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Applying the UTAUT2 model to determine factors impacting the adoption of Microsoft Teams as an online collaborative learning tool

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Abstract: This study aims to evaluate the adoption of Microsoft Teams as an Online Collaborative Learning (OCL) tool in higher education using the Unified Theory of Use and Acceptance of Technology 2 (UTAUT2) model. A survey was conducted with 85 postgraduate students from a UK university, which included open-ended questions to gather their feedback on using Microsoft Teams. Quantitative data was analysed using partial least squares, while thematic analysis was employed for qualitative data. The findings indicate that Hedonic Motivation and Habit play vital roles in students' adoption of Microsoft Teams for OCL. Furthermore, the qualitative data highlights the significance of user-friendly features and familiarity with the

tool in promoting adoption. This research not only expands the application of the UTAUT2 model in evaluating the behavioural intention of utilising Microsoft Teams in OCL but also offers practical insights for educators on effectively integrating the tool into teaching and learning practices.

Keywords: online collaborative learning; Microsoft Teams; unified theory of use and acceptance of technology 2; higher education.

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1 Introduction

Collaborative learning is an active learning method involving learners participating and working together in small groups to exchange ideas and develop a shared understanding of a specific topic (Magen-Nagar and Shonfeld, 2018; Prince, 2004). Rooted in social learning theory, where learning is seen as a social process, the high-quality social interactions in collaborative learning enable students to gain deeper learning (Bandura and Walters, 1977; Visschers-Pleijers et al., 2006). In addition, research shows that collaborative learning enhances students' conceptual understanding compared with students who went through individual learning, which is essential for complex problem-solving (Van Boxtel et al., 2000; Visschers-Pleijers et al., 2006). Moreover, collaborative learning enables learners to sharpen their social skills such as communication, coordination and cooperation, which are essential for thriving in the real world (Scager et al., 2016). Therefore, collaborative learning is commonly adopted as learning strategy in Higher Education pedagogy (Abuhassna et al., 2020).

For traditional face-to-face Higher Education Institutions (HEIs) collaborative learning activities were solely conducted face-to-face, in small groups of students. When the COVID-19 pandemic hit higher education, all synchronous face-to-face delivery had to transition to online teaching and with it we witness a proliferation of videoconferencing systems to replace what were classroom activities (Tan et al., 2022). Collaborative learning had to take its form online. According to Yücel and Usluel (2016), Online Collaborative Learning (OCL) is a pedagogical process supported by internet technology which enables learners to exchange ideas, discuss problems from various perspectives and elaborate and refine their understanding to reconstruct new knowledge to solve a problem. It employs technological infrastructure such as the internet, computers and interactive virtual learning tools to deliver learning outcomes and teaching materials (Rasouli et al., 2016). It is not a new form of learning but because of the pandemic it became a widely explored strategy.

Compared to other mainstream virtual learning tools such as Blackboard Collaborate or Zoom, there is limited research on using Microsoft Teams to fostering online collaborative learning. Hence, this paper aims to evaluate the adoption of Microsoft Teams in promoting OCL. Following on the work from Udeozor et al. (2022) and Islamoglu et al. (2021), Unified Theory of Acceptance and Use of Technology 2 (UTUAT2) has been commonly used in evaluating learning technology adoption. This research has adopted the same approach by employing UTAUT2 in evaluating the adoption of Microsoft Teams among a group of postgraduate students.

This paper starts with a literature review, followed by the research methodology section, which illustrates how we adopted UTAUT2 in designing the data collection instrument and data analysis methods. We then discuss the findings, followed by a discussion section describing how the findings address the overall research aim. Finally, we conclude this paper with the research contributions and avenues for future research.

2 Literature review

2.1 OCL and related tools

OCL enhances interaction among educators and learners and promotes a sense of social presence and community (Coll et al., 2014; Resta and Shonfeld, 2013). It encourages active learning, information exchange, cooperation and support among learners towards achieving group goals (Chatterjee and Correia, 2020; Ku et al., 2013). According to Knopf et al. (2021), OCL could improve the learning experience and generate advantages in traditional synchronous classrooms due to higher students' motivation and enjoyment of interaction. As a result, OCL contributes to learners' retention (Peter and Lois, 2020).

Despite the benefits of OCL, it is perceived as another form of communication which could not fully replicate the face-to-face interactions required by the learners (Roddy et al., 2017). For example, learners feel that certain face-to-face learning elements cannot be replicated by OCL (Tan et al., 2022). From a learner perspective, factors such as lack of experience collaborating online, confidence in own skills to communicate with others, inability to self-motivate and technical competencies, can hinder OCL benefits (Horvath et al., 2019; Lee and Choi, 2011). Although OCL may enable educators to monitor students' mental health (Morgan, 2020), it may not be particularly helpful in fully observing learners' non-verbal cues, such as body language and emotions (Fortune et al., 2011).

Therefore, to ensure the perceived benefits of OCL, the choice of OCL tools is crucial. In addition to constructing knowledge, these tools allow learners to collaborate with and provide feedback to their peers (Wu, 2020). For the past two decades, we have seen rapid development in education technology, particularly in Virtual Learning Environments (VLE) which contribute to facilitating online teaching and learning activities (Palvia et al., 2018). Blackboard Collaborate, a feature in Blackboard VLE, is seen as one of the mainstream market players in facilitating online learning (Power et al., 2010). Interestingly, we have also seen enterprise teleconference applications such as Microsoft Teams, Webex and Zoom, once used mainly for business purposes, now tapping into the online learning territory (Keerio et al., 2022). Following Oliveira and Terra (2021) research, Table 1 shows the comparison of online tools commonly used for OCL and their functionalities, which could impact learners' adoption of the tools. These tools are often supported by standard desktop and mobile operating systems such as Windows, Android, macOS and iOS.

