Exploring Intel Teach Program's Impact on Selected Pre-Service Teachers' Literacy and Attitude Towards Teaching and Learning

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Abstract

This research describes the effect of integrating the *Intel Teach to the Future Pre-service Program* in Education 4B1 (Principles and Strategies in Teaching Communication Arts) on selected Bachelor of Elementary Education students' literacy development and attitude towards teaching and learning.

The *Intel Teach to the Future Pre-service Program* trains students to develop a digital portfolio consisting of a well-planned unit that is aligned with the Basic Education Curriculum. Students create teacher and learners' support materials, samples of teacher and learners' outputs, evaluation tools, and a works cited document. The program makes use of instructional strategies that are student-centered and constructivist in approach. Authentic assessment is used to evaluate learning.

Pre-service teachers' literacy development and their attitude toward teaching and learning are drawn from five instruments, namely, the *Intel Teach to the Future* Faculty and Student Evaluation Forms, the *Intel Teach to the Future* Monitoring Form, the ICT and Technology Integration Skills Survey Form, and the teacher-made *Intel Teach Program* Evaluation Questionnaire.

Enhancement of literacy skills and attitude toward teaching and learning were manifested after the students' immersion in the program. Furthermore, it was uncovered that the technology curriculum provided pre-service teachers with opportunities to improve and acquire technological skills as well as to develop personal, social and professional competencies. Results of this research have important implications for enriching teacher preparation.

Introduction

Life in the twenty-first century is characterized by rapid change brought about by new technologies. If people do not keep up with the nature of the times, they cannot profit from the explosion of knowledge and the vast possibilities for development technologies of the Digital Age are making possible. Hence, they will be left behind. The same truth goes for teaching and learning. New forms of Information and Communication Technology (ICT) are transforming the way teachers teach and the way students learn (UNESCO, 2005; Dede, in Gordon, 2000). Therefore, it is necessary for teachers to know how to use these technologies for learning appropriately to promote optimum achievement in the classroom.

Teachers must be equipped with current literacies, that will help them prepare their learners to live in the contemporary world driven by advancements in computing and telecommunications. But what does it mean to be literate in this day and age? Literacy itself has undergone a comprehensive redefinition. According to Leu (2002), it represents "skills, strategies, and insights necessary to successfully exploit the rapidly changing information and communication technologies that continually emerge in our world". This implies that people must *learn how to learn* new technologies, develop their thinking, their social and communication skills. More importantly, in a global

information economy, citizens need to comprehend varied media, solve more complex problems, access a wide variety of information and communicate in different ways using new technologies.

Hermosa (2002) describes two types of literacies as defined by Topping: at the basic level, is *computer literacy* which means "knowledge and competencies in using computers"; and *electronic literacy* which means the ability to "access, use, manipulate, and produce information delivered, supported, accessed or assessed through computers and other electronic means". Burniske (cited in Hermosa, 2002) calls these *media literacy* which is a conglomeration of diverse literacies to include *civil, discourse, personal, community, visual* and *global literacies*. Two other literacies, namely, *evaluative* and *pedagogical literacies* make up the entire set of literacies which teachers need to have to effectively enable their learners to participate fully in contemporary life. It is not enough for teachers to be aware of and develop the ability to use new technologies for learning. Even more essential is making informed decisions on which technology to use for specific needs, purposes and contexts. A skillful integration of technology into teaching is required (Griffith and Lynch-Brown, 2002). Teachers need to treat technology as tools to make teaching and learning more effective. Consequently, they should also know how to evaluate learning properly using more authentic and holistic assessment instruments.

How should pre-service teachers' curriculum be designed to prepare them for the requirements of the twenty-first century? What competencies do they need to address the needs of their potential learners? What approaches to teaching and learning should be practiced to promote the desired educational outcomes? What instructional practices work to maximize learning today given the new technologies? What skills, values and attitudes of teachers are crucial for success in the twenty-first century? These questions serve as the impetus

for the desire to transform pre-service education to make it more responsive and contextualized to the current times.

Statement of the Problem

This research describes the effect of the *Intel Teach to the Future Pre-service Program,* on selected BEED students' literacy development and their attitude towards teaching and learning. Specifically, it seeks to answer the following questions:

1. How did the *Intel Teach Program* affect pre-service teachers' literacy?
2. How did the *Intel Teach Program* affect their attitude toward teaching and learning?
3. How effective is the *Intel Teach Program* in supporting the pre-service teachers' acquisition of twenty-first century literacies?

Theoretical / Conceptual Framework

How should teachers teach to equip their students with skills necessary for twenty-first century life? How should pre-service teachers be prepared to enable them to handle the Net Generation effectively? A technology-driven world requires new ways of teaching and learning. New forms of information and communication technologies particularly the computers and internet afford us many opportunities to revolutionize instruction so that it becomes more student-centered, engaging and effective in supporting learners' full development. In recent times, the call for a paradigm shift in our orientation toward instruction has become more pronounced. The advent of high technologies serves as the catalyst in altering traditional practices that fail to achieve better learning outcomes for students. The inevitability of change has brought with it new ways of doing things. Fresh perspectives toward literacy,

teaching, learning, and the curriculum guide change in instructional practices:

New Technologies and Current Views of Learning and Teaching

New technologies are permeating life widely today which makes the study of its potential to enhance learning fitting. New technologies have elements of "connectivity, integration, and interactivity" (Hermosa, 2002). It can contribute significantly to human development in its ability to transmit input anywhere for varied purposes. Furthermore, it supports universal access to information, serves as a tool for developing both higher levels of thinking and acquisition of content including its communication to anyone, anytime, anywhere. Its innovations permit the processing and storage of vast amounts of information as well as its rapid transmission (UNESCO, 2005).

Norton and Wiburg (2003) emphasized that twenty-first century schools must prepare students for a world rooted in information and technology. The Net Generation, *i.e.,* the generation of learners who use new electronic technologies, are relatively independent and enjoy "enhanced responsibility, interactivity and connections with others", according to Tapscott (1998, cited in Norton and Wiburg). By using new electronic media, eight paradigm shifts in learning came into being. Specifically, from linear to hypermedia learning; instruction to construction and discovery; teacher- to learner-centered; absorbing material to learning how to navigate and learn; school to lifelong learning; one-size-fits-all to customized learning; learning as torture to learning as fun; and teacher as transmitter to teacher as facilitator.

Two important ideas underlie the aforecited paradigm shifts: Gardner's Theory of Multiple Intelligences and the educational philosophy called Constructivism. Together, they provide the contemporary perspectives of the nature of learning

to help us determine how teachers in the 21st century should teach.

