

# **Evaluating students' satisfaction of Web-based technology as a learning and teaching tool**

**A comparative research among Dutch students in Middle and Higher vocational education**

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## **Abstract**

The purpose of this study is to evaluate students' satisfaction of Web-based technology as learning and teaching tool in Middle- and Higher vocational educational institutes as perceived by university students and to specify the critical factors contributing to the usage.

Students in middle vocational institutes (N=124) experience more satisfaction in using Blackboard than those in vocational institutes of higher education (N=113). To have a similar course structure and/or a strong content/context prove to be more valuable for students than active participation in the discussion board. Furthermore, the experimental results show that students in the higher education institute (N=84) to a greater extent accept the Weblog as a study learning and teaching tool than is the case with students (N=113) accept Blackboard as a learning and teaching tool.

The results of this study clearly point out the important role of enjoyment and usefulness in positively influencing the discussion on how to implement a Web-based technology and its subsequent actual use.

**Keywords:** Learning Management System (LMS), ease of use, enjoyment, feedback, usefulness, Weblog

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## 1. Introduction

The past ten years, Learning Management Systems (LMS), like Blackboard, has become a significant learning and teaching tool in middle and higher vocational education. Many institutes are now offering courses and complete degree-programs in a wide variety of disciplines at a distance. This form of course delivery has the potential to change learning and teaching at every level of education. DeWert (DeWert et al., 2003) have reported that discussion boards can provide an interactive venue where students can reflect, evaluate, solve problems and exchange ideas. Mills (2006) implemented the discussion board in courses in order to increase overall interaction as well as to better assess student learning. The preliminary results of Mills' study indicate that students who were more actively involved with course materials, discussions, and having interaction with other class students demonstrated an improvement in overall course satisfaction and academic performance. Other researchers show also that participation in the discussion board increased students' reproductive knowledge effectively (Chao-hua Lou et al., 2006) and students enjoyed working in online groups and found the discussion board useful (Finegold et al., 2006).

A common problem in many online courses is a lack of teacher-student interaction, as well as student-to-student interaction (Uts, J., et al., 2003). Students may feel not only isolated from the teacher, but also isolated and deprived of the "normal" social interaction and cognitive learning process that take place in a face-to face class (Arnold, et al., 2006). The standardization inherent in an LMS exacerbates the pain of adoption by being standardized products designed to support a non-standard base of university academics with different disciplines, teaching philosophies and instructional styles (Jones, 2009). Learning management systems are ubiquitous in higher education, bringing many benefits to both learners and teachers. However, they have a darker side. Structure influences behavior, with the large and slow moving influencing the small and fast moving more than vice versa (Dron, 2006).

The Internet is going through a major change now, by the introduction of the concept of social software or referred to as 'Web 2.0' and it is clear that the way we use the Internet is rapidly changing. The term Web 2.0 seems to be more popular in the Internet community, while the term social software seems to get more attention in academic communities, mainly because social software moves the concept beyond merely the Web (Kloos, 2006). Social software is software that is aimed at simplifying the achievement and enduring of networks among people (Gorissen, 2006). Social software is about creating networks among people and thus, relies on active user contribution. Traditional software, on the other hand, relies more on one-way traffic from source to user. This change in using the Internet could have profound implications for the way we use the Internet, the way we do business, and the way we learn. Thus, social software offers the ability to individuals and groups of people to start collaborating easily and to start sharing knowledge and information. Social software involves Weblogs (blogs), wikis, instant messaging, forums, podcasts, social networking services, collaborative real-time editing, and virtual worlds (Gorissen, 2006).

The purpose of this study is to evaluate students' satisfaction of Blackboard as learning and teaching tool in Middle and Higher vocational educational institutes and to evaluate students' satisfaction of the Weblog as learning and teaching tool in higher education institutions as perceived by university students. How do students experience the LMS or the usage of a Weblog? What factors best predict the acceptance of a LMS or a Weblog? What is the effect on students' satisfaction of the LMS usage when the discussion board is integrated into courses and as such turns Blackboard into a kind of Web 2.0 tool? This research uses the Technology Acceptance Model (TAM) constructs of usefulness and ease of use to assess students' acceptance of Blackboard as an effective learning and teaching tool, with a construct of enjoyment as external factor, because prior research shows that enjoyment plays an

important role in influencing the individual's decision whether or not to use a Web based technology. (Yi et al., 2003).

### *1.1. Study context*

#### *1.1.1. Middle vocational educational institute (M)*

A Middle vocational educational institute offers an integrated education system made up of initial and post-initial education programmes at intermediate vocational level. The initial qualification structure consists of three levels, all of which cover qualifications (and the associated education) for vocational professions. At this institute, on-the-job training plays a key role. The students' courses alternate between the institute and the workplace, where they work on key assignments and competence tests. ICT plays an important role. Students can, for instance, learn individually using E-campus, test their progress made in programmes and plan their own courses. All Blackboard courses have the same structure. The whole curriculum can be found on Blackboard. The discussion board is not integrated in the courses.

