything we like about the subject. We also help each other by saying where we actually found the information, so we are all able to benefit."

Table 12

Students' Most Frequent Responses to Interview Questions: Interaction Sub-Scale

<table>
<thead>
<tr>
<th>Item / Category</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Describe classroom interactions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>We help each other a lot</td>
<td>6</td>
<td>37</td>
</tr>
<tr>
<td>We interact a lot from by phone and e-mail</td>
<td>5</td>
<td>28</td>
</tr>
<tr>
<td>We occasionally work in pairs</td>
<td>3</td>
<td>19</td>
</tr>
<tr>
<td>We do not interact much</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>We sometimes work in groups</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>2. How do groups work together?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>We do projects together</td>
<td>6</td>
<td>35</td>
</tr>
<tr>
<td>We review for tests together</td>
<td>5</td>
<td>30</td>
</tr>
<tr>
<td>We group together in the laboratory</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>We seldom work in groups</td>
<td>2</td>
<td>15</td>
</tr>
</tbody>
</table>
The responses to the questions related to the learning sub-scale of the SCCI are shown in Table 13. Students replied that they believed that there was a balance between the amount of help they gave to their peers and received from others (35%). The importance of questions raised by other students in class was recorded on several occasions (34%). One example was "We all sort of feed off one another. There are lots of questions asked. It's a very open class. I think the questions that I ask sometimes help other students to learn more vocabulary and to understand more of what we are learning."

Another reply described a class where the sense of belonging to a community of learners was not present: "I don't think other students help me much. Questions are rare; there just isn't any opportunity. The slides just go up on the overhead and we have to take it all down. We don't learn too much. I don't think I have learned anything much in the last month." Other responses pertained to the value of class discussions (24%). A student answered "We have a lot of class discussions -- they help a lot. We are encouraged to argue and to say different points of view."

Student responses varied when commenting on the amount they thought they were learning in any one particular class. Some believed a particular class was the one they learned most from (42%). A student commented "I learn a lot more in this class. I feel we are constantly learning a lot of new things. It's a good learning environment."

Another responded "This is one I really learn a lot in. You just sort of retain the knowledge." Other students indicated a particular class was the one in which they learned the least (38%). One replied "I learn more in most other classes. I find this more difficult, and most of the time I just don't get it. It seems to go right over my head, and my teacher doesn't seem to know that."
Table 13

Students' Most Frequent Responses to Interview Questions: Learning Sub-Scale

<table>
<thead>
<tr>
<th>Item / Category</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How do you help other students learn?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The questions I ask help others</td>
<td>5</td>
<td>35</td>
</tr>
<tr>
<td>I help others from home by phone or e-mail</td>
<td>5</td>
<td>35</td>
</tr>
<tr>
<td>The teacher asks me to explain</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>I do not help others much</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>2. How do other students help you learn?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The questions they ask help me</td>
<td>8</td>
<td>34</td>
</tr>
<tr>
<td>Discussions generate different ideas</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>They help me from their home by phone or e-mail</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>They do not help me much</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>3. How much do you learn compared to other classes?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>This is the one I learn most in</td>
<td>5</td>
<td>42</td>
</tr>
<tr>
<td>Far less</td>
<td>4</td>
<td>38</td>
</tr>
<tr>
<td>A lot more</td>
<td>3</td>
<td>14</td>
</tr>
</tbody>
</table>

Table 14 shows the responses to questions based principally on use of technology in teaching. Students responded that computers helped them with project work (37%). One student commented "They are very helpful. I've used a computer for every single project I've done in this class. Doing a package of work for one topic was so easy when I used the computer. All the information was right there, and it was very easy to understand." Other responses indicated that students enjoyed using technology in their work at school (31%). A ninth grade student observed that technology was both helpful and fun, relating "We did a research project on exotic pets like monkeys and tigers, and
had to find out what their needs were if they were kept as a pet. I found a great web site and got lots of stuff from it. I enjoyed doing it that way."

Nine out of twelve of the participants (and 51% of the responses) indicated that computers made little difference in the way students worked with their peers. Some students felt computers did not affect the way they worked with their teacher (54%); others indicated that they felt computers helped them work with a teacher (33%). One student commented "Using computers is cool because it allows the student to find out things the teacher didn't know. The technology allows me to share new ideas with the teacher, so it's good for both of us." Commenting on the use of technology in a social studies class, a student in a grade eleven class revealed that "It's pretty neat. We did the Spanish-American war just from computers - nothing came from a book. I went to a lot of Internet sites, and it stuck with me much better than if I had learned from a textbook. It's easier really than having to go through the books to find out information. It's a different way of learning. Our teacher gave us some good information off the web too that she had found and wanted to share with us."

