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How learning style influences students' e-satisfaction with self-service technology in higher education

Dr. Steven Ward*
Murdoch University
s.ward@murdoch.edu.au

Mr Bill Chitty
Murdoch University
b.chitty@murdoch.edu.au

Terry Noble
Murdoch University
t.noble@murdoch.edu.au

Abstract

Self-service technology (SST) for online learning is an efficient method to deliver higher education content. This paper outlines how the learning styles of students (independent versus group) influence the adoption of, perceived value of and satisfaction from SST. Results suggest that students may prefer a mixed mode of delivery, as both individual and group learning styles negatively moderate the relationship between the adoption of and the perceived value of SST. Students with individual and group learning styles may see SST as a useful potential addition to their education and indication of educational quality, even though they may not actively use this technology.

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Introduction

The value of Australia's export education industry in 2007 was about $12.6 billion with around $12.2 billion (97%) being derived on-shore from international students (RBA Bulletin 2008). International students may prefer to learn in group based settings, such as tutorials or study groups, with direct contact with the lecturer, rather than individually accessing on-line learning management systems that use SST (Chan 1999 and Moore and Wang 2007). The challenge for higher education providers is that not all students engage with and learn from education content that is provided by SST in the same way (Scanlon 2009).

Literature Review

Readiness to adopt new technology. If the role of users in SST delivery process is unclear to them it will be a major deterrent to them using the technology for the first time (Meuter, Bitner, Ostrom and Brown, 2005). If students are forced to use SST to access online education content, it may cause them to become dissatisfied with the education provider. It has also been suggested that a choice of service delivery, online or via direct contact with staff, will influence their readiness to adopt self service technology (Reinders, Dabholkar and Frambach 2008).

A readiness to adopt new SST can be considered within the broader context of the technology acceptance model (TAM) as used in information science (King and He 2006; Hernandez, Jimenez and Martin 2008; Hashim 2008 and Li, Qi, and Shu 2008). Under this model, constructs such as perceived ease of use and usefulness, will influence a consumer's readiness to adopt technology. Therefore the first hypothesis is:

H1*: Readiness to accept new technology will have a positive effect on students' adoption of SST.*

Compatibility is a general perception about how SST can help students access information. Compatibility is similar to the 'technology readiness' construct proposed by Parasuraman (2000) in service marketing, which refers to consumers' readiness to adopt and use new technology. Compatibility is a general perception about how SST can help students access information. That leads to the second hypothesis:

H2: *Compatibility will have a positive impact on the students' willingness to adopt SST.*

Innovativeness. Innovators are generally the early adopters of a new service (Flynn and Goldsmith, 1993). For this research, part of the domain specific innovativeness scale that was developed by Goldsmith and Hofacker (1991) was used to determine the level of student compatibility with using SST to access the on-line learning management system. The third hypothesis therefore is:

H3: *The innovativeness of users will have a positive effect on their willingness to adopt SST.*

Adoption of innovation is an acceptance of SST as the means to produce a service that is independent of direct interactions with service providers (Meuter et al. 2005). The current research model assumes that SST is suitable for delivering education content on-line, and that the antecedents of adoption, as shown in Figure 1 are; *readiness to adopt new technology*, and the individual consumer differences of *compatibility, perceived risk* and *innovativeness.* The fourth hypothesis therefore is:

H4*: Users adoption of innovation will have a positive impact on their perceived value of using SST.*

Perceived value is defined as being a function of *what* users receive from the service, which is the technical quality, and *how* the service is delivered, which is the functional dimension (Gronroos, 2000). For education content that is delivered using on-line SST, Heinonen, (2004), argues that the "what" and "how" dimensions are related to traditional services, and that to understand technology based self-services 'temporal and spatial dimensions' must be included in the perceived value construct. Temporal dimensions are the times when the consumers can access the service, while the spatial dimensions include location and ease of access. The fifth hypothesis is:

H5: *The perceived value of SST will have a positive effect on user e-satisfaction.*

e-Satisfaction and Satisfaction. Consumers compare their perceptions of using SST with their pre-service expectations, and determine whether their post-service experiences have satisfied their particular needs (Oliver, 1997; Shankar, Smith and Rangaswany, 2003). This may lead to further evaluations of the service provider (in this case the university).

There may be a direct link between satisfaction with SSTs (e-satisfaction) and satisfaction with the organisation.

H6: *e-satisfaction with SST will be positively related to the satisfaction with the service organisation.*

Learning styles. How we learn often determines how we might act. In higher education the type of learning style may well influence the adoption and value derived from online learning (Drennan et al. 2005 and Beyth-Marom et al. 2005 and Oyedele and Simpson 2007). The use of Online learning systems or SSTs means that students may need to develop a more individual learning style. This may be a problem for international students, especially those of a Chinese background, who may have a more group learning style (Chan 2007) and an external locus of control.