#### *1.1.2. Higher vocational educational institute (H)*

At the investigated Higher vocational educational institute the educational concept is competence-based and practice-orientated. The Blackboard research involves the second period of the first year. The total length of the study is four years (Bachelor's degree). Blackboard courses support each study year. There is a General course info (a general course where students can find the students regulation, criteria for the competences, schedules etc.). During the first year each project has its own course and in the second and higher year each minor has its own course. Besides the Blackboard system, several websites exist. In the second, third and fourth year, students are invited to have a Weblog for describing the study process and for reflection.

Table 1: Comparison of Middle – and Higher vocational educational institutes

M	H
Middle vocational education and training	Higher vocational education
Competence-based	Competence-based
Strong content/context	Variety of content
Courses have a clear similar structure	Courses have a different structure
No discussion board integrated in the courses	Students active in discussion board

Table 1 shows the similarities and differences between the two investigated vocational educational institutes.

## 2. Research model and hypothesis

### 2.1. Research model

This paragraph deals with the Technology Acceptance Model (TAM), which Davis (1993) introduced and which was modified by Yi (Yi et al., 2003). TAM has established a powerful model for explaining and predicting usage intentions and acceptance behaviour. TAM theorizes that an individual's actual system usage is determined by behavioural intention, which is in turn jointly determined by perceived usefulness and perceived ease of use. Legrisa (Legrisa et al., 2003) concluded, after a literature study, that TAM can be regarded a useful model, but it has to be integrated into a broader one which would include variables related to both human and social change processes, and to the adoption of the innovation model. TAM does not explicitly include any social variables. TAM provides a quick and inexpensive way to gather general information about individuals' perceptions of a system. TAM provides an information representation of mechanisms by which design choices influence user acceptance, and should therefore be helpful in applied contexts for forecasting and evaluating user acceptance of information technology (Davis, 1993). TAM introduced two new constructs: perceived usefulness (the belief that using an application will increase one's performance) and perceived ease of use (the belief that one's use of an application will be free of effort).

**Perceived usefulness** is the extent to which a person believes that using the technology will enhance his or her job performance. (Davis, 1989). According to Venkantesh (Venkantesh et al., 2000) social influence, e.g. through subjective norm, defined as "a person's perception that most people who are important to him think he should or should not perform the behaviour in question", significantly influences perceived usefulness.

**Perceived ease of use** is the extent to which a person believes that using the technology will be free of effort (Davis, 1989). TAM posits that behavioural intention is a determinant of actual system use, and that behavioural intention is determined by two salient beliefs, perceived usefulness and perceived ease of use. Further, perceived ease of use is a determinant of perceived usefulness because, assuming other things be equal, users consider a system more useful when it is more effort-free (Yi et al., 2003)

Since the introduction by Davis, the Technology Acceptance Model (TAM) has been widely used for predicting the acceptance, adoption, and use of Information Systems (IS).

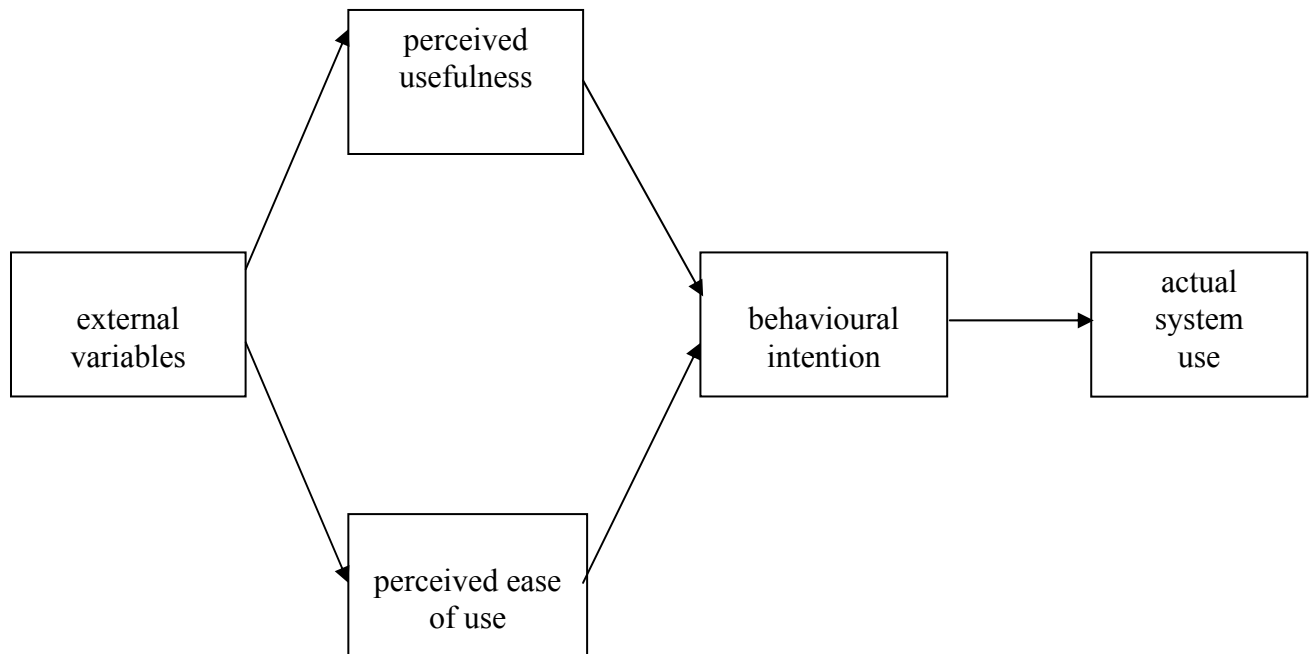


Figure 1. Davis' Technology Acceptance Model (TAM).

