



Acceptance of Unified Communications and Collaboration Applications Among Students: A Case Study of University in Sumbawa Island Indonesia

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ABSTRACT

Unified Communications and Collaboration (UCC) is a technology that combines conventional communication with computer technology to provide a more efficient communication platform. During the COVID-19 pandemic, UCC applications, such as Microsoft Team, Zoom Meeting, and Google Meet played major roles to support the teaching and learning process. However, the acceptance of UCC applications and their impacts on the future of teaching and learning process, especially for university students in rural areas, are concerned. Based on this, the current study aims to examine the factors that influence the acceptance of UCC applications at the University in Sumbawa Island, Indonesia using adapted theories of Unified Theory of Acceptance and Use of Technology model (UTAUT). In light, survey questionnaire was distributed online to 210 undergraduate students at the University in Sumbawa Island, Indonesia, to test seven factors, Facilitating Condition (FC), Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Motivation (MO), Collaboration (CO), and Behavioural Intention (BI) which were analysed using SPSS software. The findings reveal that PE, EE, SI, FC, MO, CO, and BI are significant factors that influence the acceptance of UCC applications. This finding will be a sound reference to improve the use of UCC applications for teaching and learning as well as help universities strategies their future teaching and learning system.

1. Introduction

The World Bank reported that education is a powerful tool to reduce poverty problems, improve health, create equality, peace, and stability in society [1]. However, the COVID-19 pandemic formed a disparity disaster where the educational system is one of the systems affected globally. The pandemic has changed the way conversational teaching and learning were being carried out whereby the use of technology, such as Google Meet, MS Teams, and Telegram are now essential tools. Nevertheless, underprivileged students are somewhat less likely to benefit from remote learning due to lack of electricity, connectivity, devices, and caregiver support [1]. Additionally, Fomba *et al.*,

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highlighted other problems, such as difficulty accessing proper education, lack of teaching staff, and inadequate infrastructure [2]. Practically, there are differences in the quality of education between people living in developed and developing countries, those living in cities and villages, and those with and without access to the latest technology [3].

Unified Communications and Collaboration (UCC) is a technology that combines conventional communication with computer technology to provide a more efficient communication platform. UCC is also a collection of technological advancements bundled into the app [4]. It provides real-time communication capabilities integrated across various platforms and media. Recently, its usage has been gaining popularity as most business now use it to increase staff productivity [5]. UCC evolved as technology advanced, and more components continued to be added to the UCC list for its expansion. For instance, parts of UCC are email, voicemail, calendar, scheduling tools, video conferencing, instant messaging (IM), VoIP, boards, desktop sharing, and many others. Several vendor providers for UCC applications have been used since the pandemic, such as Google, Microsoft, Cisco, IBM, and others.

During the pandemic, online distance learning was carried out in academic institutions using UCC applications. Educational institutions in urban or rural areas use the UCC applications as one of the solution tools in the learning process [6]. The previous studies showed that several universities have used online learning methods [7,8], supported using e-learning [9], or even adopted social media to communicate and collaborate [10]. Due to the catastrophic situation, the use of UCC applications was carried out without proper preparation. As such, students, teachers, school management, and all parties in an educational institution may temporarily experience different activities than usual. Although the learning method is temporary, however emergency activity could be an opportunity to improve the quality of teaching and deepen education reform [7]. Previous studies found that there were teaching and learning implications for students and lecturers/teachers during the pandemic. The studies by Rudenko *et al.*, [8] stated that the implications are lack of student participation in terms of low student motivation and discipline, ineffective evaluation, and knowledge control monitoring, lack of facilitating learning [6], and lack of technical skills [11].

Therefore, the present study aims to examine the factors influencing the acceptance of UCC applications among undergraduate students at a University in Sumbawa Island, Indonesia by adapting the Unified Theory of Acceptance and Use of Technology model (UTAUT). There are seven factors tested on 210 respondents to determine the significant factors influencing the acceptance of UCC. The findings may improve the teaching and learning process as well as help educational institutions strategy in their future teaching and learning system. The remainder of the current paper is structured as follows; the second section is the literature review, followed by methodology, findings, and discussions, and finally the conclusion.

2. Literature Review

2.1 Communication and Collaboration Technology in Educational Institutions Context

Online learning is an educational approach that utilizes the Internet and digital media in conveying information. The level of information literacy and engagement in online interactions significantly influences individual preferences for online learning [7]. Previous research has shown that user interface design for digital learning tools plays an important role in shaping people's perceptions of usability, and subsequent actions [12]. Similarly, emotional engagement plays an important role in students' intentions to continue their online learning [6]. Recently, the COVID-19 pandemic highlighted the importance of enhancing teachers' digital competencies, including self-education, reflective assessment, participation in online courses, and knowledge sharing through

educational platforms [8]. Furthermore, teachers' behavioural intentions to teach online and their perceptions of the usefulness of online learning platforms are strongly influenced by their cognitive perspective, which shapes their beliefs about online teaching [13].