Multiple Intelligences

Gardner's extensive research on human intelligence resulted in the new view that people do not have one but many intelligences. He proposed seven distinct intellectual competencies that account for the diversity of learners, namely, the linguistic, musical, spatial, logical-mathematical, bodily - kinesthetic, interpersonal and intrapersonal intelligences. Goleman, added an eighth – the emotional intelligence. What these findings imply is that in designing learning experiences for students, teachers should be able to tap these varied learning channels and provide for opportunities in which learning can be demonstrated in diverse ways (Norton and Wiburg, 2003).

Constructivist Learning

Research in cognitive psychology spurred the development of the idea that individuals construct their own understandings of the world in which they live in and they search for tools to help them understand their experience (Norton and Wiburg, 2003). Their experiences and prior knowledge help them to create meanings through reflection. Lev Vygotsky's notions of assisted learning also support the constructivist view of learning. He explains the "zone of proximal development", in which a learner is said to be able to achieve maximum capacity to learn with the help of others. He emphasized that learners cannot learn below their level of development (cited in Norton and Wiburg). The constructivist model of learning is characterized by the following instructional practices: (1) Teachers facilitate; students do, present, think and construct; (2) Working together facilitates learning and problem solving; (3) Subjects are integrated into a learning whole; (4) Learning is problem-centered; (5) There are many rich resources for learning; (6) Concepts are explored

using a variety of communication tools; (7) Assessment is based on each student's developing abilities to solve problems, communicate ideas, present information, and learn how to learn; (8) Technology connects the world to the classroom and the classroom to the world (Norton and Wiburg, 2003). Piaget (cited in Bruce, 2003) describes the natural inclination of an individual to establish balance between expectation and experience. Dewey (cited in Bishop, 2003), identified four primary interests of learners which need to be considered in planning instruction: inquiry (investigation), communication (entering into social relationships), construction (creating things) and expression (reflection).

New technologies can be vital tools to advance educational purposes that support the full development of learners. Norton and Wibug (2003) explain that if properly integrated into the curriculum, they can play a significant role in creating educational environments that reflect the way people interact with the real world, sharing representational and computational task burdens. Furthermore, they can assist in creating environments that reflect real world-contexts in which both users and tools are embedded and they can support creative and divergent thinking by allowing learners to deploy inventive problem-solving strategies in situated learning tasks and be used to honor the construction of knowledge by supporting conversations, reflection, and shared exploration.

In support of constructivism in designing learning contexts, Gordon (2000) spells out the need for increased autonomy, more collaborative work, more global connections, richer learning resources, more inquiry, interdisciplinary and project-based learning in current classrooms.

Cooperative Learning

In life, much is achieved when people work together cooperatively and collaboratively. Arends (1994) cites three important instructional effects of cooperative learning:

academic achievement, improved race relations and social skills. Training learners through cooperative learning improves learning of an academic material, skills in working with others and better self-regard. Slavin (cited in Jacobsen, Eggen and Kauchack, 1993) identifies three essential characteristics of cooperative learning strategies that account for the quality of learning gained through this approach specifically, group goals, individual accountability and equal opportunity for success. Beyond improving learning through enhanced thinking skills and better acquisition and retention of content through a supportive relationship with others, (Heinich et al., 1999) cooperative learning fosters group cooperation and interaction among students. Discussing content with others helps improve their understanding of it. Thus, creating a healthy classroom climate and optimizing not just an individual learners' learning but the entire group's learning as well.

New Literacies

To succeed in the world today which is characterized by a deluge of information and driven by rapidly changing technologies, citizens need to be equipped with twenty-first century literacies. These multiple literacies consist of skills and strategies that involve accessing, using, and generating knowledge. It refers to competencies in learning, solving problems, making decisions, collaborating with others, communicating, creating products and using higher levels of thinking in dealing with information and utilizing new technologies for their specific purposes (Gordon, 2002; Leu, 2002; Hermosa, 2002; Bruce, 2003 ; SBC Knowledge Ventures, L.P. ,2005). Literacy today means many things – it involves information, media, multicultural and visual literacies which teachers have the responsibility of developing among the learners. It implies being capable of surviving and living fully within the milieu people are in. Thus, presently, literacy is viewed as a quality of being functional or as defined by the local Literacy Coordinating Council (cited in Librero, 2002), literacy is " a range of skills and competencies – cognitive,

affective and behavioral – which enable individuals to work as human persons, develop their potential, make critical and informed decisions, function effectively in society within the context of their environment, and that of the wider community (local, regional, national, global) in order to improve the quality of their life and that of society". What appears most apparent in the way literacy is currently defined lies in its implication on learner empowerment through the appropriate use of new technologies.

The Intel Teach to the Future Preservice Program

The *Intel Teach Program*, an intensive teacher training curriculum, integrates technology into specific target subject areas. Designed by Intel Innovation in Education (2003), its purpose is to improve the effective use of technology in classroom teaching. This program taps the potential of technology to maximize learning. It supports methods of teaching that are project-based, inquiry-based, content-based, cooperative learning-oriented and makes use of authentic assessment to gauge the quality of students' learning. An analysis of the curriculum shows that it develops a wide variety of competencies that address the needs of teachers and students in the Digital/ Information Age. Technology is utilized as a tool to stimulate students' creativity, critical thinking, problem-solving skills and provides opportunities for them to engage in collaborative learning and create products that represent their learnings in different forms specifically through a multimedia presentation, a publication or a web site. Intel Innovation in Education (2003) believes that the skills students learn in the program are essential for success in a knowledge-based global economy.

The Intel Teach to the Future Pre-service Program Curriculum

The pre-service curriculum consists of modules that can easily be integrated to the existing college coursework. Future teachers are trained to develop technology-rich units with authentic assessments based on divisional/regional and national standards. Moreover, units evolve from curriculum-framing questions and learning objectives. The final product is an electronic/ digital portfolio management system. Briefly, the modules consist of the following:

Module 1: Getting Started
Pre-service teachers discuss and develop essential questions, and begin developing technology-enhanced units. The required outputs are: program folder, unit and essential questions and unit plan; and multimedia presentation about the unit.

Module 2: Locating Resources for Unit Portfolios
Pre-service teachers examine copyright laws as they pertain to education, use search engines and directories to locate internet resources for the unit.