## 2.2. Hypotheses

### 2.2.1. Active participation in the Blackboard discussion board.

Recent study shows that Dutch pupils in a secondary school did not like to work with Blackboard (Vrieling, 2006a). Dutch pupils scored significantly lower on the items ease of use,

usefulness and behavioural intention than the American students in Yi's research (Yi et al., 2003). Can this be regarded a result of the different target group (Dutch pupils aged 12 - 19 versus American students aged 18 - 20), or of the way the LMS is used? Or are there other factors such as cultural differences that have to be taken into account? Deinum (2003) investigated the implementation of Blackboard at 33 secondary schools in the north of the Netherlands. His research among Dutch pupils also shows that they did not respond well to Blackboard. Is it because teachers did not use it properly? The discussion board function was hardly used and this particular use might well be a success factor in digital didactics. Deinum recommended the use of the discussion board for pupils to hand in their products. To validate Yi's research (Yi et al., 2003) another target group was found in students of the investigated Higher vocational education institute. To investigate the role of active participation in the discussion board, teachers of the investigated Higher vocational educational institute stimulated students to hand in their agendas, minutes, mood boards, week journals etc. in the discussion board. By doing so the number of hits in the 'groups area' (discussion board and file exchange) went up by 75%, an absolute of 30.000 hits more than during the first project. The following hypothesis is tested:

**H1:** Active participation in the discussion board leads to more satisfaction of Blackboard among Dutch students age 17 – 29 in higher education.

To validate the result that active participation in the Blackboard discussion board leads to more satisfaction among Dutch students, the same research was repeated in another vocational educational institute where students don't work with the discussion board. In the investigated school for Middle vocational education on the other hand, all courses have the same structure with a strong content/context. What can be regarded more important? Active

participation in the discussion board or its structure and content/context? Assuming that active participation in the Blackboard discussion board comes closer to the characteristics of our Net generation and as such turns Blackboard into a kind of Web 2.0 tool, the following hypothesis is tested:

**H2:** Active participation in the discussion board leads to more satisfaction of Blackboard among Dutch students aged 17 – 29 in Higher vocational education compared to Dutch students in Middle vocational education who don't actively participate in the Blackboard discussion board.

### *2.2.2. Enjoyment*

Enjoyment refers to the extent to which the activity of using a computer system is perceived to be personally enjoyable in its own right, aside from the instrumental value of the technology (Davis et al., 1992). According to Yi (Yi et al., 2003) the ease of use perceptions are influenced by the degree to which people perceive using the system to be personally enjoyable. Agarwal (Agarwal et al., 2000) propose that the individual traits of playfulness and personal innovativeness are important determinants of cognitive absorption.

Prior research proposed enjoyment as a determinant of ease of use (Venkatesh, 2000). The results of Yi's research (Yi et al., 2003) also clearly indicate the important role of enjoyment, as being a positive influence on the decision of students to use Blackboard and the subsequent actual use. Enjoyment is a significant determinant of usefulness while ease of use is a non-specific determinant. Enjoyment is a stronger predictor of usefulness than ease of use is. These findings suggest that practitioners should provide a working and learning environment where personal enjoyment supports and fosters the facilitation of a successful acceptance of new technology. The results of Yi's research (Yi et al., 2003) suggest that enjoyment might

play a more influential role than ease of use in determining the usefulness perception within the Web-base IS context. The sense of enjoyment in using a given system should reduce anxiety and help people feel confident about their ability to successfully execute the requisite actions. Assuming other things being equal, the system should be perceived to be more useful as the system is considered to be more enjoyable. The research of Goetz (Goetz et al., 2006) shows that the enjoyment scales showed clear linkages to learning behaviour including self-regulated learning and creative problem solving. Thus, the hypothesis is:

**H3:** Enjoyment will have a positive effect on ease of use and usefulness in both Blackboard samples and in the Weblog sample

### *2.2.3. Ease of use, usefulness, and behavioural intention*

TAM posits that behavioural intention is a determinant of actual system use, and that behavioural intention is determined by perceived usefulness and perceived ease of use. Further, perceived ease of use is a determinant of perceived usefulness because, assuming other things being equal, users consider a system more useful when it is more effort-free. These relationships have been examined and supported by many prior studies (Davis, 1989; Yi et al., 2003; Selim, 2003). Yi's (Yi et al., 2003) research shows that in the presence of enjoyment, ease of use had no longer a significant effect on usefulness indicating that enjoyment is a stronger TAM predictor of usefulness than ease of use is. Selim (2003) however shows that ease of use had a direct effect on usefulness. The present study revalidates those relationships in a Web-based context with the following hypotheses:

**H4:** Ease of use will have a positive effect on usefulness in both Blackboard samples and in the Weblog sample

**H5:** Ease of use will have a positive effect on behavioural intention in both Blackboard samples and in the Weblog sample