Table 14

Students' Most Frequent Responses to Interview Questions: Technology

<table>
<thead>
<tr>
<th>Item / Category</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Describe using computers to learn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>They help me do project work</td>
<td>8</td>
<td>37</td>
</tr>
<tr>
<td>I enjoy using them</td>
<td>6</td>
<td>31</td>
</tr>
<tr>
<td>We only use them as word processors</td>
<td>3</td>
<td>14</td>
</tr>
</tbody>
</table>
2. How do computers affect the way you work with other students?

<table>
<thead>
<tr>
<th>Option</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makes little difference</td>
<td>9</td>
<td>51</td>
</tr>
<tr>
<td>We share information and web sites</td>
<td>3</td>
<td>24</td>
</tr>
</tbody>
</table>

3. How do computers affect the way you work with the teacher?

<table>
<thead>
<tr>
<th>Option</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makes little difference</td>
<td>8</td>
<td>54</td>
</tr>
<tr>
<td>They help me work with the teacher</td>
<td>4</td>
<td>33</td>
</tr>
</tbody>
</table>

**Summary of Qualitative Analysis**

The results reported in Tables 10-14 were used to address research question 4, which asked how students describe classroom community and its importance for learning. Students responded that one of the most important factors for them concerning classroom community and its importance for learning was the sense of belonging to a class and experiencing a spirit of being liked and wanted by their peers. A second factor that was important to them concerning classroom community was trust. As shown in Table 10, students responded equally regarding trust towards their peers and trust towards their teacher. The third principal factor that students identified as being important in their learning was technology and using computers. In addition to reporting that computers were important in their learning, students indicated that they found them enjoyable and fun to use.

The findings reported in Table 10-14 were also used to address research question 5, which asked what factors students perceived to be important for developing a sense of classroom community. Interaction with their peers was the principal factor that students reported being important to them, and helping one another with academic work was clearly identified. Student responses indicated that the classroom environment either helped or hindered the amount of interaction that was achievable. Their answers indicated
that using technology did not detract from the development of sense of community, and some students reported that technology helped them to interact with others.
CHAPTER V
DISCUSSION

This chapter discusses the results of the study, and addresses each of the five research questions. The chapter also addresses the reliability of the SCCI, and recommendations are made concerning the psychometrics of the instrument and its use with a range of different age groups. Comment is offered on the limitations that were encountered in this study, which draws attention to some of the practical constraints that may be present when conducting research among children in a busy school environment. Recommendations are made for future research on the topic of classroom community, and ways are suggested in which the variables used in this study could be controlled more tightly. The recommendations also include a possible next step in the acquisition of knowledge concerning the effect of technology on learning communities. The chapter concludes with a discussion that addresses the policy implications of the study's findings for urban educators.

The results indicate that a sense of classroom community was present among the subjects of this study and suggest that some of the students themselves are aware of a feeling of community and may also benefit from it. The data contained in this study build on previous research on the sense of community using the SCCI to measure students (Rovai and Lucking, April 2001). Many of the students who participated in this study indicated that a sense of community was important to them and helped them in the learning process. This finding supports the theory that social support and a sense of community are distinct aspects of the concept of community held by adolescents (Pretty, Conroy, Dugay, Fowler and Williams, 1996). The positive response to the concept of
project recorded the mean score of $M = 106.00$, $SD = 12.25$ (Rovai, 2001). In a study comparing traditional courses and asynchronous learning networks, Rovai (2001) reports mean SCCI scores of $M = 123.34$, $SD = 15.44$ among 255 traditional course students and a score of $M = 114.33$, $SD = 23.05$ for the 52 undergraduates studying on-line. The difference in mean scores of sense of classroom community between high school students and undergraduates is of interest. It is possible that the older participants have a greater sense of community due to their increased maturity level. It is also possible that a higher sense of community exists among subjects who have moved away from their home and school environment to an institution of higher education where they are domiciled with other students and learn together with their peers. Future research that investigates the sense of classroom community among subjects of different age levels may be able to help explain these differences.

The first research question addressed in this study was whether students in grade nine and in grade eleven in an urban independent high school differ in their sense of classroom community. There was no evidence in the analysis results to indicate that the overall scores achieved on the SCCI differed significantly between students in grade nine and grade eleven. The mean score for students in grade eleven ($M = 104.23$, $SD = 22.76$) was higher than the SCCI score for participants from grade nine ($M = 98.30$, $SD = 21.81$), an increase that could be due to a difference in maturity. Analysis between students from grades nine and eleven of the four sub-scales of the SCCI showed no significant differences in the three domains of trust, interaction or learning. Evidence was shown, however, that a statistically significant difference existed between the two grades as measured by the spirit sub-scale of the SCCI, with students from grade eleven scoring
higher. The sense of spirit and a feeling of security within a group of learners was clearly important to the students, adding evidence to the work of Forest (1998) who maintains that in a cooperative community all members need to feel included. A reason for the difference between the grades could be that the older students had attended the school for two additional years compared to the ninth grade students, and had therefore accumulated a greater sense of spirit, belonging and camaraderie. Alternatively the increase in maturity among the eleventh grade students could account for the higher scores achieved on the spirit sub-scale. These explanations are speculative, and further research would need to be conducted to determine whether a sense of classroom community actually does increase among older students in the upper grades of high school.

