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Xue Yang
National University of Singapore, yangxue@comp.nus.edu.sg

Yan Li
National University of Singapore, liyan@comp.nus.edu.sg

Chuan-Hoo Tan
National University of Singapore, tanch@comp.nus.edu.sg

Hock-Hai TEO
National University of Singapore, teohh@comp.nus.edu.sg

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National University of Singapore
tanch@comp.nus.edu.sg

Hock Hai Teo
National University of Singapore
teohh@comp.nus.edu.sg

ABSTRACT

Online discussion forum (ODF) has been touted to enrich the process of acquiring, sharing and exchanging knowledge among students and has increasingly being utilized to complement the conventional ways of teaching. Despite the widespread recognition of the benefits brought about by ODF, antecedent evidence indicates that the forum may not be utilized to its full potential due to lower than expected student participation. Drawing on the literature in social psychology and technology adoption and applying the theory of planned behavior (TPB), this research seeks to identify the motivational behavioral factors influencing the student's intention to participate in ODF. A two-phase research process was adopted: first of which involved the usage of qualitative survey data and extensive literature review to build the conceptual model of ODF participation intention. Subsequently, a cross-sectional survey was conducted to empirically test the model. Results were analyzed and implications were discussed.

Keywords

Online discussion forum, collaborative-based learning, theory of planned behavior.

INTRODUCTION

Online discussions are increasingly becoming an integral part of collaborative-based learning systems – which are designed to facilitate the specific organizational structure construction in which students work together and assist each other in pursuing academic goals (Hilke, 1990). Particularly, the Online Discussion Forum (ODF), a specific form of collaborative-based learning application, has been touted to enrich the process of acquiring, sharing and exchanging knowledge (Yuen, 2003). For instance, Leidner and Jarvenpaa (1995) concluded that the collaborative-based learning performance can be improved by replacing or complementing regular face-to-face instruction with the use of online technologies, such as ODF.

It is contended that whether the use of learning technology leads to positive effects on students' performance is largely dependent on the students' active participation, which in turn depends on how the students value the application (Keller 1987). Studies (e.g., Piccoli, Ahmad, and Ives, 2001) indicated that students had extensively recognized the helpfulness for the ODF to enhance collaborative learning, and representative enthusiasm towards the ODF participation (Dos Santos and Wright, 2001). However, some researchers (e.g., Miesing, 1998) have raised the question why in many occurrences students did not participate as greatly as the educators had anticipated and the hallucination of eager online discussion had never actually materialized.

The objective of this study is to address this question by identifying the critical behavioral motivations as antecedents of ODF participation intention. A specific mixed-method approach (Tashakkori and Teddlie, 1998) is adopted with a two-phase research process, first of which involves using qualitative survey data and extensive literature review to identify the constructs and build the conceptual model of ODF participation intention. Subsequently, a cross-sectional survey at a public university is conducted to empirically test the model and its hypotheses.

Theoretically, this study provides a deeper and nuanced understanding of the motivational determinants on students' intention to participate in technology-driven learning. Practically, by improving the understanding into what the students valued most

in the collaborative learning arena, we are able to provide further insights for educators to better perform their roles in enhancing students' ODF participation activities. Furthermore, this study also presents a two-phase analytic framework for future research. This study is capable to answer the call for theoretically grounded research into an often-neglected aspect of successful technology implementation to facilitate collaborative learning, namely student acceptance and participation (e.g., Miesing, 1998).

The organization of the paper will be as follows. Firstly, we conduct a literature review of the TPB as the backbone of this study. Following this is the first phase of qualitative study and the construction of conceptual model. Then the second phase of quantitative data analysis to test the model and hypotheses will be conducted. The paper concludes with results, discussion and future implications.

THEORY OF PLANNED BEHAVIOR (TPB)

IT adoption has been studied extensively in information systems (IS) research at the individual level (Venkatesh and Brown, 2001), including in the education and learning arena (e.g., Leidner and Jarvenpaa, 1995; Piccoli et al., 2001). Technology Acceptance Model (TAM) (Davis et al, 1989), one of the most influential individual IT adoption models, incorporates two beliefs of the potential adopters, perceived usefulness (U) and perceived ease of use (E) of technology as the main determinants of the attitudes toward a new technology. However, TAM does not capture the individual's behavioral and psychological underpinnings in technology adoption. Thus, in this study, we adopt Theory of Planned Behavior (TPB) (Ajzen, 1991), a well-researched intention model that incorporates grounded concepts and principles, as our theoretical foundation.

