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COLLABORATIVE LEARNING IN TERTIARY EDUCATION CLASSROOMS : WHAT DOES IT ENTAIL?

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ABSTRACT

Purpose - Collaborative learning has been increasingly recognized as an effective approach to promote students' success in higher education. To better understand the factors that contribute to successful collaborative learning, this study applied the Biggs' presage-process-product (3P) general model of learning to investigate the role of teaching quality, student-faculty interaction, and relatedness as presage factors, collaborative learning as process factor, and reflective and integrative learning and higher-order thinking as product factors.

Methodology - A cross-sectional approach was applied in this study, which included 1,892 Malaysian undergraduates. The study used the Quality of University Learning Experience (QULEX) survey to measure various constructs. First, confirmatory factor analysis (CFA) was conducted to establish the psychometric properties of the instruments. Thereafter, structural equation modeling (SEM) was employed to evaluate the latent variables relationships.

Findings – Based on the findings, collaborative learning fully mediated the prediction of student-faculty interaction, teaching quality, and relatedness on reflective and integrative learning and higher-order thinking.

Significance - These findings suggest that collaborative learning with social components and effective teaching maximize students' learning activities, and they should be fostered in academic institutions to improve students' academic success. Implications for improving teaching and learning are also discussed in this paper.

Keywords: Collaborative learning, teaching quality, student-faculty interaction, relatedness, reflective and integrative learning, higher-order thinking.

INTRODUCTION

Since the past decade, undergraduate experience has received and has continued to receive scrutiny from various stakeholders and policymakers associated with higher education institutions. However, in a continuously changing and fast developing world, higher education institutions should not only facilitate students' acquisition of new knowledge but also improve their inquisitive skills to continue learning for life (Bai & Xu, 2020). Most learners master how to be taught, but very few have perfected the learning process skills (Kornell & Bjork, 2021). As a result, instructors experience challenges switching from being material presenter to that of learning facilitator. Furthermore, workplaces worldwide have increasingly expressed their concerns on higher education graduates' weakness to address problems on their own, to write effectively, and collaborate successfully (Beachboard et al., 2011). According to the World

Economic Forum (2022), graduates should possess a range of skills like critical thinking, problem-solving, creativity, communication, collaboration, emotional intelligence, resilience, and adaptability to succeed in a rapidly changing job market. Establishing active, deep, and meaningful learning techniques in class is the most important responsibility of universities for empowering students to acquire the skills they need to be more self-directed (Lee & Mori, 2021; White et al., 2016).

Active learning is the process of having students engage in activities which involve gathering information, thinking, and problem-solving; this study focuses on reflective and integrative learning and higher-order thinking as two aspects of active learning. Reflective and integrative learning is defined as students being able to relate what they learn in class to their own experiences (Kolb, 2015). Higher-order thinking involves activities in which students are challenged intellectually and given complex cognitive tasks (Alqurashi, 2020). To reinforce the holistic development of graduates that possess the necessary skills for real-life situations, institutions of higher learning should pay more attention to reflective and integrative learning and critical thinking abilities (Althaus et al., 2021).

Collaborative learning is among the most constructive learning strategies to boost active learning. Collaborative learning requires learners to interact in a group setting and manage their relationships and the knowledge they create, as well as raises their active involvement (Hmelo & DeSimone, 2013). In collaborative learning, students gain critical thinking skills when they share their ideas, make decisions, and solve problems (Yaacob & Asraf, 2021). Collaborative learning offers opportunities for students to deliberate together in seeking solutions to complex situations (Le et al., 2018) which in turn facilitates the development of critical and higher-order thinking skills (Rabu & Badlishah, 2020). The fact that collaborative learning promotes voices from multiple lenses that each student brings, it encourages integration of ideas and perspectives to accomplish common goals (De Hei et al., 2015); therefore, supports integrative and reflective thinking skills. The literature on collaborative learning in higher education teaching and learning reports on students, teachers, social presence, social media, and classroom climate (Chen et al., 2018; de Borba et al., 2020; Qureshi et al., 2021; Umbach & Wawrzynski, 2005) or discipline related factors that contribute to effective implementation of collaborative learning. However, there is

limited literature on the role of instructors in collaborative learning (Liu et al, 2019; Song & Hill, 2017).

Implementing collaborative learning practices in higher education has a number of advantages, including increased engagement, improved critical thinking abilities, improved problem-solving skills, and higher student accomplishment. Higher education institutions and instructors are the main players in establishing a collaborative learning environment for rich active learning. For example, instructors must devote time and effort to interact with their students to discuss academic and non-academic matters. Students should be empowered by teaching quality that stimulates them to voice their thoughts on the planning and delivering of course content and to collaborate to fulfill their educational goals. Similarly, providing a learning environment that supports the feeling of relatedness and belonging among students is crucial for supporting students' collaborative learning. In a study by Erten and Erten (2021), the authors found that collaborative learning strategies improved students' academic achievement and enhanced their attitude towards business ethics like the ability to work effectively in teams, communicate clearly and collaborate with colleagues.