The second research question asked whether the use of technology in their classroom affects students’ sense of classroom community. This study provides no evidence that the overall SCCI score (the sum of scores of all four sub-scales) was affected by the use of technology in teaching. Analysis of each of the four sub-scales showed that there were no differences among the three domains of spirit, trust and interaction. The learning sub-scale of the SCCI, however, showed a significant increase among students who were being taught using a high amount of technology. Students from high-technology classes answered every item within the learning sub-scale of the instrument more positively than students who experienced little or no computer use in their teaching. This supporting evidence could have important ramifications. Technology usage in schools is continuing to increase, and yet little is still known about its effect upon students' sense of classroom community. Maddux, Johnson and Willis (1997), and Yaverbaum and Ocker (1998) have argued for the introduction of constructivist
approaches to learning through the use of computers, and they note the paucity of research in this area. This study raises questions concerning the use of computers in teaching. The findings suggest that the learning sub-scale of the sense of classroom community may be influenced favorably by having higher computer use in teaching, and add to the body of knowledge concerning the effects of technology on the ways in which children acquire knowledge. The findings support the views of Morrison, Lowther, & DeMeulle (1999) that technology use in the classroom and a constructivist approach to education are very compatible. The findings also support the theory that students favor an element of learner control (Relan, 1992), which they can achieve through the use of technology. The responses by some students to interview questions show that they favor being allowed to explore the Internet in order to research a project. Students explained that they felt they had more control over their learning using a computer than they did through the use of books. The findings are also in consonant with the work of Kozma (1991) who reported the value to students of using technology to explore information sources. The results suggest that students consider they are learning together in a community and building upon earlier information that they have acquired either individually or as a class. The hypothesis that use of technology in teaching affects the sense of classroom community among high school students in an urban independent school is partially supported by these findings. The calls for further research into the effects of technology on the processes of teaching and learning are supported.

The third research question addressed asked whether the impact of technology use on their sense of classroom community differs for ninth grade students compared to eleventh grade students. This non-directional research question was investigated initially
as the review of the literature showed that there was a paucity of research into the effects of technology on the sense of classroom community, and particularly so across different grade levels (McConnell, 1994; Maddux, Johnson & Willis, 1997; Roblyer & Edwards, 2000). This study found no evidence of interaction between impact of computer use in teaching and level of grade. Consequently, the hypothesis that the impact of technology use on sense of classroom community differs for ninth grade students in an urban independent high school compared to eleventh grade students is not supported. Further research would need to be conducted to investigate whether the impact of technology upon sense of classroom community differs across grade levels.

The fourth research question asked how students describe classroom community and its importance for their learning. The qualitative analyses conducted in this study revealed that students identified three main factors that were important to them concerning sense of community and its importance for their learning. The first of these was a sense of belonging to the class, a feeling of being wanted and liked by their peers. This evidence adds to earlier work on the importance of classroom cohesiveness to students (Bandura, 1986; Chin, Salisbury, and Gopal, 1996). Students' comments indicated that they valued an atmosphere of teamwork in the classroom, and could appreciate the concept of sharing elements of a task in order to complete a project collaboratively. These responses show that the value of collaborative learning was being experienced and commented upon by these students in the context of describing the importance to them of classroom community.

