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Improving the ICT Infrastructure in the Philippines

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ABSTRACT :

This case study was conducted in a private secondary school to determine the readiness of the school constituencies to embark on a technology-integrated learning environment. Fifteen science and math high school teachers and 138 students participated in the survey. Descriptive statistics were used to present the results of the study. Analysis of variance was employed to examine if differences between respondent groups and across year levels were significant. Correlation analysis was, likewise, used to find out relationships between selected variables. Level of significance was set at α=.05.

Results showed that the most common place of access to a computer for students and teachers is in the school and the workplace, respectively. Internet cafes ranked as the next most common place of computer access for students and the home for teachers. Interviews also revealed that they also encounter connectivity problem with the school network system which is perceived as a hindrance to the full integration of technology in classroom instruction. Students spend about 2 to 2.5 class hours per week in using the computer. Teachers, on the other hand, spend an average of only about 1 hour per week of computer time for their classes. The most frequently used computer applications by the students and teachers are the internet for information search, e-mail, and word processing. These are applications which majority of them used in a daily basis. Computer applications which many respondents had very limited experience or never had any experience with include database management, data analysis, and desktop publishing. Students, through their own individual efforts or with the help of their teachers, are encouraged to harness the optimum use of the computer applications for their intended purpose so they can benefit from the various potentials that the technology can offer them. Given the results of this baseline survey, it is apparent that teachers and students for the most part are quite prepared for the implementation of a technology-integrated learning environment. Recommendations on how to optimally use ICT in the secondary school curriculum are also forwarded.

1. INTRODUCTION :

The development of various forms of information and communication technologies (ICT) has made a significant contribution to a shift in the teaching-learning paradigm.

No longer is education confined to the traditional classrooms where the teacher is the main resource and sole source of knowledge. Instructional strategies enhanced by technology, particularly computer technology, have been incorporated in the design of the traditional classroom instruction.

The use of ICT to enhance classroom instruction is not surprising since this is now part of the revised curriculum for basic education as prescribed by the Department of Education.

These technological advancements paved the way to the concept of e-learning which has been defined as the "delivery of learning through electronic media such as phone bridging, audio and video (including television) conferencing, satellite broadcast, web-based or online courses that feature the use of tools such as electronic mail, electronic bulletin board systems and chat, in combination with web pages and sites" (1st National Conference on E-learning, 2002). For the purpose of this study, e-learning will be limited to mean learning through the use of both the computer and the Internet.

The present study was conducted mainly to determine the readiness of constituencies of a private secondary school to embark on a technology-integrated learning environment. Specifically, it aims to gather baseline information from students, teachers, staff, and administrator concerning their perceptions on (i.e. beliefs and awareness) and actual use of ICT in classroom instruction and in the school operations as a whole.

2. METHODOLOGY

Research design and participants

This is a case study carried out using a descriptive survey research design. Fifteen high school teachers, mostly female, participated in the survey (Table 1). They were composed of eight science teachers, six mathematics teachers, and one computer teacher. Most of them teach their main subject area to more than one year level. Majority have either bachelor's degree of have taken several masteral units, while three have master's degree. Their mean age is 32 years. Average class size reported is 37 students.

On the other hand, a total of 138 students filled-out the survey form (Table 2). The students included in the survey have been pre-selected by the school. Four intact groups, i.e. one section per year level, comprised the respondents. The most number of student-respondents were the sophomores, while the least were the seniors. Female respondents outnumbered the males in all year levels.

The relatively low number of respondents in some year levels was due to an ongoing school-wide activity at the time of the survey, involving some students in the selected sections, which prevented them from participating in the survey.

The Principal and Computer Laboratory In-charge were also interviewed on separate occasions, results of their interviews were incorporated with those of the teachers.

The instruments

Three sets of data collection instruments were used to obtain pertinent information from respondents. These are Technology Survey Form for Students, Technology Survey Form for Teachers, and Technology Survey Interview Guide for Administrator and Staff.

The instruments consist of two major parts. Part 1 contained items to collect information about the profile of respondents and their current usage and of skills in different computer applications. Part 2 was designed to obtain the respondent's general perceptions on the various dimensions of access to, use, and application of computer in education.

