INTEGRATION OF COMPUTERS INTO THE CURRICULUM: HOW TEACHERS MAY HINDER STUDENTS' USE OF COMPUTERS

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ABSTRACT. Research has shown that although the integration of computers into the curriculum by teachers remains minimal, students have consistently demonstrated a positive attitude toward computers. In this paper, we report a study that examines the secondary school students' use of computers for learning. We have focused on a high school in Nova Scotia. Based on the data we collected from surveying and interviewing both students and teachers, we identified the limited use of computers for learning by students, the dependency of students on teachers for integration, the constraints of teachers on students, and the reasons for the constraints of teachers on students in terms of teachers' practical difficulties and attitudes toward computers. Based on the above findings, we have discussed implications for the planning and implementation of integrating computers into the school curriculum.

RÉSUMÉ. Les recherches démontrent que si l'intégration des ordinateurs dans les programmes d'études par les enseignants reste un phénoméne marginal, les étudiants ont toujours eu une attitude favorable à l'égard des ordinateurs. Dans cet article, nous rendons compte d'une étude portant sur l'utilisation de l'ordinateur à des fins d'apprentissage par les élèves du secondaire. Nous nous sommes concentrés sur le cas d'une école secondaire de Nouvelle-écosse. En nous fondant sur les données recueillies au moyen de sondages et d'entrevues auprès d'élèves et d'enseignants, nous avons constaté que les élèves utilisent peu l'ordinateur à des fins d'apprentissage, qu'ils doivent s'en remettre aux enseignants pour ce qui est de l'intégration de l'informatique dans les programmes et subir les contraintes que leurs professeurs leur imposent du fait des difficultés pratiques qu'ils éprouvent et de leurs attitudes à l'égard des ordinateurs. Nous avons examiné ce que ces résultats sous-entendent pour la planification et l'intégration de l'informatique dans les programmes scolaires.

Various studies indicate that, although the availability of computers in schools has been substantially increased (Council of Ministers of Education, 1996; Goodson, Mangan, & Rhea, 1991), the use of computers

for teaching and learning by integrating computers into the curriculum remains minimal (Alberta Department of Education, 1993; Becker, 1992; Collis, 1988; Reinen & Plomp, 1993). For example, the ratio of students to computers on January 1 of 1993 in Alberta was found to have reached 10.6:1. Although 68% of respondents rated the availability of computers as satisfactory or better, the average access for most students was under two and a half hours per week of time directly related to curriculum objectives. This finding seems typical internationally. The International Association for the Evaluation of Educational Achievements (IEA) conducted a survey on the use of computers in schools from 1987 to 1990 in 18 countries (Pelgrum & Plomp, 1993). It was found that in most countries the integration of computers into school subjects was still being initiated by small groups of teachers, although there was a tendency that the higher the grade level the more frequently computers were integrated into school subjects.

Since the early 1990s, more schools have gained access to the internet. *SchoolNet*, a Canadian national project launched in September, 1993, intends to link all of Canada's 16,000 schools to the internet as quickly as possible. Currently, at least one third of schools are already on-line. Similar initiatives are under way in the United States (Gore, 1995). Again, in schools the increased availability of the latest technology, including the internet, has not led naturally to its extensive integration into the curriculum. For example, Honey and McMillan (1993) found that only a few teachers have used the internet for instructional purposes, and Honey and Henriquez (1993) found that even among a technologically sophisticated group of practitioners, the use of the internet other than for sending and receiving electronic mails was minimal.

On the other hand, research suggests that students do not demonstrate the same hesitation as teachers with regard to integrating computers. Students tend to view technology as a natural part of their lives in school, are not as reluctant as adults to experiment, and can develop the requisite skills quickly (Curtin, Cochrane, Avila, Adams, Kasper, & Wubbena, 1994; Doornekamp, 1992; Dwyer, 1994). Further, contrary to many fears teachers have about computer use in their classrooms, students using computers in their courses are not socially isolated, and tend to collaborate with each other (Dwyer, 1994).