Moore and Wang (2007) noted the learning styles of senior Chinese educators rather than students *per se*. In their work environments most (70%) worked in partnerships or teams, while the remainder worked principally on their own.

Moore and Wang (2007) also found that the most preferred method of understanding new information was a group discussion approach (45%), followed by lectures (30%) and interactive teaching methods (15%). Chinese students are therefore more likely to prefer 'teacher-directed' learning styles and less likely to engage in reflective analysis based on independent learning. It is also possible that local Australian students may prefer a group learning style rather than an individual learning style as encouraged by the use of SSTs. Therefore:

H7: Group learning styles will negatively moderate the relationship between the adoption of SSTs and their perceived value.

H8: Group learning styles will negatively moderate perceived value of SSTs and e-satisfaction.

H9: Individual learning styles will positively moderate the relationship between the adoption of SSTs and perceived value.

H10: Individual learning styles will positively moderate the relationships between the perceived value of SSTs and e-satisfaction.

Methodology

A survey of marketing students at a regional Australian University produced 144 usable responses. The response rate was 44%. The sample consisted of 70% women, 53% Australian students, almost all (92%) were 25 years or younger. Respondents were spread across all years of study, with around 32% being in their second year of university study.

The measurement scales of ***Readiness to adopt, Compatibility,*** and ***Innovativeness*** were adapted from previous research (Ward, Chitty and Graham 2007), while the ***Learning style*** scales were modified from research by Moore and Wang (2007). Table 1 shows the measurement properties of the major scales of the study; Alpha reliabilities averaged .80 and ranged from .71 to .88. The average variance extracted (AVE) for all measures were above the criteria of .50 (see Fornell and Larcker 1981). The composite reliability measures, similar to the construct reliability measures of Bollen (1989), showed that each latent construct was well represented by the observed measures and ranged from .80 to .91 and averaged .85. Communality measures were all above the acceptable level of .50 for each latent variable (Fornell and Larcker 1981).

The reported use of self learning technologies was positively skewed (1.77) and had a kurtosis of 2.89. The log of the number of the number of times of use was used to transform this variable more towards a normal distribution.

The data were analysed using Partial Least Squares (SMART-PLS2.0) (Ringle and Alexander, 2005). This included validating the measurements, and testing support for the hypotheses of interest. Partial Least Squares (PLS) has many advantages, including outer model formulation which allows for the specification of both reflective and formative modes, as well as categorical variables, and can be used with smaller sample sizes, unlike conventional structural equation modelling (O'Cass and Pecotich, 2003). Maximization of variance explained (or R^2 values) in all dependent variables is the primary objective of PLS (Hulland, 1999). In order to examine the moderation effects as outlined by H7 to H10 in PLS, the procedure as suggested by Chin, Marcolin and Newsted (1996) was followed. This included analysis of product term in the path model of moderator and predictors as well as modelling of direct path relationships.

Table 1: Measurement Properties

Scale and items and loadings of latent constructs	Measurement stats	Mean (Std Deviation)	Alpha Reliability

	Composite reliability	Communality		
Readiness to Adopt SST (4 items) AVE=.67 Capable to use (.90) Confident to get information (.81) Helps provide control over learning need (.80) Information on use of SSTs clear to me (.80)	.91	.67	26.47 (5.60)	.88
Compatibility (3 items) AVE=.70 Accessing SST saves time and effort (.89) Use a lot of SSTs with other organisations (.73) Compatible with the way I like to access information (.90)	.88	.71	15.31 (3.60)	.79
Innovativeness (4 items) AVE=.55 I am the first of my friends to use SST (.70) Compared to my friends I use a lot of SST (.81) If I heard about a new SST, I would probably use it (.65) I will try a new SST, even if I am not familiar with it (.81)	.83	.55	17.98 (4.21)	.74
Log of Adoption of SST Number of times used SST in a semester	-	-	3.78 (1.00)	-
Perceived Value (3 items) AVE=.66 SST is the best way to manage education services (.80) SST performs consistently (.77) Using SST I can find the academic information I need (.86)	.85	.66	14.37 (3.20)	.75
E-Satisfaction (4 items) AVE=.70 University is professional in providing higher education (.86) I trust university to act in my best interests (.74) SST satisfies my need for academic information (.87) Overall satisfaction with SST (.87)	.90	.70	20.23 (4.13)	.85
Satisfaction with University (5 items) AVE=.62 University satisfies my learning needs (.81) Value my education from university (.73) Satisfied with academic program (.76) I would choose this university again (.76) I would recommend this university (.86)	.89	.62	20.30 (4.56)	.86
Indvidual Learning Style (4 items) AVE=.50 Learn by memorising handouts (.58) Write own lecture notes (.66) Learn by myself (.86) Learn by receiving handouts from lecturer (.71)	.80	.50	21.32 (4.25)	.71
Group Learning Style (2 items) AVE=.81 Learn course information in a group (.80) Prefer to learn in a group (.98)	.81	.89	9.54 (2.93)	.81

