

# Professional Development of Teacher Educators through Developing their Computer Skills

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## ABSTRACT

The aim of this research was to study the professional development of college teacher educators by teaching them computer skills. The study covered 25 instructors and lecturers teaching at a teacher training college who participated in a course of computer applications in teaching. Each one of the teachers applied the skills acquired in the course in his classroom in his area of specialization. The data was gathered by means of an open-ended questionnaire and a survey of the teachers' opinions about the connection between the use of technology in teaching and professional development. These teachers reported progress in the courses they taught thanks to the content, the methodology learned in the course, and the personal attention they received from the course instructor. The findings also showed the teachers expressed positive opinions about using computers in teaching. Their responses to the questionnaire stressed the positive contribution the computer had made to communication, knowledge and study communities. One of the more striking effects of teaching these teachers computer skills for their work at the college was the great increase in cooperative group learning in accordance with the suggested strategies of this research.

Keywords: College teachers, computer, integration, online forum, professional development, teaching, technology.

## 1. INTRODUCTION

Much recent research has been carried out on the connection between integrating technology in teaching and professional development. While most of this research has focused on teacher training, very little of it has examined the professional development of computer teaching skills of college teachers entrusted with teacher training, or the computer or aspects of teleprocessing in areas such as combining knowledge with learning, knowledge communication, and knowledge management, personal professional development, and pedagogical and didactical applications.

## 2. THEORETICAL REVIEW

In the last few years, instructors and lecturers have been required to use technology in teaching and have also been required to teach online courses in a variety of disciplines both in this country (1) and abroad (2). Computer-assisted teaching makes use of new pedagogical paradigms refocusing a teacher's function to that of guiding and advising his students, while the students are refocused to carrying out research-type activities such as gathering data, selecting relevant data, processing data, etc. (3). The research literature attributes to guides/advisors the management of a multifunctional computerized forum. Mason (4) stresses the importance of a guide/advisor managing the forum in building a virtual learning community and in creating a fruitful discussion in the forum. It is imperative that he react to the participants' questions and that he enter the forum very frequently. This is necessary to stimulate the participants' enthusiasm and increase their motivation to participate in the forum. Consequently, the functions of the online instructor

include the functions of a teacher, conference head, mediator and organizer of a learning community. The community is the apparatus that must be "activated" in order to enable an environment supporting sharing of knowledge and creating new knowledge (5).

The lecturers of Boston University's School of Education and School for the Arts were called upon to participate in a project sponsored by the U.S. secretary of education entitled PT3 (Preparing and Training Tomorrow's Teacher (6)) to develop courses integrating technology in teaching. In the framework of this project, the lecturers participated in a one-hour-a-week course for professional development where they learned strategies to use a tool for building a site for the course, prepared material for the courses they taught, received individual technical support and held round table meetings where each one of them presented the materials he had developed during the professional development course. The lecturers reported on the importance of the project for them from the professional point of view. The findings of research done on this project show that the moment the lecturers became aware that technology helped them in their professional development, not only did their use of technology increase, but they also established a community whose function was to develop computerized and teleprocessed teaching tools (7). In research conducted by Shea, Pickett & Sau Lee (8), the lecturers attributed a lot of importance to the influence of technology on their professional development. Sahin and Thompson (9) stress the necessity of providing individual guidance to lecturers in subjects relevant to them and given to them to apply in their teaching process as much as the necessity of encouraging communication, cooperation and team work through learning communities providing technological and pedagogical support for colleagues in the community. Other projects dealing with training teaching staffs found a connection between the lecturers' progress in teaching as a result of the use of technology and its increased use, as well as their willingness to assimilate it (10).

Goldstein's, Kozaminsky's and Simca's research (11) was intended to examine the components that helped a group of education college teachers create a learning community ("siachnet") and study the characteristics of the online discourse of the group and their contribution to learning. The "siachnet" framework created a common learning culture stressing mutual relationships in constructing relevant knowledge for teacher training. One of the researchers' conclusions was the need to provide individual support for all the participants, both active and passive, in order to train them in guiding learner groups in subjects of their specialization (12).

The virtual meetings can provide a participant with a massive amount of information since the amount of knowledge in the world continues to double itself with increasing speed (13). Gray (14) claims that creating virtual learning communities increases the participants' social involvement, cooperation with the others in the group, motivation and expectations of themselves.