Table 1 Comparison of online tools and their functionalities for OCL purpose

Functionalities / *Online tools*	*Video conferencing and recording*	*Breakout groups*	*Chat*	*File storage management*	*Application integration*	*Subscription costs*	*Sources*
Blackboard collaborate	Yes	Yes, but no recording for breakout rooms	Yes	Yes	Yes, integrated with Blackboard learning management systems	$9000 annually for departmental license	(Blackboard, 2022; Chen et al., 2020; Tan et al., 2022)
Microsoft Teams	Yes	Yes, and recording is available in the breakout rooms	Yes	Yes	Yes, integrated with Office365	Free of charge with constraints in features and $12.50/month for each individual user with the whole Microsoft 365 package	(Buchal and Songsore, 2019; Nawi and Lee, 2022; Tan et al., 2022)
Zoom	Yes	Yes, and recording is available in the breakout rooms	Yes	Yes, integrated with third party systems	Yes, integrated with third party systems	Free of charge with constraints in features and $159.90 annually for each individual user within small teams	(Li et al., 2021; Pratiwi et al., 2020; Zoom, 2022)
Google classrooms	Yes	Yes, via Google Meet	Yes, via Google Chat	Yes, via Google Drive or Google Docs	Yes, integrated with Google suite	Google Workspace for Education Fundamentals is free to educational institutions, but users are required to pay for advanced versions. Prices are ranged from $3/month to $5/year for each student	(Google, 2022; Khalil, 2018; Ventayen et al., 2018)

Table 1 Comparison of online tools and their functionalities for OCL purpose (continued)

Online tools / *Functionalities*	*Video conferencing and recording*	*Breakout groups*	*Chat*	*File storage management*	*Application integration*	*Subscription costs*	*Sources*
WebEx	Yes, and 40 minutes for free version	Yes	Yes	Yes	Yes, soon will be integrated with business applications	Free of charge with constraints in features and $1950/year for 50 hosts	(Chaimeeboon and Namee, 2017; Copeland, 2022; Dames et al., 2017; Webex, 2022)
Slack	Yes, recording is only up to three minutes	Yes, via Breakout Hub	Yes	Yes	Yes, integrated with third party applications such as Zoom or Google Drive	Offer a free version with constraints in features, and $6.69/month for a Pro plan and $12.50/month for a Business+ plan. The Education program offers an 85% discount on both plans	(Gofine and Clark, 2017; Slack, 2022a, 2022b; Zhang et al., 2019)
Skype	Yes	Yes	Yes	Yes	Yes, integrated with third party applications	Free of charge	(Dharma et al., 2017; Skype, 2022)
WhatsApp	Yes, but not with recording	No	Yes	Yes	No	Free of charge	(Cetinkaya, 2017; WhatsApp, 2022)

Looking at the functionalities, all tools offer video conferencing and recording. However, this feature does not support OCL fully. For instance, Blackboard Collaborate allows learners to create breakout rooms, but the recording feature in the breakout rooms is not available for future reference (Tan et al., 2022). Zoom offers the most features supporting OCL. However, it does not provide its own centralised document management system and relies on integration with third-party systems such as Microsoft OneDrive and Google Drive (Pratiwi et al., 2020). Microsoft Teams and Google Classroom have their own ecosystem compared to other online tools where they integrate with the Microsoft tools and Google tools without relying on third-party tools. Both platforms provide essential features promoting OCL (Nawi and Lee, 2022; Silalahi and Hutauruk, 2020). Particularly with Microsoft Teams, it offers a workspace chat environment, file storage such as OneDrive, and Office tools such as Word and PowerPoint, which make it an apparent choice for OCL purposes (Buchal and Songsore, 2019; Ilag, 2020).

2.2 Technology adoption models in HEIs

Technology adoption models are commonly used for determining users' acceptance of a specific technology, which is vital for its implementation. Various models and theories have been adopted from social science and further developed to reflect the distinctive characteristics of information technology to understand factors influencing technology adoption and usage (Taherdoost, 2018). The notable models include the Technology Acceptance Model (TAM 1 & 2) (Davis, 1989; Venkatesh, 2000), the Theory of Planned Behaviour (TPB) (Ajzen, 1991), the Theory of Reasoned Action (TRA) (Fishbein, 1979), the Diffusion of Innovation theory (DOI) (Rogers, 2003), the Model of PC Utilisation (MPCU) (Thompson et al., 1991) and the Unified Theory of Acceptance and Use of Technology (UTAUT & UTAUT2) (Venkatesh et al., 2003, 2012), Motivational Model (MM) (Davis et al., 1992) and Social Cognitive Theory (SCT) (Bandura, 1986).

Models such as TRA, TPB and SCT are rooted in sociology, psychology and theories related to studying human behaviour. DOI has a slightly different focus as it sees the decision characteristics lie on organisational characteristics rather than individual behaviour. TAM and UTAUT have been widely applied in the adoption of information systems.