The second factor that was important to the students' sense of community and its importance for learning was the amount of trust that they experienced in the classroom.
The qualitative findings are supported by descriptive quantitative results, as shown in the mean sub-scale scores for interaction and for trust for students in both grades. Students viewed with equal importance the level of trust among their peers, and the level of trust between themselves and their teacher. A total of 28% of student responses to questions relating to trust in the classroom indicated that students trusted one another in the context of classroom learning. They relied on other students for help and offered to give help to their peers. A total of 28% of the students also reported also that they trusted their teacher and felt that their teacher reciprocated that trust. It is significant that these students felt that trust was such an important element in a sense of community. This finding provides evidence in support of the decision by McMillan (1996) to include the dimension of trust in place of influence in studies of community. He recognizes that trust has to work in both directions, with members having trust in their community and the community knowing that it can trust its members. McMillan maintains that the two-directional concept of trust permits more cohesion within a community than the concept of influence that it replaced. Significantly, no students in this study included comment regarding the concept of influence in their responses to interview questions. This finding also supports the work of Goleman (1995) who maintains that trust is necessary for true acceptance and complete membership of a community. This study adds to the findings of Rovai and Lucking (2001) whose research into the sense of community in a higher education television-based distance education program found that distant students felt less trust in their community of learners, scored lower on the SCCI, and were less certain about the value of the course.
This research adds to the wealth of literature written in support of cooperative learning, e.g. the meta-analyses by Johnson, Maruyama, Johnson, Nelson & Skon (1981), and by Quin, Johnson & Johnson (1995). These meta-analyses indicated that cooperation in a classroom is considerably more effective than interpersonal competition. This study suggests that students themselves recognize the value of a sense of community and its inherent spirit of cooperation within a classroom. The data also reveal, however, that not all students feel that they are accepted fully by their peers, and do not believe they are included in the community of learners. In a situation where the demands of state or national testing have to be considered, a teacher may not believe that there is sufficient time available to allow students to work collaboratively and still satisfy internal and external requirements efficiently. Further research into the effects of classroom community may help to understand the true value of collaborative learning to students and its impact on teaching and learning. Studies that examine the importance to individual students of a sense of community may provide evidence that would help to establish sound instructional procedures that would help the learning process for every individual.

The third important factor identified in the interview results as being important to the students' sense of community was technology and the use of computers. Students who were interviewed revealed that not only did they find computers helpful for assignments such as research projects, they also enjoyed using them in this way. This evidence derived from qualitative analysis supports the quantitative data that suggested that students experiencing high computer use in their classes responded more favorably to questions contained in the spirit and learning domains of the SCCI. This finding adds
support to previous studies that have reported students’ favorable reactions to using
technology in the classroom, e.g. Siegel & Foster (2000), and Combs (2000), and has
clear practical implications for classroom practices. If students enjoy using technology in
their lessons as well as recognizing its value, their motivation for learning may well be
increased. Technology should not be viewed as an end in itself, but rather as a tool that
augments the sense of classroom community. The school community members should
use technology to simplify, facilitate, and enhance individualized and social learning
processes within an interdisciplinary curriculum.

The final research question addressed in this study asked what factors students
perceive to be important for developing a sense of classroom community. The results of
the analysis show that students consider interaction with their peers to be the most
important factor in developing a sense of classroom community. Working in groups and
collaborating with others to complete projects were examples of interaction that they
identified as being important to a sense of community. Helping one another in a
classroom by asking questions of their peers and assisting with questions asked by their
peers were other examples of how students perceived this sense of community being
developed. This research adds to the evidence in the literature that supports the benefits
of cooperative learning e.g. Johnson and Johnson (1992), Kagan (1992) and Slavin (1991,
with others are synergistic, and the findings of this study provide supporting evidence of
that.

The results are also in accord with the philosophy of social constructivism
introduced into the literature by luminaries such as Vygotsky as early as the 1930s and
expanded upon by others in more recent decades including Sharan and Sharan (1992) and Tudge and Hogan (1997). Wilson and Lowry (2000) maintain that learners need to build on a scaffold of previous experiences and prior knowledge, but in a context of effective participation within groups and communities. Social exchange is important in the learning process and contributes to the construction of an individual's framework of knowledge and ideas. The findings of this study provide some supporting evidence that students may value the opportunity to help each other construct their individual store of knowledge in an atmosphere of social interaction within the classroom. The findings also indicate that they may enjoy using computers as part of that process. Students' favorable reactions to using technology and sharing the information that they discover may contribute to the constructivist paradigm.

**Study Limitations**

A limitation of this study was that there was no control by the researcher over teacher selection, as ethical considerations precluded the researcher from involvement in the selection process. There is the possibility that selection of the two groups of participating teachers may have been somewhat biased. The researcher was part of the school's administrative team, and it was considered that personal involvement in the selection of faculty taking part in this research would be inappropriate.

A further limitation was that there was no control by the researcher concerning the amount or type of computer use in any of the intact classes during the period of time the study was being conducted. The teachers that were selected as being frequent users of technology may not have been at a stage in the syllabus that was appropriate for computer study. Teachers may vary the frequency and amount that they utilize computers
in their lessons, and will also adapt their teaching strategy according to the needs of their students. The way in which computers were used also could vary considerably, with some teachers working from a specific software program and others requiring students to conduct Internet research. Equally limiting was the possibility that technical difficulties could have interfered with computer instruction during the study, or new software could have been made available that could lead to an increase in computer use. The amount of computer-related homework assignments or research projects that might be conducted using technology may have varied among the groups during the study, and could have affected students' responses to questions relating to their use of computers. The researcher deliberately did not observe any classroom instruction in order that the sense of classroom community among the students and between the students and the teacher would remain undisturbed. It was also considered that classroom observations during the study could impact negatively on the teachers if they perceived that their use (or otherwise) of computers was being assessed by the researcher. A consequence of the researcher's inability to control either teacher selection or instructional practice was that the problem of operationalizing the independent variable of high or low technology used in teaching the groups of students became highlighted.

