

Examining the Theoretical Factors that Influence University Students to Adopt Web 2.0 Technologies: The Australian Perspective

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ABSTRACT

The purpose of this study is (1) to examine Australian university students' awareness of the benefits of Web 2.0 technologies and (2) to investigate the factors that influence students to adopt Web 2.0 technologies to supplement in-class learning, using the theoretical foundations of both Theory of Planned Behaviour (TPB) and Decomposed Theory of Planned Behaviour (DTPB). Findings indicated that most students in this study's sample were aware of the benefits of Web 2.0 technologies to supplement in-class instructions. The findings also indicated that students' attitude, subjective norms, and perceived behavioural control were strong determinants of their intention to use Web 2.0 technologies.

Keywords: Australian Universities, Context Extension, Decomposed Theory of Planned Behaviour, Path Analysis, Replication, Student Adoption, Theory of Planned Behaviour, Web 2.0

INTRODUCTION

In the past decade the Web has shifted from a source of information to a place in which ordinary users can contribute content interactively through blogs, reviews and so on. Web 2.0 has opened

a window of opportunity for people to become producers of content rather than merely receiving it (Blank & Reisdorf, 2012). There is an increasing demand in education approaches and pedagogies for innovation (McLoughlin & Lee, 2007). In addition, students of this era

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are considered digital natives as they are widely exposed to technologies such as computers, cell phones and the Internet (Bennett, Maton, & Kervin, 2008; Prensky, 2001). Currently, there is a growing use of Web 2.0 such as wikis, social networks, social bookmarking and blogs by these digital natives (Jones, Ramanau, Cross, & Healing, 2010), and thus exploring students' perceptions of the fit of these technologies for educational purposes requires more attention from the research community.

Little research has been conducted to address students' perceptions of the advantages of incorporating Web 2.0 applications to supplement in-class learning environments. In an attempt to fill this void, Hartshorne and Ajjan (2009) conducted a study that examined university students' awareness of the pedagogical benefits of Web 2.0 applications to understand the factors that influence students to adopt these tools. This study was done in the U.S. in which the external validity of its findings is regarded as a viable research goal. Indeed, Johns (2006) indicates that context has a powerful effect on the results of a given study. In this regard, the variations of results between studies that investigate the same phenomenon within different contexts are regarded as an indicator of context effect (Johns, 2006). In line with this argument, based on the Theory of Planned Behaviour (TPB) (Ajzen, 1991) and the Decomposed Theory of Planned Behaviour (Taylor & Todd, 1995), this Australian-based research aims to provide a contextual extension for Hartshorne and Ajjan's (2009) study.

The rationale of this strategy is to add to the literature through learning about specific factors that influence students from Australian universities to adopt Web 2.0 technologies. The purpose of this research is to address the following research questions: (1) Are university students aware of the benefits of using blogs, wikis, social networks and social bookmarking to supplement traditional classroom instruction? and (2) What factors influence student decisions to adopt blogs, wikis, social networks and social bookmarking to supplement classroom instruction?

Scope of the Study

This study explores the students' perception of the suitability of blogs, wikis, social networks and social bookmarking to supplement in-class learning according to six criteria statements. These are: (1) improve students' learning, (2) increase student-faculty interactions, (3) increase student-student interactions, (4) increase student satisfaction with the course, (5) improve students writing, (6) ease of integration into university courses (Baylor & Ritchie, 2002; Hartshorne & Ajjan, 2009). Thus, the aim is to allow respondents to indicate the fitness of each technology in relation to the above mentioned criteria, in which the categorisation of these technologies can be attained from the students themselves. Moreover, it should be noted that providing an in-depth analysis of the possible types of use and interaction with these technologies by students is beyond the scope of this study.

Our focus in this study is limited to providing the factors that influence students to 'voluntary' adopt Web 2.0 to supplement in-class learning. The voluntariness of this adoption has a decisive influence for this study to use TBP and DTPB as theoretical foundation. That is, both of these theories are practical in explaining the adoption of technology in voluntary contexts (Brown, Massey, Montoya-Weiss, & Burkman, 2002) because they incorporate the attitude construct of which empirically proven in past literature to has a substantial influence on behavioural intention (i.e. technology adoption) (Pavlou & Fygen-son, 2006).

BACKGROUND

Web 2.0 Technologies

Many authors indicate that Web 2.0 technologies augment the Web, permitting users to generate, share and refine information (Alexander, 2006; Ankolekar, Krötzsch, Tran, & Vrandecic, 2008; Efthimios, Dimitris, & Gregoris, 2009; McAfee, 2006; McLoughlin & Lee, 2007). In addition, Ankolekar et al. (2008) noted three characteristics that differentiate Web 2.0 from the classical Web. First, the concept of 'community', which all Web 2.0 pages are centred on. That is, the collaboration of users in this community achieves the emerging results, where one individual within the community cannot achieve such results. Second, the concept of 'mash-ups' in which data from diverse sites is aggregated to provide new insights

with different combinations of data. For example, a user visiting housing listing websites can visualise dynamically the location of houses on Google Maps. Third, the concept of 'Ajax', which is an essential building block of Web 2.0 that enables the construction of responsive user interfaces. With such a feature, the aforementioned community pages can be accessed by a wider audience (Ankolekar et al., 2008).

