

The changing motivations of students' use of lecture podcasts across a semester: An extended Theory of Planned Behavior approach

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We extended the previous work of Moss, O'Connor, and White (2010), to include a measure of group norms within the theory of planned behavior (TPB), to examine the influences on students' decisions to use lecture podcasts as part of their learning. Participants (N = 90) completed the extended TPB predictors before semester began (Time 1) and mid-semester (Time 2), and reported on their podcast use at mid-semester (Time 2) and end of semester (Time 3). We found that attitudes and perceived social pressures were important in informing intentions at both time points. At Time 1, perceptions of control over performing the behavior and, at Time 2, perceptions of whether podcast use was normative among fellow students (group norms) also predicted intended podcast use. Intentions to use podcasting predicted self-reported use at both Time 2 and Time 3. These results provide important applied information for educators to encourage student use of novel on-line educational tools.

Keywords: podcast; e-learning; theory of planned behavior; group norms; higher education

Introduction

Given that access to information through the provision of electronic media is fast becoming the way of the future (Cebeci & Tekdal, 2006), it is important that higher education institutions embrace such technologies as part of the student learning experience. The recording of live university lectures for the provision of podcasts is increasing, providing students a revision mechanism with ease of access, mobility, and time-shifting all via a simple interface (Cebeci & Tekdal, 2006; Moss, 2007). Furthermore, *Enhanced Podcasts*, an extension of the traditional podcasting technology, can be created, which allow the use of graphics (usually Powerpoint slides) synchronised with the audio stream allowing for a richer learning experience. These graphics change at the appropriate time of the podcast, therefore reproducing

much of the original lecture, as well as forming “chapters” which students can use to quickly jump to any given point in the lecture.

Lecture podcasting is predominately used by students as a revision tool and not as a replacement for a lecture (Copley, 2007; Williams & Fardon, 2007). Williams and Fardon also found that over 40% of students used podcasts as a flexible option to manage timetabling clashes and work and family commitments. Some educational benefits are also identified with the use of web-based e-lecture tools, specifically improvements to student grades (Cramer, Collins, Snider, & Fawcett, 2007; Stephenson, Brown, & Griffin, 2008). Given that the potentially high uptake of podcasting for revision and timetabling flexibility, and the demonstrated educational benefits of using podcasts, it is important to identify the factors that influence students’ decisions to use this innovative technology as part of their learning. More importantly, using theoretical models to gain this understanding is beneficial as they provide an explanation of how the antecedents of a given behaviour affect behavioral performance, in turn, providing guidance as to how the behavior can be most effectively promoted.

Podcasting and the Theory of Planned Behavior

In a recent study, Moss et al. (2010) sought to contribute to the scant literature on students’ podcasting decision-making by employing a well validated belief-based behavioral decision-making model, the theory of planned behavior (TPB; Ajzen, 1991), to determine the psychological predictors of podcast use by students across an academic semester. The TPB incorporates constructs that examine people’s attitudes, perceptions of social pressures, and perceptions of control to understand people’s intention formation and subsequent behavioral performance. According to the TPB, attitudes, subjective norms (pressure from important others), and perceived behavioral

control influence behavioral intentions, with intentions and perceived behavioral control influencing actual behavior (Ajzen, 1991). Moss et al. found that one's intention to use podcasting was the strongest and only significant direct predictor of podcast use. Furthermore, having positive attitudes toward podcast use was important for the initiation and maintenance of the behavior whereas subjective norms was only important for the initial uptake of the behavior. The TPB model explained 40% and 53% of the variance in intentions at Time 1 (beginning of semester) and 2 (middle of semester), respectively and 9% and 37% of the variance in behavior at Time 2 and 3 (end of semester), respectively.

Given the amount of unexplained variance in students' intentions to use podcasts and their subsequent behavior, other factors may also be important to students' decisions to use podcasts. Peer influences are important in the decision-making of university students (White, O'Conner, & Hamilton, in press). In particular, student norms may be useful to examine in this context given that factors related to the normative behavior of ingroups have been shown to affect student decision-making (Hamilton & White, 2008). It may be beneficial, then, to extend the TPB to include an additional normative influence that is specifically relevant to university students. Examining a normative influence that reflects the perceptions of what other students do and think about lecture podcasting may be useful to examine in this context.

