Assessing Student Acceptance of Moodle

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Abstract

This paper presents the results of an attempt to adapt the technology acceptance model to a questionnaire to indicate whether or not the Moodle content management system was accepted by 147 Japanese University English language students. The questionnaire consisted of 13 items based on the factors of usefulness and ease-of-use. A factor analysis was performed on the results to ensure the number of underlying factors explaining the data. The result indicated that 2 factors explained more than 94% of item variation. In addition, a discussion of the individual participant answers demonstrated that more than 85% of participants of this study accepted the Moodle system as both useful and easy to use.

Student Reactions to Moodle

There are several intention-based theories that are used to explain user technology acceptance including the theory of reasoned action (TRA) (Fishbein & Ajzen, 1975) (Ajzen, 1980) an early form of the theory of planned behavior (TPB) (Ajzen, 1991) which deals with how behavioral beliefs produce a favorable or unfavorable attitude toward the behavior. In addition to these there are the technology acceptance model (TAM) (Davies, 1986) and social cognitive theory (SCT) (D. R. Compeau & Higgins, 1995) (Hill, Smith, & Mann, 1987).

While TRA and TPB attempt to explain and predict individual behavior, TAM is an adaptation of TRA which tries to specifically explain computer and information technology (IT) usage behavior (Davies, 1986).

The theoretical perspectives of TAM have been widely discussed; these include, but are not limited to, how an individual's beliefs about their abilities to competently use computers can affect actual computer use. (D. Compeau, Higgins, & Huff, 1999); the psychological origins of perceived usefulness and ease-of-use found in TAM (Karahanna & Straub, 1999); the application of TAM across different countries and cultures (Straub, Keil, & Brenner, 1997); demonstrating the important effect user satisfaction has on system usage (Igbaria & Tan, 1997); and demonstrating the predictive power of TRA (Sheppard, Jon, & Warshaw, 1988).

Davis (1986) developed TAM as a way to describe the attitudes of people to computers and IT systems based on perceived ease-of-use and usefulness with the belief that these factors can directly affect an individual's attitude towards technology. Perceived ease-of-use is the degree of effort required by a person using the system, while perceived usefulness is the degree to which a person believes a system will help them do their job.

This study used a questionnaire based on TAM in order to assess individual perceptions toward the computer based content management system Moodle (Dougiamas, 1999). Moodle is an Open Source Course Management System (CMS), also known as a Learning Management System (LMS) or a Virtual Learning Environment (VLE). It has become very popular among educators around the world and has been translated into many languages.

In order to improve the reliability and validity of the questionnaire six steps were followed: a research objective was defined, a sample was selected, questionnaire format was decided, revision of the questionnaire was performed

to improve validity, internet distribution of the questionnaire with a cover page, and analyzing the data results.

The sample of participants consisted of 147 University students studying English as a Foreign language (EFL) at a private university in Tokyo, Japan. The participants were asked to complete a web based questionnaire modeled after Davies (1986) that consisted of 13 items designed to measure their perceived ease-of-use and perceived usefulness of the Moodle system. At the time of this study, all of the participants had used the Moodle system on a weekly basis for at least 6 months.

After a review of the literature a pool of 20 items was created following the model proposed by Davies (1986) where 10 items were expected to cover usefulness and the other 10 items to cover ease-of-use. This pool was screened by 2 native English speaking professors to eliminate any duplicate or ambiguous items. This initial quality control was helpful and the original 20 items were reduced to 13 items. In addition, since the items were presented in English, the participants' second language, an initial testing of item wording was performed. Three Japanese native speaker professors, all currently working in the area of English education, were given the questionnaire and asked to highlight any language that they thought might cause confusion for the Japanese native speaking participants. At the suggestion of the testers, some minor vocabulary and grammar changes were made with the idea that this would improve overall validity.

Upon entering the web site of the on-line questionnaire the students were first presented with a cover page explaining the purpose of the study and clearly indicating that no personal information of any kind would be collected or stored. After agreeing to continue they were presented with the 13 item questionnaire consisting of statements directly related to the ease-of-use and usefulness

of Moodle. In order to measure their level of agreement to each statement participants chose a value on a Likert scale from 1 to 5, where 1 meant strongly disagree and 5 meant strongly agree.

