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Defining students' active participation in a group discussion session from different perspectives

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Abstract
This study was conducted to determine the students' active participation and validate the students' learning domains during group discussion sessions. A survey study questionnaire was deployed, including nine constructs to gauge the students' active participation. The subjects involved 201 randomly selected engineering education students from several polytechnics in the northern region of Malaysia. The students engaged in arguing and cooperating activities, and appeared very enthusiastic during the sessions, and participation was not confined to a particular gender. The implication of the study is that a good facilitating teacher should take into account the nine constructs of the students' active participation.

Keywords
Students participation, collaborative learning, group discussion, student gender, engineering education.

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Introduction

The Student Centred-Learning (SCL) approach provides an environment conducive to students' participation in learning (Tan & Harun, 2018). Students are given the freedom to make decisions on everything they learn. They act as an independent learner to gather knowledge and access learning materials from multiple sources, including from the lecturer, library, internet, and shared platforms. However, according to Biswas, Das and Ganguly (2018), several challenges have been identified in the SCL implementation, including the difficulty to change the stakeholders' perceptions and roles. The teachers do not seem to quite understand their role as a facilitator, while the students' roles and mind-set of active participation during SCL are still very much influenced by the traditional learning methods. The appropriate involvement and participation of both the teachers and students will contribute to the success of learning through the group discussion session.

Students' participation in SCL, especially in a group discussion requires specific attention (Mohamed, 2012). A critical debate in a small group discussion session is typically hard to come by without some proper guidance from a facilitator. For this reason, the teacher is the most important individual to act as a facilitator in the students' learning process; he or she plays a significant role in planning and managing the method, materials, and suitable activities to have a lively learning session. At the same time, the facilitating role is associated with the students' interest and engagement in learning (Finn & Schrodt, 2016), especially to draw the students' attention and stimulate participation. A good facilitator can implement various activities followed by exercises to increase the students' knowledge and strengthen their skills; these efforts are beyond the prescription of the textbooks and require the students' active participation.

According to Turan, Elcin, Odabasi, Ward and Sayek (2009), most of the teachers have been using the traditional way of teaching, using lectures in the traditional classroom setting. In this context, the students are encouraged to memorise the facts, and learning is largely based on the textbooks and notes. Although group discussion is used as an approach for teaching and learning, most of the time students only share information (Sargis & Larson, 2002); very rarely, group members are seen to engage in arguing and questioning the facts. In this circumstance, the focus is on reading, preparing individual notes, completing home assignments, and facing the gender inequity issue (Han, Sax, & Kim, 2007; Mohamed, 2012; Hirshfield & Koretsky, 2018).

It is the role of a facilitator to manage the learning process so that the students attain the optimal outcome through various aspects of learning.

On the other hand, research has found that students, especially those from Asia, face difficulties in participating actively in group discussions due to their family background and cultural factors (Remedious, Clarke & Hawthorne, 2008; Leatemia, Susilo & van Berkel, 2016). This circumstance is applicable to most of the tertiary education students in Malaysia; according to Abdullah, Abu Bakar and Mahbob (2012), a possible associating factor of students' passive participation in a group is due to family background, leading to no confidence in themselves and being ashamed to ask questions. In this context, lifestyles, perceptions, and early learning environment seem to have a major influence on the students' attitude towards sharing, arguing, and debating in a group discussion (Leatemia, Susilo & van Berkel, 2016). These also include personal, contextual (Remedious et al., 2008), and gender factors (Han, Sax, & Kim, 2007; Opie, Livingston, Greenberg, & Murphy, 2019), especially for those who pursue engineering courses (Han, Sax, & Kim, 2007; Hirshfield & Koretsky, 2018).

In addition, some related studies rely on students' verbal count to assess their extent of participation (Liu, 2001; O'Connor, Michaels, Chapin & Harbaugh, 2017), but neglect the students' internal and behavioural changes due to cognitive process (i.e. questioning, asking, and arguing), behaviours (i.e. physical movement), psychological state (i.e. motivation, confidence), and value (i.e. tolerance, patience). Therefore, this study attempts to revisit a wider context of the students' holistic growth involving the learning domains (cognitive, psychomotor, and affective), motivation and value (Abdullah, Abu Bakar & Mahbob, 2012), which will help the facilitator find some guiding clues in holding a successful and effective group discussion.