**H6:** Usefulness will have a positive effect on behavioural intention in both Blackboard samples and in the Weblog sample

**H7:** Behavioural intention will have a positive effect on actual use in both Blackboard samples and in the Weblog sample

#### *2.2.4. Blackboard (traditional software) versus Weblog (social software)*

Students grow up differently with ICT than previous generations. They are called the Net Generation because they grew up online (Oblinger et al., 2005). Young people teach themselves and with the devices they use, they actively maintain control of their chosen information streams. They are becoming informed at an ever earlier age and developing opinions based on interaction (Veen et al., 2005). According to Veen (Veen et al., 2005), a pupil's use of digital tools drops dramatically during school hours. Do institutes take into account the Net Generation traits when they implement new technology in their study concept? According to Veen (Veen et al., 2004) the Net Generation characteristics are: Group activity; Goal and achievement orientation; Multitasking; Experimental; trial and error; Heavy reliance on network access; Pragmatic and interactive; Ethnically diverse; Visual; Interactive.

Blogging might come closer to the Net Generation traits because its interactivity is high, it supports group activity and because students themselves are in control of their learning process. Previous research shows that the use of a Personal Digital Analyser (PDA) appears to

be much more attractive for pupils than the use of Blackboard (Vrielink, 2006b). Consequently, the hypothesis is:

**H8:** The use of a Weblog is more attractive for students in higher education than the use of Blackboard.

### **3. Research Methodology**

#### *3.1. Sample*

The subjects participated in this study included a total of 124 undergraduate students in middle vocational education and training institutes (***M***) and 113 undergraduate students in higher education (***H***). For the Weblog sample 84 students in the higher education institute enrolled in the second, the third or the fourth study year of 6 minors filled in a questionnaire during a community meeting. All participants volunteered to participate in the study. 124 resp. 113 questionnaires were handed out after 25 weeks. The mean age of the students in the Middle vocational education institute is 23.6 years (s.d. = 4.7). 29% of the respondents are female. Most of the students in the Higher vocational education institute are 19 years old (24%). Mean age = 20.5 (s.d. = 2.5), 13% of the respondents are female. The respondents' age range for the Weblog sample is from 18 to 30. Most of the students are 22 years old (24%). Mean age = 22.4 (s.d. = 2.2), 10% is female. These questionnaires, after analysis, provided answers to the research questions.

#### *3.2. Measures*

All the constructs in the research model were measured with the items from prior research Yi's (Yi et al., 2003; Vrieling, 2006b). At the top of the questionnaire, the student could fill in his/her name, age, and gender. At the end of the questionnaire the students were invited to give comment. All the questionnaire items used an 11-point Likert-type scale where 0=completely disagree, 5=neither agree nor disagree, and 10=completely agree. There were 14 questions:

three for the construct Enjoyment, four for the construct Ease of use, four for the construct Usefulness and three for the construct Behavioural intention.

The actual use in the Blackboard sample was measured through the course statistics of the control panel by counting the number of times (frequency) a student logged into Blackboard courses. The actual use in the Weblog sample was measured by asking the student how often he/she visits (uses) the Weblog. 31% of the students visit the Weblog daily and 48% of the students visit the Weblog once a week.

### *3.3. Data analysis*

The reliability of the questionnaire is measured by examining the internal consistency. ICR = Internal consistency reliability (similar to Cronbach's alpha). ICR of 0.7 or higher are considered adequate (Barclay et. al., 1995). The correlation coefficient (Pearson's product-moment correlation coefficient) is measured to show the connection between the questions.

A comparison of the mean of the constructs was made based on the results of students with a contribution in the discussion board less or greater than the average of 50. Therefore, a T-test was carried out to find if there was a significant difference. The T-test is based on an a-select random sample survey and on the assumption that the random sample survey distribution is normal divided.

The structural model and hypotheses are assessed by examining the significance of the  $\beta$ -coefficients and the variance accounted for by the antecedent constructs. The standardized  $\beta$  coefficients (the coefficient of the independent variables when all variables are expressed in standardized form) are presented. Multiple regression analyses were employed to adjust for the influence of behavioural intention on use the  $\beta$ -coefficient is measured with use as dependent variable. To determine the influence of ease of use and usefulness on behavioural intention the

$\beta$ -coefficient is measured with behavioural intention as dependent variable. To determine the influence of enjoyment and ease of use on usefulness, the  $\beta$ -coefficient is measured with usefulness as dependent variable. To determine the influence of enjoyment and ease of use, the  $\beta$ -coefficient is measured with ease of use as dependent variable (Vocht, 2004).

All statistical analyses were performed with the SPSS version 15.0. (SPSS Inc).

## 4. Results

### 4.1. Reliability of the questionnaire

Table 2: Internal Consistency Reliabilities (ICR)

Construct	<b>M</b>	<b>H</b>	<b>Weblog</b>
1. Enjoyment	0.9	0.9	0.9
2. Ease of use	0.8	0.8	0.8
3. Usefulness	0.9	0.9	0.9
4. Behavioural intention	0.6	0.6	0.9

Table 2 shows that, except for behavioural intention, all internal consistency reliabilities (ICR=Cronbach's alpha) are  $> 0.7$ . Internal consistencies (similar to Cronbach's alpha) of 0.7 or higher are considered adequate (Barclay et al., 1995). For research purposes, an ICR of 0.6 is acceptable. The questionnaire proves to be a reliable questionnaire.