Innovative research checking to what extent teacher-training colleges in Israel have assimilated communication and

information technologies (15) has examined the processes by which teacher educators and student teachers have assimilated these technologies at four of the leading teacher-training colleges in the country. Lasting three years, the research combined qualitative and quantitative methodology. As far as teacher educators are concerned, among the advantages of using teleprocessing in teaching that were revealed by the research, the model that stands out is the interactive teaching model applied through a site accompanying and supplementing the teacher's course. The site offers teleprocessed activities and tasks, the use of varied and up-to-date information sources, development of information control skills, the use of electronic tools and experiencing a new teaching environment as the teacher develops professionally. The advantages mentioned here point to the foci of training that teacher educators need as they introduce technology in teaching.

The contribution of the Internet learning site called "The Virtual Campus" to teacher educators and to teachers in general (16) consists of the following: development of learning strategies including peer teaching, focusing teaching, access to new knowledge products of the in-service trainees, references to relevant information and professional information, access to new knowledge created as a result of discussions in the forums, mindfulness in using knowledge including making knowledge available to all participants, user-friendly access and availability of information, a change in the perception of the functions of learner and teacher, and presentation of all learning proceedings that took place during the in-service training at any given place and point in time.

From the point of view of computerization, in the framework of the evaluation survey of the multimedia presentations integrated in teaching-learning processes in the teacher-training colleges (17), the following items were examined: suggestions made by teacher-counselors (5), by trainees (11) by elementary and middle-school teachers (18) and 10<sup>th</sup> grade pupils (18) in order to get a picture of the evaluation and the concepts connected to the evaluation of the production process and its products. An analysis of the more noteworthy items by the frequency with which they occurred in the teacher educators' and the trainees' answers yielded the following: use of multimedia (teacher educators 90%, trainees 89%), cooperation in learning and production (teacher educators 90%, trainees 89%) and use of special features for programs and management (teacher educators 92%, trainees 84%). The lesser items that were noteworthy for the frequency with which they occurred in the teacher educators' and trainees' answers were as follows: presentations necessitate verbal and non-verbal data processing as well as representational processing in various media, connections and branching out, interactivity, up-to-date, reliable and valid variety (teacher educators: 100%, trainees: 93%). Among the unique characteristics of the multimedia presentations integrated in learning processes we wish to stress the production of the presentation versus its use only, alternatives to presentation of information by means of different media, production through social interaction, receiving immediate results, focus and integration of information, developing awareness of variety among one's target audience and cooperation in the learning discourse by means of the computer.

Generally, the findings show that all the interviewees attributed great importance to producing presentations as part of an on-going and dynamic process requiring integrating the computer, a teacher/counselor and peers. On the other hand, there were differences between pedagogical counselors and teachers, and some of the learners concerning the points relating to the unique characteristics of presentations. The learners paid a lot more attention to the visual aspects of presentations, while the counselors and teachers focused more carefully on the process of handling information. Evaluating presentations, the

counselors looked at things from a different perspective: they put emphasis on different aspects of the subjects learned and stated that the presentations require consideration by the producers and the viewers. They stated that the presentations should represent a variety of levels of thinking, should be up-to-date, should be clear and should be well-organized. The researchers also found that the trainees and the 10<sup>th</sup> graders had a tendency to use terminology taken from the program management and used terms denoting actions focusing on the products, while the counselors and teachers used terms taken from education theories and concepts, focusing on the process. The cooperative setting led the counselors and teachers to discussions about the content and the process involved in their work. Seemingly, the functions of forum coordinators are also needed in guiding teachers preparing multimedia presentations integrated in the teaching-learning process in the framework of professional development.

### 3. METHOD

#### Purpose

The main purpose of this research is to arrive at a universal model intended for teacher educators for the purpose of teaching particular learning contents in various disciplines. The universality of the model consists of the possibility of adapting the teaching program to all teacher educators in all disciplines according to their special characteristics and needs.

#### Goals:

- Presentation of innovations not otherwise available in integrating the computer in the teacher educators' field of expertise.
- Familiarizing educators with new technological tools applicable to teacher training.
- Brainstorming in data processing and turning it into information relevant to teacher educators.

