THE IMPACT OF THE INTEL TEACH TO THE FUTURE PRESERVICE PROGRAM ON SELECTED BEED STUDENTS' LEARNING

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ABSTRACT

This research evaluated the effects of the Intel Teach to the Future Preservice Program (ITTFPP) on two classes of BEED students taking up Principles and Strategies in Teaching Communication Arts (ED 4B1) during the second semester of SY 2003-2004. It focused on describing what students learned, what problems they encountered, how they coped with such obstacles, and provides insights on what the university can do to address the needs of students.

Five instruments namely, the ITTF Faculty Evaluation, Student Evaluation and Monitoring Forms; the ICT and Technology Integration Skills Survey and a Teacher-Made Program Evaluation Questionnaire were utilized to gather data about the impact of the program on students' computer literacy development, their attitude toward the use of technology and the learnings they gained.

After one semester of implementation, it was revealed that students generally found teaching and learning more meaningful and interesting as a result of the technology integration in the course. They improved their computer literacy skills, developed more motivation, enhanced their social and metacognitive skills, applied values like patience, collaboration, diligence, resourcefulness/ creativity and sense of responsibility while working on their respective projects and consequently attaining improved learning. Students claimed that they were greatly challenged and stimulated academically. At the end of the semester, they gained better appreciation of themselves because of what they were able to accomplish. The opportunities to work independently and with others actively supported much learning technologically, better peer relationships, the acquisition of real-world learnings and the achievement of a greater self-satisfaction.

Among the problems met by students included having to cope with a curriculum that was heavily-loaded and time being too limited to be able to fully internalize what they needed to learn in the whole course; not having adequate computers and time to use them in the campus; the unavailability of computers to use during their free time and the scarcity of software needed like the publisher and the Encarta. Internet access was another common problem; having limited funds to rent computers outside of the campus was another matter; and during their scheduled project presentations, usual problems met were the lack of computer to use or an LCD to borrow, and the unavailability of the

laboratory on their scheduled presentation. Or, during the actual presentation, not having a technician to assist them when technical problems occurred.

A very essential factor that was uncovered for the successful implementation of the program has implications on the university administration's commitment to address learners' needs. Providing students with the required resources specifically the hardware, software, and internet access is a requisite to support the production of their projects. Students need administrative assistance if they are to generate their best outputs. Having the necessary equipment could enable learners to work more and better on their projects. A fully equipped computer laboratory for the exclusive use of students immersed in the ITTF PP is highly recommended. Furthermore, having a technician and faculty available when students seek assistance even outside of their classes can further enhance the support needed by students to come up with good quality projects that reflect their optimum learning.

INTRODUCTION

The Digital Age has arrived. Computers are everywhere and are permeating people's lives in the new millennium. Technology has dramatically changed the way in which the contemporary populace live and relate with one another. Survival and satisfaction in this age of information explosion brought about by the digital technologies require that everyone be equipped with computer technology literacy to profit from its many uses such as being able to access information from a variety of sources at a rate never before imagined; being able to connect with people anywhere in the country and the world at any time and place, to share and generate knowledge; getting stimulation from having one's needs and interests met; being able to create, transact business, organize data, play with one's imagination and develop thinking skills like problem-solving, critical thinking, creative thinking; having one's social skills honed through communication and collaborative projects.

Living in this highly complex world that is replete with so much information demands that people learn to deal intelligently with the challenges of modern life. People must become discriminating in consuming the deluge of information around him. To maximize the use of technology, students must know how to use technology to their advantage and purposes. Education, to be relevant needs to equip students with the necessary tools to be able to adjust to a computer-driven society so they can endure and take pleasure in life long after they leave school. Consequently, the curriculum must be responsive to the requirements of the times.

How then do schools prepare students to become technologically literate? Are our schools ready to address the needs of the times? How well equipped are our teachers? Do preservice and inservice teachers have technology skills? Do they have the competencies needed for technology integration? Are schools equipped with the

necessary facilities to support technology literacy advancement? How supportive are school administrations in regard to the move to go technological in teaching and learning? These, among others are questions that have to be faced by those concerned with education, teachers, learners and the future of this nation.

