

A Psycho-Pedagogical Model for ICT Use in the Educational Process

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Abstract Empirical studies have indicated that the existence of certain psycho-pedagogical attitudes is important for the facilitation of positive ICT utilisation by both teachers and students. In addition, research findings clearly indicate that certain psycho-pedagogical attitudes of students and teachers can significantly facilitate the implementation and enhancement of preferred ICT methodologies. The present paper suggests the adoption of a psycho-pedagogical model which graphically presents those psycho-pedagogical attitudes that, according to both teachers and students, facilitate the implementation of ICT as well as intrinsically enhance the quality of learning and instruction in the school classroom. The implementation of this model could improve the utilisation of ICT methodologies in learning and instruction by providing a flexible and positive psycho-pedagogical environment in the classroom. This could well lead to positive educational developments in the digital age and facilitate an improvement in the educational process when utilising sophisticated technologies for learning and instruction.

1. INTRODUCTION

Since the 1960s when the first attempts were made to introduce Information and Communication Technology (ICT) into the school classroom as both instructional and learning aids, much experience has been gained although, at the same time, much frustration has been generated. The dream of achieving radical change and improvement in the educational system through the use of ICT has only partially been fulfilled. The major

reason for the lack of significant success regarding the use of ICT in education thus far may be attributed to the complicated nature of the educational environment in which a multitude of psycho-pedagogical variables interact with cognitive constructs and needs and possibly interfere with the utilisation of ICT in the school classroom. Thus it is clear that there is an urgent need for a model that will pinpoint as many relevant psycho-pedagogical factors as possible that affect teaching and learning through the medium of ICT that need to be taken into account when introducing ICT into the educational setting.

In order to define any type of educational model, it is imperative to clearly describe the basic goals to be facilitated by the model. Thus a model, which will represent the facilitation of ICT educational methodologies in the school environment, should emphasise those psycho-pedagogical variables that contribute to the utilisation of ICT utilisation in education. Ongoing research, designed to identify a workable psycho-pedagogical model of teacher and student attitudes towards ICT utilisation in the learning and instructional process, has indicated how certain psycho-pedagogical attitudes held by teachers and students have a significant bearing on the application of different ICT methodologies in the educational process and the importance of addressing these attitudes in the classroom situation.

2. ICT METHODOLOGIES

Before examining the psycho-pedagogical issues that are significantly related to the use of ICT learning and instructional methodologies, it is necessary to briefly describe the different ICT methodologies presently used in the classroom situation at all levels in the educational system. Offir, Katz and Passing (1994) described the historical development of ICT use in the educational process and indicated that, since the introduction of ICT into educational settings, the 'traditional – open' courseware continuum succinctly and accurately depicts the progress made in the use of ICT for learning and instruction. The 'traditional – open' continuum provides an insight as to how ICT methodologies evolved and developed as educational media since the early 1960s up till the present time. Offir, Golub and Friedel (1993) reported that in the early days of ICT use in the school classroom, traditional CAL (computer assisted learning) and CAI (computer assisted instruction), based on rigid and 'closed' drill and practice, were the dominant ICT methodologies. When poignant questions were raised regarding the relative advantages and effectiveness of drill and practice over more traditional learning and instruction methodologies, more flexible and 'open' learning and instruction programs were developed and introduced into the

educational system. These included the development of the use of ICT based spreadsheets (Dreyfus, Einstein and Talmon 1997), which contribute to the enhancement of learner independence and creativity and provide students with sophisticated graphic assistance that promote the understanding of complicated subject matter. The use of databases which were also developed and incorporated in this stage of ICT development (Appelberg 1997) provide students with the opportunity of enriching their knowledge and comprehension of subject matter by facilitating the ability to conduct comprehensive searches for sources hitherto available only in libraries and museums. The introduction of the use of ICT based spreadsheets and databases in the educational process contributed to the promotion of improved learning and instruction and increased effectiveness in the educational process.

During the next stage of development, simulation described by Offir and Katz (1994) as a sophisticated, progressive and improved ICT methodology, designed to simulate situations that exist in reality, was introduced into learning and instruction. Through the methodology of simulation, teachers are able to provide their students with realistic models of subject matter as experienced in real life situations thereby facilitating students' understanding and mastery of the learning situation. Thus simulation enhances ICT mediated learning by providing an added dimension that closes the gap between theoretical subject matter and the applications of knowledge to real life situations.