Given the above discrepancy between the reality of minimal integration of computers by teachers and students and the positive attitude and natural tendency of students to integrate computers, it would be interesting to know if and how teachers may hinder students' integration of

computers in learning. Research into the integration of computers into the curriculum has focused primarily on teachers, by such means as teacher training and technical support for teachers, but little attention has been given to how students integrate computers.

Alternative approaches to educational evaluation emphasize that voices from all stakeholders must be heard and that communication among stakeholders needs to be maximized so that consensus can be reached (Guba & Lincoln, 1989). Because students are directly affected by teachers' integration of computers into the curriculum, a study focusing on students would broaden our understanding about computer integration, and would shed light on the impact of teachers on student learning through the use of computers.

This paper reports on a case study conducted at a high school in Nova Scotia which focused on how teachers may hinder students' integration of computers into their learning. In it, we revealed the dependency of students on teachers for integration, the constraints teachers place on students, and the reasons for these constraints.

In the context of our investigation, integrating computers into the curriculum referred to the use of computers for course work or any school teaching and learning-related activities by both teachers or students. Thus integration may include such activities as word processing for assignments, the use of internet searches for course projects, using a computer simulation for class discussion, and so on. Next in this paper, we will describe the research methodology we followed, the results we found, and the implications of the findings regarding the integration of computers into the curriculum.

METHODS

The school

This study was conducted at a large rural high school in Nova Scotia. This school is the main secondary school in its district. A total of approximately 1200 students in Grades 9 to 12 from a number of different cultural groups attend the school. Although employment opportunities in the area are created mainly by the university and the regional hospital, there is also a great deal of employment stemming from farming and fishing. As a result, students of many distinct backgrounds and socio-economic groups are represented. The administration of the school consists of a principal and four vice-principals, each of whom is responsible for one grade.

Although the school is located in a rural area, its computer facilities are typical compared to many schools, urban or rural, in the country. By 1994, the school had only one computer lab, equipped with 24 recently up-graded Novell-networked 386 computers. In early 1995, the school received a grant from the federal government to establish another computer lab of 20 networked computers with multimedia and internet connections. A third computer lab is also being pursued. The study reported in this paper took place in early 1995, immediately after the new internet computer lab was established and became functional.

Data collection techniques

SURVEY. We developed a student survey questionnaire (see the appendix), which included questions related to students' use of computers for learning, to the difficulties students experienced, and to the background information (optional). In order to ensure the validity of the survey questions, we adapted the relevant questions from the teacher survey questionnaire used by British Columbia's 1988 IEA Computer in Education Study that was a part of a large scale international study involving 18 countries (Pelgrum & Plomp, 1993). New questions related to multimedia and internet were added. The draft survey questionnaire was read by a school vice-principal and by a student to evaluate the relevance and clarity of the questions. Some revisions to the questions were made based on their feedback. After the survey, we calculated the internal consistency reliability of various scales within the questionnaire. For the "types of computer uses scale" Cronbach's alpha was .89; for the "reasons for computer uses scale" it was .77; and for the "difficulties of computer uses scale" it was .92.

With the number of students in the school exceeding 1200, the high cost to administer the questionnaires to all of them required the use of a quasi-random sampling strategy. We first arbitrarily selected a date for the administration of the questionnaire and all the classes scheduled for the last period (8th period) of that day were selected as potential classes for our survey. The teachers of those classes were approached and asked if they would be willing to administer a survey to their students. All but one agreed to participate. Represented among the classes, which covered a broad range of subjects, were students of various ability levels (general, academic, honours, and special education) from Grades 9 through 12. Fourteen classes (275 students) completed survey questionnaires and all the questionnaires were collected by the teachers at the end of the designated period.

Interview

We followed the survey study and the analysis of the survey results with a series of interviews in order to better interpret the survey results. We interviewed two vice-principals, six teachers, and six students. The teachers who were selected for interviewing were representative of most of the subjects taught at the school. One of the vice-principals selected the students who would be interviewed. The selection criteria used by the vice-principal included a representation of grade levels, representation of students' learning abilities, and a representation of ethnic background. Before the interviews took place, a letter of consent was signed by both the students who were interviewed and their parents.