#### Vision

The vision for the future in the domain of professional development is to come up with a universal model that would help actualize in practice technological teaching tools for teacher educators.

The study covered 25 instructors and lecturers teaching at teacher training college who participated in a course of computer applications in teaching. The study took place in MOFET Institute, a school for research and development of teacher training programs located in the center of the country. The areas of specialization of the instructors and lecturers include a wide range of disciplines such as science, mathematics, language, special education, early childhood, music, and so on.

We conducted interviews with and surveyed the opinions of 10 teacher educators to assess their success in teaching. We interviewed teacher educators from our college as well as some who had been taught by the author of this research at the MOFET Institute. In the chapter dealing with the results, we will present selected responses that seemed more relevant and interesting.

### 4. FINDINGS

According to Guskey's model (19), the processes involved in professional development are lengthy, systematic and directed. The effects of professional development on learning in the classroom are felt in the immediate influence they have on the teacher educators' and teachers' knowledge and practical experience, in the interaction taking place during counseling and in rising self-esteem.

The assessment of the results concerning management processes and reaching of goals was carried out through interviews with a

representative sample of participants, who were given an open questionnaire including identical questions; a survey of their positions was conducted, followed by evaluations and a presentation of planning versus practical execution of the planning.

A sample of the teacher educators' answers is quoted here. The sample answers were selected for their potential contribution to professional development research or just because they were interesting:

- **What appeals to you most in this course?**

First and foremost, the respondents stressed the appeal of the lecturer's personality, her approach to the discipline she taught and the way she taught it. As a result, their interest in innovative technologies was sustained, and continued even after the course was over. They adopted some of these innovations in their teaching as well. Concerning the lecturer's personality, here is what two of them had to say:

1a. *The appeal of the course was "the fact that the course coordinator was a 'teacher' and not just a computer person. In the context of her didactical and pedagogical skills, it was clear to her that her aim was to impart me the skills and not 'show me how.' It was also clear to her that I came to the course to become 'computer literate,' and not a technician; that is to say to be a consumer of the advanced technologies that could help me as a lecturer."* (Answer of a respondent who participated in the course 'computer applications in teaching')

1b. *"When I joined the course, I did not know how to use a computer, and I also felt great anxiety. I did not wish to use a computer because I was afraid. So, as far as I am concerned, the most important thing was the coordinator's professionalism with her wise pedagogical approach and great devotion. The fact that she was able to break through the wall of fear I had of the computer stemmed from the winning combination of the right dosage of help to the learner at the right moment side by side with allowing the learner freedom to experiment and make a great number of mistakes, of her ability to allow the learner to work in the domain of his specialization and give him some intelligent advice pertaining to his domain while simultaneously ensuring his progress in computer applications, let alone the close relationship with the learner, which she expressed in remaining with me, and those like me, for an hour, at least, after each lesson. In addition, the group of participants in the course was heterogeneous, which could have caused a lot of friction among the participants and could have worn out the teacher; however, the teacher's willingness to work with each one individually and without time constraints neutralized potentially negative occurrences such as friction and burn-out. Each one of us showed the others his products (at the beginning I did not have very much to show...), which created a thirst for more."*

- In your opinion, what were the course's more successful aspects?

1. Forming new perspectives on pedagogy and on the domain of disciplines taught.

### **Pedagogy**

1a. One respondent answered: *"The fact is that thanks to the course I became (finally...) computer literate."* She added: *"Today, I cannot even imagine myself working without using computer applications."*

1b. *"The course helped me overcome my 'compophobia' and developed the visual aspects of the subject I teach."*

*"Fine-tuning of the material taught in the course to meet the needs of the participants is a very important point in counseling teacher educators and teachers. Learning new content and new strategies arouse enthusiasm and increase motivation to take part in the courses and workshops, especially when the*

*instructors are very busy. In contrast, general subjects are tiring and boring. More emphasis should be put on the subject of teaching the students cognitive skills. The tools acquired in the course help in planning the contents of the syllabi and to plan specific lessons according to the curriculum. The presentation of the material taught in the course in tables and charts helped me organize it in an esthetic, clear and interesting way. In addition, you could tell the students in the course looked satisfied."*

