Best Technology Practices for Educational Leaders: Technology Use in Middle School Classrooms

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Abstract

Technology brings exciting opportunities for and challenges for educational environments. This research analyses the iPad® as an instructional tool in a New York State K-12 public school. The authors incorporate theoretical concepts, such as the six factors of empowerment, that relate to teachers' decsions to use instructional technology. Explanations of the six factors of empowerment are described along with the theory's origins and the creation of the teacher empowerment scale. We frame the research in the context of the educational ecosystem's complexities and the social/public/perception pressure that many schools are under to adopt technology. The research includes the importance of the role teachers play in the implementation and use of instructional technology.

We develop a new construct called "teacher technology use" (TTU) which represents an individual teachers' preference for use of instructional technology in the classroom. Case study and quantitative analysis was employed to assess TTU. Thirty teachers took part in this technology initiative. Twelve teachers were interviewed for one hour each and all thirty teachers participated in a survey measuring technology adoption. The teacher empowerment scale (utilized in this study) was used as a means to understand the affect empowerment had on technology use.

Regression results revealed that teacher empowerment was predictive of TTU. Specifically, teacher's perceived impact of technology on school life accounted for significant variance in overall technology use. Technological innovation provides exciting possibilities for TTU. However, as this investigation discovered, the role of the teacher remains essential. Teacher empowerment is pivotal for effective TTU.

Introduction

Technology leaders must understand how to foster teacher technology use (TTU) in classrooms. Historically, and when compared to other institutions, schools have been slow to adopt technology [1][2]. Reasons for this slower rate of adoption include; insufficient support and lack of specialists necessary to provide direction in how to use it appropriately [3][4][5][6][7].

Today however, technology is changing rapidly resulting in increased pressure to use instructional technology in curriculum and pedagogy [8]. This pressure is being felt worldwide [8].

Professional development is a key method used as a tool to facilitate integration of technology into pedagogy [9]. However, it must take into consideration the complexity of educational environments[9]. Mumtaz (2006) found that teacher's beliefs about technology affect the success of technology integration. When teachers view technology as complementary to their instructional techniques, they are more likely to incorporate it into their lessons [10].

Teacher perception is affected by interactions with students, colleagues and superiors influencing personal beliefs about technological abilities. Social capital and other informational social forces affect technology use [11] .Teachers require positive reinforcement from educational leadership [11]. Decisions to adopt technology are dependent upon personal belief in technical ability and the social/institutional forces that surround them [12].

Teacher Empowerment

Educational leadership is faced with the challenge of managing their teachers' comfort and ability with technology as well as their perceived role in relationship with peers, students and superiors. Teacher empowerment represents teachers' perceptions or self-efficacy regarding their ability to resolve problems and take control of their growth [13]. Teachers who feel empowered can improve upon a situation [14].

Short and Rinehart's (1992) research suggests six dimensions of empowerment forming the overall construct. Short & Rinehart define those dimensions as: decision-making, professional growth,

status, self-efficacy, autonomy and impact. Please see Table 1 below for each dimension with its definition.

Table 1. Empowerment dimensions and definitions	
Decision Making	" The level of involvement of teachers in decisions that affect their work" [14], p. 636
Professional growth (development)	"Teachers' perceptions that the school in which they work provides them with opportunities to grow and develop, to learn continuously, and to expand their own skills through the work life of the school;" [14], p. 636
Status	"Teachers' perceptions that they have professional respect and admiration from those with whom they work, that they have colleague support and respect for their expertise and knowledge;" [14] p. 636
Self-efficacy	"Teachers' perceptions that they have the skills and ability to help students learn, are competent in building effective programs for students, and can effect changes in student learning;" [14], p. 636
Autonomy	"Teachers' beliefs that they can control certain aspects of their work life;" [14], p. 636
Impact	"Teachers' perceptions that they have an effect and influence on school life" [14],p. 636

It was hypothesized that perceived empowerment would be predictive of TTU. In addition, it was hypothesized that a teacher's perception of his or her professional development opportunity would account for the most variance in iPad® use when regressed over all empowerment factors.