On the other hand, e-learning covers a wider range of topics than online learning. It consists of three main components, which are technology, content, and instructional design. It is very important in e-learning to understand the acceptance factor from both the student and lecturer side while integrating the three components. The ability to show results, subjective norms, perceived external control, system accessibility, and enjoyment significantly influence of how effective and direct an e-learning system is assessed is very essential [14]. Besides, user behaviour is influenced by performance expectations, social influence, facilitating conditions, and behavioural intentions [15]. The e-learning adoption is influenced by perceived usefulness, perceived ease of use, and behavioural goals [16]. On the other hand, intentions to use online learning for the content offered, including videos and augmented reality [17] are influenced by additional elements, and self-efficacy. Thus, learners' behavioural intention to use and embrace e-learning systems during the pandemic was positively influenced by instructor and student characteristics, perceived usefulness, and perceived ease of use [18]. In addition, course flexibility, social interaction, system effectiveness, and the perceived benefits of using e-learning all contributed to student learning satisfaction [19].

Evidently, the pandemic led to an increase in the use of social media in education. Nowadays, social networking platforms offer collaboration, communication, and storage-sharing capabilities, making them valuable for academic purposes [20]. Academics now recognize the benefits of social media properties, such as collaboration and communication that lead to adoption [20]. Perceived usefulness and simplicity of service play a role in mediating social media adoption, making it easier for teachers to communicate and collaborate with students [21]. Previous studies showed that introducing social media technologies facilitate interactions between students and teachers, increasing academic performance and exploration of knowledge [22,23]. The integration of communication and collaboration of technologies is very important to improve the learning process in higher education [24,25]. For example, WhatsApp is a popular social media-based mobile application, that has been widely used by teachers and students during the pandemic for communication and collaboration. The continued use of WhatsApp makes it an integral part of daily learning routines and norms, contributing to the development of an effective learning environment [26]. The implicit value of using WhatsApp becomes real because it becomes a natural behaviour for students [26]. Therefore, the adoption of social media can be a powerful tool to improve the educational environment [27].

2.2 Established Theories in User Acceptance

User adoption of technology can be influenced by various internal and external factors, such as geographic disparities, the accessibility of facilities, personality traits, social influences, and others. There are many theories that can be applied to identify the elements causing consumers to adopt technology. For example, Diffusion of Innovation Theory (DOI), Decomposed Theory of Planned Behaviour (DTPB), Flexible Thinking in Learning (FTL), and Task-Technology Fit (TTF). The study by Alwreikat *et al.*, [20] adapted the Technology Acceptance Model 2 (TAM2) to assess the acceptance factor of informal scientific communication tools. TAM 2 was a variant of TAM by Davis [21], which was later developed into the new model by Venkatesh [22], was as a Unified Theory of Acceptance and Use Technology (UTAUT). However, TAM and UTAUT were used and linked in the current study to ascertain the elements that encourage users to use technology.

According to Davis, in Technology Acceptance Model (TAM), users embrace and use technology in a modelled way [21]. Utilizing the system is the final stage of human technology utilization. The behavioural intentions of people are what drive them to use technology. Behaviour is influenced by attitude (A), and a general impression of technology (BI). The concept suggests that when consumers introduce new technology, a variety of factors influence their decisions regarding how and when to use it, including Perceived Usefulness (PU), Perceived Ease-of-use (PEOU), and Attitudes that are significantly influenced by external factors like social influence [23]. Once these things (TAM) are completed, people will have the attitude and desire to use technology. Due to individual differences, opinions may vary based on factors including age and gender. The actual usage of technology is determined by behavioural intentions, according to the theoretical paradigm of UTAUT. The perceived chance of a technology being adopted is determined by the direct effects of four primary constructs; performance expectations, effort expectations, social influences, and facilitation conditions. Predictor effects are all attenuated by age, gender, experience, and voluntary usage [22].

2.3 Control Variables

The current study used individual attributes, such as gender and experience as control variables because such variables influence people's acceptance of technology [24]. This is because considerable differences in computer functionality have been noted over time, however gender differences are also crucial regarding technical acceptability [25]. By looking for people who are more open to experience, it is possible to identify those who are more willing to learn and have high expectations for using technology [26]. Long before this, a study by Venkatesh *et al.*, has highlighted that there were four covariates independent influence on behavioural intention, including gender and experience which are part of the demographic information of the current study [22].