Table 1: Profile of teachers who participated in the survey

Attribute	Frequency	Percentage
Gender		
Female	14	93
Male	1	7
Total	**15**	**100**
Main subject are being taught		
Computer	1	7
Mathematics	6	40
Science	8	53
Total	**15**	**100**
Year level(s) being taught		
First	7	
Second	6	
Third	5	
Fourth	8	
Highest educational attainment		
Bachelor	6	40
MA level	6	40
MA graduate	3	20
Total	**15**	**100**
Mean age = 32 years		
Mean class size = 37 students		

Table 2: Profile of students included in the survey

Attribute	Frequency	Percentage
Year level		
First year (Aristotle)	31	22
Second year (Mendel)	41	30
Third year (Faraday)	37	27
Fourth year (Hawking)	29	21
Total	**138**	**100**
Gender		
Female	85	62
Male	53	38
Total	**138**	**100**

Data collection

A memorandum about the conduct of the survey was issued by the Principal to all high school math and science teachers. This survey for teachers was conducted in the conference room of the high School department. The teachers, arriving after their respective classes, came in several batches of 2 or 3 per batch. Semi-structured interview was also done with the teachers after completing their survey form.

A total of 15 teachers participated in the survey. The survey form for students was administered in the classrooms during vacant time. The administration was done separately for each year level. Separate interviews with the Principal and the Computer Laboratory In-charge were also conducted. A visit to the computer laboratory was done by evaluation team after the conduct of the study.

Data analysis

Frequenc distribution, percentages, and means were used to present and scale developed for the instruments were coded such that a score closer to "5" indicates more positive or favorable perception toward an item while a score closer to "1" implies more negative or unfavorable perception toward an item.

Analysis of variance (F test) were also used to examine if differences between respondent groups (i.e. students and teachers) and across year levels of students (i.e. 1st to 4th year) were significant. Correlation analysis using Pearson r was, likewise, employed to find out relationships between selected variables. Level of significance was set at $\alpha = .05$.

3. FINDINGS AND DISCUSSION

Computer access

The most common place of access to a computer for students and teachers is in the school and the workplace, respectively (Table 3). Internet cafes ranked as the next most common place of computer access for students and the home for teachers. This is expected since not all students own computer unit at home, while others prefer to spend their computer time in internet cafes, mostly for internet and games as shown in Table 6.

Table 3. Place of access to computer

Respondent	School/ Workplace	Internet café	Home	Others*
Students	**122**	**109**	**104**	**4**
1st year	29	25	24	1
2nd year	39	31	31	2
3rd year	29	30	24	1
4th year	25	23	25	-
Teachers	**14**	**5**	**9**	**-**

**Others include house of friend or relative*

Computers in schools

Most respondents felt that there are enough computer units in the school available for use by students and teachers (Table 4). Interview with students, however, revealed that while there may be sufficient number of computer units in school, the problem that they usually encounter is the lack of proper scheduling for the use of computer laboratory. This problem was also signified by the teachers. The study suggests that the school should assign specific time slots for computer use for the different grade and year levels from elementary to high school to avoid conflict in schedule.

Table 4. Sufficiency of computer units in school available for use

Respondent	Yes	No	Total
Students			
1st year	31	0	31
2nd year	23	17	40
3rd year	23	10	33
4th year	19	9	28
Teachers	8	6	14

Computer use

When asked whether they use computer in their classes, majority of the students were on the affirmative side (Table 5). Half of the teachers who responded use the computer for their classes while the other half does not.

Students who answered "yes" indicated that they spend about 2 to 2.5 class hours per week in using the computer. Teachers, on the other hand, spend an average only about 1 hour per week of computer time for their classes.

Table 5. Use of computers in classes

Respondent	Yes	No	Total
Students			
1st year	27	4	31
2nd year	38	3	41
3rd year	33	4	37
4th year	27	2	29
Teachers	7	7	14

Frequency of computer use

For students, the most frequently used computer applications are the internet for information search, games, e-mail, word processing, and graphics.

These are applications which majority of the students use on a daily basis (Table 6). On the other hand, computer applications which many students had very limited experience or never had any experience with include data analysis, database management, and desktop publishing.