Initially, items 1 to 6 were expected to measure perceived usefulness while items 7 to 13 were expected to measure perceived ease-of-use. In order to confirm that this was the case a factor analysis with varimax rotation was performed. The primary purpose of the factor analysis is to determine the number of factors underlying the questionnaire items. The result of the factor analysis is presented in table 1. The factor analysis was run for 1, 2 and 3 factors. When 2 factors were tested the cumulative variation represented by both factors combined was 0.942 or in other words, 94.2% of data variation was accounted for within these 2 factors. In addition to this cumulative percentage, the proportional variation was very balanced at 0.517 for factor 1 and 0.425 for factor 2. Since this is a very good result it was determined that there were 2 factors underlying the items. This result supports TAM which predicts two main factors of usefulness and ease-of-use.

Next, an interpretation of the results was required to decide which of the 2 factors were underlying each of the 13 items. There are no absolute values at which to cut off an item from a factor, so the choice is based on personal judgment and prior studies. For this study a low limit of 0.70 loading was chosen for the interpretation because it is a commonly used value when looking for significant loadings. This means, items with a loading of 0.70 or greater on a factor were seen to belong to that factor. Table 1 shows that items 1, 2, 3, 4, 5, 6, 9, 10, and 13 loaded on factor one. Items 7, 8, 11, and 12 loaded on factor 2. Although the results are very close to the goal of having items 1 to 6 measure usefulness and items 7 to 13 measure ease-of use, there were some unexpected results. Items 9, 10, and 13 were predicted to belong to factor 2, ease-of-use,

but they have loadings above 0.70 on factor 1. However, when we plot these loadings in figure 1 we can better visualize the loading relationship. The items in question, 9, 10, and 13 are on the very edge of the factor 1 group and very close to the 0.70 loading limit of the factor 2 group. So it could be said that items 9, 10, and 13 could be explained by either factor.

The main goal of this study was to use TAM and measure participant perceived usefulness and ease-of-use in order to get a picture of overall participant acceptance of the Moodle system. The results of the individual participant answers are represented in chart 1 and table 2. Here each possible answer from 1 (strongly disagree) through 5 (strongly agree) were broken down into a percentage of total answers over 147 participants. The percentage of total answers represented by all 1 and 2 answers was approximately 15% and is highest on item 8 (I would find it easy to get Moodle to do what I want it to do.) where 32 participants answering 1 or 2. And so, approximately 85% of all participant answers included 3, 4, or 5. These results suggest that the majority of participants in this study felt Moodle was both useful and easy to use. Therefore according to TAM these results indicate a high level of technological acceptance of Moodle amongst the participants.

This paper presented the results of a questionnaire consisting of 13 items with 2 dimensions or factors representing participant perceived usefulness and ease-of-use towards the Moodle CMS. These items were based on the technology acceptance model which uses the same factors to predict user acceptance of technology. The results demonstrated that the data collected in this study could be explained by these two factors to a level higher than 94%. In addition, the responses indicated a high degree of acceptance amongst these participants that Moodle is both useful and easy to use.

Finally, there are several points that should be mentioned. This study

focused only on the Moodle content management system and its use by Japanese EFL students, so the results may not apply to other situations. Also, in the future this study could be repeated with a wider sample of participants. Another area of improvement would be the use of multiple regression analysis to investigate the relationship between usefulness and ease-of-use. And still another elaboration would be to allow the participants to repeat the questionnaire over time and investigate the results through a longitudinal study.