An essential consideration is to equip the teachers with technology competencies to help them meet the challenges of the 21st century. But being able to operate the technology is not enough. More than this and in addition to being exposed to a wide variety of Educational Technologies they can use for diverse contexts, content and learners, preservice and inservice teachers need to know HOW to integrate technology into their instruction to support better learning in schools. It is necessary for teachers to be aware of the appropriate place of technology in education. They must know when and how to use technology to advance the purposes of education. Furthermore, schools should be able to bridge the Digital Divide by making access to technology available to students who have no opportunity to be exposed anywhere else to the new technologies driving the world today. Teachers and schools should be more responsive to students who are at risk of becoming left behind if not equipped with the skills necessary to survive and profit from the benefits of the technology that's shaping the world in the new millennium.

Statement of the Problem

This research intended to evaluate the impact of the Intel Teach to the Future Preservice Program (ITTF PP) on selected BEED students' learning. Specifically, it sought to answer the following questions:

1. *How did the ITTF PP affect students' computer literacy?*
2. *How did the ITTF PP influence students' attitude toward the use of technology?*
3. *What learnings did students acquire from their immersion in the ITTF PP?*

Theoretical / Conceptual Framework

What does it take to survive and succeed in today's world? How should teachers teach so that current students are prepared for life after school? What teacher preparation is needed so that those who will become teachers tomorrow could teach effectively and achieve the intended outcomes of education? Given the constraints in resources and teacher technology competencies, how can state-run teacher-training institutions like the Philippine Normal University cope with the demand of preparing future teachers to be equipped with the necessary teaching skills to produce students who can adapt to 21st century living?

A technology-driven world demands new ways of teaching and learning. The inevitability of change has brought with it altered needs and ways of doing things. Classroom practice cannot be the way it used to be anymore. Our learners' milieu today requires fresh perspectives if teachers' instruction is to remain responsive and functional. A paradigm shift is needed in the teachers' view of learning, teaching and the curriculum.

The Philippine Normal University, tasked to produce *"teachers for a better world"* is faced with a big challenge of equipping its preservice teachers with the tools needed to make their teaching relevant in an academic environment that is less than ideal – that is, amid resource constraints and inadequate teacher technology competencies. Fresh from a 10-day training on the Intel Teach to the Future Preservice Program, this teacher-researcher embarked on the daunting task of integrating a technology curriculum into a professional education course despite the aforementioned conditions with the intention of improving preservice teacher preparation.

The Intel Teach to the Future Preservice Program (ITTF PP) is a teacher training program designed by the Intel Innovation in Education to improve the effective utilization of technology in classroom teaching, with Intel Corporation, providing the training and curriculum materials free of charge. The said curriculum is based on research that espouses the usefulness of technology in maximizing learning. Technology is used to stimulate students' creativity, develop problem-solving skills, and a springboard to get students to work cooperatively – skills that are necessary for success in the new knowledge-based global economy (Intel Innovation in Education, 2003). The ITTF PP supports methods of teaching that are project-based, inquiry-oriented, content-based, cooperative in nature and makes use of alternative/ authentic means of assessing learning. Will this program support what we know about learning today? Will it address the needs of teachers and students for successful living in the 21st century?

A New View of Learning and Teaching

What does research say about learning and teaching in the Digital Age? New technologies have undoubtedly affected life in the 21st century in so many ways. The complexity of life and the explosion of knowledge brought about by computer-based technologies require that people possess competencies to solve multifarious problems, collaborate with others, communicate effectively, think critically and learn how to learn. Norton and Wiburg (2003) stressed that 21st century schools must prepare students for a world rooted in information and technology. Two important theories provide support for the paradigm shift teachers need to make in order to be responsive to the changing times and needs of learners: Gardner's Multiple Intelligences and Constructivism. These two learning theories give us an illustration of how students learn and correspondingly, how teachers should teach.

Multiple Intelligences

Gardner identifies seven distinct intelligences that can be developed in every human being – linguistic intelligence, musical intelligence, spatial intelligence, logical-mathematical intelligence, bodily-kinesthetic intelligence, interpersonal intelligence and intrapersonal intelligence. An eighth one, the emotional intelligence was proposed by Goleman. An important instructional implication that can be drawn from this theory is that there are a variety of learning channels teachers can tap to improve students' learning. People learn, remember, perform and understand things in different ways. As such, the effective teacher should be able to exploit the variety of ways in which learners learn a material.

