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**STUDENT READINESS FOR EduTOOLS USE:
AN INVESTIGATION OF THEIR IT-RELATED SKILLS
AND BEHAVIOURS**

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Abstract: EduTOOLS, a R&D project of the Centre for Learning Technologies which is jointly set up by the Ministry of Education, Kent Ridge Digital Labs and Infocomm Development Authority, involves an innovative use of computer technology. With EduTOOLS, students can make use of a suite of on-line tools for project work. Also available to students are a collection of recommended project resources and a list of experts. This project will be piloted in three Singapore schools - two secondary schools and one junior college. For an implementation of a high technology project such as EduTOOLS, one main concern is student readiness in terms of IT skills. This paper reports on the findings of an investigation of students' experience with computers, namely their use of computers in and outside of school, the types of computer applications used and of activities engaged with a computer, and their frequency of computer use. Self-reports of students' working behaviours on the computer as well as their affective characteristics were also captured. The implications of the findings for EduTOOLS implementation will be discussed.

Introduction

EduTOOLS is a R&D project of the Centre for Learning Technologies (CLT) which is jointly set-up by the Ministry of Education (MOE), Kent Ridge Digital Labs (KRDL) and Infocomm Development Authority (IDA). This 1.5 million-dollar project involves an innovative use of computer technology for a web-based environment to do collaborative project work. The development of this educational technology ties in with the growing significance of collaborative project work in Singapore schools.

With EduTOOLS, students will have a suite of web-based tools to collaborate effectively online as part of the project work processes. For teachers, the suite of web-based tools will help them to effectively monitor and assess students' project work processes. Centralised access to repositories, project resources and library resources that support project work will also be available to both teachers and students. However, for implementing a high technology project such as EduTOOLS, educators are concerned about student readiness in terms of their computer skills and working behaviours.

Prior to piloting EduTOOLS in three Singapore schools, a study was conducted to investigate students' experience with computers, namely their use of computers in and outside of school, the types of computer applications used and of activities engaged with a computer, and their frequency of computer use. Self-reports of students' working behaviours on the computer as well as their affective characteristics were also captured. The implications of the findings for EduTOOLS implementation are then discussed.

Method

Sample

Three schools were targeted for the piloting of EduTOOLS - two secondary schools and one junior college. For the purpose of this study, these schools are referred here as School 1, School 2 and School 3. The characteristics of the three schools are presented in Table 1. The participants from Schools 1 and 2 were secondary two students (14-year olds) and those from School 3 were first year college students (17-year olds).

Table 1
School Characteristics

	Level		School Type	
School 1	Secondary	Govt.	Co-ed	Double-session
School 2	Secondary	Govt., autonomous	Co-ed	Single-session
School 3	Junior college	Govt.	Co-ed	Full day

Instrument

A survey questionnaire was used to determine the students' experience with computer in terms of their use of computers in and outside of school, the types of computer applications used and of activities engaged with a computer, and their frequency of computer use. Self-reports of students' working behaviours on the computer as well as their affective characteristics were captured. Other relevant background information on age, sex and stream of study were also included.

Procedure

Figure 1 shows the overall framework for evaluating EduTOOLS. For this investigation study on student readiness for EduTOOLS use, participating students of the three pilot schools were administered a survey questionnaire between the period of March to April 2000, just prior to EduTOOLS implementation.

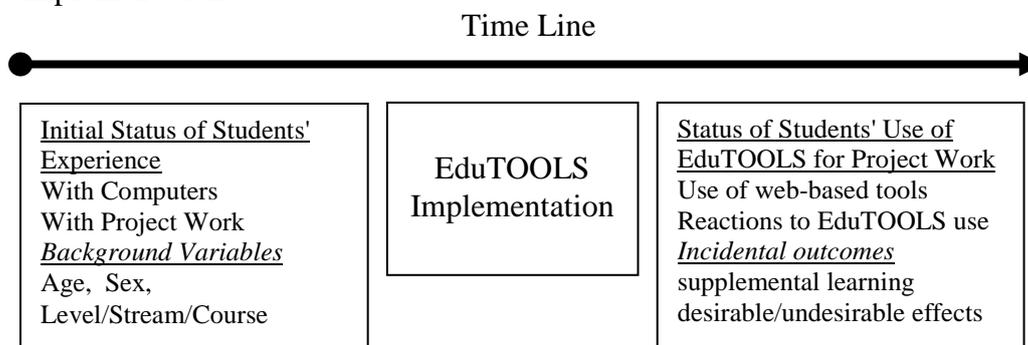


Figure 1: Framework for evaluation

Data Analyses

The collected data set was recorded and analysed using SPSS package. Descriptive statistics were used to yield profiles of the whole sample as well as subgroup samples by school.

Results

Table 2 shows the distribution of the sample by school, sex, stream/course of study and the mean age (in years) of students. A total of 489 students participated in this study. The sample consisted of 45% boys and 55% girls. For the secondary schools, students of both the Express and Normal (Academic) streams participated in this study. They had a mean age of 13.6 years. For the junior college, all students were from the Science course. They had a mean age of 16.9 years.