These models are widely applied in various sectors, including HEIs. For instance, Tang et al. (2021) applied a model adapted from TAM, UTAUT and TPB to examine tutors' intention using a mobile technology-enhanced teaching tool; Bervell et al. (2022) evaluated how facilitating conditions in UTAUT and other variables influence intention formation for Google Classroom usage, and Islamoglu et al. (2021) adapt both TAM and UTAUT2 models to develop a mobile learning acceptance model to examine the relationships among technology acceptance factors from pre-service teachers' perspectives.

A sophisticated OCL tool that equips with key features, such as those demonstrated in Table 1 is vital; however, it is the adoption from the learners by using these features in fulfilling their learning needs that makes an efficient OCL (Saadé and Bahli, 2005; Sharma et al., 2016). Therefore, it is necessary to examine how learners are influenced when accepting and using technology for OCL as we discuss in this paper.

3 Research methodology

3.1 UTAUT2 as the research model

UTUAT2 follows its predecessor UTAUT. The UTAUT model was initially derived by comparing, testing, and integrating eight theories and models to understand factors that affect the acceptance of new technology introductions (Taherdoost, 2018; Tseng et al., 2022). These theories are TAM, TRA, combined TAM and TPB, TPB, MPCU, DOI, MM and SCT. Through empirical analysis and validation, UTAUT has four core determinants influencing behavioural intention to technology usage: performance expectancy, effort expectancy, social influence and facilitating conditions. Besides the previous determinants, four moderators predict behavioural intention and use behaviour: age, gender, experience and voluntariness (Venkatesh et al., 2003). The UTAUT model focuses on organisational contexts and explains employee technology acceptance and usage. However, the theory is insufficient to analyse the adoption of consumer technology. Therefore, the theory was extended to the UTAUT2 model with three additional constructs, such as hedonic motivation, price value and habit (Venkatesh et al., 2012). While the UTAUT2 is applicable to evaluate consumers' adoption of technology, there is limited research on using the model to evaluate the adoption of OCL tools in the higher education sector.

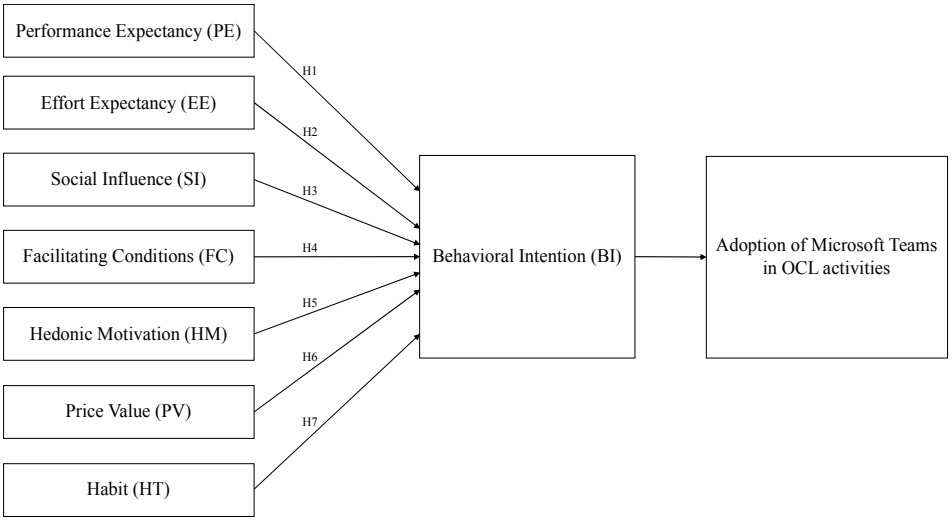
Therefore, to address this research aim, we adopted UTAUT2 to evaluate factors impacting the Microsoft Teams adoption in fostering OCL (see Figure 1). In this research, we did not consider age and experience as moderators. This study was conducted predominantly on adults in their twenties, with little age dispersion and a similar experience level, rendering it insignificant. Additionally, this paper focuses on studying factors impacting users' adoption of Microsoft Teams rather than researching the role of age, gender and experience in mitigating the significance of the relationship. In this research, we did not consider age and experience as moderators. This study was conducted predominantly on adults in their twenties, with little age dispersion and a similar experience level, rendering it insignificant. Additionally, this paper focuses on studying factors impacting users' adoption of Microsoft Teams rather than researching the role of age, gender and experience in mitigating the significance of the relationship.

3.1.1 Performance expectancy (PE)

PE refers to the degree to which users believe using the technology can help them improve work performance, such as collaborations. In this research, similar to El-Masri and Tarhini (2017)'s research, PE explores how likely learners are to adopt an OCL tool if they think it will enhance their learning in the online collaboration setting.

H1: Learners' performance expectancy determines their behavioural intention to adopt Microsoft Teams in OCL activities.

Figure 1 Research model



3.1.2 Effort expectancy (EE)

EE refers to the ease of use of technology, and it is expected to be more salient in the early adoption stages. In this study, EE investigates whether free of effort would encourage learners' adoption of Microsoft Teams as the OCL tool, a factor deemed important as proposed by Gharaibeh (2023).

H2: Learners' effort expectancy determines their behavioural intention to adopt Microsoft Teams in OCL activities.

3.1.3 Social influence (SI)

SI refers to the extent users are influenced by others who are important to them when employing technology. Like Yueh et al. (2015), SI evaluates to what extent other peers influence learners to use Microsoft Teams in the OCL setting in this research.

H3: Social influence determines learners' behavioural intention to adopt Microsoft Teams in OCL activities.