Accordingly, based on the aforementioned, this study sought to assess student-faculty interaction, teaching quality, and relatedness as positive antecedents of collaborative learning. The effectiveness of collaborative learning is associated with cognitive, social, emotional, motivational, and contextual factors. However, of great significance to us is its social aspect since the quality of relationships between teacher-student and student-student in terms of trust, bonding, and reciprocity significantly impact the success of collaborative learning (Arvaja et al., 2008). Student-faculty interaction which includes communication between the faculty and students; the ability of the faculty to provide constructive feedback; the level of support provided by the faculty (Yurdakul & Dagli, 2020) and relatedness which is the sense of connection and belonging that students feel towards each other which helps in team bonding (Yusof et al., 2020) can have the potential to predict collaborative learning. Additionally, teaching quality which entails designing courses that encourage student participation, providing clear instructions and expectations, and offering engaging and challenging activities, and also high-quality teaching can foster a sense of community among students and help establish a positive learning environment (Fauth et al., 2020; King,

2019) By promoting these factors, faculty members can create an environment that is conducive to collaborative learning, leading to improved learning outcomes for students. Therefore, we hypothesize that these three antecedents could positively predict collaborative learning, which in turn could positively predict outcome variables in terms of reflective and integrative learning and higher-order thinking among undergraduate students.

LITERATURE REVIEW

Collaborative Learning

Collaborative learning is among the most effective academic approaches for promoting students' growth and achievement (McClenney, 2006). Through collaboration, students gain essential vital skills to solve real-life issues or master content. These skills equip and enable them to deal with types of circumstances and difficulties that they will face in their career, community, and personal life (Le et al., 2018). The interactive process during collaborative learning causes conceptual changes as students reach new understandings by constructing new knowledge (Kaur et al., 2017). However, despite all the advantages of collaborative learning in higher education institutions, the ability of academic staff on how to apply it in their teaching process is still relatively weak due to lack of training (Ghavifekr, 2020).

The components of the collaborative learning process are grounded on Vygotsky's (1978) sociocultural theory. According to this theory, learning occurs as an outcome of individuals' interactions with others. Sociocultural variables influence the cognitive process, which allows convergence through the development, assessment, and repair of knowledge (Lantolf & Thorne, 2006). In sociocultural theory, through a process sometimes called scaffolding or guided participation, a more skilled person, enables a less competent person to carry out a task that the latter could not perform without assistance (Hmelo & DeSimone, 2013). By actively listening to the more competent person, explaining what he has heard, and applying the new information to the task at hand, the less-proficient student can practice, develop, and internalize skills so that they become part of his repertoire.

Collaborative learning promotes active learning by requiring students to play a proactive role in managing and monitoring their teams and the knowledge generated in discussions (Le et al., 2018). Therefore, it is a driving force in the achievement and maintenance of one's learning in terms of reflective and integrative learning and higher-order thinking. For example, according to research, collaborative learning strengthens higher-order thinking, enhances motivation, and reinforces communication skills (Hurst et al., 2013; Le et al., 2018). The collaborative learning method provides learners ample opportunities to improve their critical thinking abilities by offering prospective experiences that allow them to recall and integrate the gained skills and knowledge (Ghavifekr, 2020). It has been recommended to examine collaborative learning as a potential influence on students' reflective and integrative learning (Awang-Hashim et al., 2021). In addition, studies have emphasized that collaborative learning as a means of reflective practices could enhance self-regulated learning competencies (Buitrago, 2017; Lee & Mori, 2021). Furthermore, Xie and Ke (2011) argued that collaborative learning and reflective activities should not be ignored or discouraged in classroom activities because these two types of interaction will facilitate content-related knowledge construction processes.

Teaching Quality

Teaching quality can be described as instructors' actual teaching behaviours as well as the interaction between them and learners (Fauth et al., 2020). Therefore, teaching quality includes not just certain behaviours of instructors but those of students, considering that the two are completely interrelated. The procedure of achieving students' desired learning outcomes through teaching practices is teaching quality. According to Ismail et al. (2018), efficient teaching practices consists of diversifying instructional techniques, offering teaching tools and assistance, and providing deep insights into the contents to be addressed. In other words, teaching effectiveness is determined by instructors' ability to implement the teaching process successfully using the stated strategies.