Web 2.0: The Educational Benefits

From learning and teaching perspectives, Prensky (2001) and Bennett et al. (2008) indicated that there is a growing tendency in higher education to utilise from technology for the purpose of fulfilling the technological expectations of students. In addition, McLoughlin and Lee (2007) pointed out that in this current era of technological and social change, the diffusion of information and communication technologies can be found everywhere we live and work. As such, there is increasing demand for innovative educational approaches and pedagogies that promote lifelong learning (McLoughlin & Lee, 2007). Constructivist learning theory posits that new knowledge is constructed with respect to the learner's prior experience. As such, students actively construct their views about what they will learn in a process that is characterised to imply active mental work, which is different from the conventional methods of teaching that treat students as being passive recipients of teaching (Koohang, Riley, Smith,

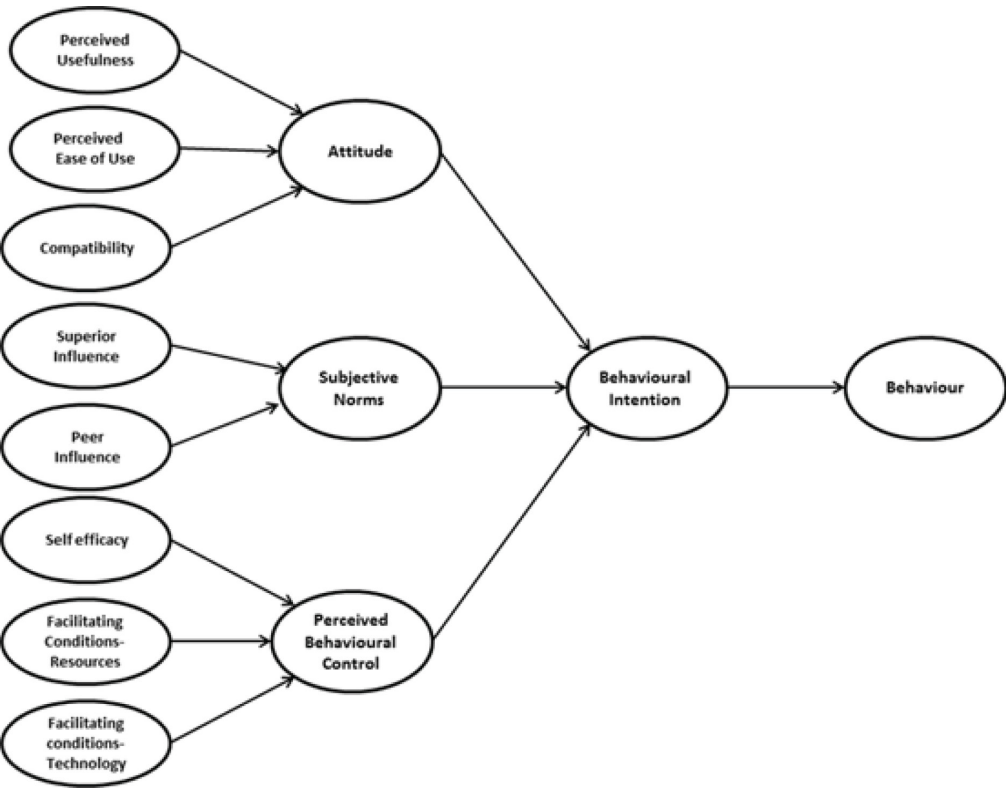
& Schreurs, 2009; Ruth & Houghton, 2009). From a constructivist standpoint, the social context in which learning takes place enables learners to construct knowledge that has special meaning to them. To construct such knowledge, learners collaborate and interact with each other in order to build their progress together (Kelm, 2011). Examples of this emerging research can be found in blogs, wikis Chhabra and Sharma (2013), Reis (2010), Ruth and Houghton (2009), and other social networking technologies (Wilson, Sala, Puttaswamy, & Zhao, 2012). This emerging research shows

the benefits but the question remains: What are the measurable pedagogical benefits of these tools for Australian university students?

Theoretical Framework

The theoretical framework of this study is based on both Ajzen’s (1991) Theory of Planned Behaviour (TPB) and Taylor and Todd’s (1995) Decomposed Theory of Planned Behaviour (DTPB) (see Figure 1). Ajzen’s (1991) TPB posits that an individual’s intention to do a particular behaviour is a key factor. Intentions are

Figure 1. Theoretical framework: Based on the theory of planned behaviour (Ajzen, 1991) and the decomposed theory of planned behaviour (Taylor & Todd, 1995)



explained by motivational factors that influence any given behaviour. These intentions are considered to be measures of the degree of people's willingness to try, of how much effort they are planning to exercise, for the behaviour to be performed. In addition, TPB assumes intention to be composed of three independent determinants: attitude, subjective norms and perceived behavioural control (Ajzen, 1991). Based on TPB, Taylor and Todd (1995) proposed a new model, which they called the Decomposed Theory of Planned Behaviour (DTPB). This model extends the notions of TPB in regard to attitude, subjective norm and, perceived behavioural control by decomposing them into specific belief dimensions (see Figure 1). From this theoretical vantage point, this study will adopt factors of both TBP and DTPB in order to pinpoint those factors that contribute to student adoption and use of Web 2.0 to supplement in-class learning.

It should be noted that there are other competing theories that can be used as theoretical foundation for this study. For example, the Technology Acceptance Model (TAM) (see Davis, 1989; Davis, Bagozzi, & Warshaw, 1989). However, Taylor and Todd (1995) indicated that the DTPB, the chosen theory in this study, "incorporates additional factors, such as the influence of significant others, perceived ability and control that are not present in TAM ... it should provide a more complete understanding of usage" (p. 147). As such, this theory, out of the known adoption and acceptance models, provides the best fit for this study.

Attitude

Attitude refers to the perception of the favourability of the behaviour in question (Ajzen, 1991). With regard to individuals' attitude towards information technology adoption, Davis (1989) states there are two determinants: perceived usefulness and perceived ease of use. First, perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (p. 320). Second, perceived ease of use is defined as "the degree to which a person believes that using a particular system would be free of effort" (p. 320). In addition, Rogers' Diffusion of Innovation theory of has been applied since the 1960s to study diverse innovations within diverse disciplines (Venkatesh, Morris, Davis & Davis, 2003). Rogers (2003) defines compatibility as "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters." (p. 240). On the basis of Davis and Rogers' theoretical concepts, Taylor and Todd (1995) decomposed the attitudinal beliefs regarding the adoption of IT into perceived usefulness, perceived ease of use and compatibility.

