

## Measuring Technology Acceptance in Educators: Adapting an Instrument

Paper presented at the 2012 New England Education Research Organization annual conference

Portsmouth, NH

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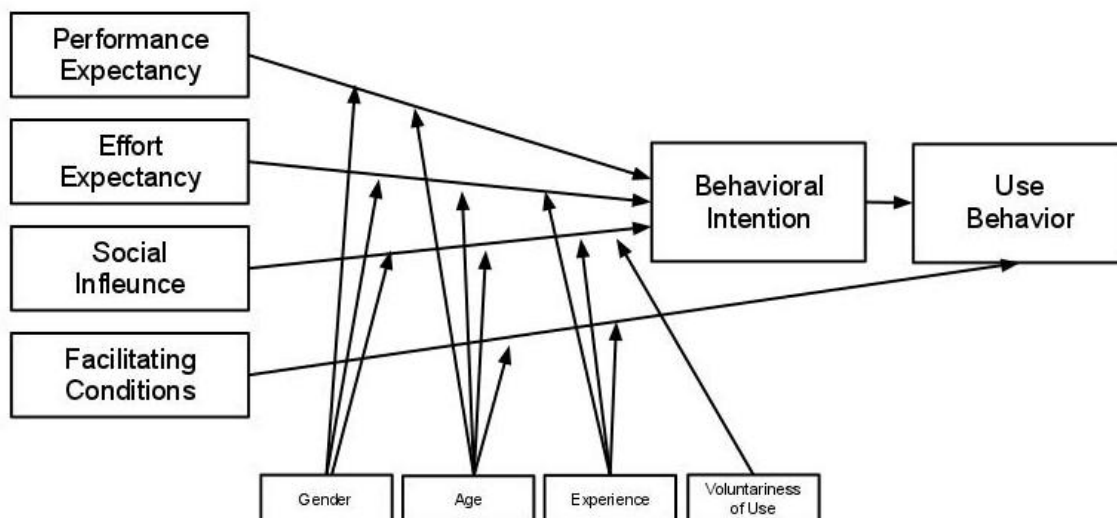
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In recent decades, information and computer technology (ICT) has transformed almost every aspect of economic, political, and cultural life in those societies where it is available. In fields other than K-12 education, much of the research that supported the development of the widely used ICT-based tools and practices has been informed by the technology acceptance model (TAM) (Davis, 1989). According to TAM, three factors (perceived ease of use, perceived usefulness, and perceived social norms) are positively associated with the decision to use ICT.

Although TAM-based research has begun to appear with increased frequency in the literature for K-12 educators and an instrument to measure TAM in youngsters has been validated (Teo & Noyes, 2008) and another has been validated for pre-service educators (Teo & Noyes, 2010), educational researchers appear to use alternative methods for measuring factors related to the use of ICT among populations of relevance to K-12 education. No model appears to have gained widespread use for measuring factors related to ICT in K-12 populations in the same way that TAM has been adopted by researchers in business and industry.

Recognizing the similarities between eight theories used by scholars in the field, Venkatech, Morris, Davis, & Davis (2003) proposed the Unified Theory of Acceptance and Use

of Technology (UTAUT) to unify those theories into a single theory. According to UTAUT, four factors a) performance expectancy, b) effort expectancy, c) social influences, and d) facilitating conditions are directly associated with the behavioral intention to use ICT. Four additional factors a) gender, b) age, c) experience, and d) voluntariness of use are indirectly associated with the behavioral intention to use ICT (see figure 1). Performance expectancy is the construct that estimates the degree to which the user perceives that he or she can use ICT to do accomplish job tasks and responsibilities. Effort expectancy is the construct that estimates the degree to which ICT is perceived to be easy to use. Social influences is the construct that estimates the degree to which the user perceives those whose opinions are valued believe one should use ICT and the social advantages of using (or not using ICT). Facilitating conditions is the construct that estimates the extent to which an organization provides financial, technical, leadership and similar support. Venkatesh, Morris, Davis, and Davis validated an instrument to estimate the level to which respondents experienced each factor.



**Figure 1.** UTAUT adapted from Vekatesh, Morris, Davis, and Davis (2003)

### **Purpose**

The instrument developed by Venkatech, Morris, Davis, & Davis (2003) was designed to measure factors influencing technology use within professionals working in diverse businesses and industries other than education. Further, the details of how the instrument was administered by Venkatech, Morris, Davis, and Davis were uncertain, although there was suggestion that it was administered via paper marked by each subject. The purpose of this research was to adapt the instrument developed by Ventatech, Morris, Davis, and Davis so that the language was meaningful for K-12 educators and so that it could be administered via a web interface. Once adapted in this manner, data was collected to determine the internal consistency reliability of the instrument.

### **Methods**

The items in the instrument development by Vekatesh, Morris, Davis, and Davis (2003) were rewritten to reflect the conditions common in K-12 schools. Once modified, the instrument was made available to a convenience sample of K-12 educators via a World Wide Web form. Cronbach's Alpha was used to estimate the internal reliability of the items designed to measure each factor of UTAUT.

### **The Instrument**

Venkatesh, Morris, Davis and Davis (2003) created a 31-item instrument for the purpose of validating the theory. Those scholars determined that several of the items could be removed from the instrument as they estimated very similar factors. The remaining items were used to create a 17-item instrument in the current research; each of the four factors posited to affect

intention to use ICT are measured with four different items. A final item on the instrument measures behavioral intention to use ICT in instruction.