It is possible that the individual teaching style as well as the personality of each teacher may have an effect upon the sense of classroom community of the students. Clearly, the teacher will have an influence upon the majority of situations that occur in any classroom on a daily basis, and this will have an effect upon the students' sense of community. Teacher effect could have an influence on any or all of the sub-scales of the SCCI and could be considered a potential confounding variable in this study. This
students for a period of time in a rotational schedule would control more closely the limitation of teacher effect. A pre-test of classroom community measured at the beginning of the semester would help determine equivalency of the subjects. The pre-test measurement also would be available for use as a covariant in subsequent statistical analyses. The limitation of the amount and type of technology involved in teaching could be controlled more closely by using computers with a number of classes for one semester, with a comparison group being instructed without technology. The type of teaching could then be reversed for the second semester, and the differences in sense of classroom community examined. This type of quasi-experimental design, however, is not often practical in a school setting. Intact classes are normally following a complicated timetable and schedule. Teachers may not be permitted to have the flexibility to be involved in such a study, and resources such as computers are in constant demand. Additional limitations such as history, testing, maturation, and mortality could affect the validity of a design that was conducted over a period of time covering more than one semester. A less closely controlled (but possibly more feasible) quasi-experimental design would involve teachers using high technology methods of instruction with one section of students, and the same teachers using low technology in the way they taught the same subject to another section. An additional threat that could affect this design, however, is the possible resentful demoralization of a section of students who realized they were not receiving a high amount of technology in their class compared to another section. Another threat that would need to be controlled is that of compensatory rivalry among subjects who may be aware that they are in an experimental situation and perceive that they are expected to perform less well than another section of students.
Future research can improve upon this study by monitoring more closely the amount of and type of computer use. It is recommended that further study into the effects of technology on students' sense of classroom community again uses intact groups in a mixed design, but employs ethnographic techniques to supplement the data collection methods used in this study. This may require the involvement of more than one researcher or alternatively a limit on the number of high/low technology groups included in the study. It is further recommended that the researcher should conduct the study in one or more schools with which he or she has no personal connection. The anonymity of the researcher would allow a presence in the classroom that would not be perceived as threatening to students or to the teachers involved. Ethnographic recording of the precise amount and type of computer use over a given period of time would be achieved. Additionally the researcher would know exactly what was expected of students in terms of computer-based homework assignments or projects. The presence of the researcher in the intact groups would also facilitate the recording of classroom interactions among the participants in classes that experienced either a high degree of technology or little technology in their teaching. These ethnographic observations may help to explain more fully the quantitative data that the future researcher obtains by administering the SCCI.

A further recommendation for future research is to determine whether differences exist at the high school level between males and females in terms of their sense of classroom community. The results of one study conducted with undergraduates indicate that female students may demonstrate a higher sense of classroom community than males. The subjects of the study conducted by Rovai (2001) were 20 adult learners, evenly divided between males and females who were all enrolled in a graduate-level
course taught at a distance via the Internet. Their sense of classroom community was measured using the SCCI, and it was found that females recorded a higher sense of community than males both at the start and end of the course. The study also investigated gender differences in the ways in which the subjects communicated with one another, and the findings suggest that females prefer a relational, interdependent style of communication pattern compared to a more autonomous, independent style exhibited by some men. Rovai's findings of gender differences in communication pattern were similar to the results of previous research by Herring (1996) and Blum (1999). A study of younger subjects that investigated whether similar patterns of gender difference existed in terms of either the sense of classroom community or the related concept of communication patterns would add considerably to the body of knowledge concerning learning communities. The results of such a study could be helpful to school administrators and to the teachers of adolescents. The findings may enable teachers to structure their classroom environment and design their lessons in a way that would recognize gender differences within a community of learners, and to harness those differences in ways that would be beneficial to all of the students.

Another suggested path of future research would serve as the next major step in increasing the body of knowledge concerning sense of classroom community. Research could be designed to investigate whether a higher sense of classroom community is related to academic achievement, and whether there is an interaction with the use of technology in teaching. This study has shown that the learning sub-scale of the SCCI can be affected by the amount of technology employed in the instruction of students. It has also provided evidence that students enjoy using computers in a learning situation. This
study did not, however, investigate any effects of computers upon academic achievement. Jones & Paolucci (1998), Kosakowski (1998) and Kearsley (2000) all call for research to be conducted into what degree students learn more and under what conditions they learn optimally when teachers use computers. A causal-comparative study could be designed to measure the subjects' sense of class community at the beginning and at the end of a semester, assess their academic achievement in a particular subject area during that period of time, and to determine whether there were significant relationships. The type and frequency of computer use incorporated in the teaching could be included as variables, and the researcher could investigate whether any interactions between computer use and sense of community are identified. This suggestion for future research could prove to be helpful to school administrators as well as to those who teach. Schools are increasingly under pressure from external agencies to be more accountable, particularly in terms of academic achievement. Achievement is increasingly measured in many schools through the use of standardized tests, with teachers and their administrators being held publicly accountable for results. Public schools in Virginia use the Standards of Learning to measure achievement, and these tests may put additional pressure on students and teachers that could have an effect upon the sense of classroom community. In some public schools in Virginia, teachers have changed their methods of teaching as well as curriculum content in the classroom in order to teach material required by the Standards of Learning. In many schools, valuable teaching time has been used in order to prepare students for taking standardized tests (Fisher, 2001).