3.1.4 Facilitating conditions (FC)

FC refers to users who believe that the necessary technical infrastructure and resources are available to support the utilisation of the system. For example, unstable internet connections could be challenging for learners and cause anxiety, which may influence learners' adoption of OCL tools. In this research, FC evaluates students' perceptions of accessing the required resources and support to use Microsoft Teams for OCL purposes.

H4: Facilitating conditions determine learners' behavioural intention to adopt Microsoft Teams in OCL activities.

3.1.5 Hedonic motivation (HM)

HM refers to the fun or pleasure derived from using a specific technology. Similar to the study by Shahali et al. (2022) on the motivational factors that encourage the use of mobile devices for learning, this study assesses learners' perceptions to which extent they believe they enjoy using Microsoft Teams in their group activities.

H5: Hedonic motivation determines learners' behavioural intention to adopt Microsoft Teams in OCL activities.

3.1.6 Price value (PV)

PV pertains to an individual's cognitive trade-off between the perceived benefits of the system and the monetary cost of using them. According to Venkatesh et al. (2012), PV positively impacts intention when the benefits of utilising technology are more significant than the monetary costs. In this study, the HEI covers the cost of Microsoft Teams licences. Hence, PV refers to how learners feel about the cost of Microsoft Teams which is included in their tuition fees and the extent of the perceived values they gain as part of the OCL activity.

H6: Price value determines learners' behavioural intention to adopt Microsoft Teams in OCL activities.

3.1.7 Habit (HT)

HT refers to individuals performing a particular behaviour automatically when using a system. Similar to Zacharis and Nikolopoulou (2022)'s study on students' adoption of e-learning platforms, HT examines how accustomed learners are to using Microsoft Teams for their group activities in this study.

H7: Learner's habit determines their behavioural intention to adopt Microsoft Teams in OCL activities.

3.2 Data collection and analysis

We adopted survey research in this paper. Survey research refers to the collection of information from a sample of individuals through their responses to questions, which involves numerical rated items (quantitative approach) and open-ended questions (qualitative approach) (Check and Schutt, 2011). Based on the UTUAT2 model, we derived a survey consisting of six demographic questions and 28 construct questions. We applied a five-point Likert scale (1-Strongly Disagree; 2-Disagree; 3-Neutral; 4-Agree; 5-Strongly Agree) for each construct question. Additionally, we included a question on soliciting additional information to explore how frequently the respondents use the tool for online collaborative activities, such as doing weekly group activities. Moreover, we also included an open-ended question to gather insights about respondents' experience using Microsoft Teams as the OCL tool: '*Do you have anything else to tell us regarding your experience in using Microsoft Teams as a collaborative online learning tool*?'.

We distributed this survey to 85 postgraduate students from a computing school in a UK HEI. We first applied the descriptive analysis to analyse the demographic information, then Partial Least Squares (PLS) to analyse the constructs data. Smart PLS

software version 3 for Mac was used to conduct the analysis. Finally, we employed frequency analysis for the other OCL tools question and thematic analysis for the open-ended question. The results are shown in the next section.

4 Results

4.1 Demographics

Table 2 illustrates the profiles of the postgraduate students. 74.1% are in the age bracket of 21–30 and 67.1% identified themselves as male students. A vast majority of them are full time students (87.1%), and 57.6% had no prior professional or industrial experience. Most of the students come from Asia (55.3%), followed by Europe (16.5%), Africa (15.3%), the UK (10.6%) and South America (2.4%).

Table 2 Postgraduate student profiles

Variables	*Level*	*Count*	*Proportions (%)*
Age	21–30	63	74.1
	31–40	13	15.3
	41–50	7	8.2
	Above 50	2	2.4
Gender	Female	28	32.9
	Male	57	67.1
Study mode	Full time	74	87.1
	Part time	11	12.9
Years of professional/industrial experience	None	49	57.6
	1–3 years	21	27.1
	More than 3 years	15	17.6
Region of origin	Africa	13	15.3
	Asia	47	55.3
	Europe	14	16.5
	South America	2	2.4
	UK	9	10.6

4.2 Measurement model

For evaluating the Microsoft Teams adoption in fostering OCL, we applied Partial Least Squares (PLS) in data analysis as it helps to explain causal relationships among constructs (Hair et al., 2011). We employed SmartPLS in performing the analysis. This section presents an evaluation of the measurement model's reliability and validity. Cronbach's alpha (α) and Composite Reliability (CR) were used to assess reliability, whilst convergent validity and discriminant validity were used to assess model validity. Table 3 shows that all factor loadings for the 27 indicators are greater than the recommended value of 0.7 (Hair et al., 2009). The *t*-values also show that all indicators have a satisfactory level of reliability, as all indicators are significantly linked with their

corresponding constructs (p <0.001) (Bagozzi et al., 1991). Additionally, Cronbach's alpha (α) values of all variables exceed the threshold of 0.7 (Bagozzi and Yi, 1988).