Group Norms

The subjective norm construct within the TPB reflects injunctive norms as the focus is on perceived social pressure from significant others to perform the behavior (Ajzen, 1991). Group norms refer to the explicit or implicit prescriptions regarding one's appropriate attitudes and behaviors as a member of a specific reference group in

a specific context (White, Hogg & Terry, 2002). Thus, use of subjective norms infers general normative pressure to be most influential on the intention-behavior relationship, whereas it has been argued that the normative influence from an ingroup (i.e., groups of people who share similar beliefs, attitudes, and goals) with whom one identifies, is more influential (e.g., Hogg & Abrams, 1988; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987).

The influence of group norms on the intention-behavior relationship can be explained using a social identity (Hogg & Abrams, 1988) and self-categorization theory (Turner et al., 1987) perspective. According to these theories, when social identity is salient, individuals construct context-specific group norms based on shared intra-group information and assimilate themselves to these ingroup norms (Turner et al., 1987). Therefore, group norms influence behavioral performance as the individual, based on their observations of group members, seeks to act in a manner similar with their ingroup, thus achieving categorization as a group member (Hogg & Abrams, 1988; Turner et al., 1987).

More recent evidence suggests that group norms predict behavioral intentions irrespective of level of identification (Johnson & White, 2003). Student peer groups have been identified as a key influence on university students' decision-making regarding use of supplementary lecture offerings (White et al., in press). Additionally, the normative influence of school friends has been shown to affect students' decision-making (Hamilton & White, 2008). Hence, in the current study, the influence of the perceived action and attitudes of an important referent group (i.e., other students in the unit) was included within the TPB to examine its influence on students' podcasting intentions.

<Insert Figure 1 about here>

The Present Study

We aimed to test an extended TPB with the additional normative influence of group norms in students' decision-making to use lecture podcasts. The target behavior was using podcasting for every lecture in the unit (i.e., subject). Given that previous research suggests that different cognitive processes may guide students' decision making across a semester (Moss et al., 2010; White et al., in press), in the present study, the predictors of podcasting use were assessed at two half-semesters. This use of multiple assessment times enabled an investigation of whether the factors determining subsequent podcasting use decision-making change as a result of students' experiences throughout the semester (e.g., when ingroup norms have become established). Specifically, this study built on Moss et al.'s (2010) previous examination of the use of enhanced podcasting in student learning. The present study assessed if group norms emerged as important for podcasting use initiation and/or maintenance. In relation to the specifications of the TPB (Ajzen, 1991) with the additional normative influence, it was expected that intention to use podcasting would be influenced by students' attitudes towards podcasting, pressure from important others to use podcasting (subjective norms), and perceived behavioral control (Hypothesis 1). In addition, according to the TPB, it was expected that intention and perceived behavioral control would predict actual podcasting use (Hypothesis 2). Finally, in relation to the additional normative influence, group norms, it was expected the more students believed that other students were using podcasting and thought podcasting was a good thing to do, the stronger their intentions to use podcasting (Hypothesis 3).

Materials and Method

Ethical clearance was applied for and granted from the University's Human Research Ethics Committee. The only inclusion criterion was that students were enrolled in the

relevant introductory psychology unit at the host institute, a major Australian university. The unit provided students with an introduction to the major content areas of psychology, with a 2-hour lecture each week repeated on two different campuses. Participants were invited by email and via the host Blackboard site to complete a questionnaire at 3 time points across the 13-week academic semester: prior to the semester's commencement (Time 1), at the middle of the semester (Time 2), and at the end of the lecture period (Time 3; see Figure 2). At both Time 2 and Time 3, participants were asked to indicate their use of the lecture podcasts since completion of the previous questionnaire. Podcasts were hosted on the unit's Blackboard site (the mandatory web-based learning management system for the host institution where students access their on-line learning materials for the units they are studying). The online questionnaires were also hosted on the unit's Blackboard site using the online testing function. A researcher, not involved in student assessment for the unit, linked the responses using the Blackboard stored identification details for each student. A total of 90 (17.75% of the enrolled unit population) university students (32 males, 51 females, 7 missing; age $M = 22.19$ years, $SD = 6.25$ years) completed questionnaires at the first data collection point of the study (i.e., prior to the semester's commencement). Of the Time 1 participants, 84 (93%) completed the questionnaire at Time 2 and 78 (87%) indicated their level of podcast use at Time 3. At all data collection time-points, the researcher/on-line instructions explained the purpose of the questionnaire, that students' involvement was voluntary, and that all responses were confidential. All participants received partial course credit for their involvement.

