The Relationship Between Teachers’ Self-Concept, Self-Efficacy and Technology Usage

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The integration of technology is a major component that has been introduced into the educational setting. Teachers are expected to either know how to use the technology or be able to adapt and integrate the technology into their classroom. Studies have been conducted to determine whether the teacher’s self-concept, or self-efficacy, affects their implementation of the technology. In this review of the literature, the question as to what is the relationship between teachers’ self-concept, self-efficacy and technology usage is being investigated. The terms self-concept and self-efficacy have both been used in research to show an individual’s perception of themselves and/or their abilities in something and need to be defined.

**Literature Review**

**Definitions**

Self-concept has been defined as a “general term used to refer to how someone thinks about or perceives themselves” (McLeod, 2008); “the idea or mental image one has of oneself and one’s strengths, weaknesses, status, etc.; self-image” (dictionary.com); “a person’s perceptions of him- or herself…formed through experience with and interpretations of one’s environment” (Marsh & Shavelson, 1985, p. 107). Bandura (1994) defined self-efficacy as “people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives” (p.1). Cherry (2011) described self-efficacy as having a major influence on how you approach your challenges and goals.

**Self-Concept**

Technology comes in many forms, including a more recent trend of interactive computer technologies. Along with new trends in technology, levels of computer anxiety may begin to develop, “…research continues to report high levels of anxiety, resistance and poor attitudes
toward computers….” (Orr, Allen & Poindexter, 2000, p. 26). This level of anxiety may be caused by certain variables such as gender or age. In a study conducted by Agbatogun (2010), he examined “the relative and combined contributions of computer anxiety, self-concept and gender to teachers’ attitude towards the use of ICT(s)” (p. 55). The study was conducted with a sample of 454 secondary school Nigerian teachers, 65.63% males and 34.36% females, selected via a simple random sampling technique. Three different scales were utilized to measure the variables including the Self-Concept Scale (SCS), Computer Anxiety Scale (CAS) and the Attitude to Interactive Computer Technologies Scale (AICTS). The results of the study revealed several factors in relation to teachers’ self-concept and their attitude toward ICT(s). “Computer anxiety in this study is the significant potent predictor of teachers’ attitude towards Interactive Computer Technology…self-concept significantly predicted the teachers’ attitude towards Interactive Computer Technologies” and “gender as a variable did not contribute to the prediction of teachers’ attitude towards Interactive Computer technologies” (Agbatogun, 2010, pp. 63-64). Igbaria & Iivari (1995) reported similar results in their study that “self-efficacy had a significant positive direct effect on computer anxiety and perceived ease of use” (pg. 600).

Overall, these findings reported that what an individual thinks or feels about his/her ability in a certain area would dictate his/her attitude towards that area such as in the area of technology usage.

Technology has changed the way that teachers teach, regardless of the subject matter. It is being integrated into all facets of the curriculum. In a study conducted by McGrail (2005), the perspectives of English teachers’ attitudes towards integrating technology and how they perceive technological change were researched using a qualitative research methodology. The population included four male teachers and three female teachers, ranging in age from mid-20s to late-40s,
with 2 to 20 years teaching experience. The findings were consistent with previous research in the area of attitude towards technology. It was concluded, “teachers’ attitude toward technology played a key role in shaping their use of technology in their classroom practices” (McGrail, 2005, pg. 19).

The confidence that a teacher has in their abilities in technology and the curriculum area will be replicated into their performance in the classroom. Smarkola (2007) examined beliefs of student teachers and experienced teachers and their intentions of using computers in the classroom. The Technology Acceptance Model was used in this quantitative-less dominant qualitative, sequential, mixed method design. A convenience sample consisting of 160 student teachers and 158 experienced teachers completed the Computer Usage Intentions Survey with 54 student teachers and 64 experienced classroom teachers volunteering to be interviewed. It was found that both student teachers and experienced teachers believed that preparing children to use computers was important and a necessity to use computer integration in the classroom. “The secondary purpose of this study was to investigate the efficacy of using the decomposed theory of planned behavior for predicting intentions to use computers” (Smarkola, 2007, p. 1210). The findings suggested that the process was more of a human process regarding beliefs and behaviors in computer usage rather than a classroom technology integration process. The teachers must have the confidence in their abilities in the area of technology use to make it successful in the classroom. A limitation to the study that was noted included the difference between the original sample size completing the survey and the actual number that volunteered to be interviewed.