Several elements of good teaching have been documented in several studies as vital for students' academic growth. Several studies have linked the elements of teaching quality, such as classroom management, the objectivity of instructions, and psychological support, to students'

positive outcomes (Evertson & Weinstein, 2013; Fauth et al., 2020). Good teaching quality significantly increased students' grade point average, satisfaction with the course, and the development of generic skills (Yin & Wang, 2015). Furthermore, it was found that good teaching quality and clear goals set directly influence students' generic skills efficacy and overall satisfaction (Grace et al., 2012). Zhang (2006) found that university students expressed a strong desire for teaching styles that are creativity-generating and that allow collaborative work. In the same vein, findings revealed that good quality of teaching is an essential institutional factor to promote student-centered approach, content knowledge, enthusiasm for teaching, communications skills, and professional competence (Witcher et al., 2008; Yin & Wang, 2015).

Student-faculty Interaction

Student-faculty interaction has been a predominant topic of interest in higher education studies. Meeuwisse et al. (2010) distinguished between formal and informal aspects of student-faculty interaction. The formal one is related to students' interaction with faculty members in terms of classroom debate, guidance, and instruction. In contrast, informal interaction is primarily related to students' social interactions with their faculty members. They argued that constructive interaction among students and faculty members serve as crucial antecedents to students' feelings of affiliation and overall educational development. Students who interact with their faculty members are more likely to learn efficiently and succeed in accomplishing their academic objectives (McClenney, 2006). Thus, it is possible to underline that student-faculty interaction, based on the instructors' acknowledgement of students as active agents of their learning, promotes learners' commitment to learning and stimulates reflection on the self, on others, and professional identity (Bruno & Dell'Aversana, 2018).

It is well-documented that frequent and positive student-faculty interactions enhance students' reflective and integrative learning, persistence, retention, academic performance as well as emotional development (Awang-Hashim et al., 2021; Hu et al., 2015; Kim & Lundberg, 2016). Ayub et al. (2020) found that following critical reflection, student-faculty interaction has emerged as the second most important factor that directly improves students' satisfaction with the

quality of their educational experiences. Furthermore, instructors' intention to focus on a collaborative learning environment enhances students' cognitive skills and engagement (Gasiewski et al., 2012; Kim & Lundberg, 2016). In addition, it was found that collaborative learning mediated the effect of student-faculty interaction on self-reported gains (Mu & Ribera, 2016), students' involvement and learning performance (Qureshi et al., 2021).

Relatedness

Relatedness is defined as students' satisfaction in their interpersonal interactions with others and the sense of belonging and attachment (Niemiec & Ryan, 2009). This need for relatedness could be fulfilled in the learning environment when students feel connected to their peers and instructors, both intellectually and emotionally (Fedesco et al., 2019). Ryan and Deci (2000) suggest that relatedness is important in motivation, particularly intrinsic motivation. Furthermore, it is argued that students' feeling of relatedness to their instructors as well as to one another predicts high levels of intrinsic motivation (Kumar & Kaur, 2019; Ryan & Deci, 2017). This is usually achieved during interactions that allow class members to work constructively and show value to one another and to work constructively regarding their views, input, and other suggestions inside or outside classrooms (Weigold et al., 2021).

According to researchers, relatedness has an important impact on students' engagement and various positive academic outcomes in higher education contexts. According to Beachboard et al. (2011), the feeling of relatedness to classmates and instructors is the stronger determinant of students' academic progress and readiness for a professional career. Students with more feelings of relatedness and belonging are more likely to take a deep as opposed to a surface approach to learning (Bunce & Bennett, 2019). Moreover, the process of discussing perspectives and communicating with classmates and instructors fosters a feeling of belonging in collaborative learning and motivates students to remain engaged throughout their learning activities (Qureshi et al., 2021). Xie and Ke (2011) found that relatedness is the critical factor that influences collaborative elaboration interactions. In addition, students' relatedness to instructors was the strongest determinant of students' interest and enjoyment in a course (Fedesco et al., 2019). Based on the review,

we understand that while research has shown that collaborative learning promotes reflective and integrative learning and higher-order thinking, more studies are needed to examine its potential impact on these areas. There is a need to investigate how teaching quality can promote a student-centered approach, content knowledge, enthusiasm for teaching, communication skills, and professional competence. More studies are needed to explore the impact of different types of student-faculty interaction on students' academic achievement and personal development.

The Present Study

The present study examined the relationships concerning teaching quality, student-faculty interaction, relatedness, collaborative learning, higher-order thinking, and reflective and integrative learning in a sample of Malaysian undergraduate students. The current study employed Biggs's (1993) Presage-Process-Product (3P) model of general learning as the underpinning theory. The term of presage factors pertains to both students' traits and the institutional ecosystem, while process pertains to students' motivation and their learning processes, and product pertains to the academic outcomes in terms of performance and achievements. According to the 3P model, "student factors, teaching context, on-task approaches to learning, and the learning outcomes, mutually interact, forming a dynamic system" (Biggs et al., 2001, p. 135).