<Insert Figure 2 about here>

Theory of Planned Behavior Measures

To maximize congruence between the prediction and criterion variables, the variables were measured at the same level of specificity in terms of target, context, action, and time (Ajzen, 1991). The TPB items were constructed in line with recommendations and were scored on a 7-point Likert scale, except for attitude, which was scored on a 7-point semantic-differential scale. Some items were negatively worded to reduce response bias and were subsequently recoded for analyses so that all items were worded in the same (positive) direction. Prior to the commencement of the semester, the TPB questions referred to the target behavior as “downloading and watching/listening to the podcast for every lecture in this unit for the first half of semester”. At the middle of the semester, the TPB questions referred to “downloading and watching/listening to the podcast for every lecture in this unit for the second half of semester”.

Intention. At Time 1 and Time 2, three items in the questionnaire assessed the strength of participant’s intention to use lecture podcasting (e.g., “I intend to download and watch/listen to the podcast for every lecture in this unit for the ...”, scored *strongly disagree* [1] to *strongly agree* [7]).

Attitude. Attitude towards lecture podcast use was assessed using 1 item at Time 1 and Time 2 that assessed an overall level of evaluation of the behavior. The item was: “For me, downloading and watching/listening to the podcast for every lecture in this unit for the ... would be: *good* [1] to *bad* [7]”.

Subjective norm. The measure of subjective norm was obtained using two items at Time 1 and Time 2 (e.g., “Most people who are important to me would approve of me downloading and watching/listening to the podcast for every lecture in this unit for the ...”, scored *strongly disagree* [1] to *strongly agree* [7]).

Perceived behavioral control. Perceived behavioral control was assessed using two items at Time 1 and Time 2 (e.g., “I have complete control over whether I download and watch/listen to the podcast for every lecture in this unit for the ...”, scored *strongly disagree* [1] to *strongly agree* [7]).

Group norm. Group norm was measured using two items at Time 1 and Time 2 (e.g., “Other students in this unit would think that downloading and watching/listening to the podcast for every lecture in this unit for the ... is a good thing to do”, scored *strongly disagree* [1] to *strongly agree* [7]).

Podcast use. At Time 2 and Time 3, participants reported their use of the lecture podcasts by answering the following question at each time point, respectively: “How many of the lectures in this unit did you download and watch/listen to in the first half of the semester?” and “How many of the lectures in this unit did you download and watch/listen to since the mid-semester break?”.

Results

Table 1 shows the bivariate correlations, means, standard deviations and reliabilities among the variables at each data collection time point. On average, from the available 10 podcasts, students used lecture podcasting 4.78 ($SD = 4.05$) times across the entire semester. Multiple regression analyses assessed the influence of the extended TPB predictors (attitude, subjective norms, and perceived behavioral control in the first step; group norm in the second step) of students’ intention to use podcasts from the beginning to the middle of semester (between Time 1 and Time 2) and from the middle to the end of semester (between Time 2 and Time 3). The TPB predictors were then used to examine students’ podcast use between Time 1 and Time 2; and between Time 2 and Time 3. Intentions and perceived behavioral control were entered in the

first step in these analyses, with attitudes, subjective norm, and group norm entered in the second step.

<Insert Table 1 about here>

Prediction of intentions to use podcasts

As shown in Table 2, in step 1 all three TPB variables of attitude, subjective norm, and perceived behavioral control significantly predicted students' intention to use podcasts in the period between Time 1 and Time 2, explaining 44% of the variance. The addition of group norm at step 2 did not significantly explain more variance in students' intentions. In the final model, attitude, subjective norm, and perceived behavioral control predicted students' intention to use podcasts in the period between Time 1 and Time 2 (i.e., from the beginning to the middle of semester).

The TPB variables also predicted students' intention to use podcasts between Time 2 and Time 3, accounting for 55% of the variance, with attitude and subjective norm, but not perceived behavioral control, revealed as significant. The addition of group norm at step 2 significantly explained a further 2% of the variance in students' intentions. In the final model, attitude, subjective norm, and group norm predicted students' intention to use podcasts in the period between Time 2 and Time 3 (i.e., from the middle to the end of semester).