TPB has been widely applied to predict and explain for human intention and volitional behavior towards different technologies (Harrison et al., 1997; Taylor and Todd, 1995; Venkatesh and Brown, 2001). TPB takes the influence of social and personal control factors on behavior into account (Taylor and Todd, 1995) and describes an active, deliberate decision process within the constraints of social expectations and limited resources (Harrison et al., 1997). More important, prior IS research has used TPB as a guiding framework to create a decomposed belief structure for technology adoption and usage (Taylor and Todd, 1995). Hence, the ability of TPB to assert that specific salient beliefs influence given behavioral perceptions and subsequent actual behavior (Ajzen, 1991) suggests its validity in the study of the motivational antecedents of ODF participation intention. Consistent with the specific decomposition approach, we propose a conceptual model for the ODF participation intention by drawing from rich research bases in technology adoption, consumer behavior, and psychology especially focusing on the dimension of behavioral motivations which will in turn determine the participation intention construction.

STAGE 1: DEVELOPMENT OF THEORETICAL RESEARCH MODEL

To identify the motivational determinants of students' intention towards ODF participation, we followed the qualitative approach suggested by Eisenhardt (1989). A university-wide survey was conducted, by the instructional technology centre of the university, to gather students' general feedback on the virtual learning environment services, including the ODF through which students can discuss course-related issues online. In total, 4939 responses from different faculties were collected and among them, 1503 students commented on the ODF. To establish an independent assessment of the feedback received, two "blind" coders (IS post-graduate students) screened, tabulated and categorized the comments based on categorization rules. Seven major motivational factors emerged from the feedbacks: (1) Social outcome expectancy; (2) Hedonic outcome expectancy; (3) Utilitarian outcome expectancy; (4) Perceived importance of learning; (5) Peer pressure; (6) Superior pressure; and (7) Conformity pressure.

Factors (1) to (3) relate to the outcome expectancy, factor (4) denotes the perceived desirability of participation in ODF, and factors (5) to (7) relate to subjective norms. Students' outcome expectancy is represented as the internal force inherent in the individual that initiates learning-oriented IT adoption behavior (Pinder 1998). It refers to a student's belief that participating in the ODF would lead to the desirable collaborative-based learning outcome they anticipate. The perceived valued outcomes and feelings of achievement will more likely motivate individuals to undertake the behaviors which may result in such favorable consequences (Compeau and Higgins, 1995).

Subjective norms are formed by a student's normative beliefs (Harrison et al., 1997) of the perceived social pressure from others who are important to him/her to perform or not to perform the behavior (Ajzen, 1991). Intuitively, in the collaborative learning environment, the perceived important sources of social pressure include the peer pressure from friends or classmates who are with no difference in the social status, and the superior pressure from instructors (such as lecturers and tutors) who are perceived to possess certain formal authority (Yang, Li, Tan, and Teo, 2004).

The following section presents sample responses of the ODF participation and the seven influential factors. Building upon the qualitative study findings, we incorporate the extant literature, particularly the TPB model, to formulate hypotheses relating these factors to participation intention and present the research model of ODF participation intention.

Intention towards Participation

According to TPB, a person's behavior has a strong positive relationship with the intention to perform the behavior when the behavior is under individual's volitional control (Harrison et al., 1997). Thus, consistent with prior research (Yang et al., 2004), the students' intention towards participation in ODF is framed as the main target behavioral dependent variable. Individual's intention to perform a given behavior is assumed to capture the motivational factors that influence a behavior (See Ajzen, 1991) and further lead to the strength of conscious plans to perform the target behavior (Harrison et al., 1997). It highlights the importance of examining the behavioral intention of the ODF participation rather than mere provision of sophisticated applications. Students also acknowledged the willingness to participate in ODF:

> *"I am willing to participate in this online discussion forum as it is a great place to spontaneously communicate and interact with fellow school mates and lecturer."*

Social Outcome Expectancy

Social outcome expectancy refers to the influence from others who belong to the same social group (Venkatesh and Davis, 2000), and may lead to the desire for social outcomes. It commonly refers to public recognition that would be achieved as a result of performing a certain behavior (Fisher and Price, 1992). One student noted:

> *"I enjoyed joining in the discussion forum since it actually acts as a tool for me to be present and in contact with the learning communities."*

Besides social independence, the modern teaching and learning encourage social interdependence simultaneously, namely it is perceived even more important by students to establish their roles in the collaborative-based learning environment. Futhur, because the asynchronous nature of the ODF makes it less possible for anyone to dominate or control the discussion, students can achieve more equitable and more democratic opportunities than in traditional classroom discussions (Ruberg, Moore, and Taylor, 1996). Participants in online discussion may also be able to project their personalities into it, creating feelings of presence that build online learning communities (Poole, 2000). Therefore, students can more easily be remembered or honored by fellow classmates and lecturers when they show their genuine ability and knowledge. The perceived power of the ODF to fulfill the social outcome expectancy can largely motivate students to participate. Hence, we posit that:

> **H1a:** The higher the social outcome expectancy, the more likely students will be motivated to form positive intention towards participating in the ODF.

Hedonic Outcome Expectancy

Hedonic outcome expectancy refers to the pleasure derived from the use of a technology (Babin, Darden, and Griffin, 1994), while the participation in the ODF in this case. Compared with the conventional way of learning, the ODF facilitates two-way communication among students and the lecturer (Yang et al., 2004). The learning process thus becomes more student-oriented in a collaborative manner by promptly interacting voluntarily based on common learning objective. Additionally, based on the students' feedbacks, we believe that a well-designed and attractive forum interface including the additional functionalities of entertainment (e.g., links to music, posted pictures, etc.) and availability of customization may also increase the degree of perceived enjoyment. One student summarized this thought:

> *"Forums are great to facilitate active off-class discussions. Furthermore, I intend to see the forum being made more attractive and "funky" i.e. give the user the ability to customize the preferences of the background design, including funny icons, addition of music and so on."*

Overall, the perceived ability of the ODF to fulfill students' hedonic expectancy will likewise motivate students to form participation intention in the ODF. Hence, we posit that:

> **H1b:** The higher the hedonic outcome expectancy, the more likely students will be motivated to form positive intention towards participating in the ODF.

Utilitarian Outcome Expectancy

Utilitarian outcome expectancy is the most immediate and tangible expectancy placed on technology-enabled collaborative-based learning, referring to the extent to which participating in the ODF enhances the quality and effectiveness of learning activities (Venkatesh and Brown, 2001). Participation in the ODF can deepen learners' understanding by facilitating greater informal spontaneous interaction and benefit from the contributions of the others on a timelier basis (Piccoli et al., 2001), especially when learners realize the crucial effect of taking responsibility to learning through communication. Empirically, students engaged in the collaborative-based learning which could be facilitated by ODF are proved to earn higher grades than those who did not (Alavi, 1994). For example, one student offered the following idea:

> *"The forum is a very useful and highly interactive means of communication among us fellow classmates plus between the lecturers and students to learn from FAQ and speed up our learning curve. It's a very good platform for one-stop academic access."*

In a nutshell, given the perceived ability of the ODF to facilitate collaborative-based learning, higher expectancies of utilitarian outcome will more likely lead to students' intentions to participate (e.g., Davis, Bagozzi, and Warshaw, 1992). Thus, we hypothesize:

> **H1c:** The higher the utilitarian outcome expectancy, the more likely students will be motivated to form positive intention towards participating in the ODF.

Perceived Importance of Learning

As indicated above, utilitarian outcome expectancy is the most immediate and tangible collaborative-based learning outcome which can internally motivate students to participate and might be moderated by the evaluation of outcome desirability (Taylor and Todd, 1995). Furthermore, the perceived importance of learning is adopted to be the evaluation standard to measure one's perception about the significance of learning. In other words, the higher the perceived importance of learning, the more likely students will be motivated to perform the collaborative-based learning activities. Hence, we hypothesize:

> **H1d:** The higher the perceived importance of learning, the more likely the utilitarian outcome expectancy will motivate students to form positive intention towards participating in the ODF.

Peer Pressure

Peer Pressure is formed when a student perceives his/her peers put more effort into participation in the ODF than the effort put into by him/her (e.g., Barron and Gjerde, 1997). To illustrate, students may be more greatly motivated to participate in the ODF by modifying one's own effort according to the signals from the peers and concurring with the peers' move. The feature of interactivity in collaborative learning also determines that the shortage of peers' participation will also weaken the motivation to participate from students' view. One student presented this observation:

> "Certain functions of the forum are hardly utilized by my friends. I think most students are not aware and will not bother these uses, as they may have other alternatives."