Table 3 The measurement model statistics

Variable	*Items*	*Loading*	*T-value*	*α*	*CR*	*AVE*
Behavioural Intention (BI)	BI1	0.838	20.008	0.810	0.888	0.725
	BI2	0.821	12.865			
	BI3	0.893	39.223			
Effort Expectancy (EE)	EE1	0.880	19.788	0.917	0.941	0.800
	EE2	0.882	22.882			
	EE3	0.937	33.953			
	EE4	0.877	23.916			
Facilitating Conditions (FC)	FC1	0.860	21.019	0.783	0.874	0.698
	FC2	0.853	21.077			
	FC3	0.792	11.328			
Habit (HT)	HT1	0.855	19.485	0.895	0.927	0.761
	HT2	0.832	17.479			
	HT3	0.920	45.046			
	HT4	0.880	31.244			
Hedonic Motivation (HM)	HM1	0.928	47.088	0.875	0.923	0.799
	HM2	0.887	21.074			
	HM3	0.867	34.774			
Performance Expectancy (PE)	PE1	0.866	26.869	0.902	0.932	0.773
	PE2	0.907	28.353			
	PE3	0.863	21.133			
	PE4	0.880	34.080			
Price Value (PV)	PV1	0.864	18.222	0.872	0.921	0.796
	PV2	0.920	36.088			
	PV3	0.891	26.702			
Social Influence (SI)	SI1	0.935	45.147	0.933	0.957	0.882
	SI2	0.939	45.486			
	SI3	0.944	53.602			

Composite Reliability (CR) for all constructs were also evaluated, and the results show that all of our constructs exhibit a high level of internal consistency with CR values exceeding the recommended value of 0.7 (Bagozzi et al., 1991). The analysis also shows that the values of all of our constructs' Average Variance Extracted (AVE) exceed the critical threshold value of 0.5, indicating good convergent validity (Bagozzi, 1981).

In addition, as shown in Table 4, the correlation of the square root of AVE for all constructs is higher than their correlations with other constructs, demonstrating the discriminant validity of our measurement model. Therefore, the developed measurement model is proven to be valid and reliable.

Table 4 Discriminant validity: square root of AVE

	BI	*EE*	*FC*	*HT*	*HM*	*PE*	*PV*	*SI*
BI	**0.851**							
EE	0.535	**0.894**						
FC	0.560	0.648	**0.835**					
HT	0.745	0.527	0.530	**0.872**				
HM	0.670	0.552	0.593	0.652	**0.894**			
PE	0.525	0.639	0.709	0.668	0.568	**0.879**		
PV	0.513	0.383	0.426	0.452	0.448	0.400	**0.892**	
SI	0.668	0.439	0.511	0.745	0.595	0.650	0.388	**0.939**

4.3 Structural model assessment

After confirming the reliability and validity of our measurement model, we moved on to testing the structural model. This step investigates the relationship between variables and evaluates the model's predictive abilities. The R^2 and the significance of path coefficients are the primary criteria for evaluating the structural model. To examine the structural models and calculate the path coefficients and their significance levels, we used 5000 samples in the nonparametric bootstrapping procedure for the PLS analysis.

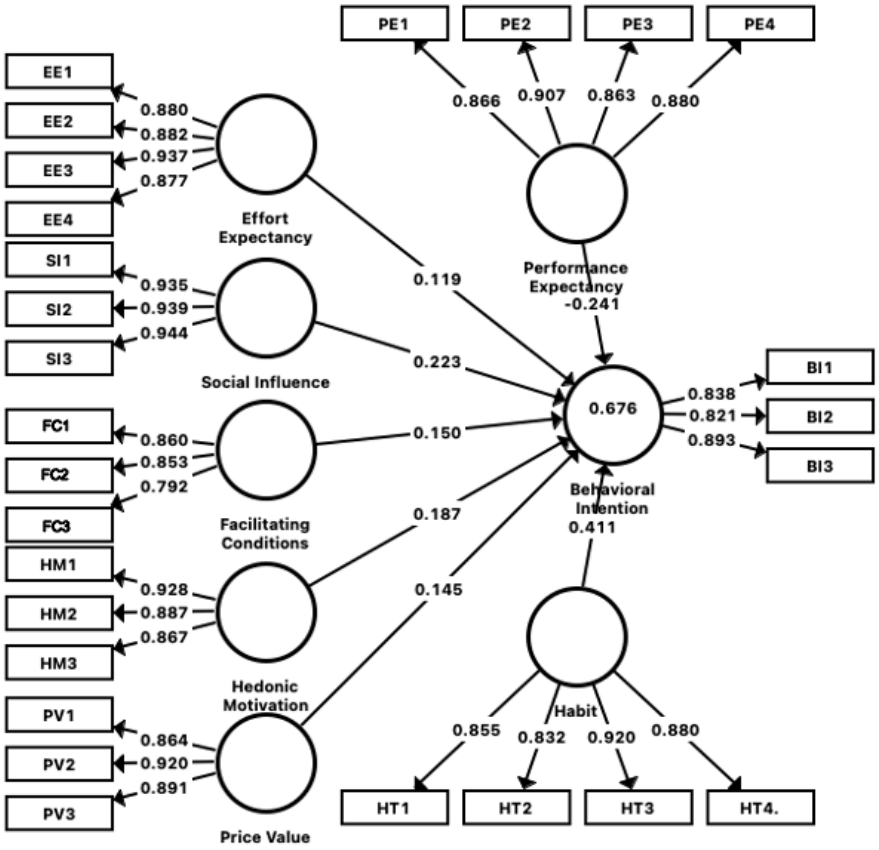
Table 5 shows that three of our hypotheses are supported while 4 hypotheses are rejected. Performance Expectancy has a negative significant relationship with behavioural intention (β = –0.241, t = 2.187, p <0.05), rejecting H1. Effort Expectancy has no significant influence on behavioural intention (β = 0.119, t = 1.298, p > 0.1), rejecting H2. Furthermore, H4 is rejected as Facilitating Conditions has no significant influence on behavioural intention (β = 0.150, t = 1.372, p> 0.1). Habit and Hedonic Motivation, on the other hand, have a positive significant relationship with behavioural intention (β =0.411, t = 3.491, p <0.000) and (β =0.187, t = 2.122, p <0.05), respectively, supporting both H7, and H5. H6 and H3 are also rejected as Price Value and Social Influence have no effect on behavioural intention (β = 0.145, t = 1.528, p >0.1) and (β = 0.223, t = 1.596, p >0.1), respectively.