In the present stage of ICT based educational developments, multimedia methodology has become an important component of the ICT based educational process. Passing and Levin (2000) provided an in-depth analysis of multimedia packages suitable for the educational process and stated that when utilising multimedia methodologies in learning the student does not only study the subject matter, but also learns how to deal with the synthetically programmed environment. The ease of use and the uniformity of the multimedia interface have significant implications for both teacher and student, since they provide a platform for a higher level of motivation, concentration, and understanding of the content being studied. The design of multimedia educational packages attempts to provide a clear, consistent and attractive ICT platform, which contributes towards the ability of teachers and students to reach excellence through user-friendly instruction and learning methodologies.

Distance learning methodologies are additional up-to-date sophisticated ICT means available in the present stage of ICT development produced to enhance the performance of both teachers and students in the classroom situation. Katz (1998 and 2000) described sophisticated third generation distance learning systems that include synchronous interactive video, email, Internet, and Intranet technologies that can be utilised in the educational

process. According to Katz learning and instruction through the medium of synchronous distance learning methodologies has been redefined to include and focus on teacher-student interaction. Interactive video-conferencing, and interaction through the medium of Internet or Intranet and email, offer one-to-many or one-to-one tuition in which teachers and students are able to communicate on-line thereby solving cardinal instructional and learning problems in real time. Third generation distance learning methodologies are characterised by their flexibility and allow teachers to continuously monitor overall progress of students. These methodologies also permit tutors to modify, reinforce and model educational processes, thereby fulfilling the cognitive needs and requirements of students. Interactivity available in third generation Distance Learning methodologies promotes active engagement of students in the learning process and leads to improved academic achievement. The implementation of multimedia and distance learning technologies at different educational levels (elementary school, high school, college) has been found to promote enhanced learning and instruction (Katz 1998, Katz 2000).

3. PSYCHO-PEDAGOGICAL VARIABLES

In a series of studies Chandra, Bliss and Cox (1988), Katz and Offir (1990), and Offir and Katz (1990), as well as numerous others, testified to the existence of psycho-pedagogical attitudes held by teachers and students at all educational levels (elementary, secondary and college) that contribute to the efficient utilisation of different ICT methodologies such as drill & practice, the use of spreadsheets, and databases in learning and instruction. In instruction using the above-mentioned ICT methodologies, psycho-pedagogical attitudinal constructs such as independence, creativity, tough-mindedness, sociability, risk-taking, stimulus seeking and sensation seeking are factors connected with efficient ICT use. Teachers characterised by the above psycho-pedagogical attitudes have been shown in research studies to hold more positive attitudes toward the use of the different ICT methodologies in classroom instruction than teachers not typified by the same variables.

In additional studies designed to examine student attitudes towards ICT use in learning, Dunn and Ridgway (1991), Katz (1993), and Katz and Offir (1991) indicated that students at different levels in the educational system (elementary, secondary and college) whose personalities were characterised by certain psycho-pedagogical attitudes, were favourable towards ICT use in the learning situation. Students typified by attitudes such as self-image, social-image, self-confidence, internal locus of control, learning satisfaction, and motivation for study were more positive towards the utilisation of the

different ICT modes and methodologies such as drill & practice, the use of spreadsheets and databases in the learning process than students not typified by the same attitudinal traits.

Offir, Golub and Friedel (1993) demonstrated that students using simulation methodologies in the learning process were more highly motivated in their studies than students studying the same content matter without utilising simulation technologies. Passig and Levin (2000) indicated that in schools where sophisticated multimedia learning and instructional packages were introduced into the school curriculum, student and teacher interest in the educational process was increased, and student achievement was enhanced. Katz (1998 and 2000) confirmed that psycho-pedagogical attitudes such as satisfaction of students, control of the learning process, and self-confidence in learning are significantly enhanced when distance learning methodologies are used in the educational process at the college level.

The evidence regarding the relationship between psycho-pedagogical attitudes of both students and teachers on the one hand and the utilisation of different ICT methodologies, from very basic drill and practice through the use of spreadsheets and databases, and culminating in the use of more advanced and sophisticated simulations, multimedia packages and ICT distance learning methodologies on the other, indicates a clearly significant and positive connection between the two areas. It is apparent that positive psycho-pedagogical attitudes contribute to a favourable standpoint of both teachers and students towards the use of ICT methodologies in instruction and learning. ICT use, in turn, enhances students' and teachers' attitudes towards learning and instruction, which in itself is an important goal of the educational process.

4. PSYCHO-PEDAGOGICAL MODEL

After reviewing the literature dealing with different aspects of ICT utilisation in the educational process, a psycho-pedagogical model that encompasses some of the key teacher-based as well as student-based psycho-pedagogical attitudes which apparently contribute to efficient ICT use in instruction and learning clearly emerges. In this model there are three major parallel structures. The first structure includes the psycho-pedagogical attitudes that contribute to the promotion of positive and effective ICT utilisation in instruction and learning, pinpointing the key psycho-pedagogical attitudes of teachers that promote the use of ICT in the educational process. Attitudes such as independence, creativity, tough-mindedness, sociability, risk-taking, and stimulus seeking are those, which

contribute to teachers' willingness to adopt the use of different and varied ICT methodologies in the instructional process.

