

Attitudes and Perceived Information Technology Competency among Teachers

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Abstract

The purpose of this study was to measure teachers' attitudes and perceived competency towards information technology (IT). The results revealed that most teachers possess positive attitudes towards IT. The findings also established that most teachers have moderate levels of IT competency. They also believe that they still lack the appropriate IT skills to integrate the technology into the teaching and learning process. The results of MANOVA analysis indicated that there are significant differences between the group of competent and incompetent teachers in terms of usefulness, confidence, anxiety and aversion toward the use of IT.

INTRODUCTION

Although teachers are equipped with knowledge and skills in using computers, the success of implementing the new curriculum with information technology (IT) in education depends greatly upon the attitudes of the teachers and their willingness to embrace such technology. That being the case, teachers should possess not only IT knowledge and skills, but they must also have the right attitudes towards IT (Wong, 2002). This is important because it has been found that teachers' attitudes toward technology have a marked influence on their readiness to utilise technology in their teaching strategies (Office of Technology Assessment, 1988). Gressard & Loyd (1985) also established that perceptions of the potential usefulness of computers can also influence an individual's attitudes toward computers. In other words, if teachers have confidence in using the technology, they will possess positive attitudes, which may greatly influence their teaching and learning process. However, if teachers are reluctant to use computers, then changing teachers' attitudes could possibly be one way of overcoming this problem. Thus, the successful use and application of computers in the educational system may very much be related to, and dependent upon, the teachers' attitudes toward IT.

This may be different from teachers who are positive about the usefulness of computers in their teaching and learning. This can be seen where Simonson (1995) emphasised the importance of positive attitudes in the learning process. He claimed that promoting positive attitudes will also promote achievement, liking and learning. This may also create competent teachers who are skilful in using and integrating IT in the classroom. Furthermore, they will gain confidence, thus making the teaching and learning process more meaningful. In relation to the issues above, it was deemed necessary to carry out a research to gauge and assess teachers' attitudes and perceived competence toward IT. For that reason, four research questions were formulated to guide this study.

The specific research questions of this study are listed below:

- 1) What are the teachers' attitudes towards IT?
- 2) What are the teachers' levels of perceived competence towards IT?
- 3) Is there a significant difference between competent and incompetent teachers in terms of their attitudes toward IT?
- 4) Is there a significant difference between competent and incompetent teachers in terms of usefulness, confidence, anxiety and aversion towards IT?

METHODOLOGY

The sampling frame of the study consisted of secondary school in-service teachers in three selected schools, each representing the three districts in Malacca: Alor Gajah, Melaka Tengah and Jasin. From the accessible population (198 in-service teachers), a total of 160 in-service teachers was selected as the sample of the study (males= 64; females= 96). Most teachers in this study were between the ages of 36 to 43 ($M=37.61$; $SD= 6.38$). The results also revealed that most of the teachers had teaching experience of between 9 to 14 years in schools ($M=11.99$; $SD=6.89$). Most of them owned computers (95%) and many had attended computer training courses (66.9%). Out of 66.9% of the teachers who had attended computer training courses, 51 (31.9%) had attended the computer training courses once only.

The instrument used in this research was a questionnaire in the Malay language that was divided into four sections. Section 1 measured the teachers' demographic background. Section 2 measured the teachers' attitudes toward IT in terms of usefulness (10 items), confidence (7 items), anxiety (11 items) and aversion (6 items). The 43 items were taken from the instrument devised by Wong (2002), with a five point rating scale from 1 (strongly disagree) to 5 (strongly agree) for positive items and vice versa for negative items. Section 3 was the IT competence scale, modified with permission from Algozzine & Flowers (2000), and it was used to measure teachers' perceived competence toward IT. There were 34 items which represented five components: basic computer operation skills (7 items), word processing (10 items), spreadsheets (5 items), telecommunication (6 items) and media communication (6 items). Each item was measured in terms of a four point rating scale from 1 (not competent) to 4 (very competent). The definition of competence by Algozzine & Flowers (2000) is shown in Table 1.

