DETERMINANTS OF INSTRUCTORS TO APPLY IT IN TEACHING

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The purpose of this paper is to discuss the internal and external determinants that affect vocational and technology instructor attitudes to apply IT in teaching. Internal factors include teacher computer knowledge, interest, perceived usefulness and perception of time applying IT in teaching. External factors include teaching climate, school policy, facility, and training in IT instruction. Teacher attitudes are defined as anxiety, beliefs and intention to use IT in teaching. As an empirical study, 141 valid science and technology university teachers were sampled in Taiwan. The results indicate almost all of the internal factors significantly influence the teacher attitudes to apply IT in teaching. Except climate factor, the other external factors did not have any significant effect on instructor attitudes to apply IT in teaching. The results could provide information for schools and human resource administrators to appropriately allocate teaching resources.

Keywords: computer attitudes; information technology (IT); anxiety, intention.

1. Introduction

Computers and information technologies are rapidly becoming important components within societies’ and people’s lives globally (Coffin & MacIntyre, 1999). Thus, computer and IT (information technology) education has become a fundamental curriculum in schools and colleges worldwide.

Most of the relevant research about teacher attitudes toward computer has focused on computer anxiety (Dupagne & Krendl, 1992). From a broader perspective, other attitudes such as teachers’ beliefs and intentions to apply computers may affect students’ learning attitudes as well. In fact, to improve teachers’ intention to apply IT in teaching should be the primary goal for school administrators. However, there are few studies about these attitudes. As for the factors that affect teacher teaching attitudes, most of the previous research emphasizes subject internal factors, such as gender, age, learning experience, computer knowledge, and individual computer facilities. There are not many studies on external factors such as training, teaching climate (how much IT in teaching is applied among colleagues), school policies, and teaching facilities for IT in teaching. In practice, these external factors may also affect instructor attitudes to apply IT in teaching.
The purpose of this study is to discuss the determinants of instructors apply IT in teaching. In this article, IT (Information Technology) is defined as all of the software and hardware tools of IT that teachers may adopt during their teaching process, such as computers, networks, software packages, and websites etc. In this paper, teacher attitudes to apply IT in teaching are first discussed, followed by a discussion on the factors that affect teacher attitudes, which include both internal and external dimensions. Teacher attitudes are defined as their anxiety, beliefs, and intentions to learn and apply IT in teaching. The internal dimensions consist of teachers’ computer knowledge, perceived usefulness, interest and time to learn and apply the technology. The external dimensions include teaching climate, school policy, facility and training in IT. For validating the research model, 141 valid science and technology university teachers in Taiwan were sampled as an empirical study. The research findings could provide information for human resource administrators of schols.

2. Literature Review

2.1. Teacher attitudes to apply IT in teaching

Many research about teacher attitudes toward computers focus on subjects’ computer anxiety (Dupagne & Krendl, 1992). However, besides computer anxiety, there are other definitions for subjects’ attitudes toward computers, such as self-efficacy (Compeau & Higgins, 1995), interest and favor (Kay, 1993). Regarding the subjects’ intention to learn and apply computers, most of articles concentrates on the users’ behaviors to use a specific computer system such as WWW (Lederer, Maupin, Sena & Zhuang, 2000), Word-Edit, and E-Mail system (Adams, Nelson & Todd, 1992). There are few studies about the attitude of teachers’ intentions to apply IT. As for beliefs, Pajares (1992) considered they could guide users’ behaviors and allow them to adapt to their environments. Most studies found that subjects’ beliefs about their abilities to use computers significantly and positively affected their computer-related attitudes (Gardner, Dukes & Discenza, 1993).

2.2. Internal factors

This paper defines internal factors as teachers’ computer knowledge, perceived usefulness, interest, and time factor toward IT in teaching. A review of literature revealed some significant influences between these factors and subjects’ computer attitudes. For instance, there were significantly negative relations between computer knowledge (and literacy) and computer anxiety (Koohang, 1989). The Technology Acceptance Model (TAM) (Davis, 1989) indicated that users’ perceived usefulness for a new IT had significantly positive effects on their intentions to apply the IT. Ai-Khaldi and Ai-Jabri.(1998) concluded that a subject’s computer liking in computers significantly affected their level of confidence, usage, and anxiety toward computers. Mikkelsen et al.
(2002) discussed the relationship between time spent on computers and anxiety for workplace users, but the results were not significant.