Standardized tests scores have become the accepted measure with which policymakers and the public gauge the benefits of educational investments (Riley, 1999).
But educators and researchers argue frequently that test scores say little about how to improve technology's effectiveness in schools. For this, they need information from research. Future research could indicate what technology applications work, under what conditions, and with which students. Research could provide information on how technology affects student attitudes toward learning, and could show the impact of technology on promoting collaboration among diverse students in a community of learners.

It is recommended that an assessment of the SCCI's reliability and validity using children of varying ages from a range of grades would need to be conducted before conducting additional research. Results of the reliability and validity assessments would determine whether any modifications of the questions was required in order to improve the instrument for use with younger subjects. It is also recommended that a modification of the SCCI be conducted to make it both reliable and valid for use with children in elementary schools. Modification of the instrument for use in elementary schools would pave the way for future research into the effects of technology on the community of learners in the earliest grades of the education system in this country. This study did not attempt to assess the validity of the SCCI, as the population of high school students was limited to 181 subjects. In order to conduct a reliable factor analysis, a larger number of subjects is required. Tabachnick and Fidell (2001) suggest that a valid factor analysis must have a minimum of 300 cases, with 500 cases needed for a good solution, and 1,000 cases needed for an excellent solution. It is recommended that a validity assessment be conducted on the SCCI using a large sample of high school students before the
instrument is used again with this age group to determine whether any refinement of the questions is required.

Another suggested path of subsequent research could investigate samples from a variety of populations. Future studies could be conducted to determine the effects of technology on students' sense of classroom community in other grades, both in high schools and in middle schools. The external validity also could be increased by measuring the sense of classroom community in a number of schools within different cultural and socio-economic settings.

**Policy Implications for Urban Education**

Based on the evidence of high reliability across scales the SCCI appears suitable for use with high school students to measure their sense of classroom community. Future researchers investigating the sense of community among urban school students can use this instrument after conducting more rigorous psychometric assessments. Administrators and teachers in urban high schools might also find this an appropriate instrument to use with students in order to gauge the sense of community that exists in different classes or in different subject areas within their schools. Knowledge of students' sense of classroom community would be invaluable to middle school teachers also, particularly as students in grades six through eight so often experience tremendous difficulties with classroom relationships as they struggle with the traumas of hormonal changes and other factors associated with emergent adolescence. A review of the SCCI could be conducted to establish its reliability and validity with elementary school children. This would necessitate structuring appropriate survey questions for a range of grade levels and
reading abilities, and determining how the instrument should be most effectively administered to young children.

The SCCI could be made available for use by teachers in any grade to help them assess the sense of classroom community that exists among their students. An assessment of classroom community would add to information that may be available on classroom climate in the school, the measurement of which is addressed widely in the literature (Chavez, 1984; Heldall, Mok & Beaman, 1999; Janz & Pyke, 2000). The information obtained from the SCCI would enable teachers to understand more about the social dynamics of a class of students, and also to increase their knowledge of the individuals within that class. The knowledge gained may help teachers to acknowledge the importance of the interactions that take place within the urban classroom and harness them for mutual benefit. The data collected could lend evidence to the viability of celebrating the importance of each individual member of the class, regardless of social background or ethnic origin. It would help teachers to identify those students who find difficulty interacting with their peers, and facilitate the introduction of an appropriate intervention or counseling.

The qualitative data in this study provide supporting evidence that high school students in grades nine and eleven enjoy using computers to assist them with their work at school. This affective dimension holds important implications for urban school administrators who may be deliberating whether computers impede or enhance the climate in their schools. Evidence provided by this research may guide teachers who themselves may be unsure whether to use computers frequently in their teaching. A federal report (Wirt et al., 2001) discloses that although computers and the Internet have
transformed business and research in the United States the majority of public school teachers do not yet feel prepared to use these new technologies. In 1999 just 10% of public school teachers reported feeling "very well prepared" to use computers in their instruction, and 23% were "prepared". The majority (55%) reported they were "somewhat prepared", and 12% were recorded as feeling "not at all prepared". The report cites several reasons for the teachers' responses, including a shortage of computers in schools, insufficient release time for teachers to learn new applications of technology, and difficulties associated with scheduling computer time for students. If students enjoy using a particular medium to assist them with their learning as suggested by the qualitative data in this study, then their motivation for studying could well be heightened. The children who are educated in urban schools originate from very diverse family backgrounds. The use of computers to learn at school may be an enjoyable experience regardless of whether the student is from an impoverished environment or from a family marked by the stamp of affluence.