Essentially, the peers' positive (or negative) attitude towards the ODF participation can affect students' intention to participate (Piccoli et al., 2001). Hence, it is argued that:

> **H2a**: The greater the peer pressure, the more likely students will be motivated to form positive intention towards participating in the ODF.

Superior Pressure

As the principle actors in any learning environment, instructor's attitude and action can have an important influence (perceived as formal authority) on students' performance in the learning environment (Piccoli et al., 2001) which is consistent with their role as learning facilitators in the collaborative-based learning dimension. Two students explained it:

> "A forum without the lecturer's frequent comments is nothing better than no forum at all because students may tend to mislead one another as a result of lecturers' ignorance towards postings."

> "The usage of the forum largely depends on the lecturer encouragement. Lecturers should be aware of the forum's importance for students and engage us in the discussion; otherwise not much information can be found there."

Evidently, the instructor's proactive (or passive) involvement can also affect students' intention to participate (Piccoli et al., 2001) because students may show more eagerness to get approval from their instructors, while contrarily they may feel frustrated of lecturers' reluctance of presence in the ODF. Because of the commonly intense desire of authentic guidance, lecturers' active engagement as a social persuasive information can perceptually promote students' enthusiasm to participate in the ODF. Hence, we posit that:

> **H2b:** The greater the superior pressure, the more likely students will be motivated to form positive intention towards participating in the ODF.

Conformity Pressure

Extant studies have shown that the strength of normative belief (i.e. pressure) as extrinsic motivator is moderated by the person's willingness to comply (i.e. conformity pressure) with the referents (Taylor and Todd, 1995), while stronger conformity pressure will accordingly enhance the effect of the peer/superior pressure on the intention towards the ODF participation. On the other hand, the dislike over the external pressure which forces them to participate in the ODF as mandatory will impair the motivation to comply:

> *"Although this online discussion forum is very popular among students, I don't feel I should participate just because others are doing so."*

Concisely, the degree pf conformity pressure will accordingly enhance or hinder individuals' perceived level of peer/superior pressure as extrinsic motivation towards the intentions to participate in the ODF, known as the moderating effect. Hence, we hypothesize:

> **H2c:** The greater the conformity pressure, the more likely students will be motivated by peer pressure to form positive intention towards participating in the ODF.
> **H2d:** The greater the conformity pressure, the more likely students will be motivated by superior pressure to form positive intention towards participating in the ODF.

Based on the previous theoretical findings with qualitative information support, the derived conceptual model is generated and presented in Figure 1. In the next section, we will describe the second phase of the research, which consists of a quantitative survey study designed to validate the proposed model.
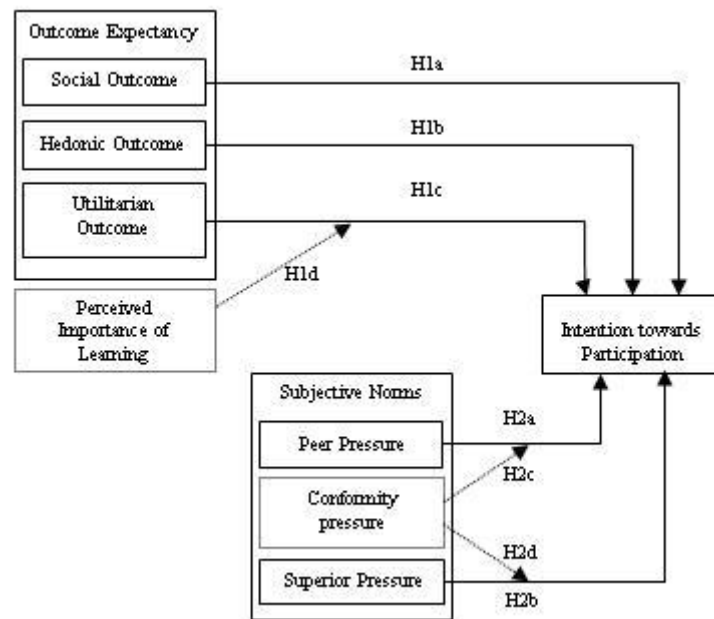