2.4 Student Characteristics

According to Baber, during the COVID-19 pandemic, the adoption of e-learning and students' acceptance is influenced by the student characteristics (motivation, mentality, and collaboration) and the technology acceptance model (perceived usefulness and perceived ease of use) [18]. Consistent with earlier research findings, the study indicates the significance of student motivation as a success factor for online learning [27]. Online learning encourages self-regulation in order for students to develop a stronger sense of self-motivation [28].

The collaboration helps students to study at their own pace and promotes connection with peers during discussion and knowledge sharing [29]. For instance, community members can use social media as a technology to collaborate and communicate more effectively [30]. Some essential elements of online learning platforms in education include forums that allow asynchronous student-teacher communication and collaboration in web conferences that allow for audio, video, as well as chat, where users can send messages and get responses in real-time [31].

3. Methodology

3.1 Research Model

The research model of the present study is shown in Figure 1. There are seven independent variables that are tested. The variables are "Facilitating Condition" (FC), "Performance Expectancy" (PE), "Effort Expectancy" (EE), "Social Influence" (SI), "Motivation" (MO), "Collaboration" (CO), and "Behavioural Intention" (BI). The mediated variable is the behavioural intention and the control

variables gender and experience play a role in moderating the influence of behavioural intention. However, the facilitating conditions variable directly influences UCC application acceptance. UCC application acceptance is a dependent variable influenced by behavioural intention.

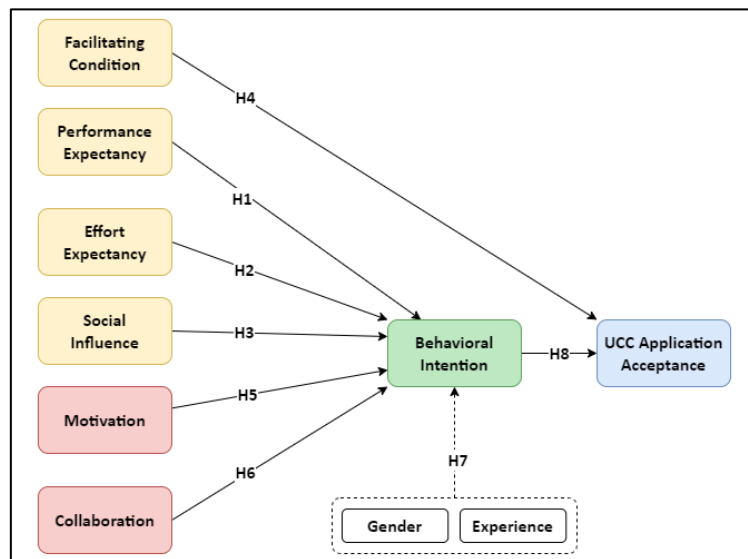


Fig. 1. Research Model

This study aims to examine the factors that influence the acceptance of UCC applications at the University in Sumbawa Island, Indonesia. Table 1 summarizes the definition of the variables in this study.

Table 1
 Variable's Definition

Variable	Definition
Facilitating Condition [32]	The degree to which a person thinks the system's technical and organizational infrastructure can sustain its use.
Performance Expectation [22]	The degree to which a person expects that using the system will enable to increase in performance.
Effort Expectancy [22]	The degree to which a person believes that the ease of use of the system is beneficial and makes them feel at ease while using it.
Social Influence [33]	The environment's powerful effect, the greater the desire that comes from a particular user's potential to utilize information technology, the more likely they will do so. It is especially true for potential users of new information technology
Motivation [18,34]	The degree to which a person is motivated to accept learning depends on their class participation, familiarity with technology, and attitude toward it.
Collaboration [11,18]	Collaboration among the students will make the learning two-way and eliminate the monotony of monologue learning and they can work well in teams to improve their performance
Behavioural Intention [22]	The person believes that adopting a new information technology will improve their performance if doing so is simple, and if using the technology has an impact on the environment, then that person will be attracted to use it

There are eight hypotheses tested in the current study in order to determine the significant factors that influence the acceptance of UCC among students at the University in Sumbawa Island, Indonesia. The hypotheses are:

- i. *H1: Performance expectancy has a significant effect on behavioural intention in using the UCC application for learning.*
- ii. *H2: Effort Expectancy has a significant effect on behavioural intention in using the UCC application for learning.*
- iii. *H3: Social Influence has a significant effect on behavioural intention in using the UCC application for learning.*
- iv. *H4: Facilitating conditions have a significant effect on the acceptance of UCC applications for learning.*
- v. *H5: Motivation has a significant effect on behavioural intention in using the UCC application for learning.*
- vi. *H6: Collaboration has a significant effect on behavioural intention in using the UCC application for learning.*
- vii. *H7a: Gender has a significant relationship to behavioural intention in using the UCC application for learning.*
- viii. *H7b: Experience has a significant relationship to behavioural intention in using the UCC application for learning.*
- ix. *H8: Behavioural Intention has a significant effect on the UCC application for learning.*

3.2 Material and Methods

This study adapted the cross-sectional approach as the data was collected over a short period of time with specific respondents among 210 undergraduate students. The respondents include undergraduate students from the University of Technology Sumbawa Island (UTS), Indonesia as they are categorized as one of the universities in a rural area. The respondents were experienced in using UCC applications during the pandemic for their learning activities.

The data were collected through a web-based questionnaire survey by the convenience and snowball sampling technique. The survey questionnaires were distributed to the respondents over the span of three weeks. Before that, the pilot study was carried out by distributing 100 questionnaires online to students. The validity and reliability tests were conducted, especially on the content test, in which significant feedback was received to improve the questionnaire. There are 34 questions used in the present study adapted from previous research by Venkatesh *et al.*, [22], Pratomo [5], Baber [18], Aburagaga *et al.*, [35] and Rudhumbu [36], as shown in Table 2.

Table 2
 The Instruments of Research

Section	Variables	No of Items	References
A	Demographic	2	-
B	Performance Expectancy (PE)	4	[5,22,36]
C	Effort Expectancy (EE)	5	[5,22,36]
D	Social Influence (SI)	4	[5,22,36]
E	Facilitating Condition (FC)	4	[5,22,36]
F	Motivation (MO)	4	[18]
G	Collaboration (CO)	4	[18]
H	Behavioural Intention (BI)	4	[18,22,35,36]
I	UCC Acceptance (UA)	3	[22,35,36]

4. Results

4.1 Reliability Analysis

Reliability analysis is used to determine the stability and consistency of instruments that measure concepts and assess the quality of a measure used by researchers [37]. Cronbach's alpha is adapted in the present study to measure the reliability and internal consistency of items. Hair *et al.*, (n.d.) stated an item is reliable in an instrument if it approaches the value of Cronbach's alpha with a value of one [38]. Therefore, a higher Cronbach's alpha value illustrates the quality of research consistency reliability. It clearly illustrates each variable with the alpha coefficient value achieved in the study. The alpha value for each variable ranges from 0.854 to 0.948, indicating a high-reliability level. Table 3 presents the internal reliability of the variables.

Table 3
 Reliability Test of the Acceptance Variables

Variables	No of Items	Cronbach's Alpha Value	Conclusion
Performance Expectancy (PE)	4	0.854	Reliable
Effort Expectancy (EE)	5	0.948	Reliable
Social Influence (SI)	4	0.879	Reliable
Facilitating Condition (FC)	4	0.902	Reliable
Motivation (MO)	4	0.856	Reliable
Collaboration (CO)	4	0.860	Reliable
Behavioural Intention (BI)	4	0.930	Reliable
UCC Acceptance (UA)	3	0.855	Reliable

4.2 Descriptive Statistics

The online questionnaire was distributed to undergraduate students at the University of Technology Sumbawa (UTS). The 210 respondents were evenly distributed between two gender categories which are male 43.8% and female 56.2%. Table 4 shows the demographic background of the respondents.

Table 4
 Demographic Profile

Variable	Category	Frequency (n = 210)	Percentage (%)
Gender	Male	92	43.8
	Female	118	56.2
Experience	< 6 months	38	18.1
	6 - 12 months	51	24.3
	12 - 18 months	33	15.7
	18 - 24 months	25	11.9
	> 24 months	63	30.0
UCC Applications	Google Meet	159	75.7
	Microsoft Teams	9	4.3
	Zoom Meeting	176	83.8
	Cisco WebEx	3	1.4
	Social media	125	59.5
	Others	7	3.3

In terms of experience in using UCC applications, there are two questions that were asked which are the kind of UCC applications used and the duration of using the application. The longest duration of using the application was more than 24 months, with percentages of 30.0%, 6-12 months (24.3%),

below six months (18.1%), 12-18 months (15.7%), and least 18-24 months (11.9%). The majority of students using Zoom Meetings were 83.8%, Google Meet 75.7%, social media 59.5%, Microsoft Teams 4.3%, Cisco WebEx 1.4%, and lastly other applications 3.3%.