Table 5 Overview of the hypotheses test results

Hypotheses number	*Hypotheses*	*β*	*T-value*	*P-values*	*2.5%*	*97.5%*	*Results*
H1	PE -> BI	–0.241	2.187	0.029	–0.456	–0.012	Significant result but against the direction of the hypothesis: Rejected
H2	EE -> BI	0.119	1.298	0.194	–0.054	0.303	Rejected
H3	SI -> BI	0.223	1.596	0.110	–0.090	0.455	Rejected
H4	FC -> BI	0.150	1.372	0.170	–0.074	0.353	Rejected
H5	HM -> BI	0.187	2.122	0.034	0.002	0.346	Supported
H6	PV -> BI	0.145	1.528	0.127	–0.005	0.364	Rejected
H7	HT -> BI	0.411	3.491	0.000	0.179	0.648	Supported

The value of R^2 is used to calculate the model's predictive power. R^2 is a statistical measure that indicates how well the independent variables explain the variance in the dependent variable. The results show that our model explained 67.7% of the variance in a user's behavioural intention (R^2=0.676). The R^2-values are greater than 0.1, which is the minimum acceptable level as defined by Bagozzi (1981), indicating that our model has good predictive power. The results of the analysis are summarised in Figure 2.

Figure 2 The results of the empirical study



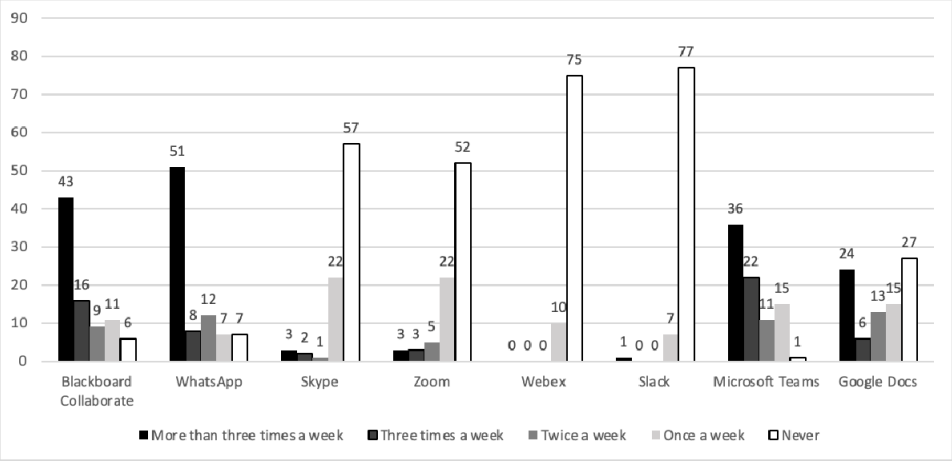
The proposed model was also examined for goodness-of-fit. PLS assesses model fit by comparing the model statistic to that of a comparable model with uncorrelated variables (Hair, 1995). Chi-square tests are highly sensitive to sample size, and the likelihood of rejecting a model increases with increasing sample size, even if the model is only marginally wrong (Hair, 1995). As a result, in large samples, almost all models are discarded as statistically unfit. Consequently, other model fit indices such as Normed Fit Index (NFI) and the Standardised Root Mean Square Residual (SRMR) should be employed. Hu et al. (1995) described the SRMR as a goodness of fit measure for PLS-SEM that can be used to avoid model misspecification. For models with excellent fit, the NFI should be between 0 and 1, with bigger values indicating stronger fit, while SRMR value less than 0.10 or 0.08 are regarded as a good fit (Hu et al., 1995). Our

hypothesised model for the NFI and SRMR metrics fulfilled this standard with NFI=0.704 and SRMR=0.072<0.08. Overall, we were satisfied with the level of fit displayed by our model.

4.4 Frequency analysis

We included frequency analysis in this research to explore how students were using other OCL tools comparing with Microsoft Teams. Based on the results in Figure 3, the top four tools used OCL purposes are WhatsApp, Blackboard Collaborate, Microsoft Teams and Google Docs. On the other end of the spectrum, more than 50% of students claimed that they never used Slack, Webex, Zoom and Skype for OCL activities. Compared with other OCL tools, Microsoft Teams is still frequently used by students, with only one student claiming to have never used the tool before.

Figure 3 Frequency analysis of other OCL tools usage compared to Microsoft Teams



4.5 Thematic analysis

To have a holistic view in students' adoption of Microsoft Teams in OCL activities, we also included an optional open-ended question to capture students' experience in using the tool. Following the principles from Braun and Clarke (2006) and Saunders et al. (2016), we applied inductive thematic analysis in analysing the qualitative data for exploring themes or patterns related to this research context. We first synthesised the responses for the open-ended question for familiarisation and to look for meaning and recurring patterns. We then started coding the data with identical meanings and grouping them into themes. Table 6 shows the codes clustered into three main themes (*features, feeling* and *fit for purpose*) along with relevant sample quotes from respondents. The triangulation of these three themes contributes to the understanding of students' adoption of Microsoft Teams in OCL activities.

