



The relationship between technology leadership strategies and effectiveness of school administration: An empirical study



Chih-Hsiang Weng*, Yao Tang

Institute of Education, National Cheng Kung University, No. 1, Ta-Hsueh Rd., Tainan 701, Taiwan, ROC

ARTICLE INFO

Article history:

Received 7 May 2013

Received in revised form

24 February 2014

Accepted 14 March 2014

Available online 21 March 2014

Keywords:

Architectures for educational technology system

Computer-mediated communication

Country-specific developments

Elementary education

ABSTRACT

This research has four main themes: (1) the level of school technology leadership used by administrators in elementary schools; (2) the degree to which administrators are aware of the effectiveness of school administration; (3) the relationship between administrators' technology leadership strategies and the effectiveness of elementary school administration; and (4) whether administrators' technology leadership strategies can predict the effectiveness of elementary school administration. The participants were 323 administrators (comprising principals and directors of academic-affairs, student-affairs, general-affairs, and counseling divisions) from 82 elementary schools located all over Taiwan and its three off-shore islands. Semi-structured interviews, expert validity surveys and a pilot-study were implemented to develop a "Technology Leadership Strategies and School Administrative Effectiveness Scale". The quantitative data gathered from the instrument was analyzed through the use of descriptive statistics, Pearson's product-moment correlation coefficient, and simple linear regression. The findings indicated that elementary school administrators were highly conscious of using technology leadership strategies, and that these administrators generally possessed a high level of effectiveness regarding school administration. The results also indicated that technology leadership strategies had a significantly positive impact on the effectiveness of school administration, and thus the former could significantly predict the latter. The findings revealed that technology leadership strategies should be seen as an essential part of school administrators' training programs, in order to improve the effectiveness of such administration.

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1. Introduction

Since technology is increasingly being applied in all areas of our lives, technology leadership is a key issue with regard to school administration. The related educational technology management approaches usually embrace complex perspectives, including the relationships among the educational departments, enterprises, schools, and all stakeholders.

There is wide agreement that the use of technologies with readily accessible, flexible and interactive resources can help promote parental engagement and develop connections among schools, communities, and families (Flanagan & Jacobsen, 2003; Hohlfeld, Ritzhaupt, & Barron, 2010; Lewin, & Luckin, R., 2010). The United Nations Educational, Scientific and Cultural Organization also noted that every professional teacher must now be prepared and able to use technology to support student learning (UNESCO, 2008). The North Central Regional Educational Laboratory (2010) has also argued that appropriate technology use can not only be very beneficial in increasing educational productivity, such as students' learning achievement and motivation, but also improve teachers' satisfaction and school administrative effectiveness. The researchers also suggest that students should be immersed in a rich, technology-enhanced learning environment, where they can select appropriate technologies to meet their own personal learning needs (Conole, late, Dillon, & Darby, 2008; Tapp, Kumar, & Hansen, 2006).

* Corresponding author. Tel.: +886 7696 4786; fax: +886 7697 4263.

E-mail address: ogc876@gmail.com (C.-H. Weng).

Technology in schools has too often been limited to the acquisition hardware and software. While an appropriate technology infrastructure or set of information and communication technology (ICT) resources are indispensable, technology planning and leadership are even more important for the effective utilization of technology in this context (Anderson & Dexter, 2005; Flanagan & Jacobsen, 2003). As a consequence, almost every K-12 leader must now become a technology director, coordinator, and supporter. Sugar (2005) stated that a technology coordinator must carry out a wide range of activities in their interactions with teachers, including instructing them on the particular set of skills needed to use a new technology, solving technical problems, providing access to existing technology resources, and collaborating with teaching staff to develop teaching materials. A school technology coordinator thus not only plays a crucial role in leading teachers to develop more effective K-12 school environments (Frazier & Bailey, 2004), but also serves as an instructional expert by providing advice, methods and strategies for appropriate curriculum-oriented technology use that maximizes students learning (Elsa & Kobus, 2003; Sugar & Holloman, 2009; Twomey, Shamburg, & Zieger, 2006). In sum, technology leadership is very important for the effective integration and use of technology in schools, and thus it is the focus of the current work.