Some interview questions were drawn from the survey questionnaires, and some questions were developed according to the need for further information about the extent of each interview subject's computer use in school. Depending on each interviewee's responses, additional questions were formed spontaneously during the interview by the interviewer. All the interviews were audio-recorded so that exact transcripts could be made for analysis.

Data analysis

We conducted both qualitative and quantitative data analyses. Descriptive statistical and cross-tabulation analyses were performed on the survey data to identify patterns of dependency of students on teachers for computer use. In order to analyse the interview data, we used the constant comparison technique (Glaser & Strauss, 1967). More specifically, we used the following procedures: (a) read all the interview transcripts to get a general sense of the data; (b) read the interview transcripts again to generate topics from the data segments; (c) made a list of topics generated and compared the topics for duplicating and overlapping meanings; (d) classified those topics into categories that are directly related to the purposes of this study. To add to the cogency of the results, we inter-referenced the presentation of the results from our statistical and interview analyses.

RESULTS

Dependency of students on teachers for computer integration

All but two of the students who completed the survey questionnaire had used computers. Table 1 reports the frequency with which students used specific types of computer applications. It can be seen that the

percentages of students who were using computers for their learning were generally low with 17.6% for word-processing every week as the highest. Only 4.4% of students were using computers every week for internet navigation, 3.3% for computer-assisted labs, 1.8% for computerised tutorials, and 2.6% for solving problems using the internet .

Table 2 lists the reasons cited by the students for their limited computer use. It indicates that 72.5% of the students who responded said that they had used computers because of the course requirement introduced by their teachers. Personal interest and exploration also played an important role: 74% of students surveyed said that personal interest was one of the main reasons for their use of computers in school. Although motivation by peers contributed somewhat to students' use of computers, it was not as large a factor as a teacher's course requirement or personal interest. Similarly, 26% of students indicated that their computer use was the direct result of a requirement by their parents.

TABLE 1. Frequency with which students have used specific types of computer applications (N=273)

COMPUTER APPLICATION	FREQUENCY* Every Week(%)	Most Weeks (%)	Some Weeks (%)
Wordprocessing	17.6	7.3	55.3
Spreadsheets	11.0	3.3	40.3
Database	4.0	3.7	45.1
Other Computer Assisted Organization	3.7	2.2	6.6
Drills and Practice	6.2	5.5	35.9
Tutorial	1.8	2.2	34.8
Simulation	2.9	6.2	27.1
Labs	3.3	4.8	27.5
Problem Solving	4.8	3.7	33.7
Multimedia	10.3	5.1	46.9
Recreational Games	17.2	10.6	48.7
Educational Games	7.0	9.9	41.0
Other CAI	2.2	0.4	6.6
Communications	3.7	3.3	24.2
Internet Navigation	4.4	4.8	39.6
Problem Solving	2.6	3.7	27.8

* Not necessarily sum to 100% because of blanks and invalid responses.

Besides students' personal interests and exploration, the fact that such a high percentage of students (72.5%) indicated that the teachers' course requirement was one of the main reasons for their computer use signifies that the computer use of most students is dependent upon teachers. In our cross-tabulation analysis, we found that the teacher's

TABLE 2. Reasons for computer use by students in percentage (N=273)

REASON	APPLICABILITY* Very (%)	Somewhat (%)	Not Applicable (%)
Personal interest/exploration	37.4	36.6	5.1
Required by teachers	27.1	45.4	13.2
Required by parents	5.1	20.9	44.7
Motivated by friends	11.7	34.1	26.0
Other reasons	6.2	3.3	2.2

* Not necessarily sum to 100% because of blanks and invalid responses.

course requirement of computer use had a significant association with the frequency of the following aspects of student computer use: taking computer courses (x^2=7.601, df=2, N=229, p<.05), accessing the new computer lab (x^2=6.972, df=2, N=233, p<.05), accessing the older computer lab (x^2=7.238, df=2, N=233, p<.05), and word processing (x^2=9.481, df=2, N=60, p<.05).

