

## **The relationship among level of knowledge, and comfort with both differentiated instruction and instructional technology and teachers' attitude toward the use of computers**

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### Abstract

This study sought to determine whether the level of knowledge, and comfort with both differentiated instruction (DI), and instructional technology (IT), can be used to predict teachers' attitude toward the use of computers. An extensive survey was used in Nicolino's research. This survey sought to investigate the factors that influence the integration of learning styles, differentiated instruction, and individualized instructional technology by teachers. The subjects, 123 teachers for this investigation were teachers in the Kindergarten through sixth grade public school system from Long Island, New York. The respondents represented seven public schools in which all classrooms were connected to the Internet. A seven part survey was completed which included a demographic section (part one), a seven-point Likert scale (parts two - six), and two open-ended questions (part seven). The survey investigated four variables: the knowledge of DI, the knowledge of IT, the comfort level of DI, and the comfort level of IT. In addition, the study examined the interrelationships between all the variables, and how each variable influences a teacher's attitude towards use of computers in the classroom. The study found there is an inverse relationship for both a teacher's level of knowledge and comfort with differentiated instruction and the use of computers in the classroom. With regard to teachers' attitude toward the use of computers, attitude had a strong correlation with instructional technology but, had a negative correlation with a teacher's comfort level with DI. The significance of the study was that teachers with a high comfort level with DI reported a negative attitude toward use of computers in the classroom. Teachers with a high level of knowledge with DI also indicated a negative attitude toward the use of computer in the classroom. This indicated that teachers who are proponents of DI will not necessarily be more disposed to the use of computers in the classroom.

### Introduction

The purpose of this study was to examine how the teacher's knowledge and comfort level with Differentiated Instruction and Information Technology predict teachers' attitude toward use of computers in the classroom.

A total of 123 teachers were surveyed. Teachers from kindergarten to grade six in Long Island, New York, in three school districts were surveyed to determine the factors integrating the use of differentiated instruction and informational technology in the classroom.

Nicolino's research concluded that each individual needs to be taught through various means to target their specific learning style. In order to do so, a teacher must plan to utilize differentiated instruction to aid life long learning. As educational importance as moves continue to be placed upon individualized instruction, schools will need to use technology to instruct, monitor, and assess student success.

### Literature Review

Since the legislation of No Child Left Behind (NCLB) in 2001, standardized testing and preparing students for testing has affected the teaching and pacing of the curriculum. These higher standards of learning nationwide have motivated teachers to find methods of instruction that will ensure quality education for children of various abilities (Utley, 2009). However, the National Commission on Teaching and America's Future in its 1996 publication of What Matters Most: Teaching for America's Future realized that the teaching programs throughout the country had to be altered in order to fulfill the requirements of NCLB. NCLB has mandated that all students must be proficient in reading and math by 2014. The National Center for Education Statistics (1999) found that only one in five regular education teachers felt competent to instruct

children from different cultures or who spoke different languages and many did not feel capable of instructing students with disabilities (Utley, 1999).

One study (Valli & Buese, 2007) indicated that in their effort to learn how to differentiate instruction, teachers were not producing quality lessons. There were few opportunities to collaborate with colleagues since spare time was needed to gain knowledge of the changed curriculum. Time is also needed for lessons involving cooperative learning and peer mentoring (Baglieri & Knopf, 2004). Though time consuming, the study stresses that cooperative learning included in various activities allows students at risk to benefit from learning strategies modeled by their peers.

Another factor inhibiting differentiation is that the time involved in developing teacher/student relationships leaves little time for other demands of teaching. It is necessary to provide courses in differentiated instruction for educators if the training is not given at the undergraduate level before the teaching certificate is granted. Some studies have shown that differentiated instruction has not been the best method for all learners. For example, a study conducted by Utley discussed that cooperative learning, as opposed to differentiated learning, was beneficial to all learners in an inclusive classroom.

One requirement of teaching in the 21<sup>st</sup> century that must be eventually addressed, if it has not been already, is the use of informational technology across the curriculum. Incorporating technology, in addition to the new instructional methods teachers now must utilize in the classroom, has become difficult (Valli & Buese, 2007). This causes educators to question how teachers' knowledge and comfort with differentiated instruction and informational technology predict their attitudes toward the use of computers in the classroom.