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Table 1
Factor Analysis Results

	Item	Uniqueness	Factor 1	Factor 2
1	Using Moodle in school would enable me to accomplish tasks more quickly.	0.028	**0.796**	0.582
2	Using Moodle. would improve my job performance.	0.040	**0.821**	0.535
3	Using Moodle. in at school would increase my productivity.	0.070	**0.807**	0.529
4	Using Moodle would enhance my effectiveness of my studies.	0.066	**0.782**	0.568
5	Using Moodle would make it easier to do my studies.	0.026	**0.768**	0.620
6	I would find Moodle useful in my studies.	0.055	**0.766**	0.599
7	Learning to operate Moodle would be easy for me.	0.025	0.598	**0.785**
8	I would find it easy to get Moodle to do what I want to do.	0.021	0.556	**0.818**
9	When I use Moodle it will be clear and understandable.	0.069	**0.741**	0.618
10	I would find Moodle flexible to work (interact) with.	0.081	**0.722**	0.630
11	It would be easy for me to become skillful at using Moodle.	0.131	0.585	**0.726**
12	I would find Moodle easy to use.	0.039	0.613	**0.765**
13	The course schedule would be easier to understand with Moodle.	0.101	**0.724**	0.612

(*Cut off point of 0.70 was used for factor loadings)

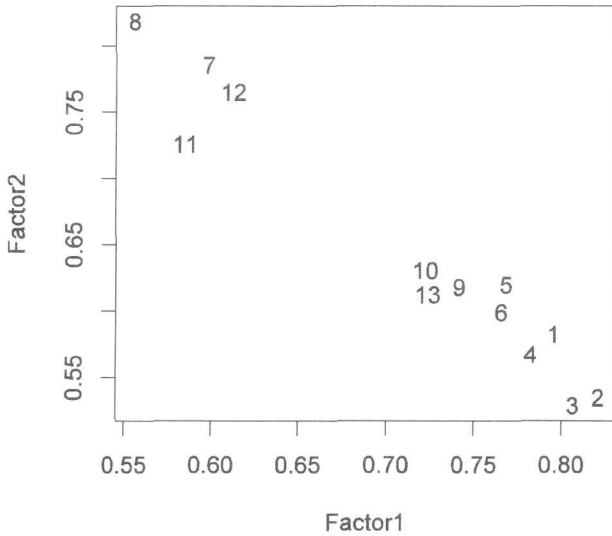|		Factor 1	Factor 2
loading	....	6.727	5.523
Proportional Variation	....	0.517	0.425
Cumulative Variation	....	0.517	**0.942**

Figure 1
Factor Analysis Results Plot (factor 1: usefulness, factor2: ease-of-use)
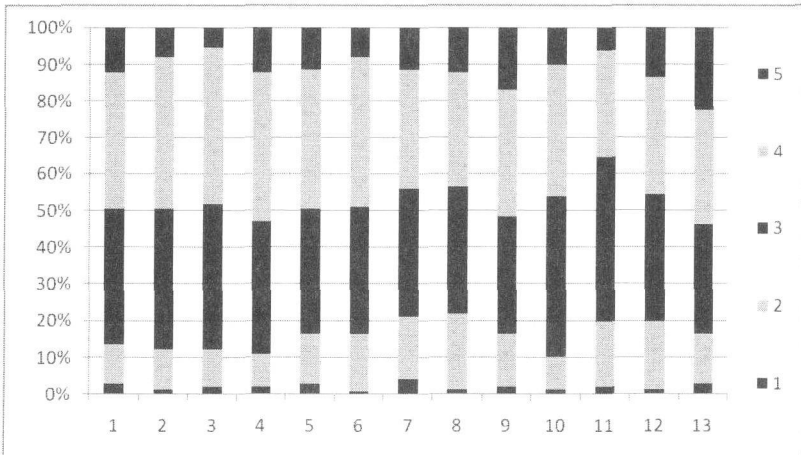
Chart 1
Percentage of total answers for each question.

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Table 2
Percentage of total answers for each question.

	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	q11	q12	q13	Mean	% of total
1	4	2	3	3	4	1	6	2	3	2	3	2	4	3.00	2.04
2	16	16	15	13	20	23	25	30	21	13	26	27	20	20.38	13.87
3	54	56	58	53	50	51	51	51	47	64	66	51	44	53.54	36.42
4	55	61	63	60	56	60	48	46	51	53	43	47	46	53.00	36.05
5	18	12	8	18	17	12	17	18	25	15	9	20	33	17.08	11.62