Table 6. Students' frequency of use of different computer applications

Computer applications	Daily	Weekly	Monthly	Once in a year	Never
File management	33	61	21	10	11
Word processing	46	67	20	3	2
Spreadsheet	14	47	37	23	14
Database management	15	35	34	24	24
Graphics	38	57	29	5	5
Presentation software	22	39	43	21	7
Desktop publishing	17	29	33	30	22
Data analysis	13	41	30	12	30
E-mail	54	54	21	2	3
Internet for info search	76	49	6	2	1
E-learning (i.e. Genyo)	26	38	37	19	8
Games	67	52	13	3	2

For teachers, the most frequently used computer applications are e-mail, word processing, and internet. These are applications which most teachers use every day (Table 7).

On the other hand, computer applications which many teachers had very limited experience or never had any experience with include database management, data analysis, and desktop publishing.

Table 7. Teachers' frequency of use of different computer applications

Computer applications	Daily	Weekly	Monthly	Once in a year	Never
File management	2	3	6	1	1
Word processing	4	7	3	0	0
Spreadsheet	2	1	9	0	0
Database management	0	0	2	0	6
Graphics	2	0	2	7	0
Presentation software	1	0	6	1	3
Desktop publishing	1	0	1	3	4
Data analysis	1	1	0	3	4
E-mail	5	7	0	0	1
Internet for info search	3	8	1	1	1
E-learning (i.e. Genyo)	2	1	11	0	1
Games	1	3	7	2	1

Among students, there were significant differences found in the frequency of use of computer applications such as e-learning, presentation software, graphics, word processing, file management, and games (Table 8). Seniors had been found to have the greatest use for these applications compared to students from other year levels.

Between students and teachers, results revealed that some of the more significant differences were found in the frequency of use for games, graphics, e-learning, and presentation software (Table 8). Teachers have been found to use these applications more often than the students. It is interesting to note that teachers in this particular survey use computers for games much more frequently compared to students.

Table 8. F values comparing frequency of use of different computer applications among students and between students and teachers

Computer applications	F values (Students-all levels)	F values (Students & teachers)
File management	2.72*	2.40*
Word processing	3.70**	2.81*
Spreadsheet	ns	ns
Database management	ns	4.21**
Graphics	4.19**	6.07**
Presentation software	4.51**	4.80**
Desktop publishing	ns	ns
Data analysis	ns	ns
E-mail	ns	ns
Internet for info search	ns	3.13*
E-learning (i.e. Genyo)	6.64**	5.26**
Games	2.66*	8.69**

Note: * *significant at α=.05*
** *significant at α=.01*
ns not significant

Computer skills

A more students, significant differences were found in the level of skill in using the internet, graphics, and games (Table 9). Specifically, sophomores were the most skillful in using these computer applications compared to other year levels.

Between teachers and students, the most important difference in the level of skill were found in using graphics, the internet, and spreadsheet (Table 9). Students were found to be more adept in using graphics while teachers were more at ease in using the internet and spreadsheet applications. This finding is understandable since teachers more commonly use the internet to research for supplementary lessons and the spreadsheet in the computation of scores and grades of students.

Table 9. F values comparing level of skill in use of different computer applications among students and between students and teachers

Computer applications	**F values** (Students-all levels)	**F values** (Students & teachers)
File management	ns	ns
Word processing	ns	ns
Spreadsheet	ns	2.42*
Database management	ns	ns
Graphics	3.26*	4.80**
Presentation software	ns	ns
Desktop publishing	ns	ns
Data analysis	ns	ns
E-mail	ns	ns
Internet for info search	3.46*	2.80*
E-learning (i.e. Genyo)	ns	ns
Games	2.63*	ns

Note: * *significant at α=.05*
** *significant at α=.01*
ns not significant

Relevance of computer applications

Students significantly differed on their perceptions as to the relevance of desktop publishing to their needs and interests (Table 10). Comparison of means showed desktop publishing as most relevant to the needs and interests of sophomores compared to other year levels. Similar perception on the relevance of the other applications was expressed by the students.

Important differences were found on the perceptions of students and teachers as regards the relevance of spreadsheet, desktop publishing, file management, internet use, and word processing to their needs and interest (Table 10). There was an overwhelming positive perception among teachers compared to students on the relevance of these applications to their needs and interests.