Subjective Norm

Another determinant of behaviour is subjective norm defined as the "person's perception that most people who are important to him think he should or should not perform the behavior in question" (Fishbein & Ajzen 1975, as

cited in Venkatesh et al., 2003, p. 428). Such social pressure is seen to play a key role in a person’s decision to do or not to do a particular behaviour (Ajzen, 1991; Thompson, Higgins, & Howell, 1991).

Perceived Behavioural Control

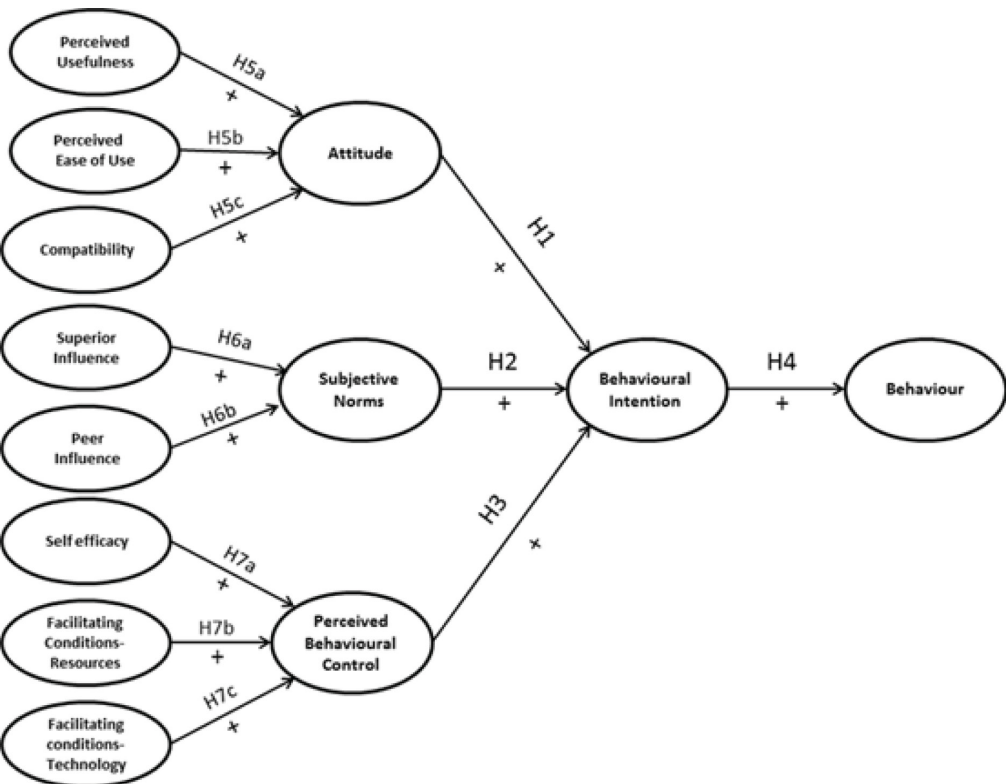
Perceived behavioural control (PBC) is conceptualised to be the third predictor of intention, and it refers to a person’s perception of performing the behaviour in terms of simplicity or difficulty. It is important to indicate that, under the assumptions of TPB, the perceived behavioural control reflects, and is affected by, the person’s past experience, includ-

ing any expected hurdles (Ajzen, 1991). Based of past literature, Taylor and Todd (1995) decomposed the factor PBC into self-efficacy and facilitating condition. Self-efficacy is defined as “the belief that one has the capability to perform a particular behavior” (Compeau and Higgins, 1995, p.189). In addition, facilitating condition is defined as “objective factors, ‘out there’ in the environment, that several judges or observers can agree make an act easy to do” (Triandis, 1980, as cited in Thompson et al., 1991, p. 129).

Hypothesis Development

Figure 2 depicts the hypotheses posited by this study. It should be noted that

Figure 2. Hypothesis development



hypotheses from 1 to 4 will be based on Ajzen (1991) TPB, while the rest will be based on Taylor and Todd (1995) DTPB.

Attitude

In this study, attitude is conceptualised as the students' favourability of the use of Web 2.0 technologies to supplement in-class learning. This in turn is expected to positively impact behavioural intentions to use these tools. Indeed, the positive impact of attitude on intention is well established in the literature (e.g. George, 2004; Hansen, Jensen, & Solgaard, 2004; Pavlou & Fygenson, 2006; Taylor & Todd, 1995). Thus, this study hypothesises the following:

Hypothesis 1: Students' attitudes towards using Web 2.0 technologies positively affect behavioural intentions.

Subjective Norms

In this study, a student's decision to adopt Web 2.0 is affected by views of their social circle. Such social pressure can affect students' behavioural intention to adopt or not adopt Web 2.0 to supplement in-class learning. Hence, this study hypothesises the following:

Hypothesis 2: Students' subjective norms in relation to usage of Web 2.0 technologies positively affect behavioural intentions.

Perceived Behavioural Control (PBC)

In this study, PBC is the students' perception of the difficulty or simplicity of the

use of Web 2.0 to supplement in-class learning. Such formed perception by student would affect their behavioural intention to adopt these tools. Thus, this study proposes the following hypothesis:

Hypothesis 3: Students' perceived behavioural control in relation to usage of Web 2.0 technologies positively affects behavioural intentions.

Behavioural Intentions

Behavioural intention is conceptualized as the degree to which students are willing to put in effort that they are planning to undertake for Web 2.0 technologies to be adopted. Prior literature reported behavioural intention to be a significant predictor of actual behaviour (e.g. Shih and Fang, 2004; Taylor and Todd, 1995). Hence, this study posits the following hypothesis:

Hypothesis 4: Students' behavioural intention in relation to the usage of Web 2.0 technologies positively affects behaviour.

Decomposed Behaviours

Perceived Usefulness

In this study, perceived usefulness is the students' perceptions of the advantages that could be gained from using Web 2.0 technologies to supplement in-class learning. In fact, results of previous studies reported the factor perceived usefulness to be a significant predictor of people's attitudes (e.g. Hartshorne

& Ajjan, 2009; Taylor & Todd, 1995). Thus, this study proposes the following hypothesis:

Hypothesis 5a: Perceived usefulness positively affects students' attitudes towards usage of Web 2.0 technologies.