Active participation predictors in a group discussion

Students' active participation in a group discussion is defined as students' participation in discussion activities, including questioning, expressing ideas, and giving opinions during the discussion session (Liu, 2001; O'Connor, Michaels, Chapin & Harbaugh, 2017; Hirshfield & Koretsky, 2018). The students are rated as passive when they lose their focus on a subject (Mustapha, Abd Rahman & Yunos, 2010); but more specifically, they are assessed on several aspects such as the way they act and interact with others in the group. Active participation in SCL involves five major activities,

namely questioning, discussing, writing, listening, and reading (Abdullah, Abu Bakar & Mahbob, 2012).

It is within this context that previous research proposes multiple definitions of active participation, but some authors use verbal interaction as the main predictor of active participation in a group discussion. Remedious, Clarke & Hawthorne (2008) depend on verbal contributions of students to indicate active participation; this means silent students are deemed to have failed in participating and learning. Similarly, in a study of O'Connor et al. (2017), the authors also use verbal expressions to determine students' participation in classroom discussion. In a study of Hirshfield and Koretsky (2018), the number of words spoken in asking technical/non-technical questions, talk time pattern, and the topics of discourse given by the participants are counted to indicate the extent of participation.

Meanwhile, there are authors who use other methods to define active participation besides the verbal count. Masek, Yamin and Aris (2016) studied the students' behaviours to determine if they are active or passive in their participation; oral ability is rated as talkative or silent, group skills excellent or poor, and confidence at high or low level. On the other hand, Liu (2001) viewed the participation level in SCL from a completely different dimension that varies according to situations, namely full integration, conditioning, marginal interaction and being a silent observer. In the full integration, students are involved actively in group discussion. Students may also be involved in group discussion with particular reasons or conditions. In the marginal interaction, students act as listeners without talking, and the silent observer is inclined to avoid verbal communication in a group. Dallimore, Hertenstein and Platt (2010) proposed that active participation entails asking effective questions and giving constructive feedback to ensure effective discussion; but considering the content and context of the students' topic of discussion, definitions of effective questions and constructive feedback remain elusive.

In the continuing efforts of researchers to define active participation, in reality, students participate in a group discussion without the guarantee of an effective discussion. It is particularly true when the participation measure concentrates on the verbal count and neglects other learning domains, which seems to contradict the definition of learning in the previous major education theories that involve changes in an individual's cognitive process, psychomotor, affective domain, and character values. In addition, it is timely with the current development of education in Malaysia

promoting more SCL activities (Yusof, Roddin & Awang, 2015; Masek, Yamin & Aris, 2016), to cultivate students with more recent skills including problem solving, communication skills, and self-confidence (Yusof, Roddin & Awang, 2015). Therefore, to better understand students' participation in a group discussion, this study focuses on several measures of predictors; namely, physical movements (behaviour), expressing opinions, motivation, and confidence (cognitive process and psychological state). The specific research questions were:

i) What is the students' participation level and how are students' internal state and behavioural changes during a group discussion (i.e. behaviour, cognitive process and psychological states)?
ii) To what extent is students' participation level different in a group discussion according to gender?

Methodology

The study is conducted using the descriptive quantitative survey methodology, which is the most suitable approach to gather accurate information from a population (Creswell, 2014). The design of the SCL is based on the engineering education classroom setting, which comprises four to five members (Kolmos et al, 2007), and the context is an electrical engineering topic, using multiple learning activities such as problem solving, brainstorming, and developing product/design, that were mostly based on the concept of active and collaborative learning.

Population and sampling

The total population consists of 413 electrical engineering students (multiple areas that include electrical, electronic, control, computer, medical, green technology, and communication) from five polytechnics in the Northern Region of Peninsular Malaysia. In Malaysia, there are a total of 36 polytechnics offering multiple courses at diploma level, including engineering, technology, social sciences, business and arts. From that figure, 22 polytechnics are offering electrical engineering courses. Since the population is made up of several heterogeneous and geographically scattered groups, the cluster sampling technique is deployed. Engineering education students were chosen since previous research has highlighted the benefit of soliciting gender inequity issues in a group discussion (Han, Sax, & Kim, 2007), especially in the case of Malaysian students

(Sayadi, 2007). Questionnaires are randomly distributed to the students within the department of electrical engineering in each polytechnic. According to Krejcie and Morgan (1970), a total of 201 samples are required for a population number of 420. At the end of the exercise, a total of 230 duly completed questionnaires are returned.