2. The long-term influence of the course on the teacher educators' work

2a. The response of an English teacher:

*"The main benefit I derived from the course is the fact that since studying in the course, I have continued learning computer applications that I need as a teacher. I did not take additional courses except for Freehand and PhotoShop. All the rest of the computer applications I needed I have learned by myself, thanks to the computer application course for teacher educators that 'paved the way,' meaning using the Internet, e-mail and computerized information sites. Today, too, thanks to the computer, I discover additional applications every day."*

2b. *"No other lecturer before this one was able to do it. All those who tried failed. I have developed in the direction of using PowerPoint presentations and e-mail."*

The literature stresses the importance of uninterrupted life-long learning by teachers and lecturers as professionals (20).

3. Reason for surprise

Response of a physical education teacher:

*"The frontal alignment of the presentation page and the fonts used for teaching body movement [were surprisingly effective] although [at first] they seemed contradictory since using computers and body movement are two totally different domains."*

- Which materials from the course did you use in your teaching?

*"One of the most important tools was the teleprocessed forum site attached to the course;"*

The rest of the answer adds further information linked to this teacher's reorganization of ideas, which occurred simultaneously with her change of perspective of the materials that developed during her learning in the course and her subsequent teaching.

*"Not only did connecting my subject to computer applications create new connections between the two domains, but it also changed the way I looked at the learning materials I have used up to now. Most of the year I racked my brain together with the lecturer on how to reorganize ideas and trends in learning that up to now had not been expressed visually."*

*"In the course of the last few years I have also used the materials I produced in the course".*

Another answer stressed the accessibility and the intelligibility of the material: *"The material became organized and became accessible and intelligible by being transferred to the screen."*

- What were, in your opinion, the successful points of your teaching?

1. Accessibility seems to have been the most successful point.

*"The students' access to the material learned, which was taught visually through a screen presentation, was a great success. The students were satisfied with my teaching and with me as their lecturer."*

2. Changing learning into a dynamic and interactive experience  
*"The change from teaching by using mainly the blackboard to computer-aided teaching done dynamically and interactively."*

3. Cooperative activity in the forums to prepare for tests

*"I was successful in using the forum in order to help the students go over the material before the tests. They answered sample questions and shared their answers. In addition, I was able to go over their answers and point out certain misunderstandings of the questions or the material learned in the course. In this joint activity the students helped each other improve and deepen their understanding of the material. The students enjoyed this joint activity, and the lesson was very dynamic."*

The use of the forum for studying for a test "was a novel and unexpected way to study English literature" because "the computer was usually used in English academic writing lessons."

4. Feedback cycle

*"The ability of the students to formulate [possible] questions before test lowered the pressure during the test since they knew how to deal with similar questions. They discussed the test among themselves and realized that the test was not so difficult after all. They cooperated directly and indirectly through the teleprocessed forum."*

5. Development and planning of teaching material

*"Integrating computer applications in my teaching enables me to vary my teaching methods, gives me access to materials available on the Internet, and enables me to prepare efficient and esthetic work sheets. In addition, I can easily find materials I prepared in the past and modify them very easily according to my present needs. Moreover, the possibility to communicate with my students by e-mail enables me to help them prepare assignments, to give them quick feedback and to give them a chance to continuously improve their assigned work."*

6. Varying evaluation methods in the courses

Some lecturers allow students to prepare summary presentations instead of regular summary papers:

- Which one of the difficulties you experienced eventually turned into a 'springboard' for succeeding in the course?

The teacher educators' answers that follow below stress the positive change that occurred in them from an emotional point of view following their participation in the course:

*"I came to the course with no knowledge and a lot of frustration with everything that had to do with computers. I had participated in quite a few computer training courses, but I was unable to apply anything that I had learned. After this course, I was highly motivated, and typed a 70-page paper I had to submit to the university in the framework of my MA studies. The paper included not only the text, but tables, diagrams, flow-charts and pictures."*

An additional respondent wrote: *"Since participating in the course, I have begun to use computerized presentations in my teaching."*

- Describe at least one change that has occurred in your professional development since participation in the course.