Perceived Ease of Use

Perceived ease of use is defined as the students' perceptions of the ease of using Web 2.0 technologies to supplement in-class learning. In this regard, the results of Taylor and Todd's (1995) study indicated that the factor perceived ease of use to be a non-significant predictor of attitude. On the contrary, both studies of Ajjan and Hartshorne (2008) and Hartshorne and Ajjan (2009) confirmed perceived ease of use to be a significant determinant of attitude. Hence, this study hypothesises the following:

Hypothesis 5b: Perceived ease of use positively affects students' attitudes towards usage of Web 2.0 technologies.

Compatibility

Compatibility is defined as the extent to which students perceive the usage of Web 2.0 technologies as compatible with their values, past experiences and needs. Results of both studies of Taylor and Todd (1995) and Shih and Fang (2004) found no significant effect of compatibility on attitude. However, both studies of Ajjan and Hartshorne (2008) and Hartshorne

and Ajjan (2009) confirmed the factor compatibility to be a significant determinant of attitude. Thus, this study posits the following hypothesis:

Hypothesis 5c: Perceived compatibility positively affects students' attitudes towards usage of Web 2.0 technologies.

Superior and Peer Influences

With regard to the adoption of Web 2.0 by university students, there are two sources of social pressure: superior (i.e. lecturers) and peers (i.e. other students) (Hartshorne & Ajjan, 2008). Prior studies found that both superior and peer influences to be significant predictors of students' subjective norm (e.g. Hartshorne and Ajjan, 2008; Taylor and Todd, 1995). Thus, this study posits the following two hypotheses:

Hypothesis 6a: Superior influence to use Web 2.0 technology positively affects students' subjective norms.

Hypothesis 6b: Peer influence to use Web 2.0 technologies positively affects students' subjective norms.

Self-Efficacy

In the context of this study, self-efficacy refers to the students' beliefs that they have the capability to use Web 2.0 technologies to supplement in-class learning. Several studies reported self-efficacy to be a significant predictor of perceived behavioural control (e.g. George, 2004; Taylor & Todd, 1995). Hence, this study posits the following hypothesis:

Hypothesis 7a: Self-efficacy of using Web 2.0 technologies positively affects students' perceived behavioural control.

Facilitating Conditions – *Resources (FCR)*

Taylor and Todd (1995) stated that IT usage decreases with the absence of resources such as money and time. In the realm of this study, FCR refer to the availability of time and money for students to make use of Web 2.0 technologies to supplement in-class learning. Hence, this study hypothesises the following:

Hypothesis 7b: Facilitating resource conditions for using Web 2.0 technologies positively affect students' perceived behavioural control.

Facilitating Conditions – *Technology (FCT)*

The usage of IT decreases when users lack the technical knowledge (Taylor & Todd, 1995). In this study, FCT refers to students' technical expertise that

facilitates their usage of Web 2.0 to supplement in-class learning. Several studies reported the factor FCT to be insignificantly related to PBC (e.g. Ajjan & Hartshorne, 2008; Todd & Taylor, 1995). However, as this study is conducted in a different context from the aforementioned studies, examining the positive effect of facilitating technology conditions on PBC is deemed rational. Thus, this study hypothesised the following:

Hypothesis 7c: Facilitating technology conditions for using Web 2.0 technologies positively affect students' perceived behavioural control.

METHODS

Participants

The sample of this research consists of 60 students who study in 14 universities and one undergraduate college across Australia shown in Table 1.

Overall, there were 60 participants, including 41 males (68.3%) and 19 females (31.7%). Of these, 20(33.3%)

Table 1. Summary of sample characteristics

Variable	Value	Frequency	Percentage
Age	18-24	21	35
	25-32	25	41.7
	33-40	13	21.7
	40 and above	1	1.7
Gender	Male	41	68.3
	Female	19	31.7
Level of study	Undergraduate	20	33.3
	Postgraduate	40	66.7

were undergraduates and 40 (66.7%) were postgraduates. Ages of participants varied from 18 to over 40 years of age. 21 (35%) of the participants were between 18 and 24 years of age, 25(41.1%) were between 25 and 32 years of age, 13(21.7%) were between 33 and 40 years of age, and only one participant (1.7%) was over 40 years of age.

Instrument

The instrument of this study was adapted from past literature (i.e. Ajjan & Harts-horne, 2008; Taylor & Todd, 1995). The survey consisted of two sections. In the first section, there were 32 items, of which four items were dedicated to elicit demographic information of students and 28 items were dedicated (1) to obtain students' usage level of Web 2.0 technologies and (2) to obtain students' perceptions of the pedagogical benefits of Web 2.0 technologies in terms of improving students' learning, increasing student-faculty interaction, increasing student-student interaction, improving student satisfaction with the course, improving student writing ability, and the extent to which Web 2.0 could be integrated into university courses. In addition, the second section of the survey includes 29 items represented as statements, of which were dedicated to elicit students' level of agreement or disagreement with statements on a five point Likert scale-type response format.

The reliability of the instrument was measured by using Cronbach's alpha, which is a widely used statistic for evaluating instrument reliability within the research community (Chau, 1999;

DeVellis, 2012; Lewis, Templeton, & Byrd, 2005). The resulting values ranged from 0.72 to 0.97 (see Table 2), in which all scales used to measure the constructs of this study qualify as reliable (i.e. above 0.70, the acceptable lower boundary of alpha coefficient) (DeVellis, 2012).

In addition, the web-survey version has undergone a two-stage pilot study. This first stage was done with the aid of three students who were asked to answer the questionnaire and to comment about anything that seemed illogical (e.g. wording of items and design features, including the number of items viewed on the screen). Moreover, the aim of the second-stage pilot study was to know how long it takes for the questionnaire to be completed in order to provide this information to the targeted participants when requesting their participations. For this step, three new students, who did not participate in the first-stage pilot study, were contacted to participate. The mean completion time was 9.61 minutes.