Constructivist Learning

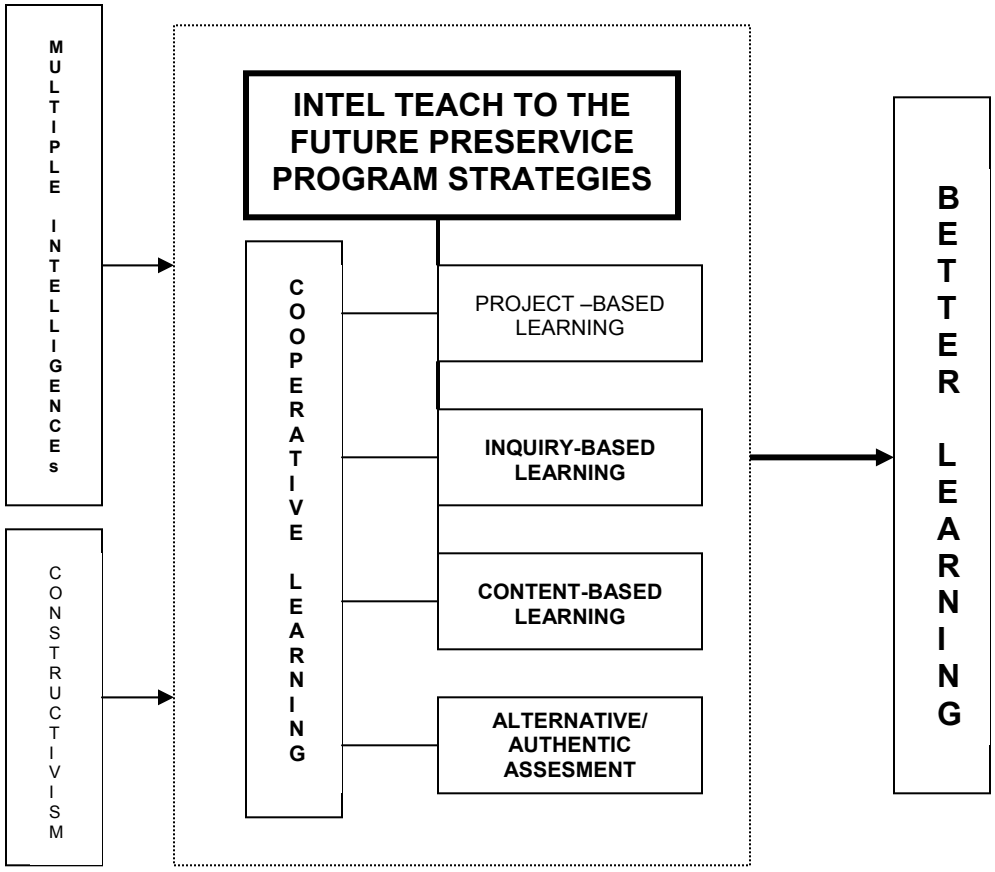
A comparison of learning that happens in school and learning that happens in real life has resulted in a serious rethinking of how we see learning and teaching today. Brown, Collins and Duguid (in Norton and Wiburg, 2003) explained that knowledge is not an independent phenomena; it is situated in the activity, context and culture in which it is learned. Therefore, how something is learned is just as important as what is learned. According to them, educators must design for holistic learning. Much of learning is social in nature and learning should not be for later life but for living now. Furthermore, students are seen not as empty receptacles but as active constructors of knowledge. A new model of learning based on current researches in the fields of educational and cognitive psychology known as Constructivism was thus born, challenging the traditional approach to teaching which is based on Behaviorism.

Jonassen (in Norton and Wiburg, 2003) described the characteristics of a Constructivist Approach to Teaching:

1. Provides multiple representations of reality.
2. Represents the natural complexity of the real world.
3. Focuses on knowledge construction.
4. Presents authentic tasks (contextualizing rather than abstracting instruction)
5. Provides real-world, case-based learning environments, rather than predetermined instructional sequences;
6. Fosters reflective practice;
7. Enables context- and content-dependent knowledge construction; and
8. Supports collaborative construction of knowledge through social negotiation.