Independent sample T-Test analysis was conducted to test the gender impact. The result as shown in Table 5 found that t value = -1.428, df = 208, Sig. = .155. This indicates no significant difference between behavioural intention using UCC applications and gender. In other words, male and female students have similar intentions to use UCC applications. Also, the One-Way ANOVA analysis was conducted to test the experience of students.

Table 5
 Summary of the Difference between Gender and Behavioural Intention

Gender	Mean	Std. Deviation	t-value	df	Sig.
Male	3.5571	1.13698	-1.428	208	.155
Female	3.7733	1.04952			

Table 6 presents the results from One-Way ANOVA analysis showing the value $F=1.109$, $df=3.5197$, $sig.=.353$. This result indicates no significant difference between behavioural intention using UCC applications and long-time experience using UCC applications. In other words, short or long periods of using UCC applications have a similar intention to using UCC applications in learning.

Table 6
 Summary of the Difference between Experience and Behavioural Intention

Experience	Mean	Std. Deviation	df	Mean Square	F	Sig.
< 6 months	3.5197	1.38083	3.5197	1.38083	1.109	.353
6 - 12 months	3.6961	1.02508				
12 - 18 months	3.7500	.85923				
18 - 24 months	3.3700	1.27704				
> 24 months	3.8452	.96556				

4.3 Acceptance of UCC Application Among Respondents

Analysis of bivariate relationships between variables on the interval scale was carried out through Pearson Correlation analysis of SPSS software. The significant relationship test between the independent variable, control variables, and the dependent variable is shown in Table 7. It shows that gender and experience do not have a significant relationship with behavioural intention. Collaboration is the highest significant relationship ($r=0.712$, $p<0.001$) with behavioural intention.

Table 7
 Summary of Bivariate Pearson's rho Correlation Coefficients

Relationship	Correlation	Strength	Direction	Result
PE → BI	$r = 0.619$; $p < 0.001$	Moderate	Positive	Significant Relationship
EE → BI	$r = 0.662$; $p < 0.001$	Moderate	Positive	Significant Relationship
SI → BI	$r = 0.683$; $p < 0.001$	Moderate	Positive	Significant Relationship
FC → UA	$r = 0.652$; $p < 0.001$	Moderate	Positive	Significant Relationship
MO → BI	$r = 0.661$; $p < 0.001$	Moderate	Positive	Significant Relationship
CO → BI	$r = 0.712$; $p < 0.001$	High	Positive	Significant Relationship
G → BI	$r = 0.099$; $p > 0.001$	Low	Positive	No Significant Relationship
E → BI	$r = 0.071$; $p > 0.001$	Low	Positive	No Significant Relationship
BI → UA	$r = 0.801$; $p < 0.001$	High	Positive	Significant Relationship

Table 8 shows that facilitating conditions have a direct influence on UCC application acceptance ($b = 0.669$, $t = 12.396$, $p < 0.001$). With that, facilitating conditions significantly influence the UCC application acceptance, supporting H4.

Table 8
 Summary of Simple Linear Regression Analysis

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.238	.204		6.069	<.001
FC → UA	.669	.054	.652	12.396	<.001

Using Hayes process macro, this study assessed the mediating role of behavioural intention between the independent variable (performance expectancy, effort expectancy, social influence, motivation, and collaboration) and the dependent variable (UCC application acceptance). The results are shown in Table 9.

The analysis results in Table 9 show the direct and indirect effect of each factor related to its influence on UCC application acceptance, in which behavioural intention acts as a mediator. Five relationships have an indirect effect from the independent variable to the dependent variable.

Table 9
 Summary of Hayes Process Macro Analysis

Relationship	Total Effect	Direct Effect	Indirect Effect	t-statistics	Results
PE → BI		.6578 (.0000)		11.3624	
BI → UA		.7108 (.0000)		13.5480	
PE → BI → UA	.6371 (.000)	.1696 (.0027)	.4675	7.7018	Partial Mediated
EE → BI		.6346 (.0000)		12.7532	
BI → UA		.5954 (.0000)		11.5513	
EE → BI → UA	.6875 (.000)	.3096 (.000)	.3778	7.7896	Partial Mediated
SI → BI		.7389 (0.000)		13.4793	
BI → UA		.6618 (0.000)		11.8904	
SI → BI → UA	.7231 (.000)	.2341 (.0001)	.4890	9.4038	Partial Mediated
MO → BI		.7101 (.000)		12.7138	
BI → UA		.6843 (.000)		12.5363	
MO → BI → UA	.6892 (.000)	.2033 (.0006)	.4859	8.7707	Partial Mediated
CO → BI		.7689 (.000)		14.6166	
BI → UA		.6455 (.000)		11.1691	
CO → BI → UA	.7452 (.000)	.2489 (.0001)	.4963	8.3976	Partial Mediated