RESULTS

To recap, the first research question of this study was:

Are university students aware of the benefits of using blogs, wikis, social networks and social bookmarking to supplement traditional classroom instruction?

For this research question, the first related survey questions asked students to describe their usage of Web 2.0 technologies (i.e. blogs, wikis, social net-

Table 2. Descriptive statistics and reliability analysis

Construct	Mean	Standard Deviation	Reliability (Cronbach's Alpha)
Behaviour	3.75	0.93	N/A*
Behavioural Intention	3.46	0.85	0.88
Attitude	3.85	0.90	0.93
Subjective Norm	3.43	0.77	0.92
Perceived Behavioural Control	3.70	0.70	0.85
Perceived Usefulness	3.86	0.58	0.72
Perceived Ease of Use	3.95	0.58	0.80
Compatibility	3.65	0.70	0.97
Peer Influence	3.54	0.70	0.92
Superior Influence	3.54	0.81	0.86
Self-Efficacy	3.86	0.88	0.94
Facilitating Conditions – Resources	3.93	0.73	N/A*
Facilitating Conditions – Technology	3.98	0.72	N/A*

* N/A: construct measured by one item, thus Cronbach's alpha coefficient is not applicable

works and social bookmarking). There were four ordinal categories available for answering these questions (i.e. never use, beginner, competent and proficient). This part will use the mode and median of each question to interpret the data.

The data in Table 3 showed that 21 students (35%) indicated that they are competent in the usage of blogs [mode = 3]. However, the value of the median which indicates the central location of the data falls into the category beginner [median = 2]. Moreover, the data also showed that 27 students (45%) were competent in the use of wikis [mode = median = 3]. Also, markedly, the greatest number of students 31 (51.1%) [Mode] indicated that they are proficient in using social networks with a median value of 3 (i.e. competent). As for social

bookmarking, 40 (66.6%) of the students were equally divided between beginner and competent categories with median value of 2 (i.e. beginner).

These results point to the direction that most students in this sample were knowledgeable about the Web 2.0 technologies studied in this research. This in fact was a good sign for this research as the more students have the practical knowledge about these technologies the more valued their critical evaluation of the role of these technologies to supplement in-class learning. In short, this part lays the foundation of the forthcoming part which has an essential role in answering the first research question.

Furthermore, the second group of survey questions, which are related to the first research question, asked stu-

Table 3. Frequency and percentage of students' current usage of blogs, wikis, social networks and social bookmarking

	Never Use (1)		Beginner (2)		Competent (3)		Proficient (4)	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Blogs	17	28.3	17	28.3	21	35	5	8.3
Wikis	10	16.6	16	26.6	27	45	7	11.6
Social networks	3	5	6	10	20	33.3	31	51.6
Social bookmarking	11	18.3	20	33.3	20	33.3	9	15

Number in **bold** = mode

dents to evaluate a set of statements on a five point Likert-type response format anchored between 'Not at all' to 'To a great extent'. There were 30 statements (i.e. 6 for blogs, 6 for wikis, 6 for social networks and 6 for social bookmarking). The data type for this part of the survey is ordinal. To cope with space limitation, we will present the results of this section in the next table to let the figures speak for themselves.

The second research question of this study was:

What factors influence student decisions to adopt blogs, wikis, social networks and social bookmarking to supplement classroom instruction?

To analyse the data collected to answer this question, this study utilised from path analysis models. Path analysis models were used to test the hypothesised relationships posited by this study. The multivariate context of variables engaged in this study is deemed suitable for statistical analysis using path analysis models (Wright, 1921, as cited in Hartshorne & Ajjan, 2009).

Moreover, Munro and Sexton (1984) stated that, in order to use path analytic models, the correlations among variables in one's theoretical model should be in the right hypothesised direction. In this study, the correlation among variables was significant and in the right hypothesised direction with no correlation exceeding 0.63.

There were 29 survey items related to this research question measured by a five-point Likert scale anchored between "strongly disagree" to "strongly agree" (see Appendix).

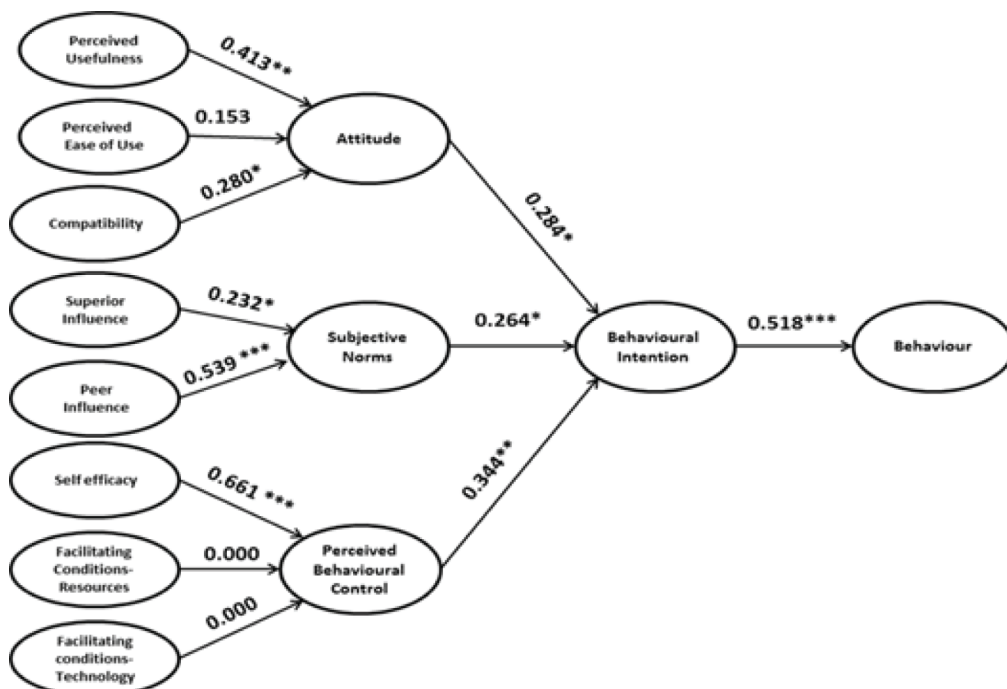
Path Analysis Results

Overall path analysis results of the factors that influence students to adopt Web 2.0 technologies to supplement in-class learning are depicted in Figure 3, and are also tabulated in Table 4. Next, each path model will be analysed to test the hypotheses posited by this study.