Module 3: Creating Student Multimedia Presentations
Pre-service teachers share web site evaluations, discuss ways to provide students internet access, create and evaluate student sample presentations. Required outputs include: student sample multimedia presentation, updated unit plan and student multimedia evaluation tool.

Module 4: Creating Student Publications
Pre-service teachers discuss ways to help students focus on learning objectives when using multimedia. Create and evaluate student publication and evaluation tools. Required outputs include: a student sample publication, updated unit plan and student publication evaluation tool.

Module 5: Creating Unit Support Materials
Pre-service teachers discuss ways to manage, store and access student computer files, create scaffolds to support learning, and explore ways to add content to units. The required outputs are unit support materials and a web site plan.

Module 6: Creating Student Web Sites
Pre-service teachers discuss internet safety guidelines for publishing student work, create and evaluate student web sites, and create web site evaluation tools. Required outputs are: student web site and web site evaluation tool.

Module 7: Creating Teacher Support Materials
Pre-service teachers discuss ways to use and manage student-email projects, create multimedia presentations, web sites, or publications to support units. Required outputs are: teacher multimedia presentation, web site or publication.

Module 8: Developing Plans for Implementation
Share teacher support materials, discuss strategies for differentiation to support diverse learning needs, create timelines and plans for unit implementation. Required outputs include an implementation plan and management documents.

Module 9: Putting Unit Portfolios Together
Pre-service teachers discuss best practices for managing student computer use, organize portfolio folders, complete unit plans, locate internet resources that offer professional development, grants and freeware. Outputs include internet resources for educators and complete unit portfolios.

Module 10: Showcasing Unit Portfolios
Showcasing portfolios, evaluation and final discussions.

Supported by current perspectives on the nature of the learner and the learning process specifically, multiple intelligences and constructivism, the *Intel Teach Program* is an ideal technology integration scheme that develops literacy

skills necessary for effective teaching and learning today. With technology's major influence on the changing educational paradigms that transform instructional practices, pre-service education should be concerned with equipping the prospective teachers first with the vital competencies they will develop in their learners. This study concentrates on verifying the impact of this curricular program on the literacy development of future teachers. Furthermore, it attempts to find out how the integration of technology into the teaching of future learners influence their attitude towards their role as teachers and how the program promotes their acquisition of skills necessary for twenty-first century teaching. Below is the schematic diagram of the conceptual/theoretical framework of this research:
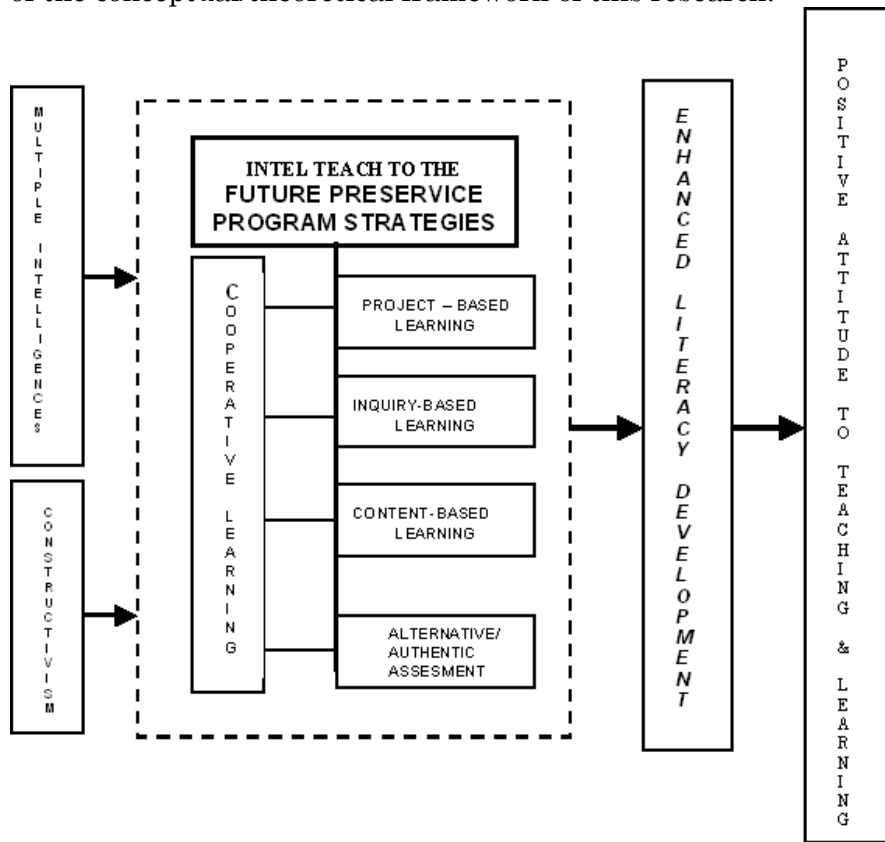

Figure 1. The Schematic Diagram of the Conceptual/Theoretical Framework

Literacy, as it is viewed in the context of the Digital/ Information Age, has changed significantly. As defined by Dede (2000), it is the ability to collaborate, create, communicate, think critically, make decisions and solve problems. They are skills, strategies and insights that make one adapt to the current technologies which means that students should be able to learn how to learn, critically evaluate the information they have accessed and used, as well as apply all other basic literacies and social learning strategies (Leu, 2002); This requires having technical skills, electronic skills of accessing, using, manipulating and producing information and applying critical thinking skills to read, understand and process information. It also involves learning how to assess student learning appropriately and making informed decisions in teaching (Hermosa, 2002). Ann Berthoff (cited in Bruce, 2003) sees it as a process that enables people to communicate, solve problems, achieve social ends, as well to think about one's thinking.

Guided by the features of an ideal learning environment, as described by multiple intelligences and constructivist perspectives, the Intel Teach Program provides learners with an opportunity to work together through instructional activities that are project-based which allows them freedom to decide how they wish to demonstrate their learning using technology; inquiry-based which provides them the opportunity to explore the vast sources of information they can find in the internet and to use their higher-order thinking skills of analysis, synthesis and evaluation in determining how to process information, critically decide which information is most useful to them and how to present the knowledge they gained meaningfully and effectively; content-based which allows them to study in-depth an academic material and explore its connections with other areas of knowledge. The learning they have acquired will then be determined more holistically through a digital portfolio which is evaluated using a set of rubrics.

Such a program for training pre-service teachers is believed to enhance their literacy or competencies for the twenty-first century to improve their view of teaching and learning.