Table 6 Thematic analysis results

Themes	*Codes*	*Sample quotes*
Features (User interface – Positive feedback)	Online meetings	Respondent 2 – '*It is an amazing tool to do online meetings. I found this tool very handy during pandemic'*
	Video recordings	Respondent 7 – '*It's good that the recorded videos can be downloaded and played on our computers*.'
	File sharing	Respondent 23 – '*It is the best tool for group work and sharing files*.'
	Seamless collaboration	Respondent 27 – '*The Microsoft Teams technology is quite impressive and helps group work unified and file sharing easy. It makes office 365 easy and seamless collaboration*.'
	Easy to use	Respondent 45 – '*It is very useful tool and easy to use. When there are group activities, I recommend this tool*.'
	Communication	Respondent 59 – '*It is very helpful to communicate throughout the semester*.'
Features (User interface – Negative feedback)	Not intuitive	Respondent 7 – '*The reply design is a bit not friendly*.'
		Respondent 68 – '*The user interface is not intuitive, especially while separating channels and files. And it lags on my system*.'
	Hard to navigate	Respondent 21 – '*It is functional, but it's also hard to find how to activate some functions*.'
		Respondent 28 – '*The application needs to be simplified. I have always found people finding it difficult to navigate their way through Teams, ending up in the wrong meeting room, unable to join groups*.'
Feeling	Familiarity	Respondent 34 – '*… when I have to use this tool for online learning or lectures but in the start I find it little difficult as I have never use it before but after using it I became familiar with it, and I found it is the easiest tool and it has helped me a lot during my online studies*.'
	Joy	Respondent 3 – '*Cannot find any flaws, pretty enjoyable as it is*.'
Fit for purpose	Right tool	Respondent 6 – '*This is an amazing tool as students are struggling right now and it allows them to work together with others*.'
		Respondent 61 – '*It is a great tool to learn, especially when face2face is not allowed* due to COVID-19. It helps to get extra support from teachers.'
	Perceived usefulness	Respondent 29 – '*It has made it easy to discuss lectures, and assignments or have meetings with colleagues and lecturers*.'
		Respondent 30 – '*In this pandemic, this tool is great for interacting with people and teamwork*.'
		Respondent 31 – '*The experience is very knowledgeable and informative. It's very easy to communicate with team members using MS teams; one can share information easily, and most importantly, user-friendly*.'

4.5.1 Features

The *features* such as *online meetings*, *video* recordings, *file sharing*, *seamless collaboration* and *communication*, *embedded* in the user interface, were seen as essential for students' adoption of Microsoft Teams in OCL activities. For example, students were grateful that the tool was generally *easy to use*, that it had a video recording feature and that it could be downloaded and viewed anywhere with an internet connection. Similarly, the file sharing feature where students could share files easily, edit documents collectively and store these in a centralised file management system was also well regarded. Importantly, students could quickly access other Microsoft 365 applications.

Despite the positive feedback, a few students did find that features, such as the reply design, are *not intuitive*. In addition, some functions are *hard to navigate*, and it needs to be simplified. For example, some students failed to navigate through the application and joined the incorrect meeting rooms or were unable to join group discussions. Some also found that it was challenging to troubleshoot issues when they needed to fix something. One student also claimed that the process of separating channels and files was not user-friendly, and its performance has not met the expectation. Interestingly, one student claimed that they would not pay for it personally.

4.5.2 Feeling

The *feeling* theme reflects how students feel about using Microsoft Teams in their OCL activities. *Familiarity* impacts students' adoption of Microsoft Teams in OCL activities. A few students were first-time users of Microsoft Teams for online learning and teaching. In the early adoption stage, as they were unfamiliar with the tool, they found it difficult to use. However, as they gradually experimented with it, they became more familiarised and enjoyed using it. It has helped them to collaborate online. This finding aligns with the frequency analysis results where students do not use Microsoft Teams as frequently compared to other OCL tools such as Blackboard Collaborate and WhatsApp. One student commented on this perspective where they found *joy* when using the tool as they felt there were fundamentally no flaws in it.

4.5.3 Fit for purpose

As for *fit for purpose,* students generally believe that Microsoft Teams was the *right tool* and useful, in terms of *perceived usefulness* for their OCL experience, especially in connecting with peers and lecturers. For instance, one student stated that using the tool facilitated the formation of new friendships. A few students also stated that Microsoft Teams was helpful during a pandemic for online learning and collaborating with peers, such as receiving additional mentorship from tutors during these difficult times, which improved students' experience and collaboration seamlessly. Students could also join meetings for group assignments and easily discuss different perspectives during lectures. For instance, the chat function enabled students to communicate effectively to share information among group members.

5 Discussion

This study aims to evaluate the adoption of Microsoft Teams in fostering Online Collaborative Learning (OCL) activities among students. The UTAUT2 model and survey research were employed to gather both quantitative and qualitative data. Similar to the study by El-Masri and Tarhini (2017) in examining the adoption of e-learning systems in Qatar and the USA by using UTAUT2, our PLS analysis results revealed that only two hypotheses, H5 related to Hedonic Motivation (HM) and H7 related to Habit (HT), were supported. Studies have shown that HM has played a significant role in predicting the intention to adopt e-learning systems (Wang et al., 2020). This perspective aligns with the self-determination theory, which claims that students' determination and intrinsic motivation depend on whether they are interested in or enjoy doing something (Deci and Ryan, 2012). It also aligns with the *feeling* theme found in the qualitative data. As for HT, students who are familiar with Microsoft Teams tend to use it more, which is in the same line of *familiarity* code derived from the open-ended question in the survey. Our findings suggest that students who are motivated to use Microsoft Teams in OCL may develop a habit of using it over time. This is supported by the results of our survey, which align with previous research by Arain et al. (2019) and Moorthy et al. (2019), which found HM and HT to be key factors in adopting technology in higher education institutions.