Behavioural Intention

Regression results indicate that (56.6%) of the variation in behavioural intention (adjusted R^2) is explained by each of the

Figure 3. Path analysis of factors that influence students to adopt Web 2.0 technologies to supplement in-class learning



* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figures are beta (β) coefficients

three factors: attitude, subjective norm and perceived behavioural control. Research hypothesis #1 stated that students' attitudes towards using Web 2.0 technologies positively affect behavioural intentions. Relying on path analysis results, attitude ($\beta = 0.284$, $t = 2.506$) had a significant effect on behavioural intention ($p < 0.05$). Hence, research hypothesis #1 is confirmed by the results of this study. In addition, research hypothesis #2 posited that students' subjective norms in relation to usage of Web 2.0 technologies positively affect behavioural intentions. Path analysis results indicate that subjective norm

($\beta = 0.264$, $t = 2.260$) had a significant effect on behavioural intentions ($p < 0.05$). Thus, research hypothesis #2 is supported by the results of this study. Lastly, research hypothesis #3 stated that students' perceived behavioural control in relation to usage of Web 2.0 technologies positively affect behavioural intentions. In similar fashion, examining path analysis results indicate that perceived behavioural control ($\beta = 0.344$, $t = 2.857$) had a very significant effect on behavioural intentions ($p < 0.01$). It should be noted that perceived behavioural control had the greatest effect on behavioural intention. Accordingly,

Table 4. The role of web 2.0 in improving students' learning, increasing student-faculty interactions, increasing student-student interactions, increasing student satisfaction with the course, improving students writing, and their ease of integration into university courses

		Not at All (1)		Little Extent (2)		Some Extent (3)		Considerable Extent (4)		Great Extent (5)	
Statement	Web 2.0	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Improve students' learning	Blogs	3	5	15	25	17	28.3	16	26.7	9	15
	Wikis	3	5	9	15	15	25	19	31.6	14	23
	Social networks	6	10	15	25	14	23.3	12	20	13	21.6
	Social bookmarking	5	8.3	12	20	21	35	18	30	4	6.6
Statement	Web 2.0	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
increase students' interaction with faculty	Blogs	3	5	12	20	17	28.3	16	26.7	12	20
	Wikis	8	13.3	11	18.3	14	23.3	18	30	9	15
	Social networks	3	5	11	18.3	12	20	22	36.6	12	20
	Social bookmarking	8	13.3	9	15	23	38.33	15	25	5	8.3
Statement	Web 2.0	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Increase students' interaction with other students	Blogs	3	5	9	15	14	23.3	24	40	10	16.6
	Wikis	11	18.3	11	18.3	16	26.6	15	25	7	11.6
	Social networks	0	0	8	13.3	6	10	21	35	25	41.6
	Social bookmarking	8	13.3	13	21.6	16	26.6	18	30	5	8.3
Statement	Web 2.0	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Increase students' satisfaction with the course	Blogs	3	5	10	16.6	22	36.6	18	30	7	11.6
	Wikis	6	10	10	16.6	17	28.3	19	31.6	8	13.3
	Social networks	6	10	8	13.3	20	33.3	11	18.3	15	25
	Social bookmarking	6	10	11	18.3	24	40	16	26.6	3	5
Statement	Web 2.0	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Improve students' writing ability	Blogs	5	8.3	6	10	21	35	17	28.3	11	18.33
	Wikis	7	11.6	12	20	18	30	14	23.3	9	15
	Social networks	10	16.6	7	11.6	19	31.6	11	18.3	13	21.6
	Social bookmarking	11	18.3	13	21.6	15	25	17	28.3	4	6.6

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Table 4. Continued

		Not at All (1)		Little Extent (2)		Some Extent (3)		Considerable Extent (4)		Great Extent (5)	
Statement	Web 2.0	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Ease of integration into university courses	Blogs	3	5	7	11.6	20	33.3	18	30	12	20
	Wikis	7	11.6	12	20	14	23.3	17	28.3	10	16.6
	Social networks	8	13.3	5	8.3	14	23.33	17	28.3	16	26.6
	Social bookmarking	6	10	8	13.3	20	33.3	20	33.3	6	10

Number in **bold** = mode

research hypothesis #3 is confirmed by the results of this study.

Behaviour

Research hypothesis #4 posited that students' behavioural intention in relation to the usage of Web 2.0 technologies positively affect behaviour. The results of path analysis indicate that behavioural intention ($\beta = 0.518$, $t = 4.618$) had a very significant effect on behaviour ($p < 0.001$). In addition, the factor behavioural intention explains (25.6%) of the variation in behaviour (adjusted R^2).