Firstly, the relationship influences between performance expectancy and UCC application acceptance is mediated by behavioural intention (PE → BI → UA). In the first relationship (PE → BI), performance expectancy had a significant impact on behavioural intention ($b = 0.6578$, $p < 0.001$), supporting H1. In the second relationship (BI → UA), behavioural intention has a significant impact on UCC application acceptance ($b = 0.7108$, $p < 0.001$), supporting H8. The results revealed a significant impact of performance expectancy on UCC application acceptance mediated by behavioural intention ($b = 0.4675$, $t = 7.7018$). Additionally, there was a direct effect of performance expectancy on acceptance of UCC applications ($b = 0.1696$, $p < 0.001$). Hence, behavioural intention partially mediated the relationship between performance expectancy and UCC application acceptance.

Secondly, the relationship influences between effort expectancy and UCC application acceptance is mediated by behavioural intention (EE → BI → UA). In the first relationship (EE → BI), effort

expectancy has a significant impact on behavioural intention ($b = 0.6346, p < 0.001$), supporting H2. In the second relationship ($BI \rightarrow UA$), behavioural intention has a significant impact on UCC application acceptance ($b = 0.5954, p < 0.001$), supporting H8. The results revealed a significant effect of effort expectancy on UCC application acceptance mediated by behavioural intention ($b = 0.3778, t = 7.7896$). Additionally, there was a direct effect of effort expectancy on UCC application acceptance ($b = 0.3096, p < 0.001$). Hence, behavioural intention partially mediated the relationship between effort expectancy and UCC application acceptance.

Thirdly, the relationship influences between social influence and UCC application acceptance is mediated by behavioural intention ($SI \rightarrow BI \rightarrow UA$). In the first relationship ($SI \rightarrow BI$), social influence had a significant effect on behavioural intention ($b = 0.7389, p < 0.001$), supporting H3. In the second relationship ($BI \rightarrow UA$), behavioural intention has a significant effect on UCC application acceptance ($b = 0.6618, p < 0.001$), supporting H8. The results revealed a significant effect of social influence on UCC application acceptance mediated by behavioural intention ($b = 0.4890, t = 9.4038$). Additionally, there was a direct effect of social influence on UCC application acceptance ($b = 0.2341, p < 0.001$). Hence, behavioural intention partially mediated the relationship between social influence and UCC application acceptance.

Fourthly, the relationship influences between motivation and UCC application acceptance is mediated by behavioural intention ($MO \rightarrow BI \rightarrow UA$). In the first relationship ($MO \rightarrow BI$), motivation has a significant effect on behavioural intention ($b = 0.7101, p < 0.001$), supporting H5. In the second relationship ($BI \rightarrow UA$), behavioural intention has a significant effect on UCC applications acceptance ($b = 0.6843, p < 0.001$), supporting H8. The results revealed a significant effect of motivation on UCC application acceptance mediated by behavioural intention ($b = 0.4859, t = 8.7707$). Additionally, there was a direct effect of motivation on UCC application acceptance ($b = 0.2033, p < 0.001$). Hence, behavioural intention partially mediated the relationship between motivation and UCC application acceptance.

Lastly, the relationship influences between collaboration and UCC application acceptance is mediated by behavioural intention ($CO \rightarrow BI \rightarrow UA$). In the first relationship ($CO \rightarrow BI$), the collaboration has a significant effect on behavioural intention ($b = 0.7689, p < 0.001$), supporting H6. In the second relationship ($BI \rightarrow UA$), behavioural intention had a significant impact on UCC application acceptance ($b = 0.6455, p < 0.001$), supporting H8. The results revealed a significant effect of collaboration on UCC application acceptance mediated by behavioural intention ($b = 0.4963, t = 8.3976$). Additionally, there was a direct effect of collaboration on UCC application acceptance ($b = 0.2489, p < 0.001$). Hence, behavioural intention partially mediated the relationship between collaboration and UCC application acceptance.

4.4 Discussion

The results of the analysis confirmed that seven out of eight hypotheses were accepted (H1, H2, H3, H4, H5, H6, and H8) and one hypothesis was rejected (H7). The results also show how the relationship between the independent and dependent variables was partially mediated by behavioural intention, as illustrated in Table 10 and Figure 2.