2.3. **External factors**

This study defines external factors as teaching climate, school policy, facility, and training in IT. Most of the related research concentrates on training and facility factors. For example, Mikkelsen et al. (2002) found that training was the most significant factor to reduce employee computer anxiety. Regarding the facility factor, studies have shown that people who have access to computer facilities at home tend to develop more computer knowledge and confidence (Rocheleau, 1995). Compared to training and facility factors, teaching climate and school policy factors were few discussed in research about computer users’ behaviors. Mostly, behaviors were described by the subjects’ colleagues, direct managers, and top managers (Cale & Eriksen, 1994). A review of literature revealed significant influences of subjective norms toward subjects’ intentions to use a certain IT system. (Igbaria, Guimaraes & Davis, 1995; Karahanna & Straub, 1999).

3. **Methodology**

3.1. **Research model**

The purpose of this paper is to discuss the internal and external factors that affect teacher attitudes to apply IT in teaching. Teacher attitudes are defined as their anxiety, beliefs, and intentions to apply IT in teaching. The internal factors are described as teachers’ computer knowledge, perceived usefulness, interest, and time to learn and apply the technology. The external factors consist of teaching climate, school policy, teaching facility, and training in IT. Based on the research model, the hypothesized is made as:

\[ H_1: \text{Internal factors significantly affect teacher attitudes toward using IT in teaching} \]
\[ H_2: \text{External factors significantly affect teacher attitudes toward using IT in teaching.} \]

3.2. **Population and sample**

The research population consisted of all full time teachers of science and technology universities in Southern Taiwan. Based on the 1:4 ratio of the public and private schools in this region, samples were drawn randomly from four private institutes and one public institute. The total sample size was 200, in which 150 responded. The total of valid responses was 141 valid responses. Male teacher was 61.7% and 38.3% was female.

3.3. **The research instrument**

According to the research framework, there were three subscales in the survey. The subscales were designed with a 5-point Likert scale (5 = strongly agree; 4 = agree; 3 =
uncertain; 2 = disagree; 1 = strongly disagree) to determine teachers’ agreement with each statement. Higher scores represent greater agreement with each statement.

The teacher’s attitudes subscale was modeled after the surveys by Mikkelsen et al. (2002) and Davis (1989). The factor analysis with the principal component method and varimax rotation were conducted to extract factor dimensions. Three dimensions were extracted and entitled anxiety, belief and intention. The explanation percentage this subscale was 67.22% and the reliabilities (Cronbach’s) were 0.761, 0.771, and 0.753 respectively. The internal factor subscale was modeled after the surveys by Levine and Donitsa-Schmidt (1998) and Mikkelsen et al. (2002). The same factor analyses were performed, and four internal factor dimensions were extracted and name as knowledge, interest, usefulness, and time. The cumulative percentage of variance of this subscale was 75.30% and the Cronbach’s were 0.837, 0.851, 0.862, and 0.607 respectively. The external factors subscale was modeled after questionnaires by Igbaria et al. (1995) and Mikkelsen et al. (2002). Having performed the factor analyses, three factor dimensions were extracted and named as climate, policy, and facility. The cumulative percentage of variance of this subscale was 62.82% and the Cronbach’s were 0.735, 0.772, and 0.740 respectively. The training variable was defined as the training activities of IT in teaching which subjects had attended for the last 3 years, such as seminars, conferences, workshop and classes. The measurement of the training variable was classified into four levels based on training hours (4 = over16 hours; 3 = 9-18 hours; 2 = 1-8 hours and 1 = 0 hour).

3.4. Data analysis

Firstly, this study yields the factor scores for all the external, internal, and attitude dimensions. Then, to demonstrate how the external and internal factor dimensions affected teacher attitudes toward IT in teaching, the multiple linear regression analysis were employed. In addition, for test the training effect, the ANOVA was employed.

4. Results and Discussions

4.1. The effects of external and internal factors

The regression results which were shown in Table 1 indicated that almost all of the internal factors significantly influenced teacher attitudes to apply IT in teaching, but the external factors didn’t. Except climate factor, the other external factors did not have any significant effect on teacher attitudes to apply IT in teaching.

