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Meni Koslowsky, Aryeh Lazar and Michael Hoffman
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VALIDATING AN ATTITUDE TOWARD COMPUTER SCALE

MENI KOSLOWSKY, ARYEH LAZAR, AND MICHAEL HOFFMAN
Bar-Ilan University
Ramat-Gan, Israel

Although several investigators have developed computer attitude scales, predictive validity of the scales has not been examined. For purposes of the present research, a computer attitude scale was designed and tested on a group of 162 university freshmen. Two factors, the computer as a controlling device and as a challenging instrument, explained a large portion of the variance in the scale; however, only the challenging factor, with predictive validity less than .20, showed any association with future computer activity. Some explanations for the findings were mentioned.

SEVERAL researchers have developed scales for measuring computer attitudes (Lee, 1970; Popovich, Hyde, Zakrajsek, and Blumer, 1987; Quintanar, Crowell, and Pryor, 1982). Generally, the scales were analyzed descriptively and psychometrically. For example, Popovich et al. (1987) discussed the internal consistency and concurrent validity of their measure. In addition, they examined sex differences on attitudes towards computer usage. However, none of the investigators cited above examined the predictive validity of the scales. Phrased somewhat differently, scales that are psychometrically sound have been developed, but the research has not shown whether they predict actual computer usage.

The purpose of the present study was to develop an instrument that meets accepted psychometric standards and is able to predict computer usage. Incorporating concepts from previous attitude scales, the present instrument was designed as part of a large-scale longitudinal study on computer activity of university students.
Method

Subjects

A total of 162 first-year undergraduate students at Bar-Ilan University in Israel participated in this phase of the study. All were taking their first computer course as part of their departmental requirements. Their ages varied from 17 to 49 (\( \bar{X} = 25, SD = 6.3 \)). The ages are somewhat inflated because most of the sample had finished at least three years of compulsory military service for men and two years for women. Of this group, 52 (32%) were men, 94 (58%) were women, and 16 (10%) refused to answer this question.

Measures

Computer Attitude Scale (CAS). The Computer Attitude Scale (CAS) developed here consists of 34 cognitive items that are based on findings from several researchers. The first major attitude investigation was conducted by Lee (1970). Through factor analysis the author identified factors relating to the importance of the computer for mankind and its awesome potential or power. Research by Peace and Easterby (1973) identified two bipolar dimensions in computer attitudes: man-machine and practical-theoretical. Finally, Morrison (1983) found that individuals were able to distinguish between positive, negative, and the practical aspects of computers. Subjects in the study also perceived the computer as an awesome or somewhat threatening machine.

Based on the concepts and many of the individual items employed in previous research, the middle author developed a scale of 34 items. The scale consisted of 5-point Likert-type items, with "1" representing "agree strongly" and "5" representing "disagree strongly." Before use in the present study, the scale was first employed with a pilot group of 50 subjects. Their responses as well as reactions to specific items caused a slight modification in wording or phrasing. However, the number of items as well as the intent of each item was not changed from the pilot study to the present empirical application.

Examples of the items used include "the computer is an interesting machine," "the computer is very complex," "the computer thinks like a human being," and "the computer controls our lives."¹

As was done in nearly all previous studies, a factor analysis was

¹ For a complete list of the items translated into English, please contact the senior author.
used to group similar variables and provide labels to these clusters. Two major factors were identified: the computer as a controlling device and as a challenging machine. The controlling factor explained 17% of the variance and consists of eight items all with item factor loadings higher than .43. Reliability as measured by coefficient alpha for the controlling factor was .77. The second factor explained slightly more than 9% of the variance and consists of five items each with loadings greater than .52. Coefficient alpha for the second factor was .82.

Dependent Measures

Three computer usage measures were calculated for each subject. The first measure was the absolute number of computer sessions; i.e., a session is defined as each time the student turns the computer on and enters an identification number (Sess). The second outcome measure consists of elapsed time from the beginning of session to the end of the session (Totime). The third measure consisted of the student-computer interaction time on the computer (Intime). The last two measures are calculated in fractions of hours. Intime is usually considerably less than Totime because much of the actual time that a student is sitting next to a computer involves such activities as thinking which button to press, hesitation or other distractions. For an experienced programmer, the ratio between Intime and Totime will be considerably closer to 1.

Procedure

At the beginning of the semester, students were asked to fill out several attitude and personality questionnaires as part of a large study on computer usage at Bar-Ilan University.

The data on students' computer usage were then collected over an effective 12-week semester. Each time a student had any computer activity, the duration and the fact of the interaction were recorded in an internal systems log. Usage data were available daily, weekly, and for the entire period of study. All statistical determinations were made using the SAS program which also proved invaluable in merging and combining the internal systems data.

Results and Discussion

As can be seen from Table 1, students on the average found the computer challenging ($\bar{x} = 3.65$, $SD = .62$). The obtained average
TABLE 1
Pearson Correlations Between the Two Predictor Factors and Three Usage Measures (N = 162)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>2.76</td>
<td>.66</td>
<td>.03</td>
<td>-.03</td>
<td>.07</td>
</tr>
<tr>
<td>2.</td>
<td>3.65</td>
<td>.62</td>
<td>.18*</td>
<td>.09</td>
<td>.16*</td>
</tr>
<tr>
<td>3.</td>
<td>17.94</td>
<td>14.54</td>
<td>.57**</td>
<td>.58**</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>0.37</td>
<td>0.21</td>
<td>.70**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>0.23</td>
<td>0.22</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The average values for Totime and Intime refer to fraction of an hour spent by students at each session.

* p < .05. ** p < .01.

value is only slightly less than "4", which signifies agreement with the statement. As for the perception that the computer is a controlling device, students’ responses were closer to the center on the 5-point Likert scale (\(\bar{x} = 2.76, SD = .66\)).

The analysis of computer activity showed that the average student had slightly less than 18 computer sessions during the 12-week semester. Average elapsed time during these sessions was about one-third of an hour and interaction time averaged slightly more than a fifth of an hour. The relatively high standard deviations for the three measures were a function of the large observed ranges.

Although intercorrelations among the various activity measures were relatively high, the predictions of usage based on the two factors were low. The controlling factor did not correlate significantly with any of the activity measures. The challenging factor correlated .18 (\(p < .05\)) with sessions and .16 (\(p < .05\)) with Intime.

The results indicate that computer attitudes as measured here are at best a moderate predictor of actual usage. From an examination of the patterns of usage over the 12-week period, the students are not behaving uniformly, both within their individual usage curves and between usage curves. Students appear to be responding to various internal and external stimuli. For some, activity increases as the semester draws to a close; for others, the opposite occurs; i.e., usage was highest at the beginning.

Future researchers need to pursue the question of the relationship between computer attitude and usage from different perspectives. The present authors are investigating possible influences of previous experiences or personality on observed behavior. In addition, attitudes expressed at the beginning of a computer course may need several follow-ups to see if the behavior itself changes the attitude.
REFERENCES