Change is constant in life, although some believe that modern schools have not changed very much over the last century. However, innovation in schools is altering the options teachers possess to assist and supplement traditional modes of instruction. As instruction is transformed, so is the culture of a school. Therefore, it becomes necessary to recognize that in the change process, teachers may push and pull a bit before instructional technology is fully integrated into a teacher's repertoire. As Cuban discusses (1996) "in reality, the innovation is but one small addition to a complex social system," leading us to examine the participants and the school culture. For the purposes of this study, the participants will be the teachers; the implementers of change.

Recognizing that change is a process, one must be aware that individuals adapt to change at varied speeds. "Hall and Hord (1996) cited in the Concerns-Based Adoption Model that individuals are fit into two dimensions: stages of concern and levels of use." (Marcovitz 2006) "Dwyer (1990) found that teachers were using instructional technology was still being used to support the same style of teaching" and not as a new development. Teachers experienced anxiety with the disruption to the status quo of their classroom routines, demonstrating a symbolic change and not an authentic change. Perhaps as leaders continue toward transforming classrooms with the use of computers, attention needs to be directed toward cultivating the attitudes of teachers through the transformation of school culture.

Time during the day or after school must be provided if teachers are to incorporate technology and differentiated instruction as part of their teaching paradigm (Brand, 1997). It is suggested that instructor training of technology be differentiated as well. Staff development should take into account the teacher's level of knowledge in order to provide quality and meaningful instruction (Chen & Cheng, 2006).

One study suggested involving the class in the development of a project (Painter, 2009). The theme of the project is often literary and is based on the students' interest of the topic. Upon choosing the project, instructors determine the purpose or objective of the project and create lessons to include a variety of modalities and follow the curriculum. Lessons in computer comprise various technologies. The teachers generate a multi-genre curriculum map that contains four parts: objectives, content/topic/resources, skills, and products. By incorporating a multi-genre curriculum map, an outline of organized instruction is provided which can then be replicated if necessary for the following school year.

### Definition of Major Terms

#### *Attitude*

Attitude is a willingness to use computers in the classroom. It is a commitment or openness toward the implementation of computers in the classroom.

#### *Knowledge*

Knowledge is commonly understood as the “cognitive possession of fact or condition of knowing something with familiarity gained through experience or association.” (Nicolino, 2006)

#### *Comfort*

Comfort is commonly understood as “a state of ease and satisfaction; lack of anxiety.” (Nicolino, 2006)

#### *Differentiated Instruction*

Differentiated instruction, according to Carol Ann Tomlinson is the process of “ensuring that what a student learns, how he/she learns it, and how the student demonstrates what he/she has learned is a match for that student’s readiness level, interests, and preferred mode of learning”. (Nicolino, 2006)

#### *Instructional Technology*

In education, instructional technology is commonly understood to be "the theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning," according to the Association for Educational Communications and Technology (AECT) Definitions and Terminology Committee. (Nicolino, 2006)

### One

#### Method

#### . Research Question One

How did the level of knowledge and comfort of teachers towards differentiated instruction and instructional technology affect a teacher’s attitude toward use of computers in the