Perceived Behavioural Control

Regression results indicate that (40.6%) of the variation in perceived behavioural control (adjusted R^2) is explained by each of the three factors: self-efficacy, facilitating conditions—technology, and facilitating conditions—resources. Research hypothesis 7a posited that self-efficacy of using Web 2.0 technologies positively affect students' perceived behavioural control. Path analysis results indicate that self-efficacy ($\beta = 0.661$, $t = 5.318$) had a very significant effect on perceived

behavioural control ($p < 0.001$). Thus, research hypothesis #7a was supported by the results of this study. In addition, research hypothesis #7b stated that facilitating resource conditions for using Web 2.0 technologies positively affect students' perceived behavioural control. The results of path analysis suggest that facilitating resource conditions ($\beta = 0.000$, $t = 0.001$) had no significant effects ($p > 0.05$) on perceived behavioural control. Hence, this study failed to confirm research hypothesis #7b. Lastly, research hypothesis #7c stated that facilitating technology conditions for using Web 2.0 technologies positively affect perceived behavioural control. Based on path analysis results, facilitating technology conditions ($\beta = 0.000$, $t = -0.002$) had no significant effect ($p > 0.05$) on perceived behavioural control. Consequently, research hypothesis #7c was unsupported by the results of this study. It should be noted that amongst the three aforementioned factors, only self-efficacy had a great effect on perceived behavioural control. See Table 5 for the path analysis of factors that influence students to adopt Web 2.0 technologies.

Table 5. Path analysis of factors that influence students to adopt Web 2.0 technologies to supplement in-class learning

fEquation	R² (Adjusted R²)	Beta Coefficient (t-Scores)
Behaviour (B) B = BI Behavioural Intention (BI)	0.269 (0.256)	0.518 (4.618)***
Behavioural Intention (BI) BI = ATT + SN + PBC Attitude (ATT) Subjective Norm (SN) Perceived Behavioural Control (PBC)	0.588 (0.566)	0.284 (2.506)* 0.264 (2.260)* 0.344 (2.857)**
Attitude (ATT) ATT = PU + PE + COM Perceived Usefulness (PU) Perceived Ease of Use (PE) Compatibility (COM)	0.519 (0.493)	0.413 (3.377)** 0.153 (1.301) 0.280 (2.377)*
Subjective Norm (SN) SN = SI + PI Superior Influence (SI) Peer Influence (PI)	0.473 (0.454)	0.232 (2.068)* 0.539 (4.800)***
Perceived Behavioural Control (PBC) PBC = SE + FCR + FCT Self-Efficacy (SE) Facilitating Conditions – Resources (FCR) Facilitating Conditions – Technology (FCT)	0.436 (0.406)	0.661(5.318)*** 0.000 (.001) 0.000 (-0.002)

* p < 0.05, ** p < 0.01, *** p < 0.001

Discussion of Results

Overall, the results of this study's first research question indicate that most students aware of the benefits of Web 2.0 technologies. Wikis were the most useful Web 2.0 technology in terms of improving students' learning, followed by social bookmarking. Furthermore, students indicated that wikis are the most beneficial in increasing students' satisfaction with the course, followed by social bookmarking. In addition, social networks were perceived as the most beneficial Web 2.0 technology in terms of increasing students' interaction with both faculty and other students. Additionally, most students perceived

social bookmarking, followed by blogs, as the most valuable technologies to assist them to improve their writing ability. Also, social bookmarking was perceived to be the easiest technology to be integrated into university courses, followed by wikis and social networks.

These results point into the direction that students would like to be active learners by utilising some popular Web 2.0 technologies they currently use for various purposes (Jones et al., 2010). Such incorporation of technology is seen to fulfill the aim of knowledge construction, in which student collaborate and build their progress together (Kelm, 2011) rather than being passive recipients of learning (Koohang et al.,

2009; Ruth & Houghton, 2009). From the students' perspective, this study provides support to researchers who call for more utilisation from technology in higher education for the purpose of fulfilling the technological expectations of students (Bennett et al., 2008; Prensky, 2001).

Moreover, the results of this study's second research question indicate that both the Theory of Planned Behaviour (TPB) and the Decomposed Theory of Planned Behaviour (DTPB) were helped explain students' adoption of Web 2.0 technologies to supplement in-class learning. As posited by both theories, students' behavioural intention to use Web 2.0 technologies was a very significant predictor of actual behaviour (i.e. actual use of Web 2.0 technologies). In addition, the results indicate that students' perceived usefulness and compatibility in relation to Web 2.0 were strong determinants of students' attitudes regarding the use of Web 2.0 technologies. However, the findings of this study did not confirm students' perceived ease of use as a significant determinant of their attitude toward using Web 2.0 technologies. Additionally, students' attitude was a strong predictor of their intention to use Web 2.0, and its indirect effect on behaviour was significant as well. Moreover, the influence of students' peers as well as lecturers were jointly found to be a strong predictor of students' subjective norms, with peer influence having the stronger effect. In turn, students' subjective norms have a significant influence on their intention to use Web 2.0 technologies. Furthermore,

as suggested by the results of this study, the indirect effect of students' subjective norms on actual behaviour was also significant. As for self-efficacy, technology facilitating conditions and resource facilitating conditions, the only significant determinant of students' perceived behavioural control was self-efficacy. Moreover, students' perceived behavioural control was a strong determinant of their behavioural intention to use Web 2.0 technologies.

There are some noticeable variations and similarities in results between this study and prior studies (i.e. Hartshorne & Ajjan, 2009; Taylor & Todd, 1995) that investigate the adoption of technology by university students. For instance, both of the aforementioned studies reported the factor resource facilitating conditions to be a significant predictor of perceived behavioural control, while this study failed to confirm such results. The findings of this study might indicate that in this current era students have the resources needed to make use of Web 2.0 technologies. So, it is assumed that the availability of resources amongst university students (i.e. time and money) has lessened the influence of resource facilitating conditions on their perceived behavioural control and the subsequent intentions to use these technologies (although we should caution that this is only a speculation). In addition, results from Hartshorne and Ajjan's (2009) study reported the positive effect of perceived ease of use on attitude, while both this study and Taylor and Todd's (1995) reported perceived ease of use to be an

insignificant predictor of attitude. In this case, such variation may be explained by the variation of contexts, especially the 'Who' component (Berthon, Pitt, Ewing, & Carr, 2002), in which these studies were conducted (see Johns, 2006). In fact, Brown et al. (2002) indicated that within voluntary technology adoption contexts, individuals tend to have higher extrinsic motivation to use the technology in question, in which make them prioritise its usefulness over its ease of use.