Although we found, from our interview of teachers, that some of them actively sought to integrate computers into the curriculum due to their perception that it would make their teaching and student learning more efficient as well as to a certain degree of their curiosity and desire to learn more about computers, even more teachers had never used or required students to use computers in their courses due to their lack of personal interest in learning about computers and due to their perception that computer integration was unnecessary for student learning.

This disparity among levels of teachers' perceptions of computer integration appeared to have direct consequences on student computer usage. Students whose teachers did not demonstrate an interest in computers tended to feel left out. As one Grade 11 student noted, "I mean, I've been to the lab [the new lab], but just in off periods. I never went up there with a teacher. . . I don't really have much use for it myself."

Table 3 lists the difficulties students have experienced. It shows that there is a split with regard to teachers' support: 41% of students indicated that the lack of teacher support was very or somewhat applicable, and another 40% of students indicated that the lack of teacher support was not a problem. Many of the difficulties listed in Table 4 are directly and indirectly related to teachers' support. For example, in terms of accessibility, students indicated in our interview that during the free periods when no teachers were scheduled in the internet computer lab, the room was locked. Even when teachers were in the room, they were reluctant to let other students use the spare machines because they did

not want to take responsibility for any problems that might arise. One Grade 9 student, when asked about the accessibility to the new lab, said "I find it really hard to get in. I would like to go to the lab more in my free time."

TABLE 3. Difficulties that students have experienced (N=273)

DIFFICULTY	APPLICABILITY* Very (%)	Somewhat (%)	Not Applicable (%)
Lack of Peripherals	14.7	21.6	43.6
Limited Access	16.8	28.6	40.3
Hardware Breaks Down Regularly	7.7	16.5	52.0
Computers Are Old And Slow	11.7	16.1	49.5
Other Problems With Hardware	5.1	2.9	5.5
Limited Software	13.2	36.6	30.8
Software Too Difficult	11.4	36.6	31.9
Other Software Difficulties	3.3	2.9	4.4
Limited Computer Knowledge	38.5	48.1	11.2
Not Enough Help	17.9	42.1	22.0
Other Technical Support Difficulties	2.6	3.3	3.7
Limited Teacher Support	8.4	32.6	39.9
Too Busy With School Work	16.1	41.4	26.7
Other School and Family Context Difficulties	3.3	3.3	4.4

* Not necessarily sum to 100% because of blanks and invalid responses.

Constraints of teachers in their computer background and attitude

The lack of teachers' support for student integration of computers into the curriculum is certainly related to teachers' computer backgrounds and their attitude toward computers. Whether individually or as a group, there is no question that the levels of teacher ability and experience at the high school were impressive. Most of the teachers had many years of experience, as well as excellent academic qualifications. Many teachers at the school possess Master's degrees. However, most of the teachers did not have a particularly strong computer background and the majority of them we interviewed claimed that their computer knowledge was at the novice level. Some teachers did not even have such basic skills as typing. For example, a Social Studies teacher, when interviewed, said:

> *My biggest downfall is that I can't type. I don't have the time to actually sit down and teach myself to type or take a typing course, so [when] it comes down to needing a test for the next day I can do it quicker by hand than anything else.*

Teachers' faith in computers is another constraint. Even the relatively advanced computer users at the school did not necessarily maintain a high degree of confidence in computers. For example, the math and computer teacher, generally perceived by his colleagues to be an "expert", commented that, "This technology is so new to me. Math is two thousand years old and I've been teaching it for twenty five. This stuff is about one year old and I've been teaching it for one year."