Methodology

This study provides a qualitative description of the effect of integrating the *Intel Teach to the Future Pre-service Program* in a professional education course particularly, ED 4B1 (Principles and Strategies in Teaching Communication Arts) on Bachelor of Elementary Education students from two sections – III-8 with 38 students and IIIE-1 with 42 students. These students were enrolled in the second semester of SY 2003-2004.

The Implementation Scheme

The *Intel Teach to the Future Program* was specifically integrated in the third of four units comprising the ED 4B1 course. The said unit focused on Instructional Planning which took nine weeks, covering 13 sessions of one and a half hours each session, or a total of 19 hours and 30 minutes. The table below illustrates how the *Intel Teach Program* was blended with the ED 4B1 course:

Table 1. Intel Teach Program Implementation Scheme 2nd Semester AY 2003-2004

TIME FRAME	ED 4B1 CONTENT	Intel Teach Program Integration	ACTIVITY
November Weeks 1-2	**Unit I:** ***Nature and Structure of the Language Arts***	-	-
Weeks 3-4	**Unit 2:** ***Teaching Strategies*** A. General Teaching Strategies 	- -	- -
December *Weeks 1-2*	B. Strategies in Teaching the Language Arts	-	-

January
 	
Week 1
 	
Week 2
	Unit III.
	Instructional Planning
	A. Basic Concepts
	B. Principles of Instructional Planning
	C. Elements of Instructional Planning
	D. Models of Planning
	E. Planning Process
	  1. Unit Planning
	    a. Nature
	    b. Components
	      1. Rationale
	      2. Essential and Unit Questions*
	      3. Objectives
	      4. Content/
		Module 1*
		(Getting Started)
		
		Module 2**
		(Locating Resources for
			Orientation on the ITTF PP, unit planning

	Resources** 5. Support Materials*** 6. Instructional Activities 7. Assessment **2. Lesson Planning**	Unit Portfolios**)** **Modules 3, 4,5,6,7***** (Creating Multimedia Presentation, Publications, Unit Support, Web Sites, Teacher Support) **Module 10** (Showcasing Unit Portfolios)	integration Module 2 Orientation Module 3,4,5,6,7 Orientation Module 10 Orientation Presentation of Sample Digital Portfolio Grouping
Week 3	(application of Weeks 1-2 discussion)	-	Group Independent work- brainstorming, planning; Teacher conferences
Week 4	(application of Weeks 1-2 discussion)	-	Independent Work – Final Group Project

February	Unit IV.		
Weeks 1-4	**Implementation and Evaluation**		
March Week 1	A. **Presentation of Digital/ Unit Portfolios**	Actual Showcasing of Unit Portfolios	Group presentations of Unit Portfolios
Weeks 2-4	B. **Microteaching** C. **Feedbacking/ Evaluation**	-	-

The implementation scheme proceeded through three phases – the Orientation, Independent Work and Teacher Conferences and the Presentation of Outputs and Feed backing:

Orientation

The *Intel Teach Program* was introduced to the respective classes in January 2004 during the discussion on Instructional Planning. Each component of a unit plan was taken up thoroughly with modules 1-7 supporting each part of a unit plan. Module one focused on formulating the essential and unit questions and writing the unit plan. The Philippine Basic Education Curriculum served as a guide for the competencies to develop. Learning outcomes were based on such standards and a set of activities envisioned to achieve the identified learning targets. A standard template for the unit plan guided the planning of the entire unit. Current approaches to learning, i.e., inquiry-based approach, project-based learning as well as authentic assessment were also tackled and considered in planning the activities. Students

familiarized themselves with the contents of the rest of the modules and a sample digital portfolio was presented after the orientation. Then they were formed into groups with 5-6 members with varying computing levels. The member with more advanced technological competencies acted as the technical coach for the group. Norms for working in groups were discussed and expectations clarified. The list of expected outputs were also specified.

Independent Work and Teacher Conferences

A digital portfolio consisting of folders on unit support (unit plan, teacher support, student support, evaluation tools), student samples (presentation, spreadsheet, publication and web site), copyright permissions and images and sounds were completed by the pre-service teachers after the given time frame. Modules 2-7 focused on locating resources for the unit portfolio, creating multimedia presentations, unit support materials, web site development and creating teacher support materials. A more intensive study of each module was assigned to students and teacher conferences and peer assistance were provided in weeks 2-4. Students were encouraged to help each other and to consult other people who may assist them technically.

A Project Plan Checklist was prepared by the teacher-researcher to serve as a monitoring instrument for the class while working on their respective digital portfolios. This management document contained the list of activities that should be accomplished, target dates to fill out until the students shall have presented their outputs. Students were required to evaluate the progress of their work, identify problems encountered and strategies they employed to address the them. Before developing their portfolios, students had met with the teacher for guidance on unit planning to ensure appropriate planning. The teacher made herself available even outside of class hours on weekdays. Much work was done by

the students outside of the school, however, because of the time constraint and the inadequate technological resources in the university.

After seeking the teacher's approval of their plans, the respective groups were allowed to work on their projects independently. The students were provided laboratory time at the Center for Educational Technology and Distance Education (CETDE). All groups allotted extra hours outside of the school to finalize and refine their projects. During that period, many reported meeting technical problems for which they should seek available help. As for the social and academic problems within the groups, they were expected to be solved by the students themselves. The group independent work served as a training ground for students' instructional planning. The problems they encountered served as opportunities for them to improve their thinking, social and personal skills.

Presentation of Outputs and Feed backing

In weeks five to nine, the students presented their digital portfolios. Two groups for each session of one hour and a half showcased their outputs and answered questions which the teacher-researcher and the rest of the class raised during the presentation. A rubric for the project presentation was used to evaluate the pre-service students' performance. The teacher provided students relevant feedback based on the assessment tool for the project.

Instruments

Five instruments served as sources of information to determine the impact of the *Intel Teach Program* on pre-service teachers' literacy, attitude towards teaching and learning and the effectiveness of the program in relation to their acquisition of twenty-first century skills.

Quantitative data on the students' computer literacy skills was derived from the **ICT and Technology Integration Skills Survey**. In this instrument, students were asked to evaluate themselves in terms of their ability to use an operating system, some general computer operations, word processing skills, presentation skills, making a publication, using a spreadsheet, surfing the internet/ communicating via email, knowledge of peripherals and teaching practices/ technology integration. It was used as a pre- and post-test to determine the *Intel Teach Program'*s impact on their technological literacy. A t-test for dependent or correlated means was applied to determine the significance of the results of the mean scores of the pre-and post-tests.