The process of integrating technology into schools in a developing country, like Taiwan, should be managed at all levels, from the Ministry of Education down to individual teachers and other stakeholders. K-12 school leaders thus need to receive training in how to be technology coordinators and agents of change at the organizational level. In the United States a number of training programs have been developed, such as “The School Technology Leadership Initiative” (STLI), which offers innovative academic programs that include a graduate certificate for school technology leaders. Moreover, school administrators can now base their technology leadership learning and practice on the National Educational Technology Standards for Administrators (NETS-A), which involve the following factors: (1) leadership and vision; (2) learning and teaching; (3) productivity and professional practice; (4) support, management, and operations; (5) assessment and evaluation; and (6) social, legal, and ethical issues. The NETS-A could be an important framework that Taiwan could use to develop its own technology leadership strategies, and in the current work the diffusion of innovation, technology acceptance model, strategic leadership and transformational leadership are all considered, as explained in more detail below.

1.1. Diffusion of innovation

Pope, Hare, and Howard (2002) argued that successful integration of innovative technology tools into instruction normally challenges the prevailing practices of faculty members, and so this development is often met with opposition. A more open-minded culture would thus be helpful in triggering innovation. The diffusion of innovation theory argues that instrumentality and interpersonal contacts provide information and influence the opinions and judgments of the members of an organization with regard to specific technologies. Therefore, the nature of the networks within an organization or community, and the roles that opinion leaders play in them, determine the likelihood that the innovation will be adopted. Opinion leaders exert influence on the behaviors of others via their personal contact, but additional intermediaries, called change agents and gatekeepers, are also included in the process of diffusion (Rogers, 1995). Rogers (1995) also argued that the diffusion of innovation consists of four stages: invention, diffusion (or communication) through the social system, time and consequences.

Sichel (1997) argued that the low usage of installed systems is a major factor underlying the “productivity paradox” surrounding the disappointing returns from organizational investments in information technology. With the gradual increase in investment in educational technology over past decade in Taiwan, the current authors wondered whether school administrators have been able to achieve corresponding educational outcomes. If good results are to be obtained from such spending, then school principals and administrative directors need to play a leading role in promoting the appropriate use of technology in teaching and learning, and take the lead in shaping an innovative school culture or environment.

1.2. Technology acceptance model

Significant progress has been made over the last two decades in explaining and predicting user acceptance of information technology at work (Davis, 1989). Numerous empirical studies have found that the technology acceptance model (TAM) consistently explains a substantial proportion of the variance in usage intentions and behavior, and that it compares favorably with alternative models, such as the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB). In addition, in the many empirical tests of TAM that have been reported in the literature, perceived usefulness was consistently confirmed to be a strong determinant of usage intentions. Furthermore, Venkatesh and Davis (2000) developed and tested a theoretical extension of TAM that explains perceived usefulness and usage intentions in terms of social influence and cognitive instrumental processes (see Fig. 1). They found that both social influence processes (subjective norm, voluntariness, and image) and cognitive instrumental processes (job relevance, output quality, result demonstrability, and perceived ease of use) significantly influenced user acceptance.

Gabriella (2011) also found that principals' support for ICT integration behaviors depend on both contextual- and individual-level variables. Contextual variables include the amount of ICT equipment available for teachers in their school, teachers' competence and frequency of use and teachers' attitudes towards the ICT usage. Individual-level variables include the principals' attitudes towards ICT integration into school teaching, their exposure to ICT training courses and their own perceptions of their competence in using ICT. Accordingly, in order to promote their school technology leadership, school administrators, especially principals, must choose and adopt appropriate strategies, which can then be expected to improve all school members' willingness to adopt key technologies, as well as their abilities to use them.

1.3. Strategic leadership and transformational leadership

The integration of technology into strategic leadership has been emphasized by researchers in many non-educational fields, as it can increase the probability of achieving superior long-term performance (Hinterhuber & Friedrich, 2002; Hitt, Ireland, Camp, & Sexton, 2001). Since schools are places for developing competitive manpower, they should also adopt strategic plans to use technology well, and to support

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