Self-Efficacy

Research studies have been conducted on teachers’ self-efficacy beliefs and concluded that there is a positive relationship between positive teaching behaviors and student achievement
(Henson, 2001). In the Bong & Skaalvik’s (2003) article it discussed the similarities and differences among the terms self-concept and self-efficacy. The similarities that were noted in the research were “centrality of perceived competence in construct definition; use of mastery experience, social comparison, and reflected appraisals as major information sources; and a domain-specific and multidimensional nature” (Bong & Skaalvik, 2003, p.1). There were notable differences as well. The differences included “integration vs. separation of cognition and affect, heavily normative vs. goal-referenced evaluation of competence, aggregated vs. context-specific judgment, hierarchical vs. loosely hierarchical structure, past vs. future orientation, and relative temporal stability vs. malleability” (Bong & Skaalvik, 2003, p.1). The consensus findings among the researchers were that it was sometimes hard to distinguish the difference between academic self-concept and self-efficacy.

The self-efficacy that a teacher has in regards to technology has been shown to have an impact on the use of the World Wide Web. Lee & Tsai (2008) conducted research on the teachers’ perceived self-efficacy and their use of the Technological Pedagogical Knowledge-Web (TPCK-W). The study was conducted to explore and assess teacher attitudes toward web-based instruction using both exploratory and confirmatory factor analyses that indicated satisfactory validity and reliability characteristics. The participants consisted of 558 teachers from elementary to high school level in Taiwan. It was concluded that senior teachers tended to have lower self-efficacy in the area of web-based instruction with their TPCK-W but higher self-efficacy in terms of their existing PCK than their juniors (Lee & Tsai, 2008). This would be interpreted as a senior teacher having more difficulty integrating the Web into their current curriculum. The study also found that teachers with more experience with web-based instruction tended to perceive higher self-efficacy with the TPCK-W than teachers with less web-based
instruction experience. The importance of these findings may help to provide Web-related instructional experiences for teachers, perhaps more for the senior teachers or even in teacher preparation courses to gain more experience (Lee & Tsai, 2008). The study provided “empirical evidence to verify the relationship between Web-related teaching experience and self-efficacy in terms of TPCK-W, which parallels the literature of those relationships in a traditional instructional setting” (Lee & Tsai, 2008, p. 18).

With the shift in curriculum to integration of technology, the focus in teacher education preparation courses has changed to include the skills needed in the area of information technology. It was noted by Albion (1999), graduates needed to not only possess the skills in the use of information technology, but also believe in their ability to integrate information technology into teaching. Teacher education preparation programs struggle to develop courses that pre-service teachers need to learn effective skills and gain the confidence that is needed when they are in the classroom. Albion’s argument was that “teachers' beliefs are a significant factor in their success at integrating technology, that self-efficacy beliefs are an important, and measurable, component of the beliefs that influence technology integration…” (Albion, 1999, p. 2). The research suggested the teachers’ felt their self-efficacy beliefs about using technology for teaching was directly related to what they practice in their classroom.

In a research article by Holden & Rada (2011), the Technology Acceptance Model (TAM) was used to “incorporate teachers’ perceived usability and self-efficacy measures toward the technologies...” (p. 343) that the teachers were presently using in their classrooms. The survey was conducted in two rural school districts in Virginia. The participants were K-12 teachers with 99 teachers responding. The results were divided into two sections then analyzed for reliability using Pearson’s correlations and Cronbach’s alpha and validity using general linear
modeling techniques. The study found “teachers’ technology self-efficacy (TSE) was more beneficial to the TAM than their computer self-efficacy (CSE)…” (Holden & Rada, 2011, p. 343). The implication of the study suggests “future researchers should strongly consider evaluating the importance of technology self-efficacy on acceptance and usage behavior of different populations and different technologies” (Holden & Rada, 2011, p. 363). It was also suggested that if the school districts would focus on increasing the individual external factors, such as self-efficacy, teachers would be more likely to accept and use the current technologies (p. 365).