Results

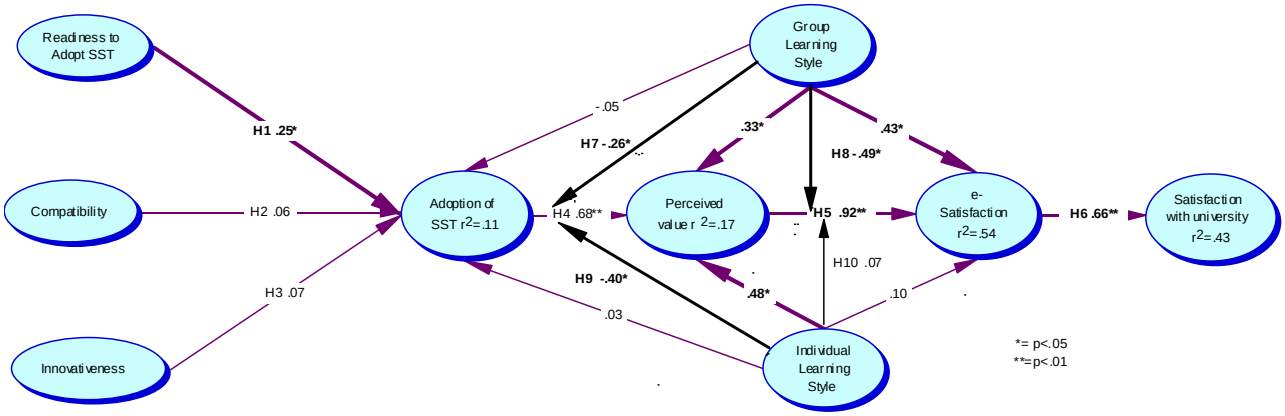
The PLS results, as shown in figure 1, showed support for **H1**, Readiness to adopt leads to adoption of SST β=.25, p <.05), **H4**, (Adoption of SSTs leads to perceived value β=.68, p <.01), **H5** (perceived value of SST is directly related to e-satisfaction, β=.92, p <.01, r^2=.52), **H6** (e-satisfaction is positively related to the satisfaction with the organisation, β=.66, p <.01, r^2=.44), **H7** (Group learning negatively moderates the relationship between adoption of and perceived value of SST, β=.-.26, p <.05) **H8** (Group learning negatively moderates the relationship between perceived value and SST, β= -.49, p <.05).

Support was <u>not</u> found for **H2**, Compatibility predicts the adoption of SST, **H3,** Innovativeness leads to the adoption of SST, **H9** (Individual learning style positively moderates the relationship between adoption of SST and perceived value). In fact, the moderation effect is negative (β= -.40, p <.05). Support was also not found for **H10**, an Individual learning style positively moderates the relationship between perceived value and e-satisfaction.

The model predicts well the level of e-satisfaction with SSTs, r^2=.52, quite well the satisfaction of university, r^2=.44, but not the level of perceived value, r^2=.11 and adoption or actual use of SSTs, r^2=.15. Other factors such as the locus of control (internal versus external) of students may better predict their levels of adoption and perceived value with SST

(see Bradley and Sparks 2002). This is the subject of future research with additional data, and is covered in an additional paper submitted to this conference.

Figure 1: Conceptual Model and
Results SST and Learning Styles



Discussion

The results show that the link between the adoption of and the perceived value of SST is negatively moderated by both a group learning and individual learning style. While these results for an individual learning style may seem counter intuitive it could be that the individual learning style as measured in this paper (Learn by memorising handouts, writing own lecture notes, learn by myself and learn by receiving handouts from lecturer) still reflects a learning style which may be independent, but is focused more on direct instruction. Students with an independent learning style, were also found to independently value SST (β=.48, p <.05), ahead of any level of adoption or use. This may indicate that SST may be a useful addition to their learning as well as lectures and tutorials. They may indeed see the provision of SST as a potential useful additon to their education, a possible indicator of educational quality, but not engage in its use.

For students with a group learning style, the relationship between perceived value and e-satisfaction is negatively moderated (β=-40, p <.05). Students with a group learning style, however, also were found to value SST (β=.33, p <.05) and were likely to be satisfied with SST (β=.33, p <.05). Again, it would appear that for these students as well, SST could be seen as an additional educational resource, rather than one that replaces face to face teaching.

There is anecdotal evidence to support these conclusions. Scanlon (2009) notes that some university students have objected to replacing traditional lectures with podcasts. Our research also showed that students must have a readiness to adopt and use SST. Therefore a task for university academics and administrators is to develop a student readiness to use SST. This may start as part of a university induction course which shows the benefits of and thus encourages the trial of SST by students. Other factors which may predict uptake and value of SST could also include the locus of control of students, the educational infrastructure of the provider and the amount of academic and technical staff support.

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