### 1. Change in teaching methods

*"First, introducing PowerPoint presentations in my lessons. Second, varying methods of evaluation in my courses."* In varying evaluation methods, too, we see the feedback cycle, which is essentially a repetition of the process of developing materials for evaluating students' work, application and evaluation, and then starting all over again.

### 2. Overcoming mental blocks

*"I am more confident in my capability and my students' capability to use technology in teaching for learning purposes." "I had 'compophobia,' but I have moved on to the 21<sup>st</sup> century confidently. I have prepared presentations for the courses I teach too."*

3. Use of new information banks as a basis for motivating students

*"Before taking the course, I could only dream about computerized information banks. The course imparted me the skills that enabled me to teach myself how to use the various information banks. The capabilities I acquired in the course enabled me to prepare work and exercise sheets that include sources derived from computerized information banks, assess them properly from a didactical point of view, using tables and flow charts."*

The last part of this answer stresses the change in the organization and layout of work sheets.

- Describe a computer-assisted learning situation that was significant to you.

1. *"Preparing for a test using the e-forum and sending class e-mail as an addition to the material learned in class in order to give students advice and clarify the subject learned."*

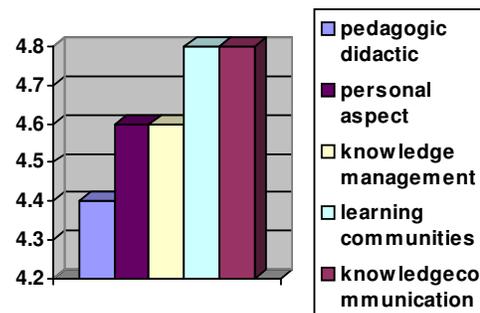
2. The computer as a planning tool and a teaching tool  
*"I will use the computer in almost every lesson both in the lesson planning stage and the actual teaching stage."*

3. Feedback cycle: application by students  
*"The presentations lead the students to ask questions that I have never anticipated."*

The lecturers apply what they have learned in the course in their own teacher training courses, and the students, in turn, apply what they have learned in their practice teaching (student teaching); they then go back to their classes at college and learn new material and new methods, and so the cycle begins all over again.

The teacher educators' direct cooperation in the virtual forum enabled them to compare their respective educational points of view, discuss ways of applying them, and enabled them to organize their materials. They could also comment on their colleagues' materials, add notes and connect them to their own documents or to other sources. (21). Sharing information also engendered social interaction among these teacher educators, which could turn out to be vitally important in dealing with problems in real time in their day to day work.

Diagram No. 1: The grading of the college teachers' positions toward / upon the contribution of professional development



The data displayed by the diagram no. 1 show the contribution of the professional development to knowledge communication and learning communities, then to knowledge management and personal aspect, and later to the pedagogic didactic aspect and its implication to teaching.

## 5. DISCUSSION

The utterance relating to integrating computer technologies in professional development, as far as sharing information is concerned and participating in learning communities, received the highest score (4.8). The second highest score (4.6) went to the utterance concerning the contribution of computerized online activity for professional development as far as information management is concerned, and to the utterance relating to the contribution of the use of computer technology to personal development. The utterances regarding the contribution of the use of the computer being significant in professional development from the didactical and pedagogical point of view, and teaching applications also received a high score (4.4). Seemingly, teacher educators attribute more importance to the domain of their disciplines and data processing processes.

*"The beginning of the management cycle must include a definition of the result to be attained. To manage information without defining the goal is like shooting an arrow without setting a target"* (Trigger, 2009, from a presentation by Avidav, 2009 (22)). In our case, the goal was defined and all our efforts were directed at its attainment: the professional development of teacher educators through the use of the computer.

### The involvement of lecturers

The teacher trainers also cooperated in writing the syllabi for developing teaching staffs. This was done in order to increase their involvement in practical application since a greater involvement of teachers as planners is likely to increase their motivation and commitment to teaching and learning, engendering a higher sense of self-efficacy.

Continuity and support for the professional development process should be anchored in 3-year development programs (23). The first step is to collect a large amount of information and use it efficiently. Professional development is based on allocation of information and transcripts of meetings concerning courses. The material is collected systematically and is continually analyzed and examined.

### Understanding theory

The face to face and virtual meetings created an opportunity for understanding the theory behind the knowledge and skills learned. The findings of the research were accessible for discussion to the teaching staffs.