The sense of classroom community is a concept vital within the social constructivist's view of learning and the process by which learners interact with one another in building upon their knowledge and experience. The implications of this study for the urban educator are twofold. First, the sense of community is important in a school classroom, and it could be linked to academic success. Teachers may find sense of community data very helpful in adding to the knowledge of individual students and how they work collaboratively. Second, the use of computers in teaching may add to the students' motivation and enjoyment of learning new information, and computer use
should be encouraged in the urban classroom where it can be appreciated by all students representing a spectrum of socio-economic, cultural, and ethnic differences.
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http://faculty.cob.ohiou.edu/salisbury/research/cohesion.html.


Rovai, A.P., Lucking, R.A. & Cristol, D. (2001). *Sense of classroom community index.* Unpublished manuscript, Regent University at Virginia Beach, VA. Copyrighted instrument inquiries to: alfrrov@regent.edu


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APPENDIX A

COMPUTER ATTITUDE QUESTIONNAIRE
18. Computers are fun ......................................................................................(SA) (A) (N) (D) (SD)
19. Computers are over-rated as a means of teaching people ....................(SA) (A) (N) (D) (SD)
20. Computers make people think more about the topics they are learning ......................................................................................(SA) (A) (N) (D) (SD)
APPENDIX B

SENSE OF CLASSROOM COMMUNITY INDEX SURVEY
SURVEY

Please complete the following based on verbal instructions you receive:
ID: ___________ A: ___________ B: ___________ C: ___________ D: ___________

Next, please check the categories that apply to you:
1. Age: ( 1 ) 25 or less ( 2 ) 26 - 30 ( 3 ) 31 - 40 ( 4 ) 41 - 50 ( 5 ) over 50
2. Gender: ( 1 ) Male ( 2 ) Female
3. Race or ethnic group: ( 1 ) White (includes Arabian) ( 2 ) Black ( 3 ) Hispanic
   ( 4 ) Asian (includes Pacific Islanders) ( 5 ) Native American ( 6 ) Bi-racial

DIRECTIONS: Below you will see a series of statements concerning a specific course or
program you are presently taking or recently completed. Read each statement carefully and place
an X in the area to the right that comes closest to indicate how you feel about the course or
program. You may use a pencil or pen. There are no correct or incorrect responses to these
statements. If you neither agree nor disagree with a statement, place an X in the neutral (N) area.
Do not spend too much time on any one statement, but give the response that seems to describe
how you feel.

Please respond to all items.

1. I feel excited about this course .......................................................... (SA) (A) (N) (D) (SD)
2. I feel that others in this course are concerned about my well-being .... (SA) (A) (N) (D) (SD)
3. I feel that there is not much interaction with the teacher ...................... (SA) (A) (N) (D) (SD)
4. I feel that this course is not learner-centered .................................... (SA) (A) (N) (D) (SD)
5. I feel that there is no group identity .................................................. (SA) (A) (N) (D) (SD)
6. I trust other students ........................................................................ (SA) (A) (N) (D) (SD)
7. I feel that I am encouraged to ask questions ...................................... (SA) (A) (N) (D) (SD)
8. I feel that I learn useful skills in this course ...................................... (SA) (A) (N) (D) (SD)
9. I feel a sense of cohesion with other students .................................. (SA) (A) (N) (D) (SD)
10. I feel that I receive insincere feedback ............................................. (SA) (A) (N) (D) (SD)
11. I feel that I learn a lot from other students ....................................... (SA) (A) (N) (D) (SD)
12. I do not value the knowledge that I learn in this course .................... (SA) (A) (N) (D) (SD)
13. I do not feel connected to my teacher ............................................. (SA) (A) (N) (D) (SD)

(Continued)