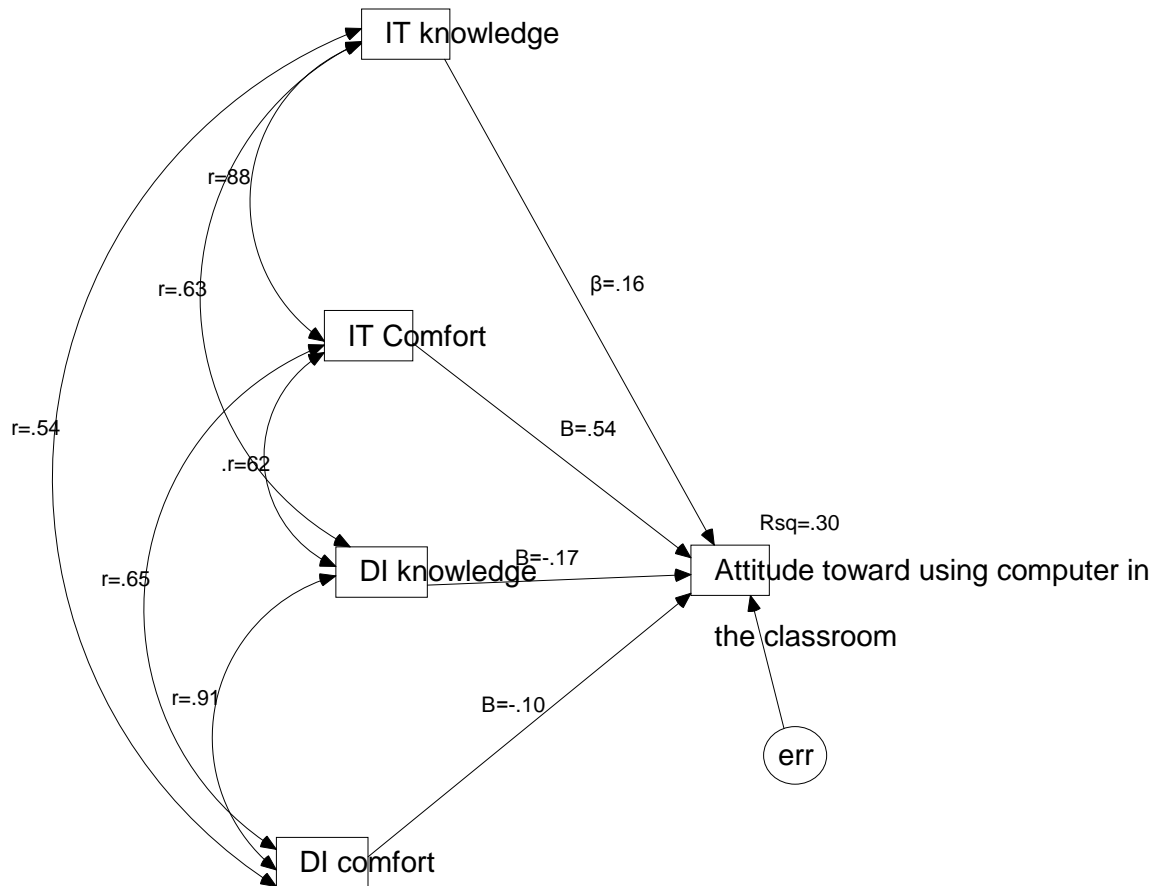
classroom? In addition, considering the interrelationship of the variables, which combination of the variables best predict teachers' attitude toward computer use in the classroom?

Research question one was analyzed using multiple regression analysis.

### Research Question Two

What is the interrelationship of the four variable level of knowledge of IT, knowledge DI, comfort level of IT, comfort level of DI?

Research question two was answered using structural equation model (SEM) path analysis.



*Figure 1 Path Analysis of Knowledge and Comfort with Differentiated Instruction and Instructional Technology. How did the level of knowledge and comfort of teachers towards differentiated instruction and instructional technology affect a teacher's attitude toward use of computers in the classroom?*

A structural equation model is represented in Figure 1. The value of  $-.17$  shows the negative Beta between the knowledge with differentiated instruction and attitude toward the use of computers in the classroom. The value of  $-.10$  shows the negative Beta between comfort and differentiated instruction and attitude toward the use of computers in the classroom. The value of  $.63$  shows a Beta between the comfort level of differentiated instruction and the knowledge of instructional technology. The value of  $.54$  shows the Beta toward the attitude of teachers using computers in the classroom and level of comfort with instructional technology. The value of  $.16$  shows the Beta between the attitude of teachers using computers in the classroom and the level of knowledge with instructional technology. The regression model shows  $R$  of  $.30$ . The value of  $.91$  shows the correlation between the level of comfort with differentiated instruction and the level of knowledge with differentiated instruction. The value of  $.65$  shows the correlation between the comfort level of differentiated instruction and the comfort level with instructional technology. The value of  $.62$  shows the correlation between the level of knowledge with differentiated instruction and the level of comfort with instructional technology. The value of  $.63$  shows the correlation between the level of knowledge with differentiated instruction and the level of knowledge with instructional technology. The value of  $.88$  shows the correlation between the level of comfort with instructional technology and the level of knowledge with instructional technology. The value of  $.54$  shows the level of comfort with differentiated instruction and the level of knowledge with instructional technology. In conclusion, Instructional Technology is the strongest predictor.