Some constraints contributing to the lack of teachers' support were related to the availability of computer hardware and software. For example, when interviewed about the potential of computer use in the curriculum, one teacher, who had a great deal of experience with computers, replied:

> *With my knowledge and background and resources I would have trouble finding a use for the computer lab for my math 541. Through lack of software, lack of hardware, lack of advanced equipment [computer screen projector], I just couldn't right now make use of it. I expect a lot of other teachers are in the same position. I don't know. The problem will be finding suitable software. And that takes a lot of funding. If I was in charge and had an infinite budget I would say if the room cost $100,000, I would establish a fund for $20,000 worth of software each year to keep the lab up to date. They don't usually do that. They put the hardware in there and then you scrounge for software. There is a lot of work to be done on what is good and bad software, and until then it is not going to be properly made use of.*

Other constraints contributing to the lack of teachers' support to students' integration of computers are related to the lack of technical support available to teachers themselves. Because of their own limited computer knowledge and skills, they expected the school to provide them with the necessary technical support and assistance with computer hardware and software. Those teachers we interviewed who had never used computers in the school clearly indicated that this general lack of support systems contributed to their overall reluctance to use or require students to use computers. Some teachers were able to have student teachers working on their practicum assist them in the lab. However, many other teachers seemed uncomfortable taking their classes to the new lab without having a computer technician present. One teacher, when asked if he thought computers could be efficiently used, commented, "If it was just me with my class I don't think much would have been accomplished."

Teachers' attitudes toward computers also create another constraint, particularly when internet is concerned. Teachers were cautious to

identify the benefits resulting from the use of computers and the internet. For example, although almost every teacher we interviewed acknowledged the internet to be a potential well-spring of useful information, they also decried the fact that there was a lot of "garbage" that had to be sifted through in order to weed out the valuable material. Teachers were aware of the vast amount of useless information on the internet and many stated that some way should be developed to filter out as much of it as possible. They believed that students tend to believe what they saw on the computer as well as on the television. Thus, the integration of technology into the curriculum had to be selective, because not everything provided by the technology was pedagogically useful. Further, individuals planning to use the internet had to know how to evaluate everything they found, and be able to scrutinize information to establish its worth. For the most part, students had never had to do that for themselves; it was therefore a new skill that they needed to be taught before the full potential of the internet could be realized. One teacher, when asked about the usefulness of materials on the internet, answered:

> *It's going to be an excellent tool, but, like everything else, we have to develop our brains and our thinking and we have to use research. You know that saying "Garbage in, garbage out"? Well, if it is garbage into the Internet we have to teach students how to identify it and make a decision.*

The problems and concerns raised about the integration of computing technology particularly the Internet into the curriculum caused some teachers to doubt whether or not it could really be a valuable part of the curriculum. One teacher made the following comment:

> *I'm not that familiar with the Internet , and what is going on it. From my understanding anyone can put information on it and how reliable the information is a problem, as opposed to texts which are approved. Right now, that might be a problem. What's good, what's bad.*

Other constraints were more policy-related. Many, for example, were dismayed by the fact that no school or board policies existed for regulating use of the internet. Control of software to guard against copyright infringement was relatively easy when weighed against the daunting task of monitoring and controlling use of the internet . Once a student was on the internet, it was difficult to restrict where the student could and couldn't go. This unique aspect of internet use may potentially frighten teachers from using computers in their classrooms for any purpose. Judging by the experience of the following teacher, many teachers' fears were not unfounded:

> *[The] Big problem with this is I don't even know if we can control it. There seems to be a lot of talk about subjects that teachers have always been told you can't do that in the classroom. No one is setting out the curriculum on the Internet. Let's say a kid is suicidal. I was down there the other day looking for some material, and I don't know why it was in this section, I don't even remember the topic I was looking for. I didn't actually go to the menu but I could tell from the title that it was ways to commit suicide. It may have been Suicide Methods or something like that. Anyway, it was obvious right away to me. We had three suicides in this school a couple of years ago. Just think of the possibilities of kids looking at that.*

Concern over use of the internet was also felt by members of the school administration. One of the vice-principals at the school cautioned that:

> *The control issue is the major problem. We know that kids are falling into some things on the Internet which are vulgar, which are racist, which are nothing short of pornography, and how we control that is a major problem. I think that there is another problem coming up and that is for some kids I have noticed that it has almost become addictive, so that if they become so addicted to searching and roaming through, then they will in fact lose. . . . I question how valuable some of the time is if they are just roaming through, instead of maybe doing what they are supposed to be doing, in terms of their other courses. Like, I've noticed a few students who have been in there every free moment that they have playing on it. So there is an addiction to it, isn't there?*

DISCUSSION

This research used a case study design. Although there are many advantages of case study research for program evaluation and for use as a precursor to subsequent large-scale quantitative research (McMillan & Schumacher, 1997), case study has its limitations. The most important limitation seems to be related to the degree to which findings are generalizable to other contexts. It is certain that research findings from case studies are not generalizable in the framework outlined by Campbell and Stanley (1963). In order to overcome this limitation, some scholars such as Guba and Lincoln (1982) call for replacing the concept of generalizability with that of "fittingness." Specifically, they argue that the concept "fittingness", with its emphasis on analyzing the degree to which the situation studied matches other situations in which one is interested, provides a more realistic and workable way of thinking about the generalizability of research findings from qualitative research such as case studies. In this paper, we have clearly described the characteristics of the school involved in this study, so that readers can make their

own informed judgement regarding the generalizability of research findings from this study to other schools.

Given the above caution regarding generalizability, we would like to discuss a few implications of the research findings reported here. If what we found is any indication, then the burgeoning desire of students to exceed the current limits of their knowledge and experience is confined by what teachers and schools can and are willing to offer. For example, we found that though students demanded more computer access in their spare time, teachers were hesitant to assume responsibility for taking them to the labs. In addition, students who had computer access through course requirements set by their teachers developed a stronger desire to use additional computer attachments and peripherals (such as printers and sound facilities) than their peers. Also they wanted a greater variety of computer software, easier-to-use software, more information about software, and generally, more computer knowledge, which is beyond what teachers could offer.

Rockman (1993) stresses that money spent on educational technology must be matched with staff development, and that teacher training institutions must play a vital role in both preservice and in-service training. This seems to be the priority of most Canadian provinces (Council of Ministers of Education, 1996). However, according to the research findings of this study, for any type of teacher training, developing teachers' belief in the value of computers should be an important component. Although early research synthesis showed that computer-assisted instruction has a positive effect on learning (Niemiec & Walberg, 1987), later synthesis studies show that the effect of computers on learning and on teaching remains preliminary, inconclusive, and differs by subjects and by types of computer applications (Ayersman, 1996; Berson, 1996; Fitzgerald & Koury, 1996; McCoy, 1996; Reed, 1996; Weller, 1996). More research into the effect of computer integration has to be conducted, and appropriate rationales have to be applied in the design of such research (Roblyer, 1996).

How to conduct in-services for teachers is another important issue. Some teachers we interviewed were not enthusiastic about that approach. When asked what things could be done to make teachers feel more comfortable with computer use, we received the following replies:

- I think we need to have more time to manipulate them on our time. I think that's more important sometimes than being in-serviced.

• I think probably one of the best ways is having somebody in the school, so he could go in with your class.

• We know that workshops do not significantly impact on the teaching unless there is consistent support and follow up. . . . We should be supporting them, we should be saying look, we have someone at the school who can go into your class and help you.

Although on-going technical support would be, theoretically, an ideal way of confronting the problem, in the present-day climate of cutbacks and budgetary restraints, this may well be impracticable for the majority of schools. In addition, because no computer resource person knows how to teach every school subject, the lion's share of planning and implementation would still rest on the teachers' shoulders. A suitable alternative might be to make a comprehensive computer-integrated curriculum available to teachers. Such a curriculum would provide teachers with detailed advice on how the teaching of each of their lessons could be assisted by technology. It would also act as an effective guideline, helping teachers avoid a trial-and-error or "last-minute" approach to preparing and organizing their lessons. The document could also include policies regarding the appropriate use of computers for both teachers and students. This would ultimately serve to boost the confidence of teachers struggling or hesitant to integrate computers into their curriculum. Of course, the implementation of a computer-integrated curriculum in each subject area would require the support of the school's administration. For example, the school time-table would have to be rescheduled in order to make it more flexible for teachers to efficiently mobilize their students.