<Insert Table 2 about here>

Prediction of podcast use

To predict students' podcast use, intention and perceived behavioral control were entered at the first step in the regression analysis, and attitude, subjective norm, and group norm on the second step. As shown in Table 3, in the period between Time 1 and Time 2, the first step of the analysis (intention and perceived behavioral control)

was significant, explaining 10% of the variance with intention revealed as the only significant predictor. Attitude, subjective norm, and group norm at step 2 did not significantly add to the model. In the final model, only intention predicted students' podcast use for the first half of the semester.

Similar results were revealed across the period between Time 2 and Time 3 in which the first step of the analysis (intention and perceived behavioral control) was significant, explaining 52% of the variance. Intention was revealed as the only significant predictor at this step (see Table 3). Attitude, subjective norm, and group norm at step 2 did not significantly add to the model. In the final model, only intention predicted students' podcast use for the second half of the semester.

<Insert Table 3 about here>

Discussion

The current study extended Moss et al.'s (2010) study which utilised a well validated decision-making model, the TPB (Ajzen, 1991), to examine the influences on students' decisions to use lecture podcasts as part of their learning. In addition to examining the standard TPB constructs, the present study assessed a further social influence that may affect students' decisions, group norms, reflecting the extent to which a student believes that engaging with the new technology is normative among fellow students who are also undertaking the unit. Using hierarchical multiple regression analyses, the predictors of student' intentions to use podcasting for every lecture in the unit (1) for the first half and (2) the second half of the semester were their attitudes and perceived social pressures from important others' to perform the behavior. Additionally, at Time 1, perceptions of control over performing the behavior and, at Time 2, perceptions of whether podcast use was normative among fellow students (group norms) also predicted intended podcast use, explaining an

overall 45% and 57% of the variance in intended podcast use for Time 1 and Time 2, respectively. Intentions to use podcasting predicted self-reported use at both Time 2 and Time 3, with 10% and 53% of the variance explained, respectively.

In partial support of Hypothesis 1 and somewhat consistent with Moss et al.'s. (2010) study, attitudes and social pressures were found to be important influences on students' intended podcast use throughout the semester. However, perceptions of one's capabilities about using podcasting was revealed as important only in the first half of semester. This finding may reflect the behavior being more unknown to the students at this time point. These findings support researchers who suggest that different cognitive processes may govern the initiation and maintenance of behavior. For example, studies have shown that attitudes are important to students' decision-making of attending supplementary class sessions across a semester (White et al., in press) whereas the predictive ability of perceptions of control or self-efficacy is found to be a stronger predictor for initiating rather than for maintaining behavior (Linde, Rothman, Baldwin, & Jeffery, 2006; White et al., in press). Furthermore, consistent with Moss et al.'s. study and partially supporting Hypothesis 2, intention to download and listen to the podcasts was found to be the only predictor of student podcast use when all predictors were entered in the TPB. Perceived behavioral control was not a significant predictor of behavior at either time point, although this finding is relatively common among TPB research (Armitage & Conner, 2001).

In relation to the additional normative influence, we found partial support for Hypothesis 3 in that group norms predicted intentions but only in the second half of semester. This finding suggests that students are more likely to intend to download and listen to lecture podcasts, at least in the second half of the semester, if they perceive that other students in the unit think that it is a good thing to do and are doing

it themselves. Across the academic semester, students might find themselves becoming more competitive, especially as they approach their final assessments and, as such, more comparisons may be made to fellow students. Alternatively, students may be making more in-class friends and, thus, are more influenced by the perceived actions and attitudes of their cohort. This result highlights the importance of fellow student class members in providing normative information that university students use when deciding how to behave. The finding is consistent with research which suggests that peer influences are important to students' decision-making (Hamilton & White, 2008; White et al., in press).

It is important to highlight that the findings of the current study point to a number of applied implications for educators wishing to employ new on-line technologies such as lecture podcasting. In general, explicitly stating the positive aspects of podcast use can improve students' intended uptake. For instance, explicit statements about the educational benefits of lecture podcasting (e.g., to increase the convenience and flexibility of learning) may influence students' willingness to embrace the new technology. Furthermore, engagement may be enhanced through statements of support from important referent groups. Consistent with accepted notions about the diffusion process of a new technology (Rogers, 1995), reinforcing the notion that family, friends, and teaching staff would want students to avail themselves of all opportunities to improve their learning by the use of resources such as lecture podcasting, may influence students' initial, as well as maintained, engagement with the technology. Additionally, early in the semester, to increase students' control over the behavior, educators could highlight the ease of use of podcasting and/or provide opportunities for students to learn how to download and listen to the lecture podcasts, thus giving students more confidence in their ability to

use the new innovative technology. Finally, it may be beneficial to instill podcasting use as a normative behavior among fellow students such as highlighting podcasting as a preferred method of accessing lecture material (Cebeci & Tekdal, 2006), that it is readily taken up by students (Cebeci & Tekdal, 2006; Moss, 2007), and that its use is common among both mature age students and school leavers (Lorimer & Hilliard, 2009).

