

# Factors Affecting Teachers' Competence in the Field of Information Technology

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## Abstract

The development of learning technology today, have a direct impact on improving teachers' information technology competence. This paper is presented the results of research related to teachers' information technology competence. The study was conducted with a survey of some 245 vocational high school teachers. There are two types of instrument used in taking the data, namely questionnaires and observation sheets. Questionnaire was used to obtain data on teacher interpersonal communication, use of information technology tools, teachers' perceptions toward information technology, and self-improvement of teachers. Observation sheet used to obtain data on teacher competence in the field of information technology Data was analyzed using path analysis through SPSS 12 and LISREL 8:30. The analysis showed teachers' competence in the field of information technology is influenced by the teacher interpersonal communication, use of information technology tools, teachers' perceptions toward information technology and self-improvement of teachers either directly or indirectly.

**Keywords:** competence, information technology, vocational high school

## 1. Introduction

To get the optimal goal of learning requires teachers who are competent in managing learning. Teachers' competence in the field of information technology is a critical need to improve learning outcomes. The linkage between technology, dissemination of information on human resource development, and readiness of individuals ability to work can begin from home (Chin & Horton, 1994). Teachers are required to follow the development of technology to improve its information technology competence, in ensuring its position as a leader in the use of learning technology. This is in line with the professionalism of educators (teachers), and responsibility as learning planners. Teachers are agents of change among learners and technologies and plays an important role in the learning process.

The new technology promises a rich educational experience and provides significant gains in learning. Learning is done using traditional methods and the internet together, better than just learning to use the Internet or a traditional lecture course (Dede, 1997; Goldberg, 2005). Achievement of students with learning using the Internet in a laboratory, higher than students who are taught using a traditional classroom approach (Day & Raven, 1998). Computer-based learning is a joyful learning, more motivating, and students' understanding of the concept better during the learning takes place (Ganguli, 1992). Through a simulation of computer, the students get better scores than students who learned with the traditional lecture method and the method of recurrent learning (Jackman & Moellenberg, 1998).

The use of appropriate technology in teaching by teachers, who are competent in the field of information technology, will provide good learning outcomes. Thomas (1993) stated that there needs to be a standard for (1) The use of computer-based technology to access information to increase personal productivity professional teachers, and (2) The use of computers and related technology to facilitate the role of teachers and students who appeared in the learning activities. This needs to be done in connection with research on teacher pedagogy that includes the proper knowledge and experience with computer education, including the use of computers and technology related to learning, assessment and professional productivity (NCATE, 2000).

As information technology hardware and software is used to implement the use of the training/practice, tutorials, simulations/ games, word processing, coloring/ drawing, music composition, spread sheets/graphics/statistics, electronic bulletin boards, electronic encyclopedias, catalog automatic card, student information, packet communications, electronic mail, conferencing group and budget inquiry. In learning the necessary aspects of computer self-directed (self-direction). The adult learning theory is appropriate to improve the competence of information technology. Adult learning theory include intrinsic motivation, problem-solving task , and the value of approaching learning activities (Heerman, 1986, pp. 117-124). Practicing combines competence in knowledge of software systems with special skills are essential in order to prepare the implementing learning (Zemke, 1984, p. 45). The incorporation of these competencies will facilitate the teachers in processing the information into materials and implement technology-based learning. Burke (2005) states teachers are required to not only know how to use the technology but also to know when and why to use it.

Important single factor in determining the success of technology in the classroom is the teacher understands and can use a computer. The technology is said to be successful if the technology can be used in accordance with the purpose of utilization. Competence is meant is the ability to use information technology in playing (using) on-line and library research, manipulating and analyzing data, writing the text and hypertext, plotting graphs and create multimedia products and is a standard unit of computer technology in the use of technology in the classroom are grouped in four general domains, namely: (1) the operation of the basic technology, (2) technological tools in using personally and professionally, (3) social issues , ethics and humanity, and (4) the use of technology in learning. Each domain can be described in specific skills, competencies that are sorted from the simple to the complex so that comprehension skills can be cumulative (New Century College, 2005; Teacher Technology Competency Committee, 2005). Information technology in learning enables the expansion of the power of perception, comprehension, analysis, thoughts, concentration and articulation through a series of activities. Evanciew and Rojewsky (1999) stated that competency can be established through effective communication and continuous learning efforts that are part repair. And Sa'ari et al. (2005) states that the same perception of teachers towards information technology also influence teachers' competence in the field of information technology. Positive perception will encourage efforts to learn which is the element of self-improvement.