## 4.2. The correlation between the questions

Table 3: Pearson's product-moment correlation coefficient (comparing M-H and H-Weblog)

		Enjoyment	Ease	Usefulness	Behavioural
Enjoyment	Blackboard <b>M</b>	1.00	0.78**	0.75**	0.59**
	Blackboard <b>H</b>		0.73**	0.69**	0.60**
	Weblog		0.61*	0.83*	0.64*
Ease of use	Blackboard <b>M</b>	0.78**	1.00	0.72**	0.51**
	Blackboard <b>H</b>	0.73**		0.61**	0.52**
	Weblog	0.61*		0.51*	0.35*
Usefulness	Blackboard <b>M</b>	0.75**	0.72**	1.00	0.67**
	Blackboard <b>H</b>	0.69**	0.61**		0.61**
	Weblog	0.83*	0.51*		0.73*
Behavioural	Blackboard <b>M</b>	0.59**	0.51**	0.67**	1.00
	Blackboard <b>H</b>	0.60**	0.52**	0.61**	
	Weblog	0.64*	0.35*	0.73*	

\* Correlation is significant at the 0.05 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed).

Table 3 shows Pearson's product-moment correlation coefficients. All variables are strongly interconnected. The ICR's and the Pearson's product-moment correlation coefficient prove that the questionnaire is a good instrument for testing the hypotheses.

*4.3. Comparising of the satisfaction of Blackboard by students who have a contribution in the discussion board less or greater than the average of 50*

Table 4. Independent T test comparison of the satisfaction of Blackboard by students in the Higher Education Institute who have a contribution in the discussion board less or greater than the average of 50

	Contributions >50 N = 45		Contributions < 50 N = 68		T	Sig. (2-tailed)
	Mean	s.d.	Mean	s.d.		
Enjoyment	<b>4.6</b>	1.8	<b>3.4</b>	2.1	0.002	p<0.01
Ease of use	<b>6.0</b>	1.8	<b>5.2</b>	1.9	0.035	p<0.05
Usefulness	<b>5.6</b>	1.9	<b>4.7</b>	2.0	0.015	p<0.05
Behavioural intention	<b>5.1</b>	1.8	<b>4.0</b>	1.8	0.002	p<0.01

Table 4 shows that 45 students who have a contribution in the discussion board greater than the average contribution of 50 have a mean score of 4.6 for enjoyment. For enjoyment and behavioural intention there is a significant better score on the level  $p < 0.01$ , for ease of use and for usefulness there is a significant better score on the level  $p < 0.05$  by the 45 students who

have a contribution in the discussion board greater than the average contribution of 50. This supports Hypothesis 1.

4.4. Comparison scores from students in Middle vocational education and training institutes (M) with students in Higher education institutes (H)

Table 5: Comparison scores from students in Middle vocational education and training institutes (M) with students in Higher education institutes (H)

Construct	<u>M</u> N = 124		<u>H</u> N = 113		T	Sig. (2-tailed)
	mean	s.d.	mean	s.d.		
Enjoyment	<b>5.5</b>	2.0	<b>3.7</b>	2.1	- 7.1	p < 0.001
Ease of use	<b>6.2</b>	1.7	<b>5.5</b>	1.9	- 3.0	p < 0.01
Usefulness	<b>6.4</b>	1.5	<b>4.9</b>	2.1	- 6.3	p < 0.001
Behavioural intention	<b>5.8</b>	1.6	<b>4.4</b>	1.9	- 6.4	p < 0.001

Table 5 shows that despite of the absence of participation in the discussion board students in Middle vocational educational institutes scored significantly better than students in Higher educational institutes. So, hypothesis 2 is not true.

4.5. Comparison of the results from respondents Blackboard sample, with the results from respondents Weblog sample

Table 6: Independent T test comparison respondents Blackboard sample, with the results from respondents Weblog sample

	<b>Blackboard H</b>		<b>Weblog</b>			
	N = 113		N = 84			
Construct	Mean	s.d.	Mean	s.d.	T	Sig. (2-tailed)
Enjoyment	<b>3.7</b>	2.1	<b>6.0</b>	2.4	7.21	p<0.001
Ease of use	<b>5.5</b>	1.9	<b>7.8</b>	1.5	9.14	p<0.001
Usefulness	<b>4.9</b>	2.1	<b>5.2</b>	2.4	0.95	0.34ns
Behavioural intention	<b>4.4</b>	1.9	<b>5.2</b>	2.4	2.76	p<0.01

ns = not significant

Table 6 shows that for enjoyment (p<0.001), ease of use (p<0.001), and behavioural intention (p<0.05) the respondents in the Weblog sample scored significantly higher than the respondents in the Blackboard sample. This supports Hypothesis 8.