New York State Public School District iPad Program:

A district on Long Island, New York, was implementing an iPad® pilot program to incorporate instructional technologies into the classroom. There were eight schools in this district: five elementary schools, two junior high schools, and one high school. The iPad pilot program was implemented in both junior high schools. Teachers in the mathematics and social studies department were given iPads® to use as instructional tools. In addition, the program involved participation in professional development.

Educational leadership wanted teachers to incorporate the iPad® into their pedagogy. They encouraged technology use instructionally, administratively and personal, allowing teachers to download applications and use the iPad® in anyway that they wished.

Method

Participants and Data Collection:

A total of 30 participants were surveyed for this data analysis. All data sets were collected from seventh, eighth and ninth grade social studies and mathematics teachers. A district superintendent provided a list of teachers participating in the iPad® pilot program. The survey response rate was 100% as the thirty teachers (respondents) were representative of all program participants.

Of the respondents, 56.7% were male, 43.3% were female. They varied in both age and years teaching (see Tables 2, 3, 4 below). All respondents had a master's degree or higher. One respondent had a PhD and one respondent had a J.D. An online survey was administered via a third party web based hosting service and all answers were based on the self-reflective responses with a 5-point Likert scale (1 = *Strongly Disagree* through 5 = *Strongly Agree*).

Table 2. Age as % of Respondent	
Age	% of Respondent
26 – 35	30%
36 – 45	40%
46 – 55	13.3%
55+	16.7%

Table 3. Years teaching as % of Respondent	
1 – 5 years	10%
6 – 10 years	20%
11 – 15 years	30%
16 – 20 years	16.7%
20 + years	23.3 %

Research Instruments

The primary purpose of the current research was to assess the level of iPad® use (TTU) by middle school teachers. In order to do so, a construct called "TTU" was created. This construct was composed of 5 items and had an internal consistency (alpha correlation coefficient) of .72. In addition to the creation of this construct, the School Participant Empowerment Scale (SPES) [15] was utilized to measure teacher's empowerment level and the six dimensions of the construct. This scale measures teachers' perceptions of their own empowerment [15]. See Table 4 for inter-construct correlations, means and standard deviations and internal consistencies.

Table 4. Inter-construct correlation, basic descriptive analysis and internal consistency

Construct	*M*	SD	1	2	3	4	5	6	7	8
iPad® Use	4.21	.51	(.72)	.54**	.23	.57**	.40*	-.004	.55**	.43*
Status	4.57	.83		(.92)	.39*	.77**	.76**	.33	.92**	.83**
Autonomy	3.73	.50			(.59)	.38	.06	.59**	.50**	.70**
Impact	4.39	.44				(.85)	.62**	.48**	.77**	.82**
Prof. Development	4.39	.46					(.89)	.25	.66**	.64**
Decision Making	3.08	.68						(.86)	.42*	.75**
Self-Efficacy	4.50	.46							(.93)	.87**
Empowerment	4.11	.43								(.83)

Analysis

A regression analysis was conducted in which empowerment was the criterion variable and TTU was the dependent variable. In order to further identify the factor of empowerment most predictive of iPad Use, a forward stepwise regression analysis was conducted in which iPad Use was the dependent variable and potential predictor variables were the six factors of empowerment specifically 1) autonomy, 2) decision making, 3) impact, 4) professional development, 5) self-efficacy, and 6) status.

Results and Discussion

Results support the first hypothesis indicating that empowerment is predictive of iPad® Use, (Beta = .60; $t(29) = 3.14$, $p <$ .05) when controlling for gender, age, experience, location, grade, department and level of instruction. However, the second hypothesis was not met. Results of the forward stepwise regression indicate that impact and decision making were the best predictors accounting for 65% of the variance in iPad Use; results are in Table 5. No other predictors accounted for any significant variance (at .05 level). Thus a two prediction equation, (impact), emerged as optimal. The equation had an overall R^2 of .65, $F(2,27) = 9.70$, $p < .05$; the standardized regression coefficients were .74 for impact and -.36 for decision making.