The results of the study should be considered in light of the study's limitations. First, the students were enrolled in an introductory psychology class and may not be representative of more advanced student cohorts or the majority of students across different disciplines. Future research, then, should consider the specific unit being undertaken, in particular the student interest in the unit and student ratings of teaching quality as well as interdisciplinary differences when replicating these findings. Second, the participation rate was relatively low compared to the total cohort of students enrolled in the subject; however, it should be noted that the study commenced prior to the beginning of semester. Third, a self-report measure of lecture podcast use was employed and so some students may have over reported their use of the technology. Employing electronic monitoring of use would provide more accurate records of performance of the target behavior. Fourth, there was an over representation of females in this study. Future research should aim to recruit a more representative sample, perhaps through identifying some university subjects with more even gender distributions, to determine the role of gender in podcast use. Finally, the focus in the current study was on examining the direct impact of group norms on intention; however, according to social identity theory (Hogg & Abrams, 1988), group norms should interact with the level of identification one feels in relation to a behaviorally relevant reference group. Future research, then, should examine the

relationship between group norms and ingroup identification within the context of predicting podcast use.

Overall, this study contributes to the scant body of research examining psychosocial predictors of student use of lecture podcasts and adds to the previous research of Moss et al. (2010) by its investigation of group norms, a social influence that is of relevance to university students. Specifically, we found that attitudes and perceptions of social pressure are important in informing students' intentions to use lecture podcasting across the academic semester. Also, in the first half of the semester, perceptions of one's ability to download and listen to the podcasts impacted upon students' intentions to engage with this on-line technology and, in the latter half of semester, the normative expectations of others attitudes and behaviors toward podcasting was important for intention formation at this later point in time. Across the semester, students' intentions to download and listen to the lecture podcasts predicted actual use. Given the increasing numbers of students interacting with podcasting technology and the rise in popularity of its use as an educational tool, it is important that research continue to examine, using theoretically based approaches, the determinants of students' intentions and behavior to embrace this and other on-line technologies.

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Table 1. Correlations, Means, Standard Deviations, and Alpha Coefficients for Student Downloading and Listening to Lecture Podcasts at Time 1 (below the diagonal) and Time 2 (above the diagonal)

Variable	1	2	3	4	5	6	<i>M</i>	<i>SD</i>	α
1. Attitude	-	.46***	.53***	.46***	.62***	.48***	5.14	1.54	-
2. Subjective norm	.47***	-	.42***	.53***	.61***	.38**	5.24	1.40	.83***
3. Perceived behavioral control	.33**	.38***	-	.50***	.53***	.41***	5.83	1.18	.55***
4. Group norm	.27*	.58***	.33**	-	.57***	.34**	5.18	1.15	.53***
5. Intention	.49***	.52***	.52***	.40***	-	.72***	4.71	1.73	.95
6. Podcast use ^a	.11	.19	.21	.13	.31**	-	2.41	2.30	-
<i>M</i>	5.14	5.28	5.75	4.99	5.38	2.33	-		
<i>SD</i>	1.76	1.11	1.26	1.10	1.38	2.14		-	
α	-	.54***	.68***	.64***	.96	-			-

Note. Pearson's *r* (and significance) is reported for two-item measures. Constructs were measured on 7-point scales. ^aThe number of podcast lectures downloaded during the unit.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2. Predicting Behavioral Intention for Time 1 and Time 2

Step	Predictor	$\beta_{\text{step 1}}$	$\beta_{\text{step 2}}$
Time 1			
1	Attitude	.25**	.25***
	Subjective norm	.28**	.23*
	Perceived behavioral control	.33***	.32***
2	Group norm		.10
	ΔR^2	.44	.01
	ΔF	22.01***	.89
	R^2	.44	.45
	Model F	22.01***	16.77***
Time 2			
1	Attitude	.37***	.34**
	Subjective norm	.37***	.30**
	Perceived behavioral control	.18	.12
2	Group norm		.20*
	ΔR^2	.55	.02
	ΔF	32.40***	4.30*
	R^2	.55	.57
	Model F	32.40***	26.37***