*Note: Because there are no data known about more or less than average use within the Weblog sample, there is only a comparison made between the average use within the Blackboard sample and the average use within the Weblog sample.*

Figure 2: Regression analyses to test the proposed model

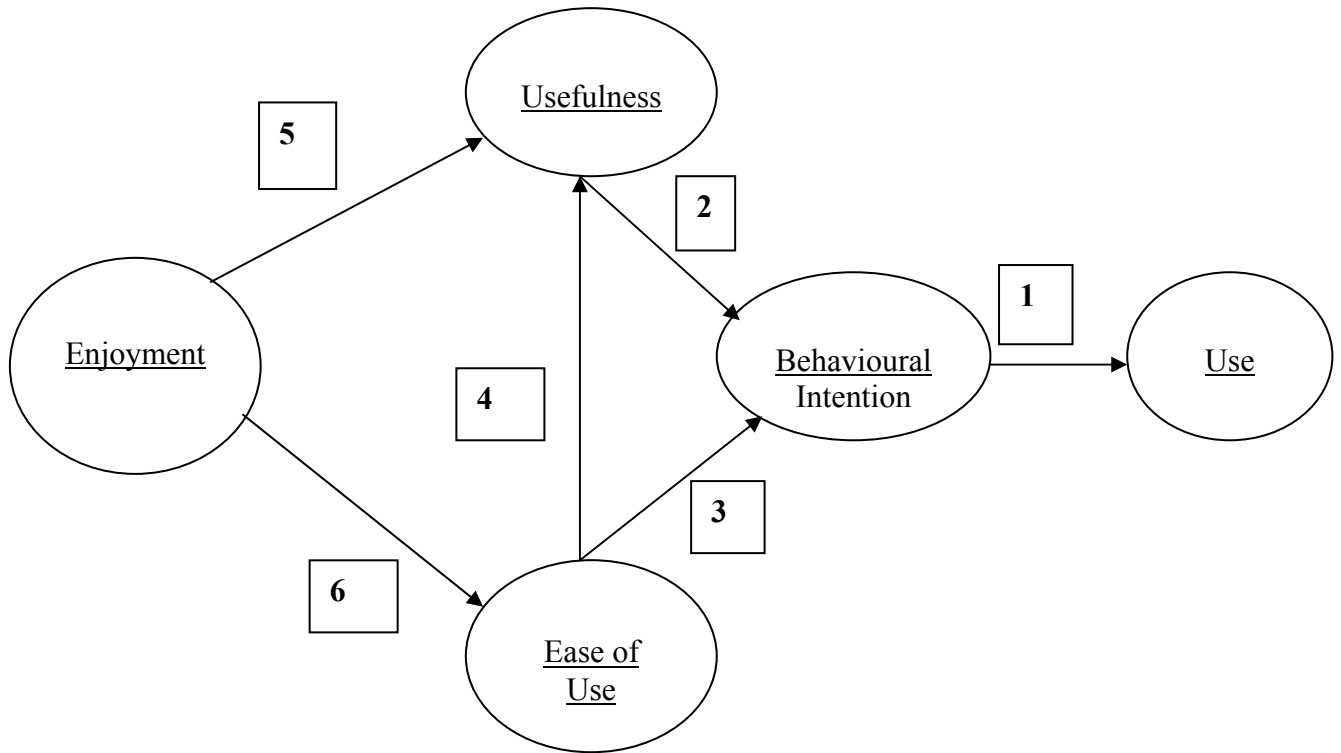


Figure 2 provides the results of the regression analysis.

Table 7: Comparison  $\beta$  coefficients

$\beta$	M <sup>1</sup> N=124	H <sup>2</sup> N=113	Weblog <sup>3</sup> N=84
1	0.34 <sup>***</sup>	0.22 <sup>*</sup>	0.55 <sup>***</sup>
2	0.62 <sup>***</sup>	0.44 <sup>***</sup>	0.75 <sup>***</sup>
3	ns	0.24 <sup>**</sup>	ns
4	0.35 <sup>***</sup>	0.23 <sup>*</sup>	ns
5	0.48 <sup>***</sup>	0.53 <sup>***</sup>	0.83 <sup>***</sup>
6	0.54 <sup>***</sup>	0.74 <sup>***</sup>	0.61 <sup>***</sup>

|ns = not significant| |\* p<0.05 | |\*\* p<0.01| |\*\*\* p<0.001|

Table 7 shows the results of the measurement of the  $\beta$  coefficients:

<sup>1</sup>**M sample**, Supporting H7, Behavioural intention has a significant effect on use (1:  $\beta=0.34$ ,  $p<0.001$ ). Supporting H6, Usefulness has a significant effect on behavioural intention (2:  $\beta=0.62$ ,  $p<0.001$ ) and inconsistent with H5, ease of use has *no* significant effect on behavioural intention. Supporting H3, Enjoyment has a significant effect on usefulness (5:  $\beta=0.48$ ,  $p<0.001$ ) and supporting H4, ease of use has a significant effect on usefulness (4:  $\beta=0.35$ ,  $p<0.001$ ). Supporting H3, Enjoyment has a significant effect on ease of use (6:  $\beta=0.54$ ,  $p<0.001$ )