When asked which among the computer applications they would like to receive training on or tutorials, respondents indicated their preference for desktop publishing. This is consistent with the earlier findings of this study which showed that desktop publishing is among the applications which both teachers and students either had very limited experience or never had any experience in using but that is considered most relevant to their needs and interests.

Table 10. F values comparing perceived relevance of different computer applications among students and between students and teachers

Computer applications	F values (Students-all levels)	F values (Students & teachers)
File management	ns	3.01*
Word processing	ns	2.80*
Spreadsheet	ns	4.38**
Database management	ns	ns
Graphics	ns	ns
Presentation software	ns	ns
Desktop publishing	3.80**	3.23**
Data analysis	ns	ns
E-mail	ns	ns
Internet for info search	ns	2.76*
E-learning (i.e. Genyo)	ns	ns

Note: * *significant at α=.05*
** *significant at α=.01*

Contributions of computer technology to education

Similar results were obtained on the perceptions of teachers and students on the various contributions of computer technology to education. Significant differences were found on the perceptions among students as well as between teachers and students on almost all contributions of computer technology to education as presented to respondents (Table 11).

It was only on such contributions of technology that it "allows better access to information", "supports diverse needs of students", and "keeps teachers and students abreast with current and emerging technologies" in which no statistically significant difference was obtained. This result implies that there is a similar and common belief among respondents that these are the most important contributions of computer technology to education.

Perceptions on computer use, access and applications

This section presents in detail respondents' use, access, and application of computer using items describing the various dimensions of computer use, access, and application. Results revealed several dimensions on which respondents significantly differed on their perceptions regarding basic computer operations, file management, various software applications, and e-mail (Table 12).

On the other hand, there was a general agreement among respondents on their perceptions concerning the various dimensions describing word processing application, internet use, and those of ethics surrounding the use of computer and its various applications.

Table 11. F values comparing perceived contribution of technology to education among students and between students and teachers

Contributions	**F values** (Students-all levels)	**F values** (Students & teachers)
Develops more student-centered teaching-learning process	4.99**	3.55**
Provides better communication channels between/among school administrators, teachers, and parents	8.00**	6.34**
Allows better access to new information	ns	ns
Helps students improve communication skills	5.41**	4.92**
Facilitates collaborative work among students	6.68**	5.01**
Makes it easier for students to complete writing assignments	3.94**	3.69**
Improves student confidence and attitude toward learning	7.61**	6.06**
Helps students enhance their problem solving skills	5.61**	3.99**
Prepares students for the workplace	3.28*	2.47**
Reduces mathematics anxiety among students	4.12**	3.27**
Expands teacher's choice of assessment tools	7.97**	5.83**
Increases emphasis on individualized instruction	7.87**	5.85**
Leads to better content knowledge of subject areas like science, math, etc.	3.49*	2.49*
Promotes creativity both among teachers and students	3.17*	2.56*
Supports diverse needs of students	ns	ns
Helps teachers make informed decisions	6.37**	5.21**
Keeps teachers and students abreast with current and emerging technologies	ns	ns
Important for more effective classroom planning and management	8.50**	6.38**

Note: * *significant at α=.05*
** *significant at α=.01*
ns not significant

Table 12. F values comparing perceptions on computer access, use, and applications among students and between students and teachers

Dimensions of computer access, use, and application	F values (Students-all levels)	F values (Students & teachers)
General perception on computer use and application I believe computers make a person's life a lot easier.	ns	ns
Computer application in education is necessary for an effective teaching-learning transaction.	7.79**	6.03**
Using computers helps me to do better on my school works/projects.	ns	ns
I find computers make my work more interesting.	ns	ns
Use of computer in education is a must nowadays.	ns	ns
Teachers should use computers to enhance their professional practice	ns	ns
Basic computer operations I would like to learn more about computers.	ns	ns
I work more efficiently when using a computer.	5.15**	4.28**
Working with a computer makes me uncomfortable.	ns	ns
I avoid computers because they somewhat intimidate me.	ns	3.15*
I hesitate to use a computer for fear of making mistakes I may not be able to correct.	ns	4.67**
I have limited experience in using computer.	6.58**	7.02**
I can use most of the operating systems in the computer.	3.29*	3.37*
I can have more than one windows open at the same time.	ns	ns
I feel confident teaching others basic computer operations.	ns	ns
I learn new features of a software on my own.	ns	ns
I do not need the computer to keep tract of my academic performance.	ns	4.12**
File management I keep my school projects in computer files.	3.06*	3.13*
I devise a system for organizing my computer files so I can locate files with ease.	ns	ns
I use computer files to keep my school projects, reports, and activities.	ns	ns
I can easily locate the files I saved.	ns	ns
I save documents I have created.	ns	ns
I organize my mail folders to save messages.	ns	ns
Word processing I use the word processor for preparing my school projects and reports.	ns	ns
I use the word processor tools (font style, spell check, thesaurus) to edit my work.	ns	ns