Table 10
 Summary of Hypothesis Testing

Relationship	Hypothesis	Effect	Result
PE → BI	H1	Significant Direct Effect	Accepted
EE → BI	H2	Significant Direct Effect	Accepted
SI → BI	H3	Significant Direct Effect	Accepted
FC → UA	H4	Significant Direct Effect	Accepted
MO → BI	H5	Significant Direct Effect	Accepted
CO → BI	H6	Significant Direct Effect	Accepted
G → BI	H7a	-	Rejected
E → BI	H7a	-	Rejected
BI → UA	H8	Significant Direct Effect	Accepted
PE → BI → UA	H1 & H8	Significant Indirect Effect	Partial Mediated
EE → BI → UA	H2 & H8	Significant Indirect Effect	Partial Mediated
SI → BI → UA	H3 & H8	Significant Indirect Effect	Partial Mediated
MO → BI → UA	H5 & H8	Significant Indirect Effect	Partial Mediated
CO → BI → UA	H6 & H8	Significant Indirect Effect	Partial Mediated

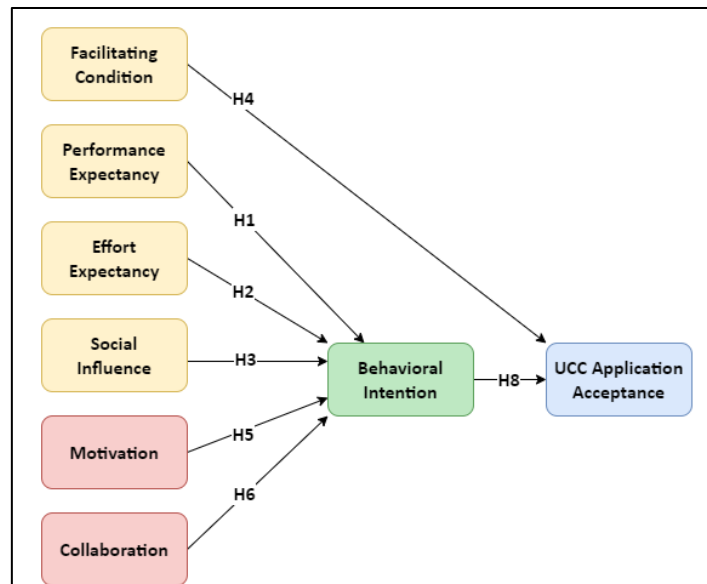


Fig. 2. Unified Communications and Collaboration Applications Acceptance Model

Table 10 shows that performance expectancy has a direct effect on behavioural intention, accepting the first hypothesis (H1). This supported past studies result in the same area [5,22,25,32,36]. The previous study by Meican *et al.*, related to UCC applications adoption and use in organizations; performance expectancy has an essential impact on the intention to use UCC applications [25]. According to the content of the questions given to the respondents in the current study, performance expectancy was measured through benefits, achievements, flexibility, and performance obtained by users when using the UCC application. With the significant results obtained, it shows that the use of the UCC application in learning can provide benefits and assist in the learning process without reducing user interest in using the UCC application.

Effort expectancy significantly influenced the acceptance of UCC applications directly through behavioural intention as mediators. This proved that effort expectancy influences behavioural intention to support hypothesis two (H2). A related study by Aburagaga *et al.*, highlighted that students perceived the technology used in learning as easy to use and have positive behavioural intention to accept it in a blended learning mode at the university [35]. However, the study by

Pratomo and Aburagaga *et al.*, stated that effort expectancy has no effect when using new technologies, such as UCC applications within an organization [5,35].

Social influence significantly influenced the acceptance of UCC applications directly through behavioural intention as mediators. This shows that social influence influenced behavioural intention to support hypothesis three (H3). These results demonstrate the role of social circles as critical in developing behavioural intentions by students to accept UCC applications in online learning. These results also indicate whether students at the university intend to use UCC applications in learning, which can be easily swayed by reference groups with whom they regularly socialize. It confirms the questions given in the current study. Additionally, confirming the findings of previous studies that social influence affected the intention to accept technology [35,39].

Based on the results, the fourth hypothesis (H4) is accepted. This shows that facilitation conditions have a significant effect on student acceptance of the use of the UCC application. Facilitation conditions are measured by user conditions, such as available facilities, assistance, and resources. Research conducted by Silic *et al.*, [39] stated that the lowest facilitation state dramatically affects the actual use of the technology. However, facilitating conditions are not seen as a factor that has a positive influence in the present study, this finding is believed to be because respondents have their own devices and internet service providers [40]. Nevertheless, the current study confirms that the highest or lowest facilitation conditions affect the use of the UCC application, considering the scope of the research is at university located in a rural area with limited resources in terms of technology and understanding.