A description of the quality of students' literacy skills development, their attitude toward teaching and learning, and other learnings were culled from other instruments as follows:

The ***Intel Teach to the Future Pre-service Program Student Monitoring*** instrument required students to answer items on the program implementation and utilization and also to supply information on their insights after immersing in the program. They were also asked to give recommendations to improve the program itself. The ***Intel Teach to the Future Pre-service Program* Evaluation Form** made them assess the extent to which the program helped them to develop pedagogical and technology integration skills and to gauge their readiness to use the program in the future. Their evaluation of the helpfulness of the program to prospective teachers was also solicited in the same questionnaire. The *teacher-made* ***Intel Teach to the Future Pre-service Program Evaluation*** instrument made students identify the computer skills they applied and acquired, the problems they encountered during the program implementation and the general learnings gained in all the areas of their development (mental, personal-social, moral) which they think they developed through the program. It also required them to describe the effectiveness of the program, make suggestions in

developing units and explain the insights they gained. Finally, the **The Intel Teach to the Future Faculty Monitoring** instrument which was accomplished by the teacher-researcher provided data on the quality of conducting the *Intel Teach Program* implementation, the insights and recommendations for enhancing future design.

Based on the data gathered from the aforementioned instruments, an analysis was made on the effectiveness of the *Intel Teach Program* in equipping prospective teachers with the necessary literacies of the twenty-first century. A triangulation process was conducted to determine the consistency or incongruence among the students' responses to the different instruments used for gathering data about their literacy development and their attitude toward teaching and learning.

Results and Discussion

A rich trove of data was drawn from the pre-service students' responses to the instruments. For the ICT and Technology Integration Skills Survey, a t-test for correlated means was computed. In the other questionnaires, students' responses were organized in tables, and frequencies indicated:

In the **ICT and Technology Integration Skills Survey** which was given as a pre- and post- test to the two classes, a marked improvement was noted in students' technological literacy. A computation of the significance of the difference between the pre- and post- test results yielded a t – test score of 7.81 for III-8 BEED, and 9.98 for IIIE-1 BEED, both significant at $p<.01$ level. This finding indicates that the technological skills of the prospective teachers improved markedly after their immersion in the nine-week technology integration program.

The significant change in pre-service teachers' technological literacy may be due to the opportunities they

were given to apply their technological skills and to learn new ones in the process of developing their digital portfolios.

As gathered from the teacher-made **Intel Teach Program Evaluation** instrument, they learned and applied the following technological skills:

III-8 BEED N= 38 * multiple responses	IIIE-1 BEED N=42 * multiple responses
MS Word (n=15)	MS Word (n=7)
Powerpoint (n=24)	Powerpoint (n=7)
Publisher (n=15)	Publisher (n=3)
Hyperlink (n=9)	
Integration of technology in any subject (n=3)	Creating a programmed lesson (n=1)
Wordart (n=1)	Transferring diskette to cd (n=1)
Copy and paste (n=1)	email (n=1)
Save files in a disc/cd (n=5)	Saving and opening files (n=7)
Create folders (n=4)	Creating folders (n=2)
Excel (n=7)	Excel (n=3)
Surfing the net (n=8)	Internet (n=4)
Making web page (n=3)	Web page (n=2)
Inserting video in mmp (n=7)	
Manipulate the computer/ operating computer confidently (n=2)	Computer usage (n=2)
Techniques to hasten work (n=1)	Computing skills necessary for teaching (n=10)
Enhances skills (n=6)	Use programs (n=1)
Exploring different programs (n=2)	Knowledge in using computers (n=8)
Ways to hasten work (n=3)	
Using computer as a diary/blog (n=1)	
Using computer as a medium for instruction (n=1)	

In terms of their role as teachers, they claimed to have acquired the following:

III-8 BEED N= 38 * *multiple responses*	IIIE-1 BEED N=42 * *multiple responses*
Broader knowledge (n=3)	Problem solving skills (n=3)
More interesting things for use in teaching (n=2)	Integrating technology in teaching (n=1)
Using rubric (n=3)	Back up files/duplicate work (n=2)
Integrating varied subjects and relating plan to RBEC (n=1)	Make presentable projects (n=4)
Systematic presentation (n=5)	Learned resources for presentation (n=1)
Observing rules in making presentations (n=1)	Better quality education (n=7)
Unique presentation (n2)	Work more easy (n=2)
Creativity (n=9)	
Having alternatives (n=4)	
Solving-problems (n=8)	
Using basic skills (n=1)	
Applying aesthetics to projects (n=1)	
Ask/ learn troubleshooting skills if computer malfunctions (n=1)	
Ask help (n=1)	
Making unit plans (n=1)	
Applying computing skills to education (n=15)	
Knowing anti-piracy (n=1)	
Sharing learnings to students (n=1)	
Innovation in pedagogy (n=1)	
Using technology appropriately (n=1)	

Specific values and attitudes were also identified by the pre-service teachers which they claimed they learned/ applied and developed while developing their digital portfolios:

III-8 BEED N= 38 * multiple responses	IIIE-1 BEED N=42 * multiple responses
Sticking to deadlines (n=1)	Know priorities (n=2)
Respect and obedience (n=7)	Openness (n=3)
Time consciousness (n=2)	Punctuality (n=3)
Patience/ perseverance (n=6)	Humility (n=3)
Sense of responsibility (n=8)	Patience (n=2)
Open-mindedness (n=12)	Resourcefulness (n=3)
Organize things/ setting priorities (n=6)	Positive attitude (n=2)
Time management (n=4)	
Being considerate (n=1)	
Looking at positive side/ being more positive (n=6)	
Being more understanding (n=4)	
Doing one's best, hard work (n=3)	
Persistence, assertiveness (n=3)	

In the process of working with others, they claimed to have learned the following:

III-8 BEED N= 38 * multiple responses	IIIE-1 BEED N=42 * multiple responses
Professional relationship with members as a leader (n=1)	Cooperation, harmony with others, participation (n=13)
Cooperation for common good / in solving problems (n=26)	Appreciation for others (n=1)
More humane and open-minded in approaching co-members (n=3)	Helping others (n=5)
Trusting others (n=4)	Trusting others (n=2)
Reaching out to others (n=1)	Thinking before giving opinion (n=1)
Unity (n=4)	Bonding (n=2)
Seeking assistance (n=1)	Giving ideas/ opinions to others (n=1)
Apply skills learned in grouping to real life situations (n=2)	Making sacrifices to achieve group goal (n=1)
Communicate/ deal with others effectively (n=1)	Ask assistance if needed (n=3)
Positive relations (n=1)	Consideration for others (n=1)
Being with others develops interpersonal relationship (n=1)	