According to Gordon (2000), what is needed in classrooms today is increased autonomy, more collaborative work, more global connections, richer learning resources, more inquiry, interdisciplinary, project-based learning. The ITTF PP advocates the same view of learning and teaching. Figure 1 presents the impact it intends on the preservice teachers:

Figure 1. The Schematic Diagram of the Conceptual/ Theoretical Framework



METHODOLOGY

The Intel Teach to the Future Preservice Program (ITTF PP) was integrated in two classes of Education 4B1 (Principles and Strategies in Teaching Communication Arts) during the second semester of School Year 2003-2004. One class consisted of 34 students (III-8 BEED) and the other had 43 (IIIE-1 BEED). The ITTF PP was particularly incorporated in the third of the four units that make up the whole course. Unit three focused on The Instructional Planning Process and the ITTF PP modules were embedded in the topic on Unit Planning covering the following components: 1.) Rationale 2.) Essential and Unit Questions (module 1) 3.) Unit Objectives 4.) Unit Content and Resources (module 2) 5.) Support Materials (modules 3-7) 6.) Instructional Activities and 7.)Assessment (module 10). The Presentation of the Unit Portfolios (module 10) was embedded in the fourth unit.

Four weeks was allotted for Unit III which begun in January 2004. The first two weeks (comprised of two sessions having one and a half-hour session each) consisted of the teacher's input on Unit Planning with the corresponding ITTF PP orientation and the respective module integration. A sample of a complete unit portfolio which this

teacher-researcher completed during the ITTF PP Faculty Training in October 16-29, 2003 was presented to the students. Then, students were asked to respond to the ICT and Technology Integration Skills Survey (pre-ITTF PP implementation). Thereafter, students with advanced computer skills were identified and assigned to take care of groups composed of 4-5 members each, with varying levels of technology competencies. The next two weeks were spent on actual planning and laboratory work. Students were expected to work collaboratively on their unit portfolios. They worked formally at the Center for Educational Technology and Distance Education computer laboratory which had less than 20 functional computers. Each group was given a Project Checklist on what they should accomplish and to indicate due dates and actual completion dates as their guide. While they were in the process of planning, the teacher conducted conferences with each group as soon as they were able to finalize their Project Plan schedules and tasks for each member; and have brainstormed on their unit topic with the corresponding essential and unit questions.

The whole month of February until the first week of March were scheduled for Intel Presentations and students' microteaching. Each group were evaluated by the teacher and the class using a rubric on the ITTF Unit Portfolio Presentation. Then after the presentations of assigned groups, feedbacking was conducted to let students know how they performed. A debriefing followed the conclusion of all presentations and conferences with the teacher. Students were then asked to respond to the ITTF PP Student Evaluation and Monitoring Forms, a Teacher-Made Program Evaluation Questionnaire and the ICT and Technology Integration Skills Survey again (post-ITTF PP implementation). Information about the impact of the ITTF PP were gathered from the aforementioned instruments and the ITTF PP Faculty Evaluation Form.

The following table summarizes ITTF PP implementation schedule and topics:

Table 1. ITTF Implementation Scheme (2ND SEMESTER SY 2003-2004)

TIMETABLE	CONTENT
November 2003	Unit I. Nature and Structure of the Language Arts
	Unit II. A. General Strategies
December 2003	B. Strategies in Teaching Language Arts
January 2004	Unit III. Instructional Planning
	A. Basic concepts B. Principles of Instructional Planning C. Instructional Planning Factors D. Models of Planning

	E. The Unit Planning Process 1. Unit Planning a. Nature b. Components a. Rationale b. Essential and Unit Questions* c. Objectives d. Content / Resources** e. Support Materials*** f. Instructional Activities g. Assessment**** 2. Lesson Planning
February – March 2004	Unit IV. Planning, Implementation and Evaluation A. Unit Planning (Independent, collaborative) B. Lesson Planning C. Presentation of Unit Portfolios **** D. Microteaching E. Feedbacking/ Evaluation

Legend: * module 1 **module 2 ***module 2,3,4,5,6,7 ****module 10

During the planning process and prior to students' group presentations of their unit portfolios, students were given the freedom to work independently in the CETDE computer laboratory provided that no classes were being held there or they could work outside of the school in available computer rental shops or at home if they have their own computers. The teacher was available for questions on the modules during the scheduled two week planning days. Beyond that, students studied the modules on their own with the help of their group members. Students were encouraged to be resourceful given the constraints in the university facilities.