The second structure presents the different commonly used ICT methodologies, namely drill & practice, spreadsheets, databases, simulation, multimedia, and distance learning methodologies, which are affected by the relevant psycho-pedagogical attitudes of teachers and students. The third structure presents the psycho-pedagogical attitudes of students that contribute to the enhancement of positive utilisation of different ICT methodologies in the learning process. Student attitudes such as self-image, social-image, self-confidence, internal locus of control, satisfaction, and motivation are those, which lay the foundation and contribute towards the willingness of students to use ICT methodologies in learning and instruction.

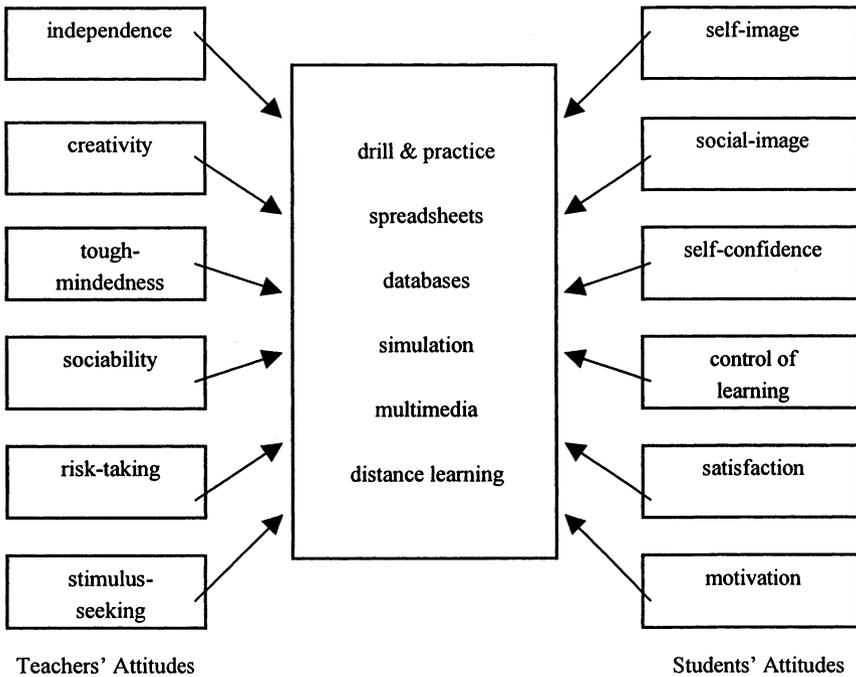


Figure 1. Relationship between ICT methodologies and psycho-pedagogical attitudes of teachers and students

5. IMPLEMENTATION OF THE MODEL

A number of psycho-pedagogical attitudes have been empirically shown to be related to the utilisation of ICT by students and teachers in the learning and instruction processes. The psycho-pedagogical model described above indicates the relationship between ICT and psycho-pedagogical attitudes that enhance and promote positive utilisation of ICT methodologies in learning and instruction. Psycho-pedagogical attitudes, adopted by teachers, such as independence, creativity, tough-mindedness, sociability, risk-taking, and stimulus-seeking, as well as psycho-pedagogical variables held by students, such as self-image, social-image, self-confidence, internal locus of control, satisfaction, and motivation for study have been shown to make a positive impact on both teachers and students in their willingness to use ICT in learning and instruction. It is evident from the empirical evidence quoted above that these psycho-pedagogical attitudes of teachers and students are vital to positively enhanced ICT utilisation that conceivably leads to an improvement in the educational process.

Now that headway has been made on the long road to the charting of a psycho-pedagogical model that describes attitudes which promote potentially improved willingness to use ICT in the educational system, further studies should be designed to pinpoint more exactly the relative contribution of the psycho-pedagogical attitudes of teachers and students towards the learning and instruction processes. When conducted these future studies could conceivably add to the reliability and validity of predictors and indicators of enhanced ICT utilisation in instruction and learning in the digital age.

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BIOGRAPHY

Professor Yaacov Katz serves as the Director of the School of Education and the Head of the Institute for Community Education and Research at the Bar-Ilan University. He specializes in the study of values and attitudes of teachers and students towards learning and instruction in general and towards the use of ICT in the educational process in particular. Professor Katz has published numerous scholarly works and papers on the above topics.