In accordance with the 3P model, teaching quality, student-faculty interaction, and relatedness are treated as presage determinants in the present research. Collaborative learning is considered as a process variable that mediates the relationships between the presage factors and product factors. The mediating role of collaborative learning in the relationships between environmental and personal variables and academic outcomes has been proven in earlier studies (Guo, 2018; Mu & Ribera, 2016; Qureshi et al., 2021). In terms of product factors, reflective and integrative learning and higher-order thinking were seen as indicators of academic outcomes. As a result, the main research question that we seek to address in the current study is whether collaborative learning mediates the relationship between the presages (teaching quality, student-faculty interaction, and relatedness) and the products (reflective and integrative learning and high-order thinking).

METHODOLOGY

Participants

Using a cross-sectional survey design, the study collected data on study variables through a survey. The participants were 1,892 Malaysian undergraduates (631 males, 1261 females) ranging in age from 18 to 27 years old (M= 21.90, SD= 1.96) from 18 universities comprising ten public universities and eight private and foreign branch universities. In terms of ethnicity, the sample was ethnically diverse, with Malays (n=1107; 58.5%) constituting the majority of the participants, Chinese (n=529, 28%), Indians (n=76; 4%), and others such as international students (n=180; 9.5%).

Data Collection

The Ministry of Education, Malaysia made a national appeal to the higher learning institutions to take part in the research. Before data collection, students were given a set of guidelines on how to answer the survey and the research objectives. Participants were notified that participating in the survey was voluntary and would not influence their course marks, and that they could opt out at any point in time. The collection of data lasted between 20 and 30 minutes.

Data Measures

We employed the QULEX survey (Awang-Hashim et al., 2019). The researchers developed QULEX measures by employing an in-depth review of engagement literature in the higher education sector and based on the findings of qualitative research. Next, the items were extensively tested against the National Student Survey (NSS) (NSS, UK) and the National Survey of Student Engagement (NSSE, USA). All items were prepared in Malay (the primary language in Malaysia) and English.

Teaching quality. Teaching quality (5 items) assessed the student's level of satisfaction teaching that emphasizes on the students (e.g., "Generally, how often did the teaching staff clearly explain course goals, requirements and expectations at the beginning of each semester?"). Items were assessed using a six-point Likert scale ranging from 1 (never) to 6 (always). This scale's scoring was

obtained by accumulating values within the scale and then dividing the value by the number of items. The reliability coefficient of this scale was 0.84.

Student-faculty interaction. This four-item scale assessed interactions between students and instructors which include discussing professional goals, participating in committees and students' organizations, discussing course contents outside classrooms, and talking about academic matters (e.g., "During the current academic year, how often have you talked about career plans with any teaching staff?"). All items were assessed using a six-point Likert scale ranging from 1 (never) to 6 (always). This scale's scoring was obtained by accumulating values within the scale and then dividing the value by the number of items. The reliability coefficient of this scale was 0.88.

Relatedness. Relatedness scale was assessed with a subscale, which is the diversity and inclusion dimension (3 items) that measures the extent to which students feel accepted and valued by the campus community (e.g., "During the current academic year, how often did you receive opportunities and recognition similar to other peers?"). A six-point Likert scale ranging from 1 (never) to 6 (always) was used to assess the items. This scale's scoring was obtained by accumulating values within the scale and then dividing the value by the number of items. The reliability coefficient of this scale was 0.85.

Collaborative learning. Collaborative learning measures how often students collaborated with others in mastering difficult material by asking for help, explaining material to others, preparing for exams, and working on group projects (5 items, e.g. "During the current academic year, how often have you worked with another student to help you understand course material?"). A six-point Likert scale ranging from 1 (never) to 6 (always) was used to assess the items. This scale's scoring was obtained by accumulating values within the scale and then dividing the value by the number of items. The reliability coefficient of this scale was 0.86.

Reflective and integrative learning. Reflective and integrative learning measured how often students made connections with prior knowledge, other courses, and societal issues (6 items, e.g. "During the current academic year, how often have you integrated ideas from different courses/modules/subjects when completing assignments?").

A six-point Likert scale ranging from 1 (never) to 6 (always) was used to assess the items. This scale's scoring was obtained by accumulating values within the scale and then dividing the value by the number of items. The reliability coefficient of this scale was 0.89.