4.1.1. Internal factors

The results indicated that the computer knowledge of teachers was the most significant factor to reduce their anxiety to apply IT in teaching ($\beta = -0.471$ and $p < .05$). This result supports prior research about finding a significant relationship between computer knowledge (or literacy) and anxiety (Koohang, 1989; Bracey, 1988). In
addition, computer knowledge also had positive effect on the intention attitude ($\beta = .294$ and $p < .01$). For the attitudes of belief and intention, the perceived usefulness of teachers to apply IT in teaching was the most significantly (positively) affecting factor ($\beta = .411$ and $.400$, and $p < .01$). This result also supports the prior research about TAM (Davis et al., 1989; Adams et al., 1992; Lederer et al., 2000).

Teacher’s interest was the only one internal factor that significantly affected all of the 3 attitude dimensions. Generally, interest is one of the primary sources of learning motives (Schunk, 1996). If users come into being interested in IT, they will spend more time to learn it spontaneously. This spontaneous learning behavior is the most efficient power to push teachers to apply IT in teaching. Finally, the time factor positively influenced teachers’ anxiety ($\beta = .372$ and $p < .05$). This result indicated that teachers who always feel busy and have no time to learn IT in teaching had higher anxiety levels.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Anxiety</th>
<th>Belief</th>
<th>Intention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>-.471**</td>
<td>.022</td>
<td>.294**</td>
</tr>
<tr>
<td>Usefulness</td>
<td>-.056</td>
<td>.411**</td>
<td>.400**</td>
</tr>
<tr>
<td>Interest</td>
<td>-.178*</td>
<td>.369**</td>
<td>.193*</td>
</tr>
<tr>
<td>Time</td>
<td>.372**</td>
<td>-.065</td>
<td>.043</td>
</tr>
<tr>
<td>Climate</td>
<td>.067</td>
<td>.182*</td>
<td>.087</td>
</tr>
<tr>
<td>Policy</td>
<td>.021</td>
<td>-.076</td>
<td>.024</td>
</tr>
<tr>
<td>Facility</td>
<td>-.115</td>
<td>.006</td>
<td>-.103</td>
</tr>
</tbody>
</table>

*Note. * $p < .05$, ** $p < .01$.

4.1.2. External factors

Almost all of the external factors did not significantly affect the attitudes of teachers to apply IT in teaching. The climate was the one external factor that had significant (positive) effect on the teachers’ attitude (belief) to apply IT in teaching ($\beta = .182$ and $p < .05$). The results implied that, for encouraging teachers to apply IT in teaching, to create atmosphere of using IT in teaching among teachers may be more effective than to offer them training opportunities or teaching facilities in IT in teaching. This result may be explained that climate can develop external pressures to push teachers to apply IT in teaching.

To summarize, the above analysis and findings confirmed most of hypothesis 1 and part of hypothesis 2.

5. Conclusions

The purpose of this paper was to discuss the internal and external factors that affect vocational and technology teacher attitudes to apply IT in teaching. The results indicated that among the internal factors, the computer knowledge was the most significant factor to reduce teachers’ anxiety attitude to apply IT in teaching. Generally, teachers’ computer
knowledge was developed from their individual study or attending extra trainings. The former, individual study, mostly related to teachers’ interest which was one of the internal factors in this study. The results also indicated that interest was the only one internal factor that significantly affected all of the 3 attitudes of teachers to apply IT in teaching. Hence, how to motivate teachers’ interest about IT is the first issue that school administrations can consider. In addition, for the internal factors, the other result indicated that perceived usefulness was the most significant factor to increase teachers’ intention and belief to apply IT in teaching. Thus, how to enhance teachers’ perceptions of usefulness upon adopting IT in teaching is the other issue school managers may pay attentions.

In this information era, computer and information technology education has become a fundamental curriculum worldwide in schools and colleges. This paper discussed the instructor attitudes toward IT in teaching with an empirical study in Taiwan. The results can provide information for Taiwanese Ministry of Education in formulating IT in teaching policies to increase education performance. Besides, school administrators can also better understand teachers’ needs to appropriately allocate teaching resources.

Acknowledgments
This research was funded by National Science Council of Taiwan with research grant: NSC 93 - 2520 - S - 366 - 001

References