Figure 1. Research Model

STAGE 2: VALIDATION OF THE THEORETICAL MODEL

To verify the proposed research model, we conducted a cross-sectional survey study by developing a questionnaire and disseminating to the target subjects, which are mainly formed by full-time third year undergraduate computing school students enrolled in an Information Systems Strategy course. All the attendants in the course were provided with the

questionnaire, thus the possibility of selection bias is largely reduced. The lucky draw with $20 cash for five of the respondents is provided as an incentive to motivate students. In total out of 254 sets of questionnaires were distributed, and 206 responses (81%) were received. We finally recorded 183 entries while 23 returned questionnaires were removed because of response incompleteness.

Instrument Development

The questionnaire scale development for the constructs was based on extensive literature review on IT adoption, behavioral and psychological decision making, and education arena, for the assurance of measurement reliability. Only validated standard items were adapted for use in current study. The card sorting procedure proposed by Moore and Benbasat (1991) is adopted in the pre-test step with 25 postgraduate students in the computing school. The questionnaire thus was revised by incorporating their feedback as well as feedback from several information system faculty members, and the content validity is adequately ascertained while four items were removed or rephrased. There were 8 constructs with 25 items in total.

Data Analysis

Cronbach's alpha and factor analysis test are conducted to assure the scale reliability and internal consistency between individual items in the scale. Partial Least Square (PLS) as a structural equation modeling (SEM) technique is adopted to test both measurement and structural model. In evaluating the measurement model, items with path loading of 0.7 or higher were considered as acceptable. For the evaluation of the structural model (hypothesized links), the Bootstrap resembling procedure was applied to test the significance of the path coefficients. To further assess the internal consistency, we measured the composite reliability (ρ). In formulating and testing the effects of moderating variables, we applied the procedure described by Chin et al. (1996). First, we standardized all indicators reflecting the predictor and moderator constructs to a mean of zero and variance of one. Then, using the standardized indicators of the predictor and moderator variables, product indicators were generated to reflect the latent interaction variable. The PLS procedure is then applied to estimate the latent variable.

The results of the PLS analysis are presented in Figure 2. The estimated path coefficient (standardized) and its associated significance level are specified next to each link. The R^2 statistic is indicated next to the dependent construct. The empirical results support the hypothesized influence of outcome evaluation on intention formation with 3 out of 4 hypotheses supported. Social outcome expectancy has an insignificant negative effect on intention with path coefficient of -0.009. Hence, H1a is not supported. This implies social recognition may not be an important expected outcome since it is given by others and there is a level of uncertainty compared with utilitarian or hedonic outcome which can be perceived by participators themselves. On the other hand, H1b is supported since hedonic outcome expectancy has a significant effect at the 0.01 level on intention with path coefficient of 0.295. One likely explanation is that since the ODF is designed to facilitate students' distant discussion voluntarily while mostly outside their lesson schedule, students should perceive the forum to be sufficiently "interesting" to participate since it is not mandatory (Yang et al., 2004).

There is a significant effect of utilitarian outcome expectancy on intention at the 0.01 level with path coefficient of 0.325. Hence, H1c is supported. The moderator construct of perceived importance of learning significantly moderate the relationship between utilitarian outcome expectancy and the intention towards participation at a 0.05 level and the path coefficient is 0.152. At the same time the possible significant relationship between the perceived importance of learning and intention is not found which also support the hypothesis of its moderator effect. The result indicates that how students evaluate the value by fulfilling utilitarian outcome expectancy also depends on how students attach importance to the learning outcome. Hence, H1d is supported.