<sup>2</sup>**H sample**, Supporting H7, Behavioural intention has a significant effect on use (1:  $\beta=0.22$ ,  $p<0.05$ ). Supporting H6, Usefulness has a significant effect on behavioural intention (2:  $\beta=0.44$ ,  $p<0.001$ ) and, supporting H5 ease of use has a significant effect on behavioural intention (3:  $\beta=0.24$ ,  $p<0.05$ ). Supporting H3, Enjoyment has a significant effect on usefulness (5:  $\beta=0.53$ ,  $p<0.001$ ) and supporting H4 ease of use has a significant effect on usefulness (4:  $\beta=0.23$ ,  $p<0.05$ ). Supporting H3, Enjoyment has a significant effect on ease of use (6:  $\beta=0.74$ ,  $p<0.001$ )

<sup>3</sup>**Weblog sample**, Supporting H3, enjoyment has a significant effect on ease of use (6:  $\beta=0.61$ ,  $p<0.001$ ) in the Weblog sample. Supporting H3, enjoyment has a significant effect on usefulness (5:  $\beta=0.83$ ,  $p<0.001$ ) in the Weblog sample. inconsistent with H4, ease of use has a no significant effect on usefulness in the Weblog sample. Inconsistent with H5, ease of use has no significant effect on behavioural intention in the Weblog sample. Supporting H6, usefulness has a significant effect on behavioural intention (2:  $\beta=0.75$ ,  $p<0.001$ ) in the Weblog sample. Supporting H7, behavioural intention has a significant effect on use (1:  $\beta=0.55$ ,  $p<0.001$ ) in the Weblog sample.

## 5. Discussion

The purpose of this study is to evaluate students' satisfaction of Web-based technology as learning and teaching tool in Middle- and Higher vocational educational institutes as perceived by university students and to specify the critical factors contributing to the usage.

Five out of eight hypotheses were supported. The results of this research indicate that active participation in the discussion board of Blackboard leads to more satisfaction of Blackboard by Dutch students in higher education (H1). Inconsistent with this statement is that students in the investigated Middle vocational educational institute scored significantly higher than the students in the Higher vocational educational institute (H2). The expectation was that students who actively participated in the discussion board would experience more satisfaction of Blackboard as a learning and teaching tool than those who don't participate in the discussion board. To have the same course structure and/or a strong content/context are apparently more valuable to students than participation in the discussion board. Group activities then occur outside the LMS. The common complaint students make is that of a poor structure. Information is often difficult to find. This study shows that when all courses have the same structure, students' satisfaction of Blackboard increases. The number of times students have to click in order to find information should be minimized and the path leading to the information should be clear and simple. Besides, having one portal and having to login only once will improve students' satisfaction of Blackboard as well. According to Weller, people find LMSs very dull. This is partly because they are made to use – if you banned LMSs it'd be a sure way to make them interesting. But what the LMS and Powerpoint have in common is that they are in the first wave of digital democratization tools. The journey needn't necessarily be onto another technology, it can be making better use of the existing one (Weller, 2009). In the Higher vocational educational institute teachers gave no feedback on the Blackboard discussion board.

In the study of Mills (2006) students received a grade for their contribution in the Blackboard discussion board. This is remarkable and it also corresponds with the observation in this study that if active participation is not a necessary part of the assessment, in other words if it is voluntary, participation in the discussion board stops. Could this partly explain the opinion among students that if participation in the Blackboard discussion board is not required, participation altogether stops? Institutes should provide appropriate and immediate feedback on performance. Students need assistance in assessing their actual competence and performance, and they also need frequent opportunities to give and receive suggestions for improvement. Such feedback should be an ongoing process in collegiate settings; it is essential to the student's learning process (Chickering et al., 1986). Experience becomes knowledge through reflection, which is enhanced by timely and appropriate criticism. Effective e-learning design will include provision for feedback that amplifies the learning from the experience, and enables students to increase their level of skill and knowledge. The range of available feedback strategies is vast, including reflective responses to prescribed questions, semi-automated responses by the system to student actions and work, shared comments in online forums and blogs, and personal responses via email, telephone, and post (Brown et al., 2005). Without such feedback students might decide to abandon Web-based technology as learning and teaching tool because of the lack of a teacher's presence. To give feedback in the discussion board is hard if not impossible due to limitations in time (Chen et al., 2005). Moreover it takes time to generate positive experience by teachers and their own point of view and his/her experience with the LMS is important (Albirini, 2005). It is important to empirically demonstrate the comparative effectiveness of a new system to potential users, such demonstrations should be done by or with the explicit endorsement of people important to the potential users (Venkatesh, 2000). Willi (1999) brings the human needs to shape and leave tangible signs in any environment to the foreground. The significance of these needs and even more, the need to

fulfil these needs with success usually brings about a drive in humans to form intensive and effective relationships with their environment. In that way, one will also attempt to reach out for the other person, trying to get into contact with interpersonal relationship. Social Presence, Teaching Presence, and Cognitive Presence are the three essential elements of an educational experience, interacting with each other (Archer et al., 2001). This also fits with the opinion of Davidson and Goldberg (2009) that the single most important characteristic of the Internet is its capacity to allow for a worldwide community and its endlessly myriad subsets to exchange ideas, to learn from one another in a way not previously available.