Desktop publishing/graphic design I know how to use pre-made clip arts to enhance my presentations.	ns	ns
I can design my own graphics to create a good presentation.	5.92**	7.62**
I use graphics and/or charts to give more meaning to my school works/projects.	ns	ns
Spreadsheet, database, & presentation applications I use spreadsheet software (e.g. Excel) to do my calculations.	ns	ns
I do not use a computer database application.	ns	ns
I can create an original database such as defining field and creating lay-outs.	ns	2.57*
I find presentation software (e.g. Powerpoint) very useful for class reports/presentations.	3.00*	2.42*

E-mail I use e-mail regularly as a form of communication.	ns	ns
E-mail is an effective means of sharing information with my fellow students and friends.	7.79**	6.03**
E-mail is a good way of communicating with my teachers, fellow students, friends, and family members.	3.82**	4.44**
I still prefer hand-outs or class materials distributed by teachers in printed form than sent by e-mail.	ns	ns
I can send an e-mail with attachment.	ns	ns
I can open e-mail attachments.	ns	ns
I can save e-mail attachments.	ns	ns
Internet use I use the internet in searching for new materials for my classes.	ns	ns
I know how to browse the Internet.	ns	ns
I can navigate a website to find the information I need.	ns	ns
I have participated in an online chat.	ns	ns
I know how to upload documents to the internet.	ns	ns
I use the networks to access reference materials for my classes.	ns	ns
I know how to download documents from the Internet.	ns	ns
I use various search engines to efficiently locate information I need.	ns	ns
I use the networks to access online library catalogs for my classes.	ns	3.71*
Computer ethics I know of copyright restrictions on the use of computer software.	ns	ns
I am not aware of ethics in computer use.	ns	ns

Note: ** significant at α=.05*
*** significant at α=.01*
ns not significant

Academic performance of students and computer use

Academic performance of students was determined using their average grades in math and science for the first two quarters of school year 2006-2007. Only grades in math and science were used in the analysis since these are the initial subject areas in which technology was integrated in classroom integration.

By year level, students significantly differed in their math grades, with the Juniors obtaining the highest math grade average (Mean = 89.9) and the Freshmen the lowest (Mean = 85.3) (Table 13). No significant difference was found in so far as science grade average across year level is concerned.

Table 13. Grades of students in math and science

Subject	1st year	2nd year	3rd year	4th year	F
Math	85.3	86.5	89.9	87.0	8.99**
Science	87.3	85.8	87.2	85.5	2.21^{ns}

Note: *** significant at α=.01*
ns not significant

Correlation analysis, using Pearson r, was employed to find out any relationship between academic performance and frequency of use of various computer applications and between academic performance and skill in the use of various computer applications. For both relational analyses, science and math grades were correlated with all computer applications. Results showed that only few of the bivariate analyses conducted indicated significant relationships.

Specifically, grade in math was found to be significantly related with the frequency of use of spreadsheet and database management applications (Table 14). This result clearly shows that spreadsheet and database management applications are important contributory factors to better academic performance of students in math. Grade in science, on the other hand, was found to have a significant relationship only with file management.

Furthermore, grade in math has been found to correlate significantly with the skill in using file management and presentation software while science grade was not related with the skill is using any of the computer applications (Table 15).

The resulting non-significant bivariate relationships imply that academic performance of students in independent of their frequency of use of computer applications and of their skill in using the different computer applications. This independence indicated that academic performance of students will remain the same in whatever amount of use of these applications as well as in any level of skill in using the various computer applications.