In-service training, on-going technical support, and curriculum guidelines would no doubt help to reduce the constraint of teachers on students. Aside from these things, though, teachers will also need to have an open mind. Many students are undoubtedly going to know more about computers than their teachers do. Thus, teachers will need to place a certain measure of trust in their students, and be willing to learn from them. For example, even though teachers' knowledge of computers may be limited, they should be willing to give students opportunities to use computers to complete their course work.

It is clear that new policies and practices are required to achieve a more effective integration of computers into the school curriculum. As more and more investment dollars pour into this area, from both the govern-

ment and the private sector, greater attention needs to be paid to students and to how students' potential use of computers may be restricted by teachers. Although teachers are central to the integration of computers into the school curriculum, particularly in controlling student access to computers, in influencing computer course taking, and in affecting student attitudes toward the potential utility of computers, students' personal interest and self-motivation – particularly where multimedia/CD-ROM, tele-communications and, to an even greater extent, student attitudes toward computers are concerned – should not be overlooked. Teacher training on the subject of integrating computers into the school curriculum should focus on understanding students' demands and expectations, on the positive element of their personal interest and peer motivation, and on how teachers may create barriers to student learning in this area. Such a training program should also emphasize the ways in which teachers and students can work together towards achieving the full integration of computers into the school curriculum.

APPENDIX. Student Survey Questionnaire

Section I. Current use of computers.

1. Have you ever used computers? Yes [ ] No [ ]

*If **Yes**, please proceed.*
*If **No**, please go to **Section III** on page 5.*

Section II. For those who have used computers.

2. What types of computer have you used?

Commodore	[ ]
IBM PC compatibles	[ ]
Apple	[ ]
MacIntosh	[ ]
Others (please specify)	[ ]

3. Where have you used computers?
School [ ] At home [ ] At friends' homes [ ] At stores, exhibitions, fairs etc. [ ]

4. Have you ever taken a computer course? Yes [ ] No [ ]
If you have, what grade was it in? _____

5. Have you ever used the new computer lab at the school? Yes [ ] No [ ]

6. Have you ever used the old computer lab at the school? Yes [ ] No [ ]

7. Described below are some common types of computer software, check the frequency of the type you have used.

Type of use	Frequency of use
Computer - Assisted Organization	
(1) Word processing/desktop publishing	every week [ ] most weeks [ ] some weeks [ ]
(2) Spreedsheet	every week [ ] most weeks [ ] some weeks [ ]
(3) Database	every week [ ] most weeks [ ] some weeks [ ]
(4) Others (please specify)	
_____	every week [ ] most weeks [ ] some weeks [ ]
Computer-Assisted Learning	
(1) Drill and practice	every week [ ] most weeks [ ] some weeks [ ]
(2) Tutorial	every week [ ] most weeks [ ] some weeks [ ]
(3) Simulation	every week [ ] most weeks [ ] some weeks [ ]
(4) Labs	every week [ ] most weeks [ ] some weeks [ ]
(5) Problem solving	every week [ ] most weeks [ ] some weeks [ ]
(6) Multi-media/CD-ROM	every week [ ] most weeks [ ] some weeks [ ]
(7) Recreational games	every week [ ] most weeks [ ] some weeks [ ]
(8) Educational games	every week [ ] most weeks [ ] some weeks [ ]
(9) Others (please specify)	
_____	every week [ ] most weeks [ ] some weeks [ ]
Internet	
(1) Communication (such as e-mail)	every week [ ] most weeks [ ] some weeks [ ]
(2) Internet navigation (information searching, collecting and sharing)	every week [ ] most weeks [ ] some weeks [ ]
(3) Problem solving	every week [ ] most weeks [ ] some weeks [ ]
(4) Others (please specify)	
_____	every week [ ] most weeks [ ] some weeks [ ]

8. Described below are some possible reasons for which you have used computers.
Check the degree which best applies to you.