Higher-order thinking. The scale on higher-order thinking measures students' ability to solve difficult issues using different skills such as applying relevant information, theories, and approaches; evaluating the perspectives of others, making decisions or sources of information; as well as coming up with new ideas (3 items, e.g., "During the current academic year, how often did you apply facts, theories or methods to solve new problems?"). A six-point Likert scale ranging from 1 (never) to 6 (always) was used to assess the items. This scale's scoring was obtained by accumulating the values within the scale and then dividing the value by the number of items. The reliability coefficient of this scale was 0.88.

Data Analyses

SPSS was used to calculate descriptive statistical analysis. Following that, we employed CFA using the SEM method with latent constructs via AMOS to analyze the full model fit indices, in which we presented teaching quality, student-faculty interaction, relatedness, collaborative learning, reflective and integrative learning, and higher-order thinking as latent associated variables. The average variance extracted (AVE), discriminant validity and composite reliability (CR) were estimated as well. When correlation coefficients between latent variables do not surpass the cut-off threshold of 0.90, discriminant validity is asserted (Tabachnick & Fidell, 2013). Furthermore, the threshold values of composite reliability and convergent are achieved once the coefficients of CR and AVE surpass 0.60 and 0.50 (Hair et al., 2014), respectively.

To test our hypotheses, we measured two structural equation models: (a) a full indirect effect model whereby the relationships between the exogenous constructs (teaching quality, student-faculty interaction, and relatedness) and the endogenous constructs (reflective and integrative learning and higher-order thinking) are fully mediated by the construct of collaborative learning; and (b) a partial mediation model in which we added direct relationships from the exogenous constructs (teaching quality, student-faculty interaction, and

relatedness) to the endogenous constructs (reflective and integrative learning, and higher-order thinking). Maximum likelihood technique and the covariance matrix were employed to evaluate both models. The comparative fit index (CFI), the Tucker-Lewis Index (TLI), the root mean square error of approximation (RMSEA) with 90 percent confidence interval (CI) and the standardized root mean square (SRMR) were employed to analyze the fit indices of the models. The set threshold values for SRMR was 0.08 or lower, lower than or equal to 0.06 for RMSEA, and equal to or higher than 0.90 for TLI and CFI (Kline, 2011). Furthermore, the bias-corrected bootstrap (at 95% confidence interval) method was employed to determine the significance of the indirect effects (MacKinnon et al., 2004).

RESULTS

Descriptive Statistics

Table 1 displays the descriptive statistics results in terms of Cronbach's alpha (α), means, standard deviation, and normality of the distribution (kurtosis, skewness). All of the measurement scales revealed an excellent internal consistency, with values ranging from 0.84 to 0.89. According to Leech et al. (2005), acceptable values for skewness and kurtosis are in the range of within +1.00 and −1.00. Skewness with ranges from −0.26 to 0.24 and kurtosis with ranges from −.62 to −0.30 signify normal distribution of the variables.

Table 1

Descriptive Statistics of the Variables

Variable	*A*	M	SD	Skewness	Kurtosis
Teaching quality	0.84	4.56	0.85	−0.17	−0.62
Student-faculty interaction	0.88	3.32	1.18	0.24	−0.46
Relatedness	0.85	3.73	1.03	0.11	−0.30
Collaborative learning	0.86	4.47	0.92	−0.26	−0.37
Reflective and integrative learning	0.89	4.22	0.85	0.01	−0.38
Higher-order thinking	0.88	4.23	0.97	−0.05	−0.36

Note: *N*=1892

Measurement Model

Before examining our proposed structural model, CFA was employed to evaluate the measurement model which was specified with six correlated latent constructs (teaching quality, student-faculty interaction, relatedness, collaborative learning, reflective and integrative learning, and higher-order thinking) and their 26 items as indicators. The model demonstrated a very good fit indices: $\chi 2$/df ratio = 3.45 ($\chi 2$ =943.02, df = 373), CFI = 0.97, TLI = 0.97, RMSEA = 0.03, 90% CI [0.034 – 0.039], and SRMR = 0.04. The findings of composite reliability (CR), AVE, latent constructs correlations, and loading ranges of the items are shown in Table 2. The results showed that the composite reliability (CR) and AVE coefficients surpassed the specified thresholds of 0.60 and 0.50, respectively (Hair et al., 2010). All measured items exhibited significant and high loadings on their specified variables, with values ranging from 0.68 to 0.90. Additionally, discriminant validity was confirmed as none of the correlation coefficients between latent variables surpassed the threshold point of 0.90 (Tabachnick & Fidell, 2013).