Diagram of relationships between variables Interpersonal Communications (IC), the Use of Information Technology (UIT), Teacher Perception (TP), Self-Improvement (SI), and Information Technology Competence (ITC) is described as Figure 1.

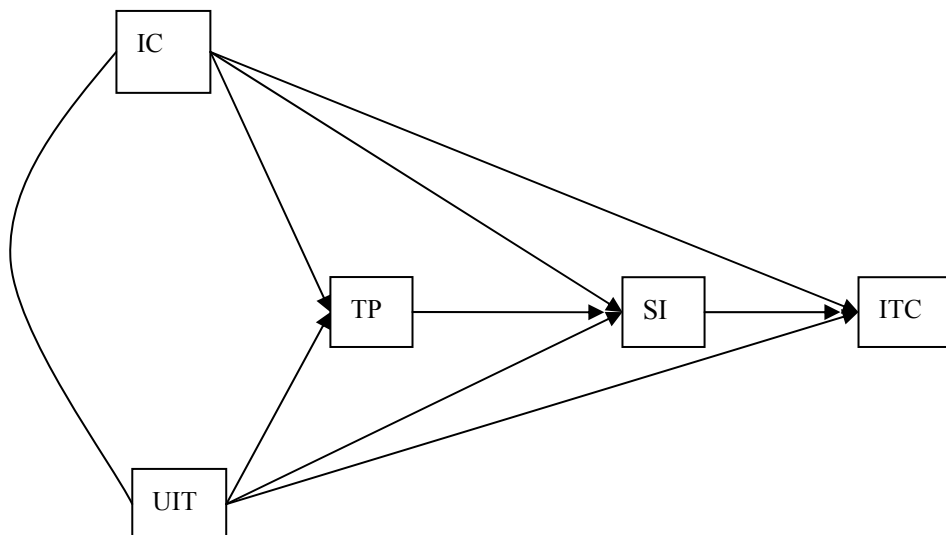


Figure 1. Diagram of the relationship between variables

## 2. Methodology

Data were obtained through a survey. The instrument used was a result of the development and testing instruments. Questionnaire is used to get data of teacher interpersonal communication, use of information technology tools, teachers' perceptions of information technology, and self-improvement of teachers. The reliability coefficient of each of them is 0.9167, 0.9176, 0.9354, 0.9381. Then the data of teacher competence in the field of information technology is taken through the assessment form, which had reliability coefficient 0.7309. The sum of respondents were involved in this study was 245 out of 728 of vocational high school teachers in Medan-Indonesia. There was 17 vocational high schools in Medan. Sample was taken by stratified proportional sampling. Data were analyzed with path analysis using software SPSS.12, and Lisrel 8.30.

## 3. Results

The data of this study are described as shown in Table 1.

Table 1. Description of research data.

No.	Variable	Mean	Median	Modus	Category
1.	Interpersonal Communication (IC)	41.52	41	41	Less
2.	Use of Information Technology (UIT)	41.69	42	40	Less
3.	Teacher Perception (TP)	134.15	134	132	High
4.	Self-Improvement (SI)	77.49	77	49	Sufficient
5.	Information Technology Competence (ITC).	67.11	67	66	Sufficient

In Table 1, it appears that the perception of teachers towards information technology at the high category. Other factors are at sufficient and less category. Obtained from the assumption test that, in terms of normality, terms of homogeneity and linearity requirements fulfill to the next test. Test models of causality simple correlations between variables shown in Table 2.

Table 2. Correlation matrix

	IC	UIT	TP	SI	ITC
IC	1	-	-	-	-
UIT	0.30*	1	-	-	-
TP	0.24*	0.30*	1	-	-
SI	0.53*	0.32*	0.33*	1	-
ITC	0.43*	0.50*	0.49*	0.45*	1

(\*) = Sig = 0.05

The test results in Table 3 showed that the model was fit to the data so that it can be used generalize teacher competence in the field of information technology.

Table 3. Fitness model test

Goodness of Fit (GOF)	Estimate	Model Test
Chi-square (df = 1)	31.13	Fit
Nilai P	0.17	Fit
Root Mean Square Error of Approximation (RMSEA)	0.353	Fit

The analysis showed that all path coefficients between variables are significant. Based on this, does not need to be modified. The pattern of causal relationships between variables is the same as the proposed model. The shape

of model constructed fulfilled as a good model for improving teacher competence in the field of information technology. In this case, the variables included in the model are the teacher interpersonal communication. The use of information technology tools, Teachers' perceptions of information technology, and Self-improvement of teachers. Path coefficients between variables are presented in Table 4.