Table 1: Definition of Competence

IT Competence Scale	Definition
Very competent	Can teach others how to perform a task
Competent	Can complete a task
Somewhat competent	Can perform a task with assistance
Not competent	Cannot perform a task

In order to assess the in-service teachers' levels of attitudes towards IT and their perceived levels of competencies towards it, scoring procedures reflecting low, moderate and high degrees were constructed. The score for each domain was categorised into three levels, namely, low, moderate and high. The score for each level was derived by subtracting the minimum score from the maximum score achieved by the respondents; the score was then divided by the three levels. Since items from the attitudes towards IT were developed by Wong (2002) specifically for Malaysian teachers, it was deemed unnecessary to conduct another round of content validity tests for this research; each of the items in Section 3 (teachers' perceived competence toward IT) was checked for content validity. The appropriateness and relevance of the items were scrutinised by a panel of expert judges from different areas of IT and language. The experts evaluated and reconstructed the content of the instruments and several changes were made. A pilot test was carried among 30 in-service teachers

who were not involved in the actual study to affirm the reliability of Sections 2 and 3. The Cronbach alphas reported for these sections were 0.95 and 0.98 respectively.

FINDINGS

The average mean of all the means (4.04) was obtained. The teachers' attitudes towards IT were found to be high – this was obtained by dividing the total mean scores of the teachers' attitudes toward IT with the 34 items of the instruments. The findings indicated that most of the teachers (80%) had very positive attitudes toward the technology. Their scores ranged from a low of 90.0 to a high of 168.0. The dimensions measured were usefulness, confidence, anxiety and aversion. As shown in the results in Table 2, most of the participants found IT to be useful (83.1%). It can be concluded that the participants believed that using computers would actually enhance their job performance. The results also indicated that most of the participants had moderate and great confidence. Their scores in their level of confidence in the use of IT ranged from moderate (47.5%) to high (50.6%). It can be assumed that the participants had confidence in their ability to use computers.

Table 2 also illustrates that the majority of the participants exhibited very low anxiety (78.8%) toward the use of IT. This possibly was an indication that they did not have any feelings of fear or apprehension vis-à-vis their use of computers in general. The results also revealed that the majority of the participants had very little aversion (75.6%) towards IT, suggesting that they did not have any feelings of dislike or negative reactions towards using computers.

Table 2: Levels of Attitudes Toward IT According to Sub-domains (N=160)

Attitudes	Low F (%)	Moderate F (%)	High F (%)
Usefulness	1 0.6	26 16.3	133 83.1
Confidence	3 1.9	76 47.5	81 50.6
Anxiety	126 78.8	32 20.0	2 1.3
Aversion	121 75.6	38 23.8	1 0.6

Most of the teachers had moderate levels of IT competence (55%). However, some of them had high levels of the relevant competence and were able to teach others how to perform a task by using computers. This can be seen where the lowest score recorded was 38.0 and the highest score was 134.0. The dimensions measured were basic computer operation skills, word processing, preparing spreadsheets, telecommunication and media communication. This suggested that the majority of the participants could perform a task with assistance and complete the task by using computers. The results in Table 3 show that most of the participants had a moderate level of IT competence in basic computer operation skills (43.1%), word processing (48.1%), using/preparing spreadsheets (51.9%) and telecommunication (48.1%). However, in media communication (57.5%), most of the participants had low levels of IT competence. This suggests that most of the participants were not able to perform a task in media communication compared to the other IT competence sub-domains, where most were able to perform a task with assistance and complete the given task. Therefore, proper computer training courses that emphasise skills in media communication should be given to improve the participants' level of IT competence in that particular skill.

Table 3: Levels of Competency Toward IT According to Sub-domains (N= 160)

IT skills	Low F (%)	Moderate F (%)	High F (%)
Basic computer operation skills	28 17.5	69 43.1	63 39.4
Word processing	15 9.4	77 48.1	68 42.5
Spreadsheet preparation	54 33.8	83 51.9	23 14.4
Telecommunication	61 38.1	77 48.1	22 13.8
Media communication	92 57.5	56 35.0	12 7.5

An independent-sample *t*-test was conducted to compare the attitudes toward IT of teachers who perceived themselves as IT competent and those who did not. The identification was made by referring to the definition of competence by Algozzine & Flowers, 2002 and it was revealed that there were 97 competent and 63 incompetent teachers. Therefore, there was a significant difference between teachers who perceived themselves as IT competent ($M = 144.55$, $SD = 11.72$) and those who did not [$M = 126.67$, $SD = 14.70$; $t(158) = -8.516$, $p < .001$]. A one-way between-groups multivariate analysis of variance (MANOVA) was performed to investigate differences between teachers who perceived themselves as IT competent (labelled as competent) and those who did not (labelled as incompetent) in terms of four attitude components. The four dependent variables that were used were usefulness, confidence, anxiety and aversion. The independent variables were competent and incompetent teachers. Testing on preliminary assumptions was conducted to check for normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices and multicollinearity, with no serious violations noted.