Table 2

Correlation, Composite Reliability (CR), and Convergent Validity (AVE) of the Variables

	1	2	3	4	5	6	CR	AVE	Loading range
1. Teaching quality	1						0.85	0.54	0.70-0.80
2. Student-faculty interaction	0.47***	1					0.84	0.65	0.80-0.82
3. Relatedness	0.53***	0.59***	1				0.86	0.69	0.73-0.90
4. Collaborative learning	0.58***	0.52***	0.51***	1			0.85	0.54	0.68-0.77
5. Reflective and integrative learning	0.64***	0.59***	0.56***	0.69***	1		0.89	0.58	0.68-0.79
6. Higher-order thinking	0.59***	0.58***	0.53***	0.62***	0.80***	1	0.88	0.73	0.83-0.89

Note: N=1892, ***p <0.001

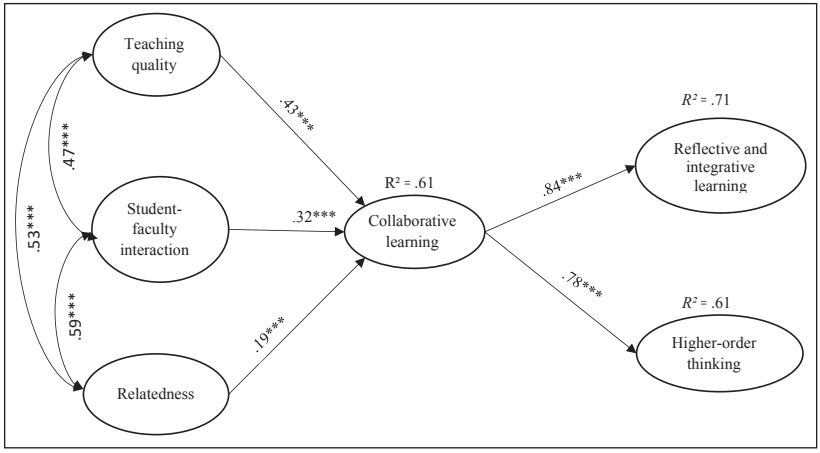
Structural Model

Using the SEM approach, we examined the full mediation model in which collaborative learning fully mediated the influences of student-

faculty interaction, teaching quality, and relatedness on reflective and integrative learning and higher-order thinking (Figure 1). The model demonstrated a good fit to the data: $\chi^2/df = 5.9$ ($\chi^2 = 1669.93$, $df = 280$), CFI = 0.95, TLI = 0.95, RMSEA = 0.05 (0.049 - 0.054), and SRMR = 0.06. Consequently, we measured the partial mediation model to the test, in which we added direct paths from the exogenous constructs (teaching quality, student-faculty interaction, and relatedness) to the endogenous constructs (reflective and integrative learning, and higher-order thinking). However, in addition to the decline in explained variances, the partial effect model had significant differences ($\Delta\chi^2$ (6) = 380.65, $p < .05$) to the full model and the coefficients of direct and indirect relationships had declined significantly. As a result, for parsimony, the full mediation model was considered.

Figure 1

Standardized Beta Coefficient for the Hypothesized Model. For Clarity Purposes, We Excluded the Observed Indicators from the Model.



Note: ***p<.001.

For determining the significance of indirect effects, the bootstrap approach was applied, with the confidence interval (CI) level set at 0.95 and bootstrap bias-corrected samples set at 2000. The coefficients of the full mediation model relationships and their corresponding ρ-values are presented in Table 3. The coefficients weights in Table 3 showed that collaborative learning fully mediated the indirect relationships between teaching quality, student-faculty interaction, relatedness,

and the dependent variables of reflective and integrative and higher-order thinking. The results revealed that all indirect relationships were significant and positive. Overall, variance explained for collaborative learning was 61 percent, reflective and integrative was 71 percent, and higher-order thinking was 61 percent (Figure 1).

Table 3

Bias-corrected Bootstrap Results

Path	B	95% CI	
		Low	High
Teaching quality→collaborative →reflective and integrative	0.37***	0.317	0.417
Teaching quality→collaborative →higher-order thinking	0.34***	0.293	0.388
Student-faculty interaction→collaborative →reflective and integrative	0.27***	0.221	0.316
Student-faculty interaction→collaborative →higher-order thinking	0.25***	0.204	0.296
Relatedness→collaborative →reflective and integrative	0.16***	0.107	0.208
Relatedness→collaborative →higher-order	0.15***	0.099	0.192

Note: ***$p < .001$

DISCUSSION

As an innovative learning approach, active learning was described as "classes in which students read, write, discuss, or be engaged in solving problems to be actively involved, students must engage in such higher-order thinking tasks such as analysis, synthesis, and evaluation" (Bonwell & Eison, 1991, p. 5). It is a powerful technique that allows students to participate in the creation, testing, and refinement of their mental models (Michael & Modell, 2003). In other words, learning is a direct result of teaching, but it does not necessarily take place just as an instructor teaches. Thus, instructors must transform their concept of learning from basic knowledge acquisition, with students learning by rote, to more consequential knowledge construction (Gleason et al., 2011). In order to gain academic objectives and fundamental skills such as cogent argument and critical thinking, instructors

should establish class activities in which students engage with the given topic, with peers, and even with instructors, as well as apply constructed knowledge, skills, and perspectives (White et al., 2016). Thus, to contribute to the literature of active learning, this study aimed to determine the mediating role of collaborative learning in the relationships between student-faculty interaction, teaching quality, relatedness, and higher-order thinking and reflective and integrative learning.