A teacher’s self-efficacy is not the only factor that needs to be studied to determine if a teacher uses technology or any type of computer-supported education. Celik & Yesilyurt (2012) conducted a study to “test the effect levels among the latent variables of attitude to technology, perceived computer self-efficacy, computer anxiety and the attitude toward doing computer supported education and these latent variables’ ratios to each other” (p. 148). The researchers believed that the computer is the main tool of computer-supported education and the perceived computer self-efficacy among teachers would play an important part in whether a teacher applied computer-supported education or not. Participants consisted of 471 pre-service teachers of which 72.6% were female and 27.4% were male. The research was conducted via a relational survey model to determine “the presence and extent of covariance among two or more variables” (Celik & Yesilyurt, 2012, p. 150). Data was collected and factor analyses of scales were analyzed via SPSS and AMOS. Celik & Yesilyurt (2012) concluded that “technology attitude positively and significantly affects perceived computer self-efficacy, computer anxiety and computer supported education” (p. 156). This is significant because of the present education world and how vital computer-supported education is in the school system. If a teacher is more
confident and has a better computer self-efficacy, he/she is more likely to have a positive attitude in relation to computer-supported education.

A teacher’s disposition towards technology can affect whether or not the teacher utilizes the technology in the classroom. Vannatta & Fordham (2004) conducted a study on the use of technology among K-12 teachers and if teacher dispositions could predict classroom technology use. The Teacher Attribute Survey (TAS) was used to conduct the study to measure “a variety of teacher attributes, such as teacher self-efficacy, philosophy, openness to change, amount of professional development, and amount of technology use in the classroom” (Vannatta & Fordham, 2004, p. 253). Six schools were selected to participate in the survey, four elementary and two high schools. The participants consisted of 177 teachers, 137 of whom were female, and were narrowed to 170 after data screenings revealed seven outliers and were eliminated, completed the survey. The findings suggested a willingness to commit one’s time to learning the technology and an openness to change and innovation was essential to predicting technology use in the classroom. It takes time to learn how to use technology; time spent personally learning and time spent in training. The result “suggests that time is essential in becoming a technology using teacher, but also that technology use may predict time commitment to teaching” (Vannatta & Fordham, 2004, p. 261). One issue with the results occurred due to the self-efficacy variable being excluded from the generated regression model. This is most likely due to the “TAS focusing on technology use and not how that use influenced student outcomes” (Vannatta & Fordham, 2004, p. 262).

Johnson-Martin (2010) conducted a “quantitative descriptive survey…to assess and describe the effect of technology training on career and technical education (CTE) teachers’ perceptions of computer self-efficacy and technology practices in a vocational school
It is important to note that CTE teachers have the task of training and developing students in highly technical skills to enter the workforce upon graduation, which makes technology training crucial. In this study, the sample size consisted of 84 teachers that participated in the survey; 69.0% females and 31.0% were males. Johnson-Martin’s (2010) study concluded, “that technology training had a positive effect on the variables of teachers’ perceptions of computer self-efficacy, current instructional practices, and personal computer use” (p. 160). Therefore, it is important for teachers to be trained on the use of technology in order to increase their self-efficacy. This would increase the teachers’ confidence in implementing the technology and using it effectively to increase student achievement. A limitation that was discussed in the literature was in regards to the “willingness of teachers who volunteer to exhibit interest, and respond honestly to questions on each of the surveys, addendum, and interview questionnaire” (Johnson-Martin, 2010, p. 29) and that the survey was completed with teachers all from the same school district. It was noted that a field test of the instrument would help to alleviate these issues.