There was a statistically significant difference between competent and incompetent teachers on the combined dependent variables = $F(4, 155) = 19.5$, $p = .000$; Wilks' lambda = .67; partial eta squared = .33. When the results for the dependent variables were considered separately, the variables that were significant to reach statistical significance using a Bonferroni adjusted level of .00125, were teachers' usefulness = $F(1, 158) = 31.81$, $p = .000$, partial eta squared = .00125; confidence = $F(1, 158) = 57.2$, $p = .000$, partial eta squared = .00125; anxiety = $F(1, 158) = 60.7$, $p = .000$, partial eta squared = .00125, and aversion = $F(1, 158) = 27.7$, $p = .000$, partial eta squared = .00125 toward using computers.

An inspection of the mean scores indicated that competent teachers reported higher levels of teachers' usefulness ($M = 43.49$, $SD = 3.94$); confidence ($M = 27.75$, $SD = 3.10$); anxiety ($M = 47.39$, $SD = 4.97$) and aversion ($M = 25.91$, $SD = 2.66$) toward using computers than incompetent teachers in terms of their usefulness ($M = 39.41$, $SD = 5.19$); confidence ($M = 23.67$, $SD = 3.68$); anxiety ($M = 40.15$, $SD = 6.76$) and aversion ($M = 23.43$, $SD = 3.26$) toward using computers.

The results suggest that teachers who are competent in using computers find IT to be more useful; they approach it with greater confidence and display low anxiety and aversion towards using it. Therefore, being competent in using computers is also an important asset rather than only having positive attitudes toward IT. This shows that both these criteria play a significant part to establish the concrete development of teachers in integrating IT into the teaching and learning process. In other words, to generate the potential of teachers in IT, there is an urgent need for them to acquire the right attitude with a higher competency level for the betterment of the technology application in the education system.

DISCUSSIONS

The results of this study show that the majority of teachers have highly positive attitudes (usefulness, confidence, anxiety and aversion) toward IT. This means that teachers are aware of the importance of IT in their teaching. They already have background knowledge in using computers. This can be proved where the majority of the teachers (66.9%) have attended computer training courses. According to Kennewell (1992), teachers who participate in computer training courses provide a good foundation for further development, and will have long-lasting effect on the use of IT in their schools. This can be seen where the findings indicate that the majority of the teachers (83.1%) found IT to be useful. The result of the survey on teachers' confidence toward using computers was also encouraging, where most of the teachers who had moderate (47.5%) to high confidence (50.6%) showed strong optimism toward IT. Thus, it assumed that teachers can see the value of the computer in enhancing their students' learning and they are confident that they can use the computer in their classrooms. They are aware that they need to have confidence in using computers in order for them to be skilful. This is also supported by McFarlane and Jared's (1994) findings that suggested that confidence has a role to play in the effective IT usage in the classroom.

According to Hong & Koh (2002), "...teachers in rural secondary schools in Malaysia displayed positive attitudes toward computers and had low computer anxiety levels..." (p.44). This truly supports the findings where 78.8% of the teachers experienced very low anxiety in using computers. This shows that teachers who value computers as part of an asset in improving education will try to avoid computer anxiety in order to be competent, thus influencing their performance in IT. This is also suggested by Clark (2000) who stated that developing positive attitudes will help teachers gain more confidence, and prevent them from being apprehensive towards computers generally. The findings also indicate that most of the teachers had very low aversion (75.6%) toward IT. They did not have any negative reactions toward the implementation of computers in schools. In the same vein, teachers who are having positive attitudes toward computers, either directly or indirectly, have low levels of computer aversion toward IT. This is supported by Mohd. Said (1998) who said that most of the respondents in the research who displayed great high confidence in IT experienced great enjoyment, gave their full support and showed low aversion toward computers and reacted in a positive manner to using them.