Certain personal insights and thinking skills were also identified by the pre-service teachers which they have developed during their immersion in the *Intel Teach Program:*

III-8 BEED N= 38 * *multiple responses*	IIIE-1 BEED N=42 * *multiple responses*
Creativity (n=4)	Updated knowledge (n=2)
Confidence, courage (n=18)	Confidence (n=16)
Objectivity (n=1)	Asking questions (n=2)
Share and enhance creativity (n=3)	Development of imagination (n=1)
Think first before suggesting solution to a problem (n=1)	Answered questions (n=1)
Try hard to succeed (n=6)	Improved personality and attitude (n=3)
Use talent/ potential (n=2)	Good decision making (n=1)
Better attitude to group work (n=4)	Positive thinking (n=1)
Personality enhancement / self improvement (n=8)	Effective leadership (n=1)
Being thoughtful (n=1)	Creativity (n=3)
Keeping calm under tough situations (n=1)	
Discovered strengths and weakness (n=3)	
Learned a lot from INTEL (n=1)	
Computers make things easy (n=1)	
Apply learnings to real life situations (n=1)	
Do what's best (n=1)	
Appreciate and accept one's mistakes (n=1)	
Be happy (n=1)	
Acceptance of change (n=1)	

Data from the aforementioned instrument reveal that the *Intel Teach Program* had a positive impact on prospective teachers' personal and professional development. In terms of their technological literacy, they acquired, applied and learned varied computing skills. The enhancement of their literacy, i.e., "range of cognitive, affective and behavioral skills and

competencies" (Literacy Coordinating Council, as cited in Librero, 2002) necessary to become functional within the context is evident from their description of the things they learned, their insights, the thinking skills, values and attitudes developed in the process of working on their project. The literacies which Gordon (2002), Leu (2002), Hermosa (2002), Bruce (2003), SBC (Knowledge Ventures, LP., 2005) have identified can be reflected in the quality of pre-service teachers' learnings which include application and learning of new technological skills, use of thinking skills, learning and application of specific values and pedagogical skills, collaborating with others, solving problems and making decisions.

The enhancement of pre-service teachers' literacy and their acquisition of particular literacies may have resulted from the opportunities they were given to work on the Intel Teach Program digital portfolio independently and in groups. Furthermore, it is likely that the time constraint; the less than ideal conditions e.g., limited access computers, the teacher not being always around to coach them, their inadequate technological skills etc. might have benefited them more because the situation forced them to find ways to solve their problems, to explore possibilities and to get things done under pressure. They learned to deal with others more appropriately to achieve goals.

In the development of the project output, the pre-service teachers were required to envision the skills they wanted to develop in their students while applying their instructional planning skills. Such a process may have allowed the prospective teachers to see their function more fully. The pedagogical skills they identified reveal their consciousness of the requirements of their profession such as the need for broader and deeper knowledge of content, better technological skills, familiarity with presentation skills, and development of personal and social values.

In the ***Intel Teach to the Future Program Student Evaluation Survey,*** the students were asked to judge the *Intel Teach Program's* effectiveness in terms of the following:

IIIE-1 BEED

CRITERIA	Not at all	Small Extent	Moderate Extent	Great Extent
Integration into the curriculum		1	**13**	**27**
Provided strategies for use as teachers		1	**15**	**25**
Illustrated effective uses of technology with future students		3	**10**	**28**
Opportunities to collaborate with classmates		3	**18**	**20**
Illustrated project-based teaching strategies		3	**15**	**22**
Illustrated inquiry-based teaching strategies		2	**7**	**21**

III - 8 BEED

CRITERIA	Not at all	Small Extent	Moderate Extent	Great Extent
Integration into the curriculum		1	**9**	**24**
Provided strategies for use as teachers			**16**	**18**
Illustrated effective uses of technology with future students			**12**	**22**

Opportunities to collaborate with classmates		1	**19**	**14**
Illustrated project based teaching strategies			**19**	**15**
Illustrated inquiry-based teaching strategies		1	**18**	**15**

From the responses made by the students above, the *Intel Teach Program* was perceived to be highly effective in helping prospective teachers to develop teaching competencies involving integration, application of specific approaches and strategies in teaching (i.e., technology -enhanced, student-centered and promoting more collaborative interactions). Responses were generally from the moderate to great extent levels in terms of effectiveness.

In the same instrument, the students were also asked to judge their level of preparedness in conducting specific activities with their future students before and after the program implementation:

IIIE –1 BEED

	BEFORE				AFTER			
	1	2	3	4	**1**	**2**	**3**	**4**
Implement methods of teaching emphasizing independent work by students	3	27	11			2	27	10
Integrate educational technology into the grade or subject I will teach	6	19	16				21	18
Support my future students in using technology in their school work	8	14	19			2	17	21
Evaluate technology-based work my future students will produce	8	19	14			3	11	20

III - 8 BEED

	BEFORE				AFTER			
	1	2	3	4	1	2	3	4
Implement methods of teaching emphasizing independent work by students	3	14	15	2		3	11	19
Integrate educational technology into the grade or subject I will teach	3	19	12	2		1	13	20
Support my future students in using technology in their school work	2	14	13	5		2	13	20
Evaluate technology-based work my future students will produce	3	13	14	4		3	11	20

Legend: 1 – not at all   2- somewhat   3- moderately   4- very well

A comparison of the pre-service teachers' responses before and after the program implementation shows that there is a positive change in the way they see the level of their preparedness in applying more student-centered and technology-enhanced instructional practices. More prospective teachers saw themselves as able to engage in these activities much better after going through the program.

The tables below show us that they recognize the ideas and skills they learned from the program as instrumental in their successful integration of technology to their future students. The majority are inclined to recommend the training to other prospective teachers.

III-E 1BEED

	1	2	3	4
Will ideas and skills from the Intel Teach Program help you successfully integrate technology into your future students' ideas?			8	3
Would you recommend this training to a fellow education student?			6	35

III - 8 BEED

	1	2	3	4
Will ideas and skills from the Intel Teach Program help you successfully integrate technology into your future students' ideas?			7	27
Would you recommend this training to a fellow education student?			5	29

Legend: 1 – definitely not   2- probably not   3- probably yes   4- definitely yes

It can thus be inferred that the *Intel Teach Program* generally had a positive impact on the pre-service teachers' perception of themselves as teachers who are capable of implementing student-centered and technology-enhanced instructional methods. The majority acknowledge that the ideas and skills they have learned will be useful for them in utilizing technology for the development of their future students. This positive influence of the program on their perception of themselves as teachers explain why they are inclined to recommend it to other future teachers.