Students were expected to work on modules 1-7 and 10. Module 1 dealt with evolving curriculum framing questions and completing a unit plan. Module 2 focused on getting acquainted with copyright laws, search engines, directories, and internet resources for the unit. Module 3 was about the creation of student multimedia presentations, web site evaluation, ways to provide internet access and evaluation of multimedia presentation samples. Module 4 focused on the creation and evaluation of student publications. Module 5 covered support materials for students including management and storage of data, accessing student computer files, and scaffolds to support learning. Module 6 oriented students on internet safety guidelines, uses of web sites, creation and evaluation of web sites. Module 7 gave students ideas on uses and management of e-mail projects, multimedia presentations, web site and publishing

projects to support units. Finally, Module 10 provided students with information on how to showcase and evaluate portfolios and some final discussions about the ITTF PP curriculum.

With the teacher as a facilitator and coach and guided by a Project Checklist; having a variety of resources to utilize – their peers, the library, other people, the internet and the software available in school, the computer shops or in their homes, students were required to come up with unit portfolios within a period of at least two weeks before their actual presentation. Later groups had at most 6 weeks to prepare.

RESULTS AND DISCUSSION

Computer Literacy

In the ICT and Technology Integration Skills Survey, students were asked to evaluate their computer literacy according to skills in computing such as - using an operating system, some general computer operations, word processing skills, presentation skills, making a publication, using the spreadsheet, surfing the internet/ communicating via email, knowledge of peripherals and teaching practices and technology integration. Results showed obvious improvements in terms of knowledge and comfort level in using the computer. While initially, more students claimed to have "no knowledge" of specified skills in the general computer technology competencies mentioned above, positive changes became evident after students were exposed to the ITTF PP. Their level of performance moved toward to higher levels that indicated, "some knowledge", "comfortable doing" and "able to train others" . Most of the respondents claimed later to have more confidence in using the computer technology and that they were able to help others use the technology.

The Teacher-Made Program Evaluation Questionnaire provided support for the results of the ICT and Technology Integration Skills Survey with students identifying specific computer skills they applied in their respective unit portfolios: i.e., encoding, using MS word, inserting graphics and images, internet surfing, downloading sounds, printing, scanning pictures, saving files, making brochures/flyers/ using the publisher program, making powerpoint presentations, using the Encarta, using the internet, using the media player, linking files, using paint, inserting sounds and videoclips. Among the computer skills developed/ applied or acquired, students enumerated the following: using MS word, making powerpoint/ multimedia presentations, using the internet, using the media player, using the publisher program, hyperlinking, importing files, transferring data from the computer to the CD, using the winzip, downloading sounds movieclips and videoclips, operating the LCD, CD burning, saving files, making folders, scanning, surfing the internet, using search engines and inserting graphics and images. There were technology skills mentioned which were not expected in the projects but were learned by students from their own efforts. The primary software used were: MS Word,

Powerpoint, Excel, and Publisher. Other resources used were the internet, digital encyclopedia (Encarta) and photo editor.

Attitude Toward the Use of Technology

Results from the Student Evaluation forms indicated that students realized the relevance and usefulness of the program to their current course/classes and their future role as teachers. In the item that required students to describe the worth of the ITTF class based on a 4-point scale ranging from "not at all, small extent, moderate extent and great extent", most students perceived the program as focusing on technology integration in the curriculum, able to provide them with teaching strategies to be used with future students, illustrating the effective uses of technology with future students, and exemplifying project-and inquiry-based strategies of teaching. After the program, most students decided that they were more prepared to implement methods that emphasized independent work by students, integrated educational technology in the subject they would teach, support their students in using technology in their school work and evaluate technology-based work future students will produce. Majority of the students thought that the ideas and skills they learned from the ITTF class would help them successfully integrate technology into their future students' activities and that they would recommend the training to their fellow education students.

In the Intel Teach to the Future Monitoring Form for Students, majority of the respondents perceived the importance of the use of technology among future students to be very important to increase their motivation, participation in learning, ability to learn the course content, provide them with a broader range of resources for learning, demonstrate/ represent in a variety of ways what they have learned and to provide those students with no computers at home opportunities. In addition, they expressed other uses of technology as follows: to let students see that the world is globalizing and moving towards more technologically-enhanced instruction; that school activities are related to real-life situations, advance students learning and acquire deeper understanding of lessons and to make learning enjoyable.