Table 4. Path coefficients between variables

	TP	UIT	SI	ITC
IC	p=0.1633. t=2.57	-	p=0.4509. t=8.13	p=0.2078. t=3.4
TP	-	-	p=0.1838. t=3.3	-
UIT	p=0.2568. t=4.04	-	p=0.1289. t=2.28	P=0.3644. t=6.68
SI	-	-	-	p=0.2232. t=3.63

$\alpha = 0.05$

IC = Interpersonal Communication

TP = Teachers' Perception

UIT = Use of Information Technology

SI = Self Improvement

ITC = Information Technology Competence

As shown in Table 4. at significance level  $\alpha = 0.05$  that (1) The interpersonal communication of teacher influence teachers' perceptions to Information Technology directly. (2) The use of information technology affecting teachers' perceptions about information technology directly. (3) The interpersonal communication affect teacher self-improvement of teachers directly. (4) The use of information technology affects the self-improvement of teachers directly. (5) The teachers' perceptions about information technology affect teachers' self improvement directly. (6) The interpersonal communication of teachers affect teachers' information technology competence directly. (7) The use of the information technology influence the teachers' competence in the field of information technology directly. (8) The self improvement of teachers affect the information technology competence of teachers directly. Based on this results, It can be concluded that the model of the relationship of these variables can generalize the level of information technology competence of teachers. The effect exogen variable against endogen variable is showed in Table 5.

Table 5. The effect of exogen variable against endogen variable

Exogen Variable	Endogen variable - Information Technology Competence (ITC)					
	Total	t-test	Result ( $t_{\text{tab } \alpha = 0.05, df = 240} = 1.96$ )	Indirect effect	t-test	Result ( $t_{\text{tab } \alpha = 0.05, df = 240} = 1.96$ )
IC	0.3152	5.7460	Sig.	0.1226	3.4185	Sig.
UIT	0.4307	7.3606	Sig.	0.1055	3.8638	Sig.
TP	0.3353	6.5412	Sig.	0.0277	2.0297	Sig.
SI	0.1505	2.5674	Sig.	-	-	-

In Table 5, it appears that interpersonal communication (IC). Use of information technology and Teacher's perception were affect Information technology competence of teacher indirectly.

#### 4. Discussion

The importance of teachers' competence in the field of information technology is to help students to search for information, to process information and to present information during the learning process. This is consistent with the findings of research conducted by Sangra and Gonzales (2010) on the role of information and communication technologies in improving the learning and teaching process. Based on this, the teacher needs to be improved competence in the field of information technology through the addition of frequency of

interpersonal communication among fellow teachers, between teachers and students, between teachers even with people who are involved with education. The things that need to be communicated are related to the use of information technology in learning. Ongoing communication between teachers and teachers and between teachers and students enabling them to share the latest information regarding the usefulness of information technology in the field of learning. The latest information obtained by the teacher can encourage teachers to learn at their own initiative or through discussion with people who understand more about the use of information technology in learning. If such an effort is underway on an ongoing basis is certainly the knowledge and skills of teachers will increase. With the understanding that there has been a teacher of self-improvement, such conditions need to be created by education managers wisely. Seminars or workshops on the use of information technology are the right choice for this purpose.

Teachers need to realize and accept that the beneficial information technology in learning. This is in line with research findings Gosper et al. (2010) about teaching and learning and web-based lecture technologies. On the awareness of teachers about this interest will be the impetus for teachers to understand the use of information technology. Conditions such as these are part of the process of self-improvement of teachers towards improving teacher competence in the field of information technology. Teacher involvement in activities that use information technology tools in learning, an alternative to improve the competence of teachers in the field of information technology. Such conditions will provide wider opportunities for teachers to become competent in the field of information technology.

### 5. Suggestions

Based on this finding, the Institution and the Teacher were hoped to give an attention to the competence of graduates in the field of information technology. In line with the utilization of information technology needs to be poured into the curriculum. To support efforts to improve teacher competence in the field of information technology, education managers should allocate sufficient funds for the development of information technology in learning as required by the teacher.

The executive is expected to increase the competence of learning through the use of information technology in learning on an ongoing basis. Network providers would be able to provide school fee waivers for institutions that require network services in order to improve the quality of education can deliver maximum results. Subsequent researches by other researchers are expected to examine other factors related to teacher competence in the field of information technology. The more factors that are known to affect the competence of teachers in the field of information technology, measures to improve the competence of teachers will be more effective.

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