From the ***Intel Teach to the Future Pre-service Program Monitoring Form for Students*** the confidence of prospective teachers in applying specific learner-centered approaches in teaching can be observed:

IIIE – 1 BEED

Theme/ Approach	1	2	3
Project-Based Learning	6	31	4
Inquiry Approach	6	31	4
Authentic Assessment	4	27	10
Technology Integration in the Curriculum	13	26	2

III - 8 BEED

Theme/ Approach	1	2	3
Project-Based Learning	4	26	4
Inquiry Approach	4	25	5
Authentic Assessment	3	23	8
Technology Integration in the Curriculum	10	21	3

Legend: 1 – very confident   2- confident   3- needs further input

Most of the pre-service teachers' responses express their confidence in applying new approaches to teaching, as can be seen from the number of those who say that they are confident or very confident in using these student-centered and technology-supported teaching approaches.

The level of importance they give to technology use is very evident in the number of students who find technology important and very important in enhancing motivation to learn; students' active involvement in their learning; learning; the use of resources; diverse ways of representing learning; maximizing learning and making it fun. The majority of the pre-service teachers find the use of technology essential for teaching and learning, as indicated in the following tables:

IIIE – 1 BEED

REASONS FOR USING TECHNOLOGY	1	2	3	4
Increase students' motivation	31	11		
Increase student' participation in their own learning	31	9	1	
Increase students' ability to learn course content	32	8	1	
Provide students with a broader range of resources	31	10		
Provide students with multiple ways to demonstrate or represent what they have learned	29	11	1	
Provide opportunities for students to who do not have computers at home	29	11	1	
Others: Advance students' learning to have deeper understanding of lessons	2			
Make learning enjoyable to students	1			

III - 8 BEED

REASONS FOR USING TECHNOLOGY	1	2	3	4
Increase students' motivation	27	7		
Increase student' participation in their own learning	27	7	1	
Increase students' ability to learn course content	22	10	2	
Provide students with a broader range of resources for learning	26	8		
Provide students with multiple ways to demonstrate or represent what they have learned	26	8		
Provide opportunities for students to who do not have computers at home	29	4	1	
Others: See effect of globalization through more technologically-enhanced instruction	1			
Make students relate school activities and real-life situations	1			

Legend: 1 – very important   2- important   3- slightly important   4- not important

From the same instrument, preservice teachers gave their own description of the significant learnings gained from the *Intel Teach Program*. Their responses are summarized below:

SIGNIFICANT LEARNINGS GAINED III E-1 BEED *multiple responses*
There are many activities we can do with our students such as the publications and the presentations as outputs of learning. Another is the Unit Plan that the teacher can maximize all the things that can help in the learning of the students and the teacher as well.
Powerpoint presentation, using MS Publisher, how to make a web site and use the LCD projector.
I was able to learn not only about the basics about technology, I explored the powerpoint to create a multimedia presentation. I was totally illiterate when it came to computers but now, I 'm proud to say that Intel has taught me a lot.
Integrating in all subject areas. The computer is a very good tool in teaching

and helping students enhance their abilities. The program also allows us to learn effectively.
Gives information about planning your class effectively and interesting.
How to broaden your range of using the technology in the teaching and learning process.   And also broaden the researches that you need in searching information needed by us to become an effective teacher someday.
How to make a powerpoint presentation and brochure through MS Word.
How to enhance skills in dealing with computer properly.
To learn in presenting a multimedia presentation especially skills in MS Powerpoint, creating of publication and Unit portfolio.
I know how to make a rubric to evaluate my students' materials objectively, and as a future teacher, this is the most important part in evaluating learners.
Technology is very useful to us, especially as future teachers.

SIGNIFICANT LEARNINGS GAINED
III - 8 BEED
*multiple responses
Making multimedia presentation and unit plan.
Create presentations that I could use during our demo teaching in the future.
I learned more how to organize and create a whole unit by using or integrating technology. By improving my presentation that can give information and learning to students using multimedia presentation.
Making rubrics is the most significant learning I got from INTEL.
The use of computers, the things that it can do in teaching. I think that this program will help me a lot to teach well in the classroom with hi-tech gadgets that will surely emphasize learning on the students' part.
Learned how to make a works cited document. It is very important to acknowledge our resources. Now that I am confident to research in the internet without violating any person's work.
That teachers need not be technologically ignorant, because technology provides very useful materials to use, it can increase the motivation of students to participate more in class.
How to integrate technology in my course and other subjects.
It can give a lot of learnings, since I am not good in terms of computer and now I can say that I can master it well, but with the help of others.
I learned how to be a leader, and I learned that technology really can change the way we teach on whatever aspect. And last that there is still room for me to learn.

The essence of technology is teaching how to use, whom to use and where to use. This will help me to become an effective educator someday.
The realization that teaching and learning should not be confined to the four walls of the classroom and to the textbooks. There are more things to learn if you just have the desire and the willingness to do so. And teachers should have the thirst for knowledge to be always updated in the changes of the time.
I learned that teaching comprises the importance of technology.
That technology is fast growing and fast approaching mankind. It is a big word to describe what the world is today.
The big challenge of integrating technology with content and methods.

A pattern can be observed from the pre-service teachers' insights after their immersion in the *Intel Teach Program*. Their technology skills were improved, their pedagogical skills enhanced, and better learning for themselves resulted from technology integration. Furthermore, they thought that better learning of their future students could happen by using technology in teaching.

Finally, from the **Faculty Monitoring** instrument, the following information were gathered:

Pre-service teachers' knowledge of technology integration made teaching and learning more meaningful and interesting. The feedback gathered from students regarding their *Intel Teach Program* experience presented a more concretely illustrated of the quality of the literacy that evolved from their program immersion. Specifically, they claimed that they developed higher levels of motivation to learn, thus improving their achievement level; that the program helped them to develop their social skills - i.e., support for each other through coaching and tutoring; seeking help from other people who are knowledgeable in using the computer; thus, improving their technological literacy as they got engaged in using technology for their specific purposes. They also identified certain values like patience, collaboration, diligence, resourcefulness and creativity which they developed in the process. As learners, they were greatly challenged to take risks

in applying their learnings. They solved problems and worked hard to achieve their goals. Students' declarations indicate the improvement in their literacy which is needed for success in the twenty-first century which demands skills and strategies to adapt to needs, purposes and contexts; appropriate values and attitudes necessary to achieve one's goals, living in harmony with others, finding satisfaction in what they do and most of all, continuously trying to develop themselves personally and professionally. These are reflective of the descriptions made by Gordon (2002), Leu (202), Hermosa (2002), Bruce (2003), SBC Knowledge Ventures, L.P. (2005) on literacy in the twenty-first century.