In future teaching, about half to a greater mass of the subjects see the uses of computers in activities like learning about the subject matter, practicing and mastering skills, solving problems, working collaboratively with other students in the same classroom; producing multimedia reports, web pages, and doing word processing; corresponding with experts, authors or student from other schools via email or the internet was also considered as quite beneficial. Most of the students were able to transfer their learnings from the ITTF class in courses such as Measurement and Evaluation, Strategies and Principles in Teaching Mathematics and Science and in Teaching Makabayan, Career planning, Guidance and Counseling, Filipino Concentration and even their IT2 class. They were able to apply the use of the Boolean Logic in researching, using the search/meta search engines, making powerpoint/ multimedia presentations, preparing brochures, making portfolios, identifying good web sites creating folders and using word processing to organize reports.

Learnings Gained

While students met problems during the planning and implementation processes of the ITTF PP such as the lack of computer access and resources, lack of information or limited knowledge regarding the use of the computer and various software, time pressure; poor time management, technical problems, failure to follow instructions, lack of preparation or inadequate knowledge of unit planning, integration and use of strategies; unavailability of needed software, lack of internet access poor knowledge of the requirements of the unit plan like acknowledging resources; feelings of frustration, lack of cooperation among groupmates and inequality of the division of tasks, it was revealed that students were able to address the said problems along the way.

Based from the Teacher-Made Evaluation Questionnaire, students developed their academic and thinking skills: they improved their computer skills especially saving files both in the hardware and in the CD, scanning pictures, reducing pictures, creating new files, using other software as an alternative, restarting the computer using the CTRL+Alt+Del command; they learned how to back up files and to copy URLs; they learned how to solve their problems; learned how to revise and synthesize their work, create more presentable outputs; they consulted a variety of resources – their module to know what to do, the technician when they have technical problems or other people who were more knowledgeable, they went to the library, surfed the internet and the RBEC for specific information that they needed; they also learned how to use software like the publisher and powerpoint, to make an evaluation tool, write lessons and employ strategies of teaching. A better quality of education was associated with the use of technology. Personally, students developed values like accountability – contributing to group efforts, dividing tasks among themselves. They further cited the enhancement of their resourcefulness, patience, resilience, time-management and decision-making skills, positive attitudes, assertiveness, self-confidence, striving for better outputs (competitiveness), creativity, leadership skills, sacrificing for the benefit of a better output and ensuring that work is backed up, becoming more punctual and knowing one's priorities. Socially, they learned to cooperate and work collaboratively with others; share knowledge, ideas, opinions with group members; help others, be more appreciative and considerate of others; to think before expressing an opinion and to "bond" with others.

From the ITTF PP Monitoring Form the learnings students declared in the Teacher-Made Evaluation Questionnaire are similarly expressed. They mentioned the following significant learnings from the program implementation: the improvement in their use of computer technology, the awareness of computers' usefulness for the improvement of teaching and learning, the knowledge of how to use the technology appropriately for effective teaching, knowing how technology's use can expand creativity and knowledge; the improvement in their research skills, knowing how to acknowledge sources, confidence in researching in the internet without violating ethical considerations; increasing students' motivation to learn and participate in class; knowing how to plan a unit, integrating technology into teaching and learning, making learning more interesting; knowing how to integrate technology in various courses, content and

methods; learning from technology and gaining mastery in using technology through the help of others; recognizing the many resources one can utilize and that learning need not be confined to the four walls of the classroom and from textbooks; developing a thirst for knowledge; realizing that more things can be learned with an open mind and a willingness to learn; that teachers should be responsive to changing times; that there is no escaping technology today because it defines what the the world is today: technology-driven; that improvement in students' outputs can be achieved through the use of technology; learning how to do a powerpoint presentation, using the MS Publisher, making a web site and using the LCD projector; making a unit portfolio and broadening the range of technology use for teaching and learning.

The ITTF PP Faculty Monitoring form also confirm what students verbalized in the previous instruments. It was observed that students were more motivated to learn and were able to achieve better learning while working independently; social skills improved – students supported each other through coaching and tutorial, they sought help of people whom they thought could provide them with technical assistance; they developed values like patience, collaboration, diligence, resourcefulness and creativity; and they were greatly challenged.