The positive relationship between peer pressure and intention is significant at the 0.05 level, with path coefficient of 0.113. Hence, H2a is supported. However, the conformity pressure is detected to negatively moderate the peer pressure effect. Hence, H2c is not supported. Probably, this is because students may respond negatively to the requirement from peers to participate in the discussion forum since fellow classmates or friends are perceived to be in the same social status as them. On the other hand, the effect of superior pressure on the intention is significant at the 0.05 level with coefficient of 0.213 and the conformity pressure positively moderates this relationship. This shows the social superiority from lecturers' instruction or incentives (e.g. reward on grades) will have greater impact on enhancing the pressure effect. Hence, H2b and H2d are supported.
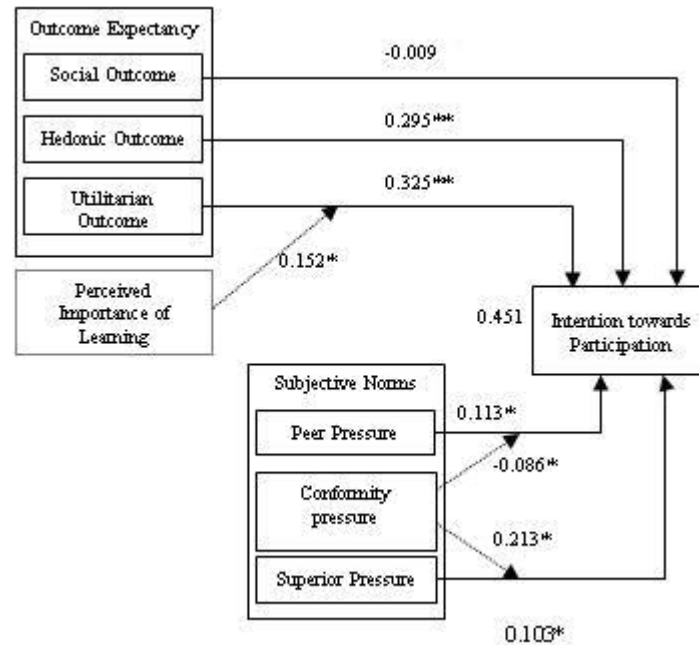
Figure 2. Results of PLS Analysis

(*Significant at 5% level of significance **Significant at 1% level of significance)

CONCLUSION

This research specifically explored the two most important dimensions of the motivational determinants of the intention construct, namely outcome expectancy and subjective norms by modifying the original TPB model. We also examined possibility of moderating variable effects on the decomposed independent variables of one construct (e.g. conformity pressure on the decompositions of peer pressure and superior pressure).

Theoretically, this study possesses certain novelties. First of all, this study adopts a mixed-method, rigorous approach in its empirical examination of the participation intention of collaborative-based learning application, which is unique in this stream of research. Second, it applies and tests the TPB model by decomposing the key independent constructs and incorporates the multiple moderating effects on some of the decompositions. To test the moderators' effect, PLS-graph has been adopted as the statistical analysis tool. Besides the theoretical backbone extension, an empirically oriented conceptual model deduction means is conducted through the implications from the pilot survey results. Based on this, a more comprehensive and holistic review on the determinants of participation intention , based on both extant literature and the qualitative data gather from study 1, has been done to develop the final research model with sub-constructs for the two key independent constructs. The empirical validation results indicated that the varying effects of each sub-construct on the intention formation. In a nutshell, this study has presented a more comprehensive model explaining the intention to participate in the ODF designed to encourage students to involve.

Empirically, the statistic analysis results confirm the hypothetical moderating effect of perceived importance of learning on relationship between utilitarian outcome expectancy and the intention to participate, as well as the conformity pressure on the effect of peer pressure. This implies the moderators will accordingly affect the cost and benefit computation and consequently strengthens or weakens the effect of the independent variables on the intention to participate. Notwithstanding the complexity of introducing moderating variables in many prior studies, this study will be of benefits to those researchers contemplating to further explore the importance of moderating variables on intention formation (Yang et al., 2004).

Practically, a number of issues are worth mentioning. First, it seems that to motivate students to participate in the ODF, the outcome expectancy aspects and the perceived behavioral norms of the students must be addressed and taken into consideration. Indeed, if the ODF is designed and marketed as an "interesting yet beneficial" informal learning avenue, it may potentially lead to more favorable responses from the students. Second, from the extent student feedbacks, the presence of instructor influence may yield mixed effects on the participation intention. Practitioners have to be wary of this. Third,

conventional wisdom dictates that perceived behavioral control is essential towards participation. However, given the level of IT competency among the students and increasing "standardization" of user interface, the perceived behavioral control becomes a prerequisite for the ODF rather than a determinant of intention formation.

Conclusively, the ODF is increasingly being adopted to complement the conventional ways of teaching and learning by encouraging students to take a more proactive approach towards learning. With a better understanding of the factors leading to the participation intention, the ODF could be more readily accepted by the students and hence, a better collaborative-based learning environment for both the instructors and the students could be achieved.

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