The results of this study also indicate that certain factors, including Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC) and Price Value (PV), are not significant in determining students' adoption of Microsoft Teams for OCL activities. Thematic analysis of the survey data suggests that students had mixed feedback about the features of Microsoft Teams and were still early adopters of the platform. Some students found the tool was fit for purpose, while others noted that some interfaces were not intuitive, which could have impacted their adoption. This also aligns with the findings reported by Khalid et al. (2021) and Alotumi (2022) that PE is insignificant to higher education students' behaviour intention to adopt technology. Additionally, since the tool is new for students in terms of OCL, SI does not play a significant role in their adoption decision. The insignificance of PE, EE and SI is consistent with the findings of Kwateng et al. (2018). Although students may not be familiar with Microsoft Teams functionalities, it is still a cloud application running on a desktop or mobile device with a stable internet connection. Furthermore, as discussed by Utomo et al. (2021), since the tool is a cloud application that can be accessed via desktop or mobile devices with a stable internet connection, and students had enough technical knowledge to launch the tool, FC is not found to be significant in adopting the Microsoft Teams. Lastly, since the subscription of Microsoft Teams is part of students' tuition fees, which comes unnoticeable for students, PV does not affect the adoption of Microsoft Teams.

5.1 Theoretical implications

UTAUT2 is a widely used model in educational technology research. Many studies, such as those by Tseng et al. (2022) and El-Masri and Tarhini (2017) demonstrated the applicability of UTAUT2 in examining the adoption of learning technologies such as Massive Open Online Courses (MOOCs) and e-learning systems in educational settings.

This research contributes to the literature by extending the application of UTAUT2 in the context of Online Collaborative Learning (OCL) and targeting the adoption of Microsoft Teams as a OCL tool. This study aims to address the research gap in the literature by investigating the use of Microsoft Teams in an OCL context (Tan et al., 2022). Additionally, echoing the call by Venkatesh et al. (2012) for researchers to test the applicability of UTAUT2 in new contexts and user groups, this study provides an example of how UTAUT2 can be used to understand technology adoption in OCL setting.

This research has revealed that Hedonic Motivation (HM) and Habit (HT) are the main factors that educators should consider when introducing a new OCL tool, such as Microsoft Teams, to students. This finding is unique compared to existing research that explores the UTAUT2 constructs in impacting the adoption of learning technologies. This perspective has implications for pedagogy, as it suggests that the design of OCL activities should be interactive and enjoyable while meeting intended learning outcomes in order to encourage students to use the tool. Tutors should make an effort to make the experience of using the tool an enjoyable one, and also make sure that the students are familiar with the tool and its features, this will help to make the tool a habit for the students and will increase their motivation to use it.

5.2 Practical implications

This research provides valuable insights for educators on how to utilise Microsoft Teams as an effective educational tool for promoting OCL activities. As a business application developed by Microsoft, and part of the Office 365 ecosystem, there is limited research on the application of Microsoft Teams in education, as noted by Tan et al. (2022). This study can inform educators on effective ways to incorporate the tool in teaching and learning.

For example, the study highlights the importance of user-friendly features in determining the adoption of Microsoft Teams among students. Additionally, the tool should be designed to effectively support OCL activities. The adoption of Microsoft Teams has increased in higher education since COVID-19 (Pal and Vanijja, 2020; Sobaih et al., 2021), hence designers and developers of Microsoft Teams should consider the perspectives of Hedonic Motivation (HM) and Habit (HT) when creating the tool for OCL purposes. This will increase the chances of students adopting the tool for their collaborative learning activities.

From an educational perspective, this research provides valuable insights for HEIs on how students will adopt Microsoft Teams in the context of OCL. Understanding this is crucial for educators to run effective teaching and learning sessions with students. Furthermore, educators can emphasise the benefits of using Microsoft Teams for OCL, which increases motivation and cultivates the habit of adopting this tool in return. This research could also be beneficial in a blended learning setting, which promotes teaching and learning through technology (Al-Suraimi and Hasan, 2022).

6 Conclusions and future work

In summary, this research concludes that Microsoft Teams is a suitable tool for OCL activities and that UTAUT2 is a suitable model for assessing the adoption of Microsoft

Teams for OCL purposes. However, the adoption of Microsoft Teams for OCL is still in its early stages. Based on the findings of this study, various approaches can be taken to encourage the adoption of Microsoft Teams, such as focusing on Hedonic Motivation (HM) and Habit (HT), making the tool user-friendly and providing guidance and training.

One limitation of this study is the small number of respondents participating in the survey research. Additionally, this research is limited to postgraduate students. For future research, it would be beneficial to extend the survey to students from other HEIs who are also adopting Microsoft Teams for OCL, including undergraduate students and students taking short courses or continuous professional development courses. This would provide a more comprehensive understanding of the adoption of Microsoft Teams for OCL across different student groups.

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