SUMMARY AND CONCLUSION

Evidently, the ITTF PP had a positive impact of the on students' learning. Computer literacy and integration skills developed markedly over a short period of time. Students expressed the development of their technology skills and their feelings of confidence in applying the technology skills they already knew and acquired in the process to enhance their unit portfolios. Students were able to identify quite a number of technology skills learned while doing their respective projects. Furthermore, attitude toward computer technology and its use was also positive. Students were able to see the relevance, timeliness and usefulness of technology in improving learning. They felt better prepared for their future tasks as teachers – improving learning of students, promoting independent learning, increasing their motivation to learn, integrating technology in various subjects and knowing how to evaluate learning appropriately using the rubrics. The respondents clearly saw the function of technology in promoting educational objectives, learning of the content, acquiring better understanding of lessons; seeing how important competencies in technology are in different subject areas, how technology integration can improve production of academic outputs; support the development of thinking and social skills and the acquisition of specific personal values needed for success in life.

Much learnings were articulated by students from their immersion in the ITTF PP: technology skills enhancement, academic, thinking/ problem-solving, and metacognitive skills development; enhancement of social skills and certain positive values; an awareness of future students' needs and a belief in one's preparedness for effective teaching in the future .

Students' growth in computer operations and applications, their positive attitudes and the learnings they claimed to have gained can be attributed to a number of factors: foremost is the opportunity to take an active role in their learning; students applied what they already knew about how to use the computer and discovered new technology skills in the process of using technology for their projects. Second, students were given much opportunity to make decisions and to solve problems. The teacher gave them a general orientation on what they were expected to create i.e., a unit portfolio that makes use of technology to support teaching and learning. But students themselves planned, created support materials, distributed tasks and the teacher was only there to serve as a coach/ guide and a resource person whenever students needed her. Third, working collaboratively with others promoted people-oriented skills while it also developed students' thinking skills. Students helped each other learn content, and an opportunities to support each other to achieve common goals. Fourth, students developed higher level thinking skills as they formulated essential and unit questions, solved problems they encountered and worked on finding answers and solutions to their questions and problems respectively. Finally, the tasks involved in creating their unit portfolio and the occasion to work with others helped them to master competencies related to life and their future role as teachers. Thus, helping them to see the usefulness of integrating technology into their teaching to improve learning; to acquire competencies in instructional planning and decision-making; to see how technology can assist them in accessing knowledge they need to teach a subject more effectively; to make teaching more interesting, their unit plan more organized; to have students come up with better outputs that illustrate or communicate their learnings; to be able to evaluate students' learning in a more effective manner and to explore the potential of technology to inform them of the state-of- the-art of teaching and the events happening around them so that their teaching will become more relevant to the needs of their learners.

The abovesaid conclusions are well supported by the constructivist approach to learning which emphasize the idea that knowledge is constructed by actively participating in the learning events (Cox, 2002). Students in the ITTF PP engaged in actual tasks of inquiring, planning, deciding, creating outputs, solving problems and interacting with others as they learn and work together. Such are activities that simulate real-life behaviors. Constructivists believe that "the ultimate measure of learning is based on the ability of the student to use knowledge to facilitate thinking in real life" (Heinich et al., 1999 p. 17). Students were empowered in the program as they worked on their projects and attempted to achieve goals. In the ITTF PP, learners constructed their own understanding of things, they made use of their prior knowledge to learn new things, they interacted with others and they engaged in authentic tasks – all characteristics of constructivist classrooms upon which all meaningful learning is based.

The theories of Constructivism and Multiple Intelligences help us to understand the kind of learning that occurred in the ITTF PP. Eight principles which Norton and Wiburg (2003) identified support these theories and were observable in the program. One, the teacher served as a facilitator, students were actively engaged – they did, they presented, they used their thinking and constructed meanings. Two, students worked together which facilitated learning and problem-solving. Three, students integrated

different subject areas into a learning whole as they planned their units. Four, the learning involved problem-solving; facing challenges resolving difficulties; negotiating meanings. Five, students used many resources in planning their units and creating support materials. Six, students learned about concepts and planned activities to build concepts through a variety of communication tools. Seven, the creation of rubrics helped preservice teachers to assess learning based on performance – development of problem-solving abilities, ability to communicate ideas and present information effectively and to learn how to learn. Eight, the students in the ITTF PP made use of technology to get connected to the world and vice versa – they accessed web sites, attempted to create their own web site, they made use of the internet, they communicated with others via the electronic mail and they were able to access data and tools following fair use guidelines. Improved learning thus occurred in the ITTF PP class as a result of methods and activities that supported the constructivist approach to instruction that made up the ITTF curriculum.