Conclusion

In sum, the *Intel Teach Program* can be said to have positively affected the literacy and attitude of pre-service teachers toward teaching and learning. The processes students engaged in helped support their acquisition and development of literacies for effective teaching and learning as much as made them show proper adjustments to relate to the demands of a given situation.

The pre- and post-test results show that the program improved prospective teachers' computing skills. This resulted from the many opportunities to learn and apply their technological skills and to learn new ones, as they worked on their respective digital portfolios. Literacy today is conceived to be actively constructed by individuals to help them to participate actively in understanding themselves, and those around them. What matters more is what they make of their world or what helps them to express their ideas and aspirations, communicate with others including those with different backgrounds and ideals. It is the process of acquiring critical, socially engaged intelligence.

Based on such conceptions of literacy, it was observed that the *Intel Teach Program,* though implemented briefly for nine weeks, had a positive influence on the literacy development of pre-service teachers. A significant improvement in their technological competence resulted after their exposure to the technology curriculum. The qualitative data gathered from the instruments used in the study revealed that prospective teachers developed literacies that are necessary for the twenty-first century. They demonstrated positive values and attitudes, improved their social skills which are vital for living, learning and working.

Their immersion in the program enhanced their instructional skills and instilled specific professional values needed for the current times. Their first-hand experience in student-centered, project-based, inquiry-based and cooperative learning-based instructional practices had a considerable impact on their attitude toward teaching and learning including the importance they assign to technology in improving instruction. They grasped their critical role as teachers and appreciated their duty to change the quality of learning in schools as manifested in their responses to the program evaluation. Students felt empowered as they engaged in informed decision-making, planning thoughtfully how to make teaching more interesting and functional, yet conscious of their instructional objectives.

In the program, the process of developing a unit plan helped the learners to engage in constant reflection, work on their pedagogical skills and improve the practice of working together with their peers. Their experience of actively accessing information, using information, solving academic, personal and social problems, making decisions and producing outputs stimulated and made their learning more meaningful. The program made them participate in their own learning processes and enabled them to experience the emerging teaching approaches that promoted student inquiry, collaboration and project development. They were trained to use technology

appropriately, communicate and provide assistance to each other.

It could, therefore, be concluded that the *Intel Teach Program* effectively contributed to the pre-service teachers' development of twenty-first century literacy. Made up of varied competencies, literacy comprises skills, attitudes and values that prospective teachers also need to develop in students for their appropriate adjustment to the demands of the times. Based on the pre-service teachers' experience, the *Intel Teach to the Future Program* has many personal, academic and social benefits. An understanding of the goals and purposes of the program is essential. Although the embedded conditions in *Intel Teach Program* had many constraints, e.g., inadequate computers, software and technical expertise, limited time and other personal and social concerns, it still made a positive impact on pre-service teachers' literacy development and attitudes toward teaching and learning.

The aforecited conclusions are supported by the constructivist approach to learning which emphasizes the idea that knowledge is created by actively participating in the learning events (Cox, 2002). In fact, students in the *Intel Teach Program* engaged in actual tasks of inquiring, planning, deciding, creating outputs, solving problems and interacting with others as they learned and worked independently. The activities students did in the program simulated real-life behaviors. Heinich et al. (1999) cited, for that matter that the ultimate measure of learning is based on the ability of the student to use knowledge to facilitate thinking in real life. The process of working on their digital portfolios helped the pre-service teachers to address their respective challenges independently which consequently empowered them as learners. In the program, the students tried to make sense out of their experience. They made use of their prior knowledge to learn new things, interacted with others, and engaged in authentic tasks which characterize constructivist classrooms upon which all meaningful learning is based.

The theories of Constructivism and Multiple Intelligences help explain the kind of learning that occurred in the *Intel Teach Program*. Eight principles according to Norton and Wiburg (2003) were featured in these theories, as observed in the program. One, the teacher served as a facilitator and students were actively engaged; learners did the tasks required of them; they presented their outputs, used their thinking skills in the process of creating their unit portfolios and constructed meanings out of their experiences. Two, students worked together to achieve common goals which facilitated their learning and problem-solving. Three, students integrated different subject areas in planning their units. Four, their learning involved problem-solving; meeting challenges resolving difficulties and negotiating meanings. Five, students used many resources in planning their unit portfolios and creating support materials. Six, students learned about concepts and planned activities to build concepts through a variety of communication tools such as multimedia presentation, publication and web site development. Seven, the creation of rubrics helped pre-service teachers to assess learning based on performance, specifically, the development of problem-solving abilities, ability to communicate ideas and present information effectively and to learn how to learn. Eight, the students 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 for resources; they also communicated with others through the electronic mail; were guided by ethical standards of the internet and the fair use guidelines in accessing data; above all, they utilized technology tools to expand their learning and plan for their teaching. The *Intel Teach to the Future Program* thus, effectively helped pre-service teachers acquire the new literacies of the century which improved their attitude towards teaching and learning.

Recommendations

Although the *Intel Teach Program* has much potential to develop pre-service teachers' literacy and to enhance their attitude toward teaching and learning, the program does not claim to be a panacea to teachers' instructional problems. It is necessary for potential teachers to grasp the underlying philosophy behind the program if it is to be integrated into the curriculum, and if they must be properly trained to be able to implement it effectively considering their respective contexts. More important, teachers need to have clear purposes and objectives in teaching to guide the activities for learning. The success of the program does not depend merely on the availability of computers, but is ensured by the sound planning, preparation and implementation of the program by the teacher.

Notably, despite the time constraint and other inadequacies of the school context, the pre-service teachers demonstrated vital skills and strategies necessary for success in today's world through the program. A more careful and detailed study of the factors that caused the development of such skills and attitudes may, however be necessary. Further analyses could be made from the rich data provided by the five instruments used in this study. After all, varied educational contexts may help implement the *Intel Teach Program* differently. The effects of the varied implementation strategies may also be explored.

The apparent improvement in literacy and the consequent positive attitude toward teaching and learning is a good springboard for a closer examination of pre-service teachers' respective beliefs about teaching and learning; and their knowledge base of specific instructional strategies to their teaching preparation.

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