What is surprising is the lack of significant relationship between academic performance and the more common computer applications like using the internet for information search for math, science, and any other subject area. Use of word processing and spreadsheet should also be optimized for report organization and presentation and simple data analysis.

Table 14. Relationship between frequency of use of different computer application and grades

Computer applications	Pearson r values Math	Pearson r values Science
File management	ns	0.19*
Word processing	ns	ns
Spreadsheet	0.19*	ns
Database management	0.18*	ns
Graphics	ns	ns
Presentation software	ns	ns
Desktop publishing	ns	ns
Data analysis	ns	ns
E-mail	ns	ns
Internet for info search	ns	ns
E-learning (i.e. Genyo)	ns	ns
Games	ns	ns

Note: * *significant at α=.05*
ns not significant

Table 15. Relationship between skill in use of different computer applications and grades

Computer applications	Pearson r values Math	Pearson r values Science
File management	0.19*	ns
Word processing	ns	ns
Spreadsheet	ns	ns
Database management	ns	ns
Graphics	ns	ns
Presentation software	0.21*	ns
Desktop publishing	ns	ns
Data analysis	ns	ns
E-mail	ns	ns
Internet for info search	ns	ns
E-learning (i.e. Genyo)	ns	ns
Games	ns	ns

Note: * *significant at α=.05*
ns not significant

Summary, Conclusion and Recommendations

This baseline survey was conducted during the 2nd quarter of school year 2009-2010 in a private secondary school in Southern Luzon. The main objective of the survey is to determine the readiness of the school constituencies to embark on a technology-integrated learning environment.

Selection of the school was based on its commitment to implement and integrate in its curriculum a technology-enhanced learning environment.

Fifteen science and math high school teachers participated in the survey. Most of these teachers are female, have taken several masteral units, and have a mean age of 32 years. For students, a total of 138 filled-out the survey form. (They are distributed as follows: 1st year, 31; 2nd year, 41; 3rd year, 37; and 4th year, 29.)

Three sets of data collection instruments were used to obtain pertinent information from respondents. They survey for teachers was conducted in the conference room of the High School department while that for students was held in the classrooms during vacant time. The administration of survey instrument for students was done separately for each year level.

Descriptive statistics were used to present the results of the study. Responses to the Likert-type 5-point scale developed were coded such that a score closer to "5" indicates more favorable perception toward an item while a score closer to "1" indicates more unfavorable perception toward an item. Analysis of variance was employed to examine if differences between respondent groups and across year levels were significant. Correlation analysis was, likewise, used to find out relationships between selected variables. Level of significance was set at α=.05.

Results showed that the most common place of access to a computer for students and teachers is in the school and the workplace, respectively. Internet cafes ranked as the next most common place of computer access for students and the home for teachers.

Most respondents felt that there are enough computer units in the school available for use by students and teachers. Interview with students and teachers, however, revealed that while there may be sufficient number of computer units in school, the problem that they usually encounter is on the lack of proper scheduling for use of the computer laboratory. To maximize the use of the computers, it is suggested that specific computer laboratory schedule be allotted for each grade and year level to avoid conflict in schedule.Interview with the school constituencies also revealed that they also encounter connectivity problem with the school network system.

They feel that this is problem can be a hindrance to the full integration of technology in classroom instruction if not addressed by the school administration very soon.

When asked whether they use computer in their classes, majority of the students were on the affirmative side. Half of the teachers who responded use the computer for their classes while the other half does not. Students indicated that they spend about 2 to 2.5 class hours per week in using the computer. Teachers, on the other hand, spend an average of only about 1 hour per week of computer time for their classes.

The most frequently used computer applications by the students and teachers are the internet for information search, e-mail, and word processing. These are applications which majority of them used in a daily basis. Students also indicated that they use the computer for games almost everyday. On the other hand, computer applications which many respondents had very limited experience or never had any experience with include database management, data analysis, and desktop publishing.

Among students, there were significant differences found in the frequency of use of computer applications such as e-learning, presentation software, graphics, word processing, file management, and games. Seniors had been found to have the greatest use for these applications compared to students from other year levels. Between students and teachers, results revealed that some of the more significant differences were found in the frequency of use for games, graphics, e-learning, and presentation software. Teachers have been found to use these applications more often than the students. It is interesting to note that teachers use computers for games much more frequently compared to students.