RECOMMENDATIONS

While results of this research show much potential in improving preservice students' learning and preparation for teaching, the success of the ITTF PP's implementation to promote better teaching and learning however, depends to a large degree in the support that the university administration is willing to give its teachers and students. Hermosa (2002) aptly stated the assistance administration can provide: in terms of teacher and staff training on computer literacy and technology integration; providing infrastructure, technical support and mechanisms for adoption of hardware and software, and promoting the attitude that technology represents opportunity rather than imposition (p. 28).

Among the most common problems met by students in coming up with their unit portfolios were the inadequate facilities if not the lack of computers to use in school. Ten students had to share in one computer at the CETDE laboratory. Software availability was also another problem. It is believed that the quality of students' projects would improve significantly if they had the hardware and the software they needed. Considering the lack of available computers and software in the process of creating the unit portfolios, students had to rent, borrow or work outside of the school to meet expectations. Many of them were financially constrained to afford computer rental shops. The lack of internet connection was also another complaint from students which further affected the quality of their outputs. Time pressure and much content to be learned in the course were other factors that they had to contend with.

During students' presentation of projects on the other hand, another common problem was the unavailability of the computer laboratory to use or the lack of the needed LCD to be able to show the whole class their outputs. Oftentimes, they experienced technical problems but there was no technician to help them troubleshoot . All 6 classes that integrated the ITTF PP including other professional education courses had to share just one computer in the College of Education for presentations. Most of

the time, there were conflicts in schedules of use. No LCD was available. A connector made student multimedia presentations larger by connecting the computer to the 21-inch television set in the College of Education Educational Technology room.

On the whole it is deemed necessary for school administration to commit itself to providing the teacher and the students the necessary hardware and software they need to achieve the objectives of the course and the ITTF curriculum. Internet access, provision of a technician to assist the teacher and the students when they experience technical problems is also essential. Having a computer laboratory to use regularly and for a longer period of time is most valuable to support students application of knowledges and skills gained and also to bridge the Digital Divide. In addition, he course and the ITTF PP can be further studied to determine what topics can be integrated and to make sure that there is enough time to learn them. Having enough time to internalize topics to be covered and to work on projects will ensure better outputs and maximized learning.

REFERENCES

Farstrup, A. E. (2002). *What research has to say about reading instruction.* Newark, DEL: International Reading Association.

Candau, D. et al. (2001). *INTEL Teach to the Future Preservice Curriculum and CD ROM.* USA: Intel Corp.

Cox, C. (2002). *Teaching language arts: A student- and response-centered classroom* (4th ed.). Boston, MA: Allyn and Bacon.

Gordon, D. T. (ed.) (2000). *The digital classroom: How technology is changing the way we teach and learn*. Cambridge, MA: Harvard Education Letter.

Heinich, R. et al. (1999). Instructional media and technologies for learning (6th ed.). Upper Saddle River, NJ: Prentice-Hal,l Inc.

Hermosa, N. (2002 November). New technologies,new literacies: New challenges for the reading teacher. *The RAP Journal*, Vol XXV, p.22-228.

INTEL Innovation in Education. (2003). *Intel Teach to the Future* (flyer). Philippines:Intel Corp.

Labbo, L. et al. (2003 November). Teacher wisdom stories: Cautions and recommendations for using computer-related technologies for literacy instruction. *The Reading Teacher*, Vol. 57(3).p. 300-304.

Leu, D. Jr. (2002 February). Internet workshop: Making time for literacy. The Reading Teacher, Vol. 55 (5), p.466-472).

Norton, P. & Wiburg K. M. (2003). *Teaching with technology* (2nd ed.). Belmont, CA: Wadsworth/ Thomson.

Simkins, M. et al. (2002). *Increasing student learning through multimedia projects*. Alexandria, VA: Association for supervision and Curriculum Development.