The 17 items were transcribed into a form on Google Docs, and when the items were transcribed, the researcher changed the language to more accurately reflect the work settings of K-12 educators. Each item was associated with a six-point Likert scale, one end of the scale was labeled “Definitely no” and the other end “Definitely yes” (see figure 2). A sample of five educators completed the survey for the purpose of editing the items and testing the compilation formulas on the spreadsheet linked to the form. Those educators recommended several changes in language and also made several recommendations related to the presentation of the questions to participants. The version of the form (see appendix A) completed by the subjects is available online (Ackerman, 2011).

**The challenge of learning about computers is exciting.**

0 1 2 3 4 5

Definitely no       Definitely yes

**I intend to teach with the system in the next month.**

0 1 2 3 4 5

Definitely no       Definitely yes

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**Figure 2.** Examples of the UTAUT items on the web form

### **The Population**

The instrument was made available to all of the faculty and staff working at four small schools in a supervisory union located in working-class towns in Vermont. This population represents a convenience sample of the researcher's colleagues. The population was invited to participate in the study through an email request made using the email system provided by the school. It is estimated that the message was sent to 250 potential participants; the number who actually received the message is not known. No efforts were made to track participation, and no efforts were made to follow-up with non-respondents. No demographic data were collected from respondents.

### **Data Analysis**

The instrument was designed to estimate the level of performance expectation, effort expectancy, social influence, and facilitating conditions experienced by each respondent. For each factor there were four items, and Cronbach's Alpha was calculated to estimate the internal consistency reliability of the items. Only those participants who had responded to all of items for a factor were included in the calculation of Cronbach's alpha for that factor.

### **Results**

The request for participation was sent on a Thursday morning, and by the end of the school day on the following Monday, 40 people had begun the instrument. Two participants completed fewer than five items, so those cases were excluded. Valid N and estimates of internal reliability for each factor are indicated in table 1.

Table 1. Valid N and Cronbach's alpha for each factor

Variable	Valid N	Cronbach's Alpha
Performance Expectancy	34	.92
Effort Expectancy	38	.81
Social Influences	35	.74
Facilitating Conditions	32	.69

### Discussion

When using Cronbach's alpha as an estimate of internal reliability, a value of .70 is generally taken as the minimum acceptable value to conclude the instrument is internally reliable. Using this measure, it appears that the instrument as presented to his population is internally reliable for PE, EE, and SI.

The internal reliability of the instrument for FC is questionable. This may reflect conditions in the population as opposed to problems with the instrument, however. Many facilitating conditions are associated with leadership and support, and the population that participated in this research had experienced recent changes in leadership and support. The educators work in four different school buildings, two of which had new administrators who were assuming active leadership roles relative to educational technology. Further, there was a new superintendent in the school district, and the district technology coordinator had resigned abruptly about a month before the instrument was administered. The extent to which these extraneous factors related to leadership and support influenced the responses is unknown.

These initial results suggest this instrument for measuring factors associated with technology acceptance in populations of K-12 educators is likely to be internally reliable. Considering the relatively homogeneous population (all of the towns a adjacent and governed by the same bodies) and the lack of controls for who participated, it is reasonable to further measure

internal consistency reliability with larger and more diverse populations. It does appear, however, that the current language and administration via the web can produce internally consistent data within populations of K-12 educators.

No efforts were made to triangulate this data with other measures of factors related to technology acceptance within the population. Such steps are necessary before this instrument is considered a valid measure of the factors related to technology acceptance in K-12 educators.

While this is only a first step in measuring these factors, further research to elucidate the extent to which UTAUT describes K-12 populations is anticipated to shed light on important factors related to the adoption of ICT for curriculum and instruction. Also, further study confirming the applicability of UTAUT to K-12 populations may allow researchers and planners to justify decisions to apply findings of research describing ICT in other organizations to K-12 settings.

## Appendix A. The instrument as presented to subjects

## Unified Theory of Acceptance and Use of Technology

In this survey, ICT or "the system" refers to the information and computer technology that you use for curriculum and instruction in your classroom or in other rooms in your school (e.g. computer rooms, library, and other common spaces).

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**I find the system useful in my job.**

0 1 2 3 4 5

Definitely no       Definitely yes

**I find it easy to get ICT to do what I want it to.**

0 1 2 3 4 5

Definitely no       Definitely yes

**People who influence me think I should use ICT in my classroom.**

0 1 2 3 4 5

Definitely no       Definitely yes

**The system I have for teaching is compatible with other systems I use.**

0 1 2 3 4 5

Definitely no       Definitely yes

**Using the system improves the quality of my teaching.**

0 1 2 3 4 5

Definitely no       Definitely yes

**Learning to do new things with the system is easy for me.**

0 1 2 3 4 5

Definitely no       Definitely yes

**People who are important to me think I should use ICT in my classroom.**

0 1 2 3 4 5

Definitely no       Definitely yes

**I have the resources necessary to use the system.**

0 1 2 3 4 5

Definitely no       Definitely yes

**Using the system increases my productivity.**

0 1 2 3 4 5

Definitely no       Definitely yes

**Teaching with ICT is so complicated, it is difficult to understand what is going on.**

0 1 2 3 4 5

Definitely no       Definitely yes

**School administrators have been helpful in the use of the system.**

0 1 2 3 4 5

Definitely no       Definitely yes

**I have the knowledge necessary to use the system.**

1 2 3 4 5

Definitely no      Definitely yes

**If I use ICT, I will increase my effectiveness in the classroom.**

0 1 2 3 4 5

Definitely no       Definitely yes

**It is easy for me to get the system to do what I want.**

0 1 2 3 4 5

Definitely no       Definitely yes

**In general, the school has supported the use of the system.**

0 1 2 3 4 5

Definitely no       Definitely yes

**A specific person is available for assistance with difficulties.**

0 1 2 3 4 5

Definitely no       Definitely yes

**I intend to teach with the system in the next month.**

0 1 2 3 4 5

Definitely no       Definitely yes

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