The findings showed that teaching quality has a significant relationship with collaborative learning and a significant indirect relationship with reflective and integrative learning as well as higher-order thinking via the role of collaborative learning mediation. The collaborative learning approach develops students' critical thinking skills and deep learning strategies (Hmelo & DeSimone, 2013). In activities that involve students in collaborative problem-solving and knowledge production, the pedagogical support provided by instructors is crucial (Le et al., 2018). In other words, generic skills efficacy and satisfaction are dependent upon the delivery of quality teaching, clear goal-setting, and perceptions of appropriate assessment methods and workload (Grace et al., 2012). During collaborative learning, instructors can perform a variety of tasks such as offering explicit instructions to prepare students for teamwork, observing activities throughout group activities, and expressing their perspectives on learning and active participation (Lee & Mori, 2021). Previous studies indicated that the quality of teaching (e.g., creative-generating teaching) enhances collaborative learning (Qureshi et al., 2021; Zhang, 2006). Students who have a positive perception of teaching quality are more likely to be involved in learning activities and develop their generic skills (Guo, 2018). Accordingly, perceptions of teaching quality and collaborative learning strategies have been implemented in higher education institutions to instill students' interest, curiosity, active participation, learning success, and inspiration (Qureshi et al., 2021).

The results also showed a significant prediction of student-faculty interaction on reflective and integrative learning and high-order thinking throughout the mediation of collaborative learning. This result implies that students who interact with their instructors more regularly are more likely to take part in collaborative learning tasks; subsequently, improving their cognitive skills in terms of reflective and integrative learning and high-order thinking. Academic staff are

among the main institutional factors. Their contact with students both inside and outside the classrooms enhances students' learning commitment, self-discipline, feeling of affiliation, as well as optimal engagement and learning (Kim & Lundberg, 2016). Interactions not only encourage students in learning, but enable them to be more concentrated, proactive, and eager to discuss information and ideas with others (Le et al., 2018). Previous studies highlighted the importance of the mediating role of collaborative learning between student-faculty interactions and educational outcomes. For example, Umbach and Wawrzynski (2005) found that collaborative learning significantly mediated the prediction of student-faculty interaction on student engagement. Furthermore, it was found that interaction with instructors significantly predicted collaborative learning and students' engagement, which in turn predicted their learning performance (Qureshi et al., 2021).

Collaborative learning also fully mediated the relationship between relatedness and reflective and integrative learning and high-order thinking. Sense of relatedness taps the learning climate that supports feelings of belonging, acceptance, importance, and interpersonal support from others such as peers and instructors (Košir & Tement, 2014). Relatedness and connecting with classmates and instructors are theorized as crucial determinants of educational excellence and optimum classroom participation (Weigold et al., 2021). Collaborative learning supports active learning and provides students with opportunities to articulate their knowledge expressions within peer-based contexts. Such kind of interaction depends on the students' feelings of relatedness and emotional involvement during their everyday interactions with classmates and instructors at the university (Koh, 2019). Relatedness proved to be the single most influential variable predicting students' perceptions of their institutions' contributions to their persistence, retention and overall educational development (Beachboard et al., 2011). Xie and Ke (2011) found that relatedness is an acritical factor that influences collaborative elaboration interactions among students. In their qualitative research, King and Bunce (2020) found that when students are valued and appreciated, they are more likely to work collaboratively during their classroom activities.

In addition, collaborative learning significantly predicts reflective and integrative learning and higher-order thinking. Collaborative

learning is an appropriate pedagogical strategy that may be described as a continuum process in which cognitive thinking is strengthened and peer interactions are produced (Rabu & Badlishah, 2020). Collaborative learning is considered in higher education as an approach that drives interests and willingness to participate and seems to have a desirable influence on students' brainstorming, problem-solving skills, psychological development, and persistence (Prokess & McDaniel, 2011). Collaborative learning guides the development of higher-order thinking skills by encouraging students to justify their thinking and externalizing self-reflection by way of directing appropriate questions (Hmelo & DeSimone, 2013). According to Gleason et al. (2011), instead of passive learning, collaborative learning is a form of active learning in which students must think critically and proactively participate in the learning practices. Furthermore, to encourage reflective and integrative practices, interaction throughout collaborative learning is essential among students to facilitate positive mutual communication in the learning process (Kaendler et al., 2016). Interactions and reflections are strongly linked as learning in a supportive social environment includes a form of interaction that aids in knowledge construction and reflective and integrative practices (Rabu & Badlishah, 2020; Ruan & Griffith, 2011). Xiao et al. (2016) investigated reflective thinking during collaborative learning activities and revealed that providing explanations for decisions made during reflective activities helps the students to express their views and opinion, understand course content, and actively engage in cognitive thinking.