Table 2

Distribution of Sample by Sex, Stream/Course of Study and Mean Age

	N	Sex		Stream			Course			Mean Age (SD)
		M	F	E	NA	NT	S	A	C	
School 1	191	89	102	121	70					13.6 (.6)
School 2	234	88	146	158	76					13.7 (.6)
School 3	64	44	20				64			16.9 (.5)

Sex: Male (M), Female (F)

Stream of Study: Express (E), Normal Academic (NA), Normal Technical (NT)

Course of Study: Science (S), Arts (A), Commerce (C)

Students were asked about their use of computers in school. Table 3 presents the results. For the overall sample, 74% had used computers during scheduled class time, 44% before & after school hours, 30% during free periods and 15.4% during weekends/holidays. Analyses by school reveal some differences in students' use of computers in each school and this may be reflective of the school's curriculum hours. For School 1, a double-session school, about 50% of its students reported using computers during scheduled class time as well as before & after school hours. But for School 2, a single-session school, 90.6% its students reported using computers during scheduled class time. Being a full-day college with more flexible curriculum hours, results show higher usage of school computers by students in all four categories of time periods.

Table 3
Use of Computers in School

	% of Students			
	Overall	School 1	School 2	School 3
Scheduled class time	74.0	56.0	90.6	67.2
Free periods	29.9	17.3	27.4	76.6
Before & after school hours	43.6	50.3	36.8	48.4
Weekends/holidays	15.4	11.0	13.7	34.4

Table 4
Use of Computers Outside of School

	% of Students			
	Overall	School 1	School 2	School 3
Home	86.7	85.3	84.2	100.0
Friend's home	63.4	58.1	67.1	65.6
Library	56.4	89.1	46.6	54.7
Someone's place of work	12.9	8.9	15.4	15.6
Others	2.7	2.6	3.0	1.6
No access	1.4	0.0	3.0	0.0

Table 4 presents the results of students' use of computers outside of school. 86.7% of the overall sample had used computers at home. This result reflects the home computer ownership amongst students. 63.4% of them had used computers at their friends', 56.4% at libraries and 15.6% at typically parents' place of work or relatives' homes. Only 1.4% of the students had no access to computers outside of school. Examination of the results by school reveals similar pattern of computer use by students. Two interesting points are noted from the results. One is that, amongst JC students, there was 100% home computer ownership, and the other is the exceptionally high percentage of students in School 1 who had used computers at libraries.

Table 5 shows the results obtained for the frequency of computer use. About one-quarter of the overall sample reported computer use in the categories 'once a while', '1-2 hrs per week' '3-7 hrs per week' and '>7 hours'. Only a very small percentage of the sample had not use the computer at all. A Comparing the two secondary schools, a trend of higher frequency of computer use is noted amongst students of School 2. Compared to their secondary counterparts, JC students had a higher frequency of computer use.

Table 5
Frequency of Computer Use

	% of Students			
	Overall	School 1	School 2	School 3
Never	0.2	0.0	0.4	0.0
Once a while	26.3	31.9	26.5	7.8
1-2 hrs per week	22.8	26.7	19.2	23.4
3-7 hrs per week	25.1	27.2	20.5	34.4
> 7 hrs per week	25.7	14.1	32.5	34.4

Table 6
Use of Computers for Learning (top five subjects)

Overall		School 1		School 2		School 3	
Subject	%	Subject	%	Subject	%	Subject	%
History	52.5	Maths	59.7	MT Lang	74.4	Science	60.9
MT Lang	51.5	History	55.0	History	59.8	Maths	40.6
Maths	42.9	Music	44.0	Lit.	55.1	EL	40.6
EL	41.1	MT Lang	35.6	Geog	47.9	Geog	37.5
Geog	37.6	EL	33.5	EL	47.4	Music	23.4

Students were asked about their use of computers for learning in different subject areas. Table 6 shows the results for the top five subjects. For the overall sample, the five subjects with the highest percentage of students include History, Mother Tongue Languages, Mathematics, English Language/ General Paper and Geography. Examination of the results obtained for each school reveals that computers had been popularly used by students for the learning of languages and of humanities subjects such as history, geography, literature and music. For School 3, 61% of the JC students had used computers for the learning of Science. This result is not surprising considering that these students were on the science track of study.

Table 7
Computer Applications

	% of Students			
	Overall	School 1	School 2	School 3
Word processing	86.3	84.3	85.5	95.3
Open tools	67.3	73.8	63.7	60.9
Games	78.3	75.9	78.6	84.4
Educational software	46.6	47.1	46.2	46.9
Authoring/Programming	9.4	6.3	5.6	32.8

Table 7 presents the results of the computer applications used by students. For the overall sample, the three most popular applications are word processing, computer games and open tools. 46.6% had used educational software, but only 9.4% had used computer authoring/programming applications. Examination of the results obtained for each school revealed similar pattern of use. However, it is noted that compared to their secondary counterparts, more JC students had used authoring or programming applications.