Another study conducted by Fenyvesiova & Kollarova (2013) was developed to determine the level of self-efficacy of teachers based on the type of school they taught at, the gender of the teacher and the amount of teaching time they had acquired. The participants consisted of 100 teachers from a lower secondary education, second level elementary school and upper secondary, high school. The sample consisted of 74% women and 26% men. For data collection, the Ohio State Teacher Efficacy Scale (OSTES) was adapted to meet the needs of the study. The findings of the study concluded that self-efficacy of teachers was a powerful motivational factor which significantly influences the classroom experience.
Norton (2013) investigated secondary teachers’ perceptions on how self-efficacy influences the academic achievement of their students. The study utilized four data collection methods to explore teacher self-efficacy. The researcher utilized two focus groups, interviews, a self-efficacy assessment test, and open-ended survey questions. The sample size consisted of 12 teachers, four male and eight females, ranging in age from approximately 35-40. The small population size was noted as a limitation in the study. Results found that “confidence in teaching and in the subject matter was a great factor in determining teacher self-efficacy” (p. 153) and several teachers noted that the attitude of the surrounding teachers and administrative support as influencing their self-efficacy in the classroom.

With the increase in technology in the classroom, teachers must not only have the skills and competencies in technological areas they must also exhibit a positive attitude towards the integration of technology to make it a successful, learning environment. Holcomb, Brown & Lima (2010) conducted a study to determine if “educators' self-efficacy scores for use of technology within the classroom change as a result of engaging with performance-based assessment” (p. 124). The Educational Technology Skills Confidence Survey was used to measure the teachers’ self-efficacy in a pre- and post-format, utilizing a 5-point Likert-type scale. The sample population was taken from pre-service and in-service educators, with a total of 986 participants. Findings from the study reinforced that self-efficacy consistently and significantly increased, suggesting a powerful educational impact of performance-based assessments when they are embedded within an authentic assessment environment that allows participants to use all the resources available to them important to note that based on observing their own actual
performance, participants were able to more accurately gauge their efficacy levels for the specific tasks (Lima, 2010, p. 128).

Individuals’ beliefs about their abilities and how competent they feel in the area of computer use has been investigated with managers and professionals to determine their computer self-efficacy as well. Compeau & Higgins (1995) conducted a study to measure computer self-efficacy with 100 individuals in the pilot study and 2000 participants being randomly selected for the main study from a subscriber list. The computer self-efficacy measure survey was created and then mailed to the 2,000 participants; 1,020 completed and returned with a response rate of 53.4%. Of the 1,020 participants, 83% were male and 17% female. The findings reported, “individuals in this study with high self-efficacy used computers more, derived more enjoyment from their use, and experienced less computer anxiety” (Compeau & Higgins, 1995, p. 203).

Limitations that were reported in the study were found in respect to the measure itself. The measure used hypothetical scenarios for responses to questions to measure self-efficacy, asking participants to answer based on future factors. However, when questioning the participants about their confidence in the use of computer, it correlated to their responses. The overall conclusion of the study showed that computer self-efficacy was a factor in technology usage not only with teachers but other professions as well.

Conclusion

Technology has become a major part of the curriculum in the educational setting. Pre-service teachers are being trained to use and integrate technology when they enter the workplace in hopes of instilling confidence in their abilities. Numerous studies have been conducted to determine if a teachers’ self-concept and/or self-efficacy is a determining factor in relation to whether the teacher implements the technology into the classroom (Smarkola, 2007; Agbatogun
Computer anxiety has also been determined to be a pre-cursor for integrating technology (Igbaria & Iivari, 1995; Compeau & Higgins, 1995 and Agbatogun, 2010).

The review of the literature in this paper found overwhelmingly that a teacher’s self-concept and self-efficacy were vital elements in the use of technology. Research supported that teachers believed their attitude towards the technology made a difference in whether they used the technology in the classroom for instruction. Teachers reported if there was a high level of computer anxiety due to lack of adequate training or low self-concept with the technology, they were unlikely to integrate technology into the curriculum. Low self-efficacy or low self-concept prohibited the advancement of student achievement. It was also noted that teachers with high self-efficacy in the use of technology was a motivating factor within the classroom, therefore, increasing student academic success (Norton, 2013).