### Professional development as a part of comprehensive view of the processes

The teachers' commitment to organization led to their willingness to apply the contents in the courses as needed while they evaluated the difficulties and the successes at the level of the (educational) system (24).

A sense of urgency should be created among the course participants. Among other things, subjects like the following should also be discussed: engendering a vision for change, communicating the vision to others, strengthening the vision and clearing obstacles, producing short-term results, continuing with the changes and anchoring the changes in the culture of the organization. The importance of the courses should be made clear to the staff expected to participate in the courses.

### **Emphases:**

- Peer learning through sharing information in face to face meetings and virtual forums, joint planning of interventions and promoting joint discussions.
- Processing information into knowledge.
- Tools for thinking and leading in the field.
- Creative thinking, finding creative solutions (Levy (25), or what Stamatis (26) calls Structure Inventive Thinking (SIT)). Such thinking increases teachers' motivation to

find solutions and examine their uniqueness, to define and reformulate the solution, to find ways to save time and resources by uniting, multiplying, subtracting, dividing, reversing, and adding dimensions.

- Dynamic and interactive learning.
- Familiarization with opportunities, flexibility and inteness on the needs of the group, commitment and involvement throughout the whole learning process.

### **The contribution of teacher educators using computer-aided teaching to the field of education and the domain of professional development**

Among the innovations of this research, we wish to emphasize the opening of new perspectives for the lecturers participating in the course. The opening of new perspectives contributed to knowledge management and joining it to the possibility of exposing the teacher educators to knowledge from many other domains and a variety of ideas. In addition, they learned new teaching strategies, course planning and practice in applying them. The importance of looking at material from an innovative point of view is a centerpiece of the constructivist approach to teaching and learning. This approach focuses on the tools in the computerized learning environment in order to help the learners to clarify the various perspectives on the world by forming perspectives of their own (27). In the framework of this approach, an understanding of the learning process becomes more likely when tools and environments for computerized learning are used. Participating in the development of a computerized environment enables educators to increase the use of this technology and may even affect the whole education system. Learning in such an environment should focus on authentic assignments that are relevant to the non-virtual, real world. Actually, the course used assignments taken from the curricula, which had a reasonable degree of difficulty (28).

Teacher training should be done through familiarizing the trainees with innovative computerized and teleprocessed tools, which should be continually updated in order to enable the innovations to penetrate the whole system of teacher training, and from teacher training to teaching in the education system. Communication should also be continually going on, meaning participating in the virtual forums independent of time and place. This is crucial because knowledge and innovations accumulate quickly. New knowledge should be used unhesitatingly, but in accordance with the needs of the environment and in accordance with prevailing circumstances, stressing the involvement of data managers, sharing the work, the products of their work and their willingness to contribute to the process of decision-making in the organization.

In order to heighten the lecturers' awareness of using computers in teaching, the connection between their knowledge of subject matter and their pedagogical and didactical knowledge should be strengthened.

The success of the course is also contingent on adapting its content and methodology to the needs of the various learners, including teacher educators. This adaptation, according to the respondents and researchers that have investigated the subject (8) (15) (29), speeds up and encourages changes in methodology and in adaptation of technology to teaching. Such adaptation promotes the professional development of teacher educators in the pedagogical and didactical domain, and in the implementation of changes in their own classes. Their critical reflection on their work will spur them on to continue to find more and better ways to use technology in the classroom for the benefit of their trainees, who in turn use it in their student-teaching, and so on until we come full circle back to the teacher educators. The more these teachers are able to overcome the

obstacles of 'compuphobia,' the more their motivation to widen their knowledge of technology in teaching increases.

## 6. IMPLICATIONS

### The Implications of Professional Development for College Teaching

1. Increase in academic cooperation according to the strategies suggested in this research.
2. Keeping in touch with colleagues through the peer networks.

Learning was based on past empirical experience (30), translated by Diamant, (16). For past results, see for example Zaretsky (31).

Training lecturers in computer technology should be adapted individually to each member of the staff, starting with courses, individual guidance, material for self-learning, and learning communities that draw into them additional members of the staff. Seemingly, the most important factor is the benefit of using the computer for advancing professional goals (15).

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