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14. I feel that I can rely on others in this course ........................................(SA) (A) (N) (D) (SD)
15. I feel that the learning environment facilitates discussion ..................(SA) (A) (N) (D) (SD)
16. I feel that our discussions promote learning ........................................(SA) (A) (N) (D) (SD)
17. I feel important in this course ..............................................................(SA) (A) (N) (D) (SD)
18. I feel uneasy exposing gaps in my understanding ..............................(SA) (A) (N) (D) (SD)
19. I feel that this course offers limited resources to work with ..............(SA) (A) (N) (D) (SD)
20. I feel that learning is important in this course ......................................(SA) (A) (N) (D) (SD)
21. I do not feel a spirit of community ........................................................(SA) (A) (N) (D) (SD)
22. I feel that members of this course are loyal to each other ...............(SA) (A) (N) (D) (SD)
23. I feel that a few students dominate this course .................................(SA) (A) (N) (D) (SD)
24. I feel that this course provides valuable skills .....................................(SA) (A) (N) (D) (SD)
25. I feel close to others in this course .......................................................(SA) (A) (N) (D) (SD)
26. I do not feel comfortable speaking openly ...........................................(SA) (A) (N) (D) (SD)
27. I feel that there is no need to think critically in this course ...............(SA) (A) (N) (D) (SD)
28. I feel isolated in this course ...................................................................(SA) (A) (N) (D) (SD)
29. I distrust my teacher ............................................................................(SA) (A) (N) (D) (SD)
30. I feel that there is a mutual respect for ideas .........................................(SA) (A) (N) (D) (SD)
31. I feel that this course does not meet my educational needs ...............(SA) (A) (N) (D) (SD)
32. I feel uncertain about others in this course .........................................(SA) (A) (N) (D) (SD)
33. I feel that discussions are one-way ......................................................(SA) (A) (N) (D) (SD)
34. I feel that I learn a lot in this course .....................................................(SA) (A) (N) (D) (SD)
35. I feel out of place in this course ...........................................................(SA) (A) (N) (D) (SD)
36. I feel secure in this course .....................................................................(SA) (A) (N) (D) (SD)
37. I feel that discussions are high quality ...............................................(SA) (A) (N) (D) (SD)
38. I feel that this course includes unimportant material .........................(SA) (A) (N) (D) (SD)
APPENDIX C

STUDENT INTERVIEW QUESTIONS
APPENDIX D

LETTER TO PARENTS, INCLUDING CONSENT FORM
Dear Parents,

As a doctoral candidate I have chosen to research the effects of technology on the sense of classroom community. In recent years, the use of technology in teaching has greatly increased. Computers are now commonplace in the classroom, and students are becoming more adept at using them in different subject areas. Little is known to date about the effects of the increased use of technology on the sense of classroom community, and it is not clear whether it is helping to bond learners or whether it actually might increase feelings of isolation. The purpose of my study is to add to the body of knowledge in that field, and consequently help the school improve its learning environment.

With your permission, your student at xxxxxxxxxx School can assist my research. Your child will complete two brief surveys that have been designed to measure students' attitude to computers and their sense of classroom community. These questionnaires will be given to a number of classes that vary in the amount of technology that they use in their learning.

Your child’s participation in this project is purely voluntary, and will not affect his/her standing at the school. Each child’s responses will be anonymous, and teachers will not have access to the responses. There is no personal risk or discomfort involved with this research. Clearly it will be most helpful if all students in each class do take part in order to get a total measure of the sense of classroom community.

If you give permission for your child to take part in this project, please complete the attached consent form, and return it to the school at your earliest convenience. In the event that you do not give permission for your child to take part, I would appreciate the return of the form with the appropriate section completed. Permission will be requested by telephone if the form is not completed.
If you have any questions regarding your child’s participation in this study, please contact Mervyn Wighting, the researcher, through Dr. Robert Lucking, his Old Dominion University committee chair, at 683-5545. Thank you for your assistance in this project.

Sincerely,

Mervyn Wighting
Doctoral Candidate,
Old Dominion University
Parent Consent Form – Sense of Classroom Community Project

Please check the appropriate statements below, sign the form, and return it to school.

_______ I grant permission for my child __________________________

to take part in this research project.

_______ I do not grant permission for my child __________________________

to take part in this research project.

Parent/Guardian signature __________________________

Date ________
VITA

Mervyn J. Wighting was born in the south of England. He earned a Bachelor's degree in education and science from the University of Sussex and upon graduation entered Britannia Royal Naval College. During his career as a naval officer he served in ships deployed to the Far East, the Mediterranean and in the North Atlantic. Shore duties included a number of educational establishments where he enjoyed teaching young men and women the skills, technology and leadership required in a modern fighting force. Commander Wighting's significant staff appointments included NATO exercise planning in Mons, Belgium and Director of Strategic Intelligence to the Supreme Allied Commander Atlantic in Norfolk, Virginia.

Following retirement from the Royal Navy, his second career was a natural progression that allowed him to continue his love of education, working as both a teacher and as an administrator in schools in the United States. He earned a Master's degree in education administration from Old Dominion University in 1996, and continued his pursuit of higher education by embarking on a doctoral program in urban services with an emphasis on academic leadership while continuing to work full time.

Dr. Wighting presently resides in Virginia Beach, Virginia.