Table 5
Forward Stepwise Regression Analysis for 6 Predictors of iPad Use (Showing significant predictor only)

		Overall		Increment	
	Variable	R^2	*F*	R^2	*F*
Step 1:	*Impact*	.57	13.18**	.57	13.18**
Step 2:	*Decision Making*	.65	9.70**	.09	4.55*

*p < .05 **p < .01 ***p<.001*

The findings appear consistent with previous studies. However, the identification of perceived impact as the single best predictor of iPad® Use is an interesting result. The literature suggests that professional development is the most effective tool for educational leaders to influence and facilitate technology use. It was therefore hypothesized that a teacher's perception of professional development opportunity would be the most important factor but results of this analysis indicate otherwise.

The impact factor of empowerment measures an individual's perception of the extent to which he or she is capable of influencing school environment [15]. This finding implies that when teachers feel they are effective and can influence the environment around them, their level of iPad® use increases.

Conclusions and Implications

This study investigated the relationship between teacher empowerment and technology use, specifically iPad® technology. The findings demonstrate that empowerment influences the level of technology use. It also identifies "impact" as the most predictive factor of empowerment when accounting for iPad® use. This is important because much of the literature suggests that professional development is the most effective way to increase technology use. According to the findings of this study, enhancing a teacher's "perception of impact" will result in a higher level of technology use.

A number of limitations must be acknowledged when considering these findings. It is important to note that all measures identified are self-reports. Also, this data is indicative of a single (high socio-economic) district and therefore it may not be generalizable to all middle school environments. A study would have to randomly sample middle school teachers throughout the country who are currently part of an iPad® program to allow for greater generalizability. However, the 100% response rate strengthens the study and ensures that the data is truly representative of this iPad® pilot program.

References

[1] Cox, M., Preston, C., & Cox, K. (1999). What Factors Support or Prevent Teachers from Using ICT in their Classrooms? *British Educational Research Association Annual Conference.* Brighton: University of Sussex.

[2] Passey, D., & Samways, B. (1997). Information Technology:supporting change throough teacher education. London: Chapman & Hall.

[3] Rosen, L., & Weil , M. (1995). Computer Availability, Computer Experience, and Technophobia Among Public School Teachers. Computers in Human Behavior , 9-31.

[4] Winnans, C., & Brown, D. (1992). Some Factors Affecting Elementary Teachers' Use of Computer. Computers in Education , 301-309.

[5] Dupagne, M., & Krendl, K. (1992). Teachers' Attitudes Toward Computers: a review of the literature. Journal of Research on Computing in Education , 420-429.

[6] Hadley, M., & Sheingold, K. (1993). Commonalities and Distinctive Patterns in Teachers' Integration of Computers. American Journal of Education , 261-315.

[7] Mumtaz, S. (2006). Factors affecting teachers' use of information and communications technology: a review of literature. Journal of Information Technology for Teacher Education , 9 (3), 319-342.

[8] Bala, S., & Anamika. (n.d.). Adopting Advancements of ICT: A Necessity for the Empowerment of Teacher Educators. Journal of Progressive Education.

[9] Scott, P., & Mouza, C. (2007). The Impact Of Professional Development On Teacher Learning, Practice And Leadership Skills: A Study On The Integration Of Technology In The Teaching Of Writing . Journal of Educational Computing Researching , 37 (3), 229-266.

[10] Bongalos, Y. Q., Bulaon, D. R., Celedonio, L. P., Guzman, A., & Ogarte, C. F. (2006). University teachers' experiences in courseware development . British Journal of Educational Technology , 37 (5), 695-704.

[11] Li, S. (2010). Social capital, empowerment and educational change: a scenario of permeation of one-to-one technology in school. Journal of Computer Assisted Learning , 26, 284-295.

[12] Veen, W. (1993). How Teachers Use Computers in Instructional Practice: four case studies in a Dutch secondary school. Computers and Education , 1-8.

[13] Short, P. M., & Johnson, P. E. (1994). Exploring the Links Among Teacher Empowerment, Leader Power, and Conflict. Education , 114 (4), 581-591.

[14] Rinehart, J. S., Short, P. M., Short, R. J., & Eshley, M. (2004). Teacher Empowerment and Principal Leadership: Understanding the Influence Process. Teaching and Teacher Education , 20, 277-289.

[15] Short, P. M., & Rinehart, J. S. (1992). Teacher Empowerment and School Climate. Education , 113 (4), 592-597.