Table 8
Computer Activities

	% of Students			
	Overall	School 1	School 2	School 3
Surf & browse web	86.7	86.4	83.8	98.4
Newsgroup/bulletin board	12.7	10.5	10.7	26.6
Email	54.2	40.8	54.7	92.2
Chats	55.2	41.4	56.8	90.6

Table 8 shows the results of student participation in computer activities. For the overall sample, the three most popular activities are surfing/browsing the web, online chats and emailing. Only 12.7% of the students had participated in newsgroup/bulletin board discussions. Examination of the results by school revealed similar pattern of participation for secondary students in School 1 and School 2. It is noted that JC students had a higher level of participation in all four activities, especially emailing and online chats.

Table 9
Extent of Working Alone/With Others

		% of Students			
		Overall	School 1	School 2	School 3
<i>Working Alone</i>	Rarely	6.7	6.8	8.1	0.0
	Sometimes	22.7	22.6	25.6	9.4
	Most of the time	70.7	70.5	63.2	90.6
<i>Working With Others</i>	Rarely	40.0	41.9	33.3	56.3
	Sometimes	50.6	50.3	53.6	42.2
<i>Others</i>	Most of the time	9.1	7.9	12.6	1.6

Students were asked about the extent of their working alone or with others when using computers. Table 9 shows the results of their working behaviour. For the overall sample, 71% had worked on computers alone and did so most of the time and 50.6% had sometimes worked with others. Only 9% did so most of the time. The analyses by school show similar working patterns for secondary students. But for the JC students, it is noted that they had more independent working behaviours. 91% had worked alone most of the time and only 1.6% had worked with others.

Students were asked about their liking for using computers. They indicated their liking on a 5-point scale ranging from 'strongly disagree' through 'neutral' to 'strongly agree'. The results are presented in Table 10. For the overall sample, 88% indicated positively to liking to use computers, 10% had neutral feelings and only 1.6% were negative. It is also noted that, compared to their JC counterparts, more secondary students had expressed positive feelings regarding using computers (52% versus 31%). This result may be due to the novelty of using computers experienced by younger students.

Table 10
Like Using Computers

	% of Students			
	Overall	School 1	School 2	School 3
Strongly disagree	0.8	2.1	0.0	0.0
Disagree	0.8	0.5	0.9	1.6
Neutral	10.4	10.5	8.5	17.2
Agree	38.9	35.1	38.9	50.0
Strongly agree	48.9	51.8	51.3	31.3

Table 11
Proficiency at Using Computers

	% of Students			
	Overall	School 1	School 2	School 3
Strongly disagree	5.6	8.4	3.9	3.1
Disagree	11.3	9.5	11.6	15.6
Neutral	43.8	44.7	44.6	37.5
Agree	34.6	32.1	36.5	34.4
Strongly agree	4.7	5.3	3.4	7.8

Students were asked about their proficiency at using computers. They indicated their proficiency on a 5-point scale ranging from strongly disagree through neutral to strongly agree. The results are presented in Table 11. For the overall sample, 40% indicated positive agreement to being good at using computers, 44% were neutral and 17% disagreed. The analyses by school showed similar pattern of responses for both secondary and JC students.

Discussion

The EduTOOLS project, an innovative idea of an IT-rich environment for students to do collaborative project work, aims at integrating technology for teaching and learning. But are students ready for the use of this computer-based technology? The findings of this study provide some baseline information about students' computer skills and working behaviours. In general, older students had more experience with computers. This is reflected in their frequency of use, their experience with computer applications and their participation in computer activities. The results also indicate that students had used computers for the learning of many subject areas especially the languages and humanities subjects. The evidence here points to good infusion of computer technology for teaching and learning purposes in the schools, and on a broader perspective indicates significant progress of the IT masterplan made in Singapore schools since its 1997 launch.

Older JC students were more independent computer users, whereas younger secondary students worked more with others on the computer. This working behaviour may be attributed to the process of learning computers where novice users had learned their computer skills from others and hence a more prevalent collaborative mode of working on computers. Another reason may be that older students had access to home computers thus enabling them to work independently.

Students had positive attitudes about using computers, and their self-reports indicated satisfactorily good proficiency at using computers. These results suggest a general receptiveness for computer-based technology amongst students.

With EduTOOLS, students are provided with a suite of web-based tools to do collaborative project work. But to use EduTOOLS, students must have access to computer facilities with internet connectivity as well as a certain level of computer skills. The results of this study show that students had good access to computers in and outside of school, but it had not established students' accessibility to the internet. This piece of information would be critical for EduTOOLS implementation. Based on students' computer skills and experience, it can be concluded that the older JC students should be more ready to use EduTOOLS than the younger secondary two students. Students' overall positive attitudes about using computers should facilitate the integration of this computer technology as tools for collaborative project work in Singapore schools.

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