Among students, significant differences were found in the level of skill in using the internet, graphics, and games. Specifically, sophomores were the most skillful in using the aftermentioned computer applications compared to other year levels. Between teachers and students, the most important differences in the level of skill were found in using graphics, the internet, and spreadsheet. Students found to be more adept in using graphics while teachers were more at ease in using the internet and spreadsheet applications.

Students significantly differed on their perceptions as to the relevance of desktop publishing to their needs and interests. Comparison of means showed desktop publishing as most relevant to the needs and interests of sophomores compared to other year levels. Similar perception on the relevance of the other applications was expressed by the students.

Important differences were found on the perceptions of students and teachers as regards the relevance of spreadsheet, desktop publishing, file management, internet use, and word processing to their needs and interests. There was an overwhelming positive perception among teachers compared to students on the relevance of these applications to their needs and interests.

When asked which among the computer applications they would like to receive training on, respondents indicated their preference for desktop publishing. This is consistent with the earlier findings of this study which showed that desktop publishing is among the applications which both teachers and students either had very limited experience or never had any experience in using but that is considered most relevant to their needs and interests.

Similar results were obtained on the perceptions of teachers and students on the various contributions of computer technology to education.

Significant differences were found on the perceptions among students and between teachers and students on almost all contributions of computer technology to education as presented to respondents. It was only on such contributions of technology that it "allows better access to information", "supports diverse needs of students", and "keeps teachers and students abreast with current and emerging technologies" in which no statistically significant difference was obtained. This result implies that there is a similar and common belief among respondents that these are the most important contributions of computer technology to education.

Results of the study also revealed that respondents significantly differed on their perceptions regarding basic computer operations, file management, various software applications, and e-mail. On the other hand, there was a general agreement among respondents on the perceptions concerning the various dimensions describing word processing application, internet use, and those of ethics surrounding the use of computer and its various applications.

Academic performance of students was determined using their average grades in math and science for the first two quarters of school year 2005-2006 or prior to the full use of Genyo in the high school curriculum. Only grades in math and science were used in the analysis since these are the initial subject areas in which Genyo supplementary materials were utilized.

By year level, students significantly differed in their math grades, with the Juniors obtaining the highest math grade average and the Freshmen the lowest. No significant difference was found in so far as science grade average across year level is concerned.

Correlation analysis, using Pearson r, was employed to find out any relationship between academic performance and frequency of use of various computer applications and between academic performance and skill in the use of various computer applications.

For both relational analyses, science and math grades were correlated with all computer applications. Results showed that only few of the bivariate analyses conducted indicated significant relationships.

Significantly, grade in math was found to be significantly related with the frequency of use of spreadsheet and database management applications. This result clearly shows that spreadsheet and database management applications are important contributory factors to better academic performance of students in math. Grade in science, on the other hand, was found to have a significant relationship only with file management. Furthermore, grade in math has been found to correlate significantly with the skill in using file management and presentation software while science grade was not related with the skill in using any of the computer applications.

The resulting non-significant bivariate relationships imply that academic performance of students is independent of their frequency of use of computer applications and of their skill in using the different computer applications. This independence indicates that academic performance of students will remain the same in whatever amount of use of these applications as well as in any level of skill in using the various computer applications.

What is surprising is the lack of significant relationship between academic performance and the more common computer applications like using the internet for information search for math, science, and any other subject area. Use of word processing and spreadsheet should also be optimized for report organization and presentation and simple data analysis.

Students, through their own individual efforts or with the help of their teachers, are encouraged to harness the optimum use of the computer applications for their intended purpose so they can benefit from the various potentials that the technology can offer them. Given the results of this baseline survey, it is apparent that teachers and students for the most part are quite prepared for the implementation of a technology - integrated learning environment.

Problems at the school level such as lack of proper scheduling in the use of computer laboratory and erratic connectivity within the school network system were identified by the students and teachers. While prominent at the present time, these problems though are being addressed by the school administration given their commitment to use technology to enhance student learning and teaching effectiveness.

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