Besides, Wong et al. (2003) reported that participants with computer experience are more likely to find IT useful, thus building greater confidence and having lower aversion towards IT. This can be seen in this research where most of the teachers had computer experience (66.9%) and low aversion (75.6%) in using computers. Where teachers' perceived competence toward IT was concerned, most of the teachers indicated that they had moderate levels of IT competence (55%). The result shows that teachers are between the range of "somewhat competent" and "competent" in using computers. This suggests that teachers are able to perform any task with some assistance and eventually complete the task given. They are able to integrate computers into their teaching lessons. In other words, teachers are able to use the technology, thus proving themselves to be competent enough to teach others to develop their skills in using computers. According to Motter (1995), such hands-on experience could increase the participants' positive attitudes toward computers and eventually increase their skills.

The findings also indicate that the majority of the participants had moderate levels of IT competence in basic computer operation skills (43.1%), word processing (48.1%), spreadsheet usage (51.9%) and telecommunication (48.1%). This shows that most of the teachers are "somewhat competent" (can perform tasks with assistance) or "competent" (can complete tasks) in using computers. However, most of the participants had low levels of IT competence in media communication (57.5%). They are not able to perform tasks in media communication such as using

the liquid crystal display (LCD) projector and developing electronic slides with sounds and multimedia.

This suggests that the majority of teachers are able to use some of the sub-domains, which are basic computer operation skills, word processing, spreadsheets and telecommunication in their daily life, or career-related activities. It is not surprising that most teachers feel competent in word processing and telecommunication, since these are two of the most widely used computer applications (Abdul Rahman & Jamaludin, 1997). In fact, it is also not surprising that teachers are competent in using the basic computer operation skills, since knowledge of operating systems is critical to most functions such as inserting floppy diskettes, creating folders and assessing information via floppy diskettes.

However, it is also not surprising to discover that teachers are not competent (cannot perform tasks) in media communication. It might be that there are more technical areas that need to be learned by teachers. Therefore, computer training that emphasises media communication should be given in order to improve teachers' levels of IT competence in that particular skill. This is also supported by Dusick (1998) who stated that teachers appear least competent in multimedia, networking, presentations and programming, due to their more technical natures. Therefore, teachers with low confidence in technology would be less likely to try them while teachers who are more confident may most likely not have difficulty in accessing more advanced and more expensive technology.

The findings show that there is a significant difference between the mean scores of teachers' attitudes for the competent and incompetent teachers. It is most likely that competent teachers have more positive attitudes ($M = 144.55$, $SD = 14.70$) compared to the incompetent teachers ($M = 126.67$, $SD = 14.70$). This suggests that being competent and having the right attitude in using computers are favourable assets for professional teachers in motivating their preparedness towards IT. The results of MANOVA also indicate that there is a significant difference between competent and incompetent teachers in terms of attitudes, which are usefulness, confidence, anxiety and aversion. This shows that teachers who are competent in using computers report that they find IT more useful. They are more confident and have lower levels of anxiety and aversion compared to incompetent teachers. Burkett et al. (2001) also agreed that teachers with lower anxiety and aversion, as well as having confidence in IT, are most likely to acquire creditable competency in the technology. Clearly, investment in new technologies will be effective only if teachers are willing to become fully competent in using these technologies. In addition, computer literacy is essential if teachers want to progress and develop (Abdul Hamid, 1993). Teachers need to reflect upon themselves that they are not only doing so for the benefit of the education system, but they are actually rewarding themselves by having the right attitudes and values, as well as being competent in using the technologies.

CONCLUSION

Several positive findings emerged from this study. It was found that teachers seem to have positive attitudes toward new technologies. They seem to find IT more useful and have greater confidence, lower levels of anxiety and aversion toward using computers. This shows that teachers are proactive in today's challenge where IT plays a part in the education system. Teachers' attitudes must always be commensurate with the right attitude needed to face the current technology, which always evolves without limitations. In fact, there is a need for teachers to improve their skills through frequent use, and practice, in order for them to successfully use any technology in teaching. This is because there is no reason to believe that the technology evolution will stop. Therefore, training programmes must be added, removed or revised, as new technologies evolve.. Education is always concerned with the development of the potential of individuals for the future, not only among students but also among teachers. Therefore, teachers must understand that learning how to use computers does not play a part only in accumulating knowledge and new skills, but also that a greater part of learning is the result of trial-and-error endeavours in normal life. Therefore, teachers

ought to have the courage to try new skills without apprehension, so that they are able to act as agents of change to fulfil the national aspirations enunciated in the philosophy of Malaysian education.

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