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## Discussion

When educators recognize that students require individualized and differentiated instruction, they seek to provide that instruction by any means possible. One modality is through the use of instructional technology. Nicolino’s study sought to examine the perceptions of teachers toward learning styles, differentiated instruction and individualized instructional technology and the teacher’s willingness to adopt individualized instructional technology. (Nicolino, 2006) In his study, Nicolino examines the level of knowledge and comfort reported by teachers about learning styles, differentiated instruction, and instructional technology. It is suggested in that study that these issues will allow the implementation of successful instructional technology use in the classroom.

Mediation by principals or lead teachers may be necessary to guide teachers toward the best method for incorporating differentiated instruction (Valli & Buese, 2007). This may target an opportunity to train teachers in the area of technology so that informational technology can be presented effectively in the classroom. According to the study, using differentiated instruction is

not a marker for technological instruction. Results of the analysis confirm that knowledge and comfort level of DI does not affect attitude towards use in the classroom. “Under the right conditions-where teachers are personally comfortable and at least moderately skilled in using computers themselves...and where teacher’s personal philosophies support student-centered...computers are clearly becoming a valuable and well functioning instructional tool.” (Becker, 2000).

The results of this study reveal that while knowledge and comfort levels of IT show a positive relationship between instructional technology and attitude toward computer use in the classroom, a negative relationship exists between the knowledge and comfort levels of DI and the attitude toward use of computers. Of interest to this study is that the knowledge and comfort levels of DI indicate a positive relationship with the level of knowledge and comfort of IT. Further study may inquire about the need for teacher training and staff development in the validity of differentiated instruction and computer use in the classroom. **When joined together, differentiated instruction and instructional technology can be used to best meet the specific needs of students. This apparent success is motivational in and of itself.**

## References

- Baglieri, S. & Knopf, J. (2004). Normalizing difference in inclusive teaching. *Journal of Learning Disabilities*, 37, 525-529. Retrieved July 26, 2009 from Dowling College, SAGE Publications Website: <http://ldx.sagepub.com/cgi/content/abstract/37/6/525>.
- Becker, H. (2000). Findings from the teaching, learning, and computing survey, *retrieved from* [hjbecker@uaci.edu](mailto:hjbecker@uaci.edu).
- Carr, J. (1998). Information literacy and teacher education. Retrieved July 26, 2009 from [www.ericdigests.org](http://www.ericdigests.org).
- Marcovitz, D. (2006). Changing schools with technology: what every school should know about Innovation, retrieved from July 26, 2009 from Dowling College, OCLC NetLibrary.
- Nicolino, P. (2006). Teacher perceptions of learning styles assessment, differentiated instruction,

instructional technology and their willingness to adopt individualized instructional technology (Doctoral Dissertation, Dowling College, 2007). *Proquest Information and Learning Company*.

Painter, D. (2009). Providing differentiated learning experiences through multigenre projects. *Intervention in School and Clinic*, 44, 288-293. Retrieved July 26, 2009 from Dowling College, SAGE Publications Website: <http://isc.sagepub.com>.

Utley, B. (2009). An analysis of the outcomes of a unified teacher preparation program. *Teacher Education and Special Education: The Journal of the Teacher Education Division of the Council for Exceptional Children*, 32, 137-149. Retrieved July 26, 2009 from Dowling College, SAGE Publications Website: <http://tes.sagepub.com/cgi/content/abstract/32/2/137>.

Valli, L. & Buese, D. (2007). The changing roles of teachers in an era of high-stakes accountability. *American Educational Research Journal*, 44, 519-558. Retrieved July 26, 2009 from Dowling College, SAGE Publications Website: <http://aer.sagepub.com/cgi/content/abstract/44/3/519>.