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3. Predicting Downloading and Listening to Podcasts at Time 2 and Time 3

Step	Predictor	$\beta_{\text{step 1}}$	$\beta_{\text{step 2}}$
Time 1			
1	Intention	.27*	.28*
	Perceived behavioral control	.07	.07
2	Attitude		.08
	Subjective norm		.07
	Group norm		-.02
	ΔR^2	.10	.01
	ΔF	4.42*	.16
	R^2	.10	.10
	Model F	4.42*	1.81
Time 2			
1	Intention	.72***	.78***
	Perceived behavioral control	.01	.02
2	Attitude		.06
	Subjective norm		-.10
	Group norm		-.09
	ΔR^2	.52	.01
	ΔF	40.57***	.75
	R^2	.52	.53
	Model F	40.57***	16.51***

Note: Predictor data for podcast use at Time 2 and Time 3 were collected at Time 1 and Time 2, respectively.

* $p < .05$, ** $p < .01$, *** $p < .001$.

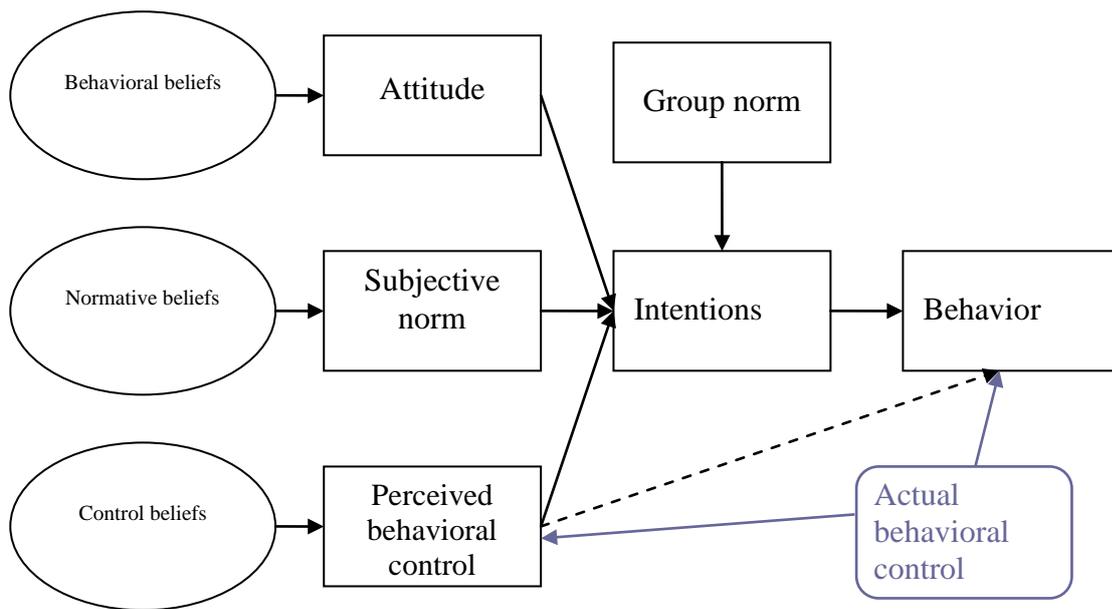


Figure 1. An extended Theory of Planned Behavior

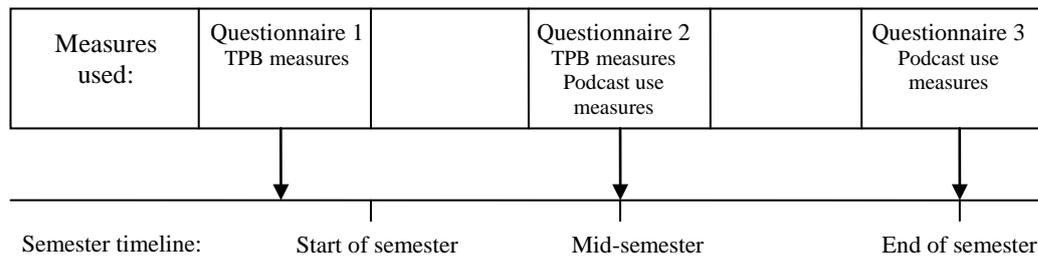


Figure 2. Data Collection Timeline

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