Practical Implications

The results of this study suggest that most university students in this study's sample have the preference of using Web 2.0 technologies to supplement traditional classroom instruction. Such results may be beneficial for both educational institutions and educators and may trigger the need to re-think their traditional methods of teaching in order to reach the expectations of students of this era. In fact, the infusion of such technologies (i.e. Web 2.0) with traditional education methods can complement one of the major goals of education, which is the construction of knowledge based on sharing and participation (Kelm, 2011; Koohang et al., 2009; Reis, 2010; Ruth & Houghton, 2009). Thus, it is assumed that practitioners within the Australian educational realm can benefit from the results of this study to understand the current attitudes and beliefs of students about pedagogies and educational approaches in order to meet (or preferably exceed) these students' expectations.

Limitations and Future Research

One methodological limitation of this research, was that the collection of data thorough the Internet. That is, the web-survey mode of administration applied in this study may jeopardise the representativeness of this study's sample. In this regard, Nosek, Banaji, and Greenwald (2002) indicated that self-selection bias is a major drawback of web surveys where a non-serious respondent may find the topic of the questionnaire interesting and respond to it. So, this issue may constitute a methodological limitation for this study. However, to tackle this problem, this study employed careful steps to distribute the link to the survey in order to reach the targeted sample, including requesting 5 academics to participate in distributing the link to their student and meeting 99 students face-to-face and request their participation by giving them a participation sheet that includes the goals of the research, the draw of prizes and the direct web-link to the survey.

Another limitation of this study was the sample size, which was not sufficient to make an adequate generalisation of findings. In this regard, Bogozzi and Yi (1988) indicated that the power of the test, whether to reject or prove one's model, increases as the sample size increases. Thus, it can be said that the sample size of ($n = 60$) was not really adequate to provide effective generalisability of results as well as increasing the power of the tests using path analysis models. However, it should be noted that

the generalisability of the results is not the main thrust of this study. This is due to the exploratory nature of this research, in which the aim is to provide a snapshot of the situation and to encourage other scholars to engage in further confirmatory research that could provide more insightful results.

One additional limitation is that the sample of this study was not evenly distributed on both the gender and the level of study variables with males ($n = 41$, 68.3%) more than double the number of females ($n = 19$, 31.7%) and postgraduates ($n = 40$, 66.7%) double the number of undergraduates ($n = 20$, 33.3%). Such imbalanced distribution on these two variables should be taken into consideration when interpreting the results of this study.

Furthermore, future research may consider the contextual factors that affect students' adoption patterns. That is, by extending the theoretical framework on which this study was based, future research can provide more explanations of the 'Why' such theoretical factors affect students to adopt Web 2.0 technologies. In this regard, this study did not explain the reasons why some factors do or do not affect students' adoption patterns. In addressing such a limitation, it is viable for future research to provide a theoretically-based explanation of such factors. In addition, although this study has a sample of respondents from different age groups, universities and genders, no comparison of results between these groups has been made. This could be a potential research direction to explain

which group of students (e.g. male vs. female) has more acceptance potential of the idea of incorporating Web 2.0 technologies for educational purposes.

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APPENDIX

Questionnaire Items

Behaviour (B)

B1: I believe that I could communicate to others the consequences of using Web 2.0 technologies for in-class learning.

Behavioural Intention (BI)

BI1: For in-class learning, I intend to use Web 2.0 technologies this semester.

BI2: For in-class learning, I intend to use Web 2.0 technologies frequently this semester.

BI3: For in-class learning, I intend to use Web 2.0 technologies within the next semester.

Attitude (ATT)

ATT1: To supplement in-class learning, I intend to use Web 2.0 technologies this semester.

ATT2: To supplement in-class learning, I intend to use Web 2.0 technologies frequently this semester.

ATT3: To supplement in-class learning, I intend to use Web 2.0 technologies within the next semester.

Subjective Norms (SN)

SN1: People who influence my behaviour would think that I should use Web 2.0 technologies to supplement in-class learning.

SN2: People who are important to me would think that I should use Web 2.0 technologies to supplement in-class learning.

Perceived Behavioural Control (PBC)

PBC1: I would be able to use Web 2.0 technologies to supplement in-class learning

PBC2: I have the resources and knowledge and ability to make use of Web 2.0 technologies to supplement in-class learning.

PBC3: Using Web 2.0 technologies is entirely within my control.

Perceived Usefulness (PU)

PU1: I would be able to use Web 2.0 technologies to supplement in-class learning.

PU2: I have the resources and knowledge and ability to make use of Web 2.0 technologies to supplement in-class learning.

PU3: Using Web 2.0 technologies is entirely within my control.

Perceived Ease of Use (PEU)

PEU1: I feel that using Web 2.0 technologies will be easy.

PEU2: I feel that using Web 2.0 technologies will be easy to incorporate in my classroom learning environment.

PEU3: I feel that it will be easy for me to become skilful at using Web 2.0 technologies.

Compatibility (COM)

COM1: Using Web 2.0 technologies is compatible with the way I learn in the classroom.

COM2: Using Web 2.0 technologies fit well with the way I learn in the classroom.

Peer Influence (PI)

PI1: Classmates who influence my behaviour would think that I should use Web 2.0 technologies to supplement in-class learning.

PI2: Classmates who are important to me would think that I should use Web 2.0 technologies to supplement in-class learning.

Superior Influence (SI)

SI1: My lecturers who influence my behaviour would think that I should use Web 2.0 technologies to supplement in-class learning.

SI2: My lecturers who are important to me would think that I should use Web 2.0 technologies to supplement in-class learning.

Self Efficacy (SE)

SE1: I would feel comfortable using Web 2.0 technologies.

SE2: I could easily use Web 2.0 technologies on my own.

SE3: I know enough to use Web 2.0 technologies.

Facilitating Conditions- Resources (FCR)

FCR1: I can use Web 2.0 technologies using any computer connected to the Internet.

Facilitating Conditions- Technology (FCT)

FCT1: Web 2.0 technologies are compatible with my computer that I currently use in the classroom.