IMPLICATIONS

In the book titled "How People Learn II", Bransford et al. (2018, p. 132) stated that "It is recommended that teams of cognitive scientists conduct research, developmental psychologists, curriculum developers, and teachers to investigate the potential benefits of collaborative learning in the classroom and the problems that must be addressed to make it beneficial for all students". In this regard, the current study attempted to investigate more about the learning environment that is conducive to the establishment of collaborative learning for university students. The findings support the importance of teaching quality, student-faculty interaction, and relatedness in assisting collaborative learning, which in turn facilitates reflective and integrative learning and higher-order thinking skills.

By considering the crucial role of instructors in the process of teaching-learning, higher education institutions should raise essential concerns for consideration, especially regarding teaching quality. Practitioners in higher education must start considering students' feedback and perceptions, identifying students' relevant expectations and needs from their instructors, increasing instructors' awareness of these requirements, and continuous professional improvement. In other words, instructors are assumed to possess a decent level of content expertise, the skills to establish a comfortable and satisfying learning climate, the skills to present work that inspires and prompts students, the willingness to assist students with uncertainties, ability to develop personal talents and skills, competence, and self-concept (Brown & McIntyre, 1993). To support these elements of effective teaching, it would be beneficial for higher institutions to implement in-service training and ongoing professional development activities to improve instructors' teaching quality (Farrell, 2013; Üstünlüoğlu, 2017).

Practitioners and instructors should also support high quality formal and informal interactions between students and faculty members. The most crucial aspect of learning activities is facilitating regular interactions and frequent contact between faculty members and students, which result in a feeling of community. To enhance interactions between students and their faculty members, colleges and universities could conduct a series of seminars and workshops to stimulate interactions among faculty members and students (Guo, 2018). Faculty members, on their part, are required to devote time and effort in student-faculty interactions especially when they recognize that the positive behaviours and outcomes such as continuing to work hard in classroom activities, seeking complex and challenging tasks, and sense of belonging could emerge from the interactions (Kim & Lundberg, 2016).

In addition, by acknowledging the value of relatedness, higher institutions should provide a rich and meaningful learning environment that supports students' sense of belonging. Maintaining excellent and responsive interactions with instructors and other students might help to instil a sense of relatedness and belonging (Niemiec & Ryan, 2009; Ryan & Deci, 2017). In educational settings, positive relationships with classmates and a sense of classroom community are always crucial for the fulfilment of the basic need for relatedness among students (Beachboard et al., 2011). In addition, the flipped classroom method, by empowering constructive engagement, is likely to create

a classroom climate that motivates students to form groups for learning, which could eventually boost their relatedness experiences (Abeysekera & Dawson, 2015).

LIMITATIONS AND FUTURE DIRECTIONS

The study has some limitations. First, the research participants were requested to self-report their perceptions using the survey method. In large and highly complex institutional contexts, analysing self-reported data has several positives and provides a precious and informative tool for evaluating the quality of teaching and learning (Douglass et al., 2012). Nevertheless, it must be clarified that self-reported data may not capture students' actual activity or reflect real experience, and as a result, evaluations of these perceptions could be biased (Veenman, 2011). As a result, the current study's findings must be treated cautiously; in addition, alternative approaches such as interviews or perceptions of classmates, and instructors could be considered in future research. Besides, the data was obtained using a cross-sectional design. Therefore, to produce a stronger inference of causality between variables in the model, it is imperative to employ longitudinal research design in future studies. Furthermore, there are prospective covariates that could influence the relationships in our hypothesized model. Thus, future studies should consider the effect of covariates such as gender, age, and educational level because these variables may influence relationships in the hypothesized model. For example, research has shown that gender differences exist in students' perceptions of teaching and learning (Bong & Skaalvik, 2003), and age may also affect students' perceptions of teaching and learning (Kember et al., 2011). Educational level can also be a significant factor in students' perceptions, as the expectations and experiences of students in different academic stages may vary (Fryer & Bovee, 2016). By taking these covariates into account, future studies could obtain a better understanding of the complex relationships between variables and improve the validity and generalizability of its findings.

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