The results of this study clearly point out the important role of enjoyment and usefulness in positively influencing the discussion to use a Web-based technology and its subsequent actual use (H3). These findings significantly extend prior research on user acceptance of web-based technology (Yi et al., 2003; Selim, 2003) and empirically validating the relationship with enjoyment as the external variable. Enjoyment is the powerful external factor which positively effects behavioural intention through usefulness. This corresponds with the findings of Yi (Yi et al., 2003). Enjoyment might play a more influential role than ease of use in determining the usefulness perception within the Web-based IS context. In the arrangement of courses and assignments, teachers should take into account the factors of usefulness and enjoyment. Selim (2003) distinguished four major critical factors for the perceived usefulness of course websites (course work interactivity, to enable students to accomplish their course work quickly, facilitating student-student, and student-teacher interactions and to increase students' productivity and effectiveness). This study validates the results of prior research that enjoyment is a stronger predictor for usefulness than ease of use is (Yi, et al., 2003). It is generally accepted that the interactivity of online tasks is an important determinant of learning (Lander, 1999) and this interactivity can contribute to students' experience regarding enjoyment. A goal placed within reach provides enjoyment, and as such it effects behavioural intention through

usefulness. It is important that an assignment is geared to the student's perception of his or her environment. This can be made possible, for instance, when data is used coming from the students themselves. Students tend to become more motivated when developing their own product. If this product is actually utilized in a factory or at school than it works extra motivating (Andernach, 2005). The attributions children make for their success or failure in an activity and the enjoyment they derive from the activity have been identified as motivating factors that encourage them to participate, succeed, and potentially continue in the activity. (Baron et al., 2007).

Furthermore, two of the tested hypotheses involving the critical factors contributing to the usage of Web-based technology are not true. Ease of use has no significant effect on usefulness and on behavioural intention in the presence of enjoyment (H4 and H5). Supporting H6, usefulness has a significant effect on behavioural intention in the Blackboard and in the Weblog sample. Supporting H7, behavioural intention has a significant effect on use in the Blackboard and in the Weblog sample. It is remarkable that the scores on the items Dutch students' made are still 10-15% lower than the scores on the items the American students' made in Yi's research (Yi, et al., 2003). Is this due to cultural differences or is this because of the fact that our Net generation differs already from the generation in 2002?

The experimental results of this study show that students in the higher education institute to a greater extent accept the Weblog as a study learning and teaching tool than is the case with Blackboard (H8). The results show that a Weblog appears to be valuable for the students. Whether Weblogs enable deep learning is also hard to say based on the empirical data from the research of Kloos (2006). The opinions of the participants differ also whether the Weblog contributed to their learning experience or not. Cameron and Anderson (2006) conclude that blogging has distinct advantages over more common threaded discussion in its support of style, ownership and identity, and its public nature may enhance resolution phases of cognitive

presence. However, its lack of safety and the current inefficiencies of linking and threading messages present greater challenges than the more familiar threaded discussion or email list. Perhaps the blog's greatest relative advantage is for non formal and open education that takes learning beyond the traditional course.

Nowadays it is no longer the teacher or the student who are central in the learning process but the learning process itself is central. A learning process place and time independent. The content/context relevance for students, feedback and enjoyment are apparently the key factors. Stoof (et al, 2002) proposes three variables for enhancing viability: people, goal and context. The choice of what technology depends on the situation. A triangle between teacher, student, and content. What content, which pedagogical approach and with what technology. Why and how? (Hudson, 2008). According to Carliner (2009) organizations will increasingly rely on their internal systems to provide meaningful content to workers at the time and in the context of need. The content will gradually grow to take different forms. Although sometimes the content will be in the form of tutorials, the content might also provide practice, reminders, quick facts, advice, and similar types of useful content. According to Mishra (2009) *Technological Pedagogical Content Knowledge (TPACK)*, attempts to capture some of the essential qualities of knowledge required by teachers for technology integration in their teaching, while addressing the complex, multifaceted and situated nature of teacher knowledge. At the heart of the TPACK framework, is the complex interplay of three primary forms of knowledge: Content (CK), Pedagogy (PK), and Technology (TK). Effective technology integration for pedagogy around specific subject matter requires developing sensitivity to the dynamic, transactional relationship between all three components. A teacher capable of negotiating these relationships represents a form of expertise different from, and greater than, the knowledge of a disciplinary expert (say a mathematician or a historian), a technology expert (a computer scientist) and a pedagogical expert (an experienced educator). Bersin's (2009) research shows that the single

biggest driver of success in today's modern L&D world is culture. 'No matter how well you design the programs, systems, and experiences - they only "stick" when the company itself values a continuous focus on organizational and individual learning. More and more top executives are thinking "how can I get people in this organization to more rapidly share information, talk to customers, and learn faster." These types of conversations lead to a discussion about the organization's learning culture - one of the biggest drivers of success in this new era'.

Further research is needed to investigate how Web-based technology can be integrated and utilized in order to improve and enhance the learning process for the Net Generation. The characteristics of this Net generation should be taken into account. One of the characteristics of this generation is that young people teach themselves and with the device they use, they actively maintain control of their personal information streams. Moreover, further investigation on cultural aspects as openness, willingness, values, and principles of participants is recommended.

Although there are many more questions than answers on the subject of teaching using Web-based technology, it is hoped that these results and experiences might encourage further pedagogical dialogue and empirical results about how to effectively and successfully organize and deliver courses in this new technological environment.

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