Motivation significantly influenced the acceptance of UCC applications directly through behavioural intention mediators. It shows that motivation influences behavioural intention to support hypothesis five (H5). Motivation is one of the variables associated with student characteristics that positively influenced behavioural intention, thus student motivation is an essential factor determining online education's success [18]. In this study, respondents were asked several questions related to motivation in learning, working, collecting assignments online, motivation to be active in class during online learning, and motivation to improve self-ability while studying online in class. With significant positive research results, it shows that if students are active in class activities, it is likely that they will be motivated so that they have the intention to use technology such as the UCC application to support online learning.

Besides motivation, collaboration significantly influenced the acceptance of UCC applications either directly or indirectly through behavioural intention mediators. It shows that collaboration influenced behavioural intention to support hypothesis six (H6). This is in line with the results of research conducted by Venkatesh, where collaborating in discussions makes the class come alive and increases students' knowledge and self-confidence [33]. Students with shy characters find it easier to discuss things online behind the scenes than in class. It made learning two-way and overcame monotonous monologue learning. For this reason, there is need to involve collaboration among students and between students and lecturers. Thus, collaboration can be formed and raise intentions in using technology to communicate online.

Behavioural intention partially mediated performance expectancy, effort expectancy, social influence, motivation, and collaboration on UCC applications acceptance. Performance expectancy was found to positively influence behavioural intention [22]. The research results from Venkatesh found that effort expectancy positively affected behavioural intention [32]. While social influence affected behavioural intention. Collaboration and motivation are student characteristics that positively influenced behavioural intention [18]. However, collaboration is the most significant effect on behavioural intention in using the UCC application in this study.

The research also examined differences between individuals and revealed the control variables are concerned. The results depicted no significant relationship between gender or experience on behavioural intention in using the UCC application. Females and males have similar levels of intention to use UCC applications, so gender difference was not essential in influencing intention. It was in line with research conducted by Aljaafreh, tracing the adoption of social media as a platform that supports online learning [40]. In the study by Arkorful [29], supported by previous research by Aljaafreh [40], the experience was found to have a significant positive effect. Individuals with more experience with social media use may show better attitudes toward adopting social media in learning than those with relatively less experience. However, based on the results of this study, the individual experience has a similar level of intention to use UCC applications in learning, so the difference in the length of time using UCC applications does not have a relationship with behavioural intention. Thus, experience as a control variable and the same as gender is unimportant, so its influence can be ignored in the acceptance of UCC applications.

5. Conclusions

The findings of this study provide valuable insights into the factors that influence student acceptance of UCC applications. The study conducted a comprehensive examination of various factors that played a role in student acceptance of UCC applications and presented a comprehensive list of key factors. This information can serve as a reference for other universities and educational institutions to strategize and improve the use of UCC applications for communication and collaboration in teaching and learning. For the University of Technology Sumbawa specifically, the results of this study can help guide future efforts to enhance student's engagement and acceptance of UCC applications in the learning process. Understanding the factors that impact student acceptance, UTS and other universities in rural areas can work to improve the overall user experience and create a more engaging and effective learning environment.

This research was conducted to enrich understanding of the use of UCC applications at the university level. Nevertheless, the study has certain limitations which hinder generalization of the findings. Firstly, the present research did not focus on one UCC application but on the general acceptance of UCC applications. However, an individual's acceptance rate may vary for different UCC applications due to personal characteristics as well as the features of the application. Therefore, future research is advised to explore how UCC-based applications are used in the academic community among individuals with different backgrounds and various applications. Secondly, cross-sectional data collection was used in the current study. But for various reasons which could make individual behaviours change over time, it is advised for future study to employ longitudinal in order to address this issue. Thirdly, future research should replicate or expand the proposed conceptual model, for example in several rural areas with different economic and cultural conditions or even compare between countries. Fourthly, sampling was carried out on undergraduate students in the present study even though acceptance by postgraduate or diploma also needs to be investigated. Besides that, lecturers' acceptance of using the UCC application is also essential. For this reason, further research can expand the scope of the research cluster. Lastly, based on existing literature, the present study only included eight variables to explain the acceptance of UCC applications in the conceptual model. However, there are several other available variables, such as learning engagement, economic conditions, environmental and cultural conditions, the characteristics of the subject being taught, and others that can be used. Future research can expand this model and combine it or use other established models by including other variables.

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