Reasons	Degree of applicability
(1) Interest/Exploration	Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(2) Required by the teachers	Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(3) Required by the parents	Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(4) Motivated by friends	Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(5) Others (please specify)	
_____	Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]

9. Described below are some difficulties you may have experienced.
Check the degree which best applies to you.

Difficulty	Degree of applicability
Hardware	
(1) Can't get to a computer	Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(2) Don't have attachments (such as printer, sound)	Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(3) Computers and printers keep breaking down	Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]

(4) Computers too old and slow — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(5) Other (please specify)
_____ — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]

Software
(1) Not enough variety of software available — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(2) Software too difficult to use — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(3) Lack of information about the software — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(4) Others (please specify)
_____ — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]

Technical support
(1) Limited computer knowledge — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(2) Not enough help — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(3) Others (please specify)
_____ — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]

School and family context
(1) Lack of teacher support — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(2) Too busy with school work — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(3) Others (please specify)
_____ — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]

GO TO SECTION IV

Section III. For those who have never used computers

10. Described below are some possible reasons for which you have not used computers. Check the degree which best applies to your situation.

Difficulty — Degree of applicability
(1) Can't get to a computer — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(2) Can't get attachments (such as sound, printer) — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(3) Computers and attachments keep breaking down — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(4) Computers you can use are too old and slow — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(5) Others (please specify)
_____ — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]

Software
(1) No interesting software — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(2) Software hard to use — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(3) Not enough information about the software — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]

(4) Other (please specify)
_____ Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]

Technical support
(1) Limited computer knowledge and skills — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(2) Cannot get technical assistance — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(3) Others (please specify)
_____ Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]

School and family context
(1) No teacher support — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(2) Too busy with school work — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(3) Too busy with other interests — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(4) No support from family — Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]
(5) Others (please specify)
_____ Very applicable [ ] Somewhat applicable [ ] Not applicable [ ]

Section IV. Background

The following background information will help us to study equity issues in computer use in schools. If you fell uncomfortable to answer any of the questions, you may leave it blank.

1. What grade level are you at?
Grade 9 [ ] Grade 10 [ ] Grade 11 [ ] Grade 12 [ ]

2. Do you have a computer at home? If yes, for how many years have you had the computer at home?
[ ] No [ ] Yes, for less than three 3 year [ ] Yes, for more than 3 years

3. What are your grades

[ ] Art	Above 85% [ ]	Above 70% [ ]	50-70% [ ]	Below 50% [ ]
[ ] English	Above 85% [ ]	Above 70% [ ]	50-70% [ ]	Below 50% [ ]
[ ] French	Above 85% [ ]	Above 70% [ ]	50-70% [ ]	Below 50% [ ]
[ ] Mathematics	Above 85% [ ]	Above 70% [ ]	50-70% [ ]	Below 50% [ ]
[ ] Science.	Above 85% [ ]	Above 70% [ ]	50-70% [ ]	Below 50% [ ]
[ ] Social Studies	Above 85% [ ]	Above 70% [ ]	50-70% [ ]	Below 50% [ ]
[ ] Physical Education	Above 85% [ ]	Above 70% [ ]	50-70% [ ]	Below 50% [ ]
[ ] Others (please specify)				
_____	Above 85% [ ]	Above 70% [ ]	50-70% [ ]	Below 50% [ ]

4. What is your gender? [ ] Male [ ] Female

5. Does your father work outside of the home? Yes [ ] No [ ]
If yes, what is his job?_____

6. Does your mother work outside of the home? Yes [ ] No [ ]
If yes, what is her job? _____

7. Do you have any handicap? Yes [ ] No [ ]
If yes, what is it?_____

8. What is your ethnical background?
Oriental [ ]; Black [ ]; White [ ]; Native [ ]; South American [ ]; East Indian [ ].

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