Instruments

The questionnaire comprises two major parts: Part A-- demographic information; and Part B-- students' participation elements. In Part B, a total of 57 items are developed to gauge the students' participation level in a group discussion, which is adapted from previous studies (Remedious et al., 2008; Masek, Yamin & Aris, 2016; O'Connor et al., 2017; Hirshfield & Koretsky, 2018). These constructs include items related to the cognitive process, behaviour, psychological state, and personal value (Masek, Yamin & Aris, 2016). Items were developed based on the students' interaction and communication, physical movement, confidence, oral expression, group skills, reflection; and opinions (Remedious et al., 2008). As a result of synthesizing, the process of active and collaborative learning has yielded nine dimensions, namely; participation at the beginning and end of the session, hesitation, acceptance and encouragement, tolerance, confidence, patience and respect, group skills and argument, and autonomy. The main references for developing these dimensions were from the Model for Active Learning from Rubin and Hebert (1998).

The instrument reliability index is developed based on the *Cronbach's Alpha (α)*. The results indicate a high index of reliability at 0.899 (Hair, Ringle & Sarstedt, 2011). The issue of clarity is resolved by using a series of pilot studies, so that items developed contain unambiguous and understandable statements. Here are some examples of items developed: "I argued about ideas with the group members during discussion"; and "I give my full cooperation to my group members in order to complete the task".

Data analysis

Data were analysed using the quantitative descriptive method aided by *Statistical Package for Social Science for Windows Version 22.0* (*SPSS V22.0*). The results of Part A are presented in the form of frequency and percentage, while Part B in the form of mean scores (M) and standard deviation (SD). An independent t-test, a type of

inferential statistic, is utilised in order to compare the students' levels of participation in the group discussion between genders.

Result

Demographic information

A total of 230 sets of questionnaires were collected, but only 201 sets were duly completed and suitable for data analysis (more than 87% response rate). The majority of the returned questionnaires are from male respondents with a total of 115, while the remaining 86 are from female respondents. The gender proportion in percentage form is indicated in Table 1.

Table 1: *Gender proportion*

Gender	Percentage (%)
Male	57.2
Female	42.8
Total	100.0

Students' participation in a group discussion

The overall mean score for the 57 items is 4.12 (Mean=M) (SD = .23), indicating a high level of student participation in the group discussion session, which encompasses the cognitive process, psychological state and value. The students agreed that they had actively participated in the group discussion, which is indicated by the following highly rated items: '*I accept a proposal of an idea from group members'* (M= 4.39, SD= .60), which shows the students' willingness (value) to agree with the peer's opinions to some extent; '*I put more effort at the end of the discussion session'* (M=4.36, SD=.66); and '*I argued about ideas with the group members during discussion*' (cognitive process) (M= 4.34, SD=.54). Also, the students were motivated (psychological state) due to the relevance of the topic to their daily activities (M=4.33, SD=.52). Table 2 displays the mean scores and standard deviations of the elements that were highly rated by the respondents.

Table 2: *Mean score and standard deviation for highly rated items*

No	Item	M	SD
1	I accept a proposal of an idea from group members	4.39	.60
2	I put more effort at the end of the discussion session	4.36	.66
3	I argued about ideas with the group members during discussion	4.34	.54
4	I was motivated because of the relevance of the topic of discussion to my daily activities.	4.33	.52
5	I give my full cooperation to my group members in order to complete the task	4.32	.56

The students' behaviours demonstrated active participation in the group discussion; several lowly rated items lend support to this claim; for example, *'I was just sitting when voicing my opinion*' (M=3.72, SD= .86). The students' confidence level was high when they participated in the group discussion session, which is indicated by a lowly rated item--'*I was afraid to ask a question when I did not understand*' (M=3.93, SD= .82). The students' tolerance level was high during the discussion session, which is indicated by the item-- '*The discussion session was dominated by the same individual*' (M= 3.85, SD= .62). The rest of the items are shown in Table 3:

Table 3: *Mean score and standard deviation for items with lowest rating*

No	Item	M	SD
1	I was just sitting when voicing my opinion	3.72	.86
3	The discussion session was dominated by the same individual	3.85	.62
4	I did not make any physical movement during discussion	3.90	.93
5	I was afraid to ask a question when I did not understand	3.93	.81

Here is a salient point of the discussion process (Table 4): the data indicate that the students participated more actively and put in more efforts in the later part of the discussion session (M=3.80, SD= .86) (M=4.36, SD= .66), compared with the beginning part of the session (M=3.72, SD= .86). Further analysis shows that the students started

to actively participate in the discussion when they had an idea to speak about; this is a sign that their cognitive process was activated (M=4.31, SD=.47).

Table 4: *Mean score and standard deviation for items active participation*

No	Item	M	SD
1	I actively participate at the beginning of the discussion session	3.72	.86
2	I actively participate at the end of the discussion session	3.80	.86
3	I put more effort at the end of the discussion session	4.36	.66
4	I participate when I have an idea to voice	4.31	.47

Data also indicate that the students liked to talk during the discussion session (M=4.01, SD=.60), although some of them were slightly inhibited to share their views; this is indicated by a lower mean score of (M=3.79, SD=.86). However, the students activated their cognitive process when they were in a mood to argue about the ideas proposed by some group members (M=4.34, SD=.54) and impress upon them their own opinions (M=4.12, SD=.58). The students applied a good value when they wanted to raise a question if they did not understand certain areas of the topic (M=4.18, SD=.44). This shows that students participated in critical discussions in a group (refer Table 5).

Table 5: *Mean score and standard deviation for items critical discussion*

No	Item	M	SD
1	I like to talk during the group discussion session	4.01	.60
2	I do not feel shy talking to my group members	3.79	.86
3	I argued the ideas proposed by team members	4.34	.54
4	I make my group members understand of my idea	4.12	.58
5	I like to ask someone directly if I do not understand something	4.18	.44

Generally, when comparison was made according to constructs; data analysis indicated that the highest mean score is for autonomy (M=4.36, SD=.41), which indicates that the students enjoyed participating in an environment that allows them to move and talk. The lowest mean score is for hesitation (M=3.96, SD=.61), which indicates that the students were indecisive as regards participating in the discussion by asking questions, moving around, and giving opinions. Details are as indicated in Table 6.

Table 6: *Students participation in a group discussion*

No	Construct	M	SD
1	Participation at the beginning of the session	4.30	.382
2	Participation at the end of the session	4.23	.372
3	Hesitation	3.96	.612
4	Acceptance and encouragement	4.28	.475
5	Tolerance	4.21	.369
6	Confidence	4.06	.501
7	Patience and respect	4.14	.483
8	Group skills and argument	4.31	.338
9	Autonomy	4.36	.409

Students' participation and gender difference in group discussion

The descriptive statistics indicate that the mean for the male respondents (M= 4.21, SD= 0.22) is slightly higher than that of the female respondents (M= 4.18, SD= 0.24). However, a further analysis using independent t-test indicates that there is no significant difference between the genders of students who participated in the group discussion t (199) = 0.748, p = .455). The mean scores and standard deviations are contained in Table 7, while the results of the independent t-test are displayed in Table 8.

Table 7: *Mean score of students' participation and gender difference in group discussion*

Gender	M	SD
Male	4.21	0.22
Female	4.18	0.24

Table 8: *Independent t-test result of students' participation and gender difference*

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
participation	Equal variances assumed	.039	.843	.748	199	.455	.02470	.03303	-.04044	.08983
	Equal variances not assumed			.738	173.852	.461	.02470	.03346	-.04134	.09074

Findings and discussion

As regards students' participation in a group discussion, especially as regards engineering education students in Malaysian polytechnics in this case, active participation is expected, taking into account several factors as stated in the literature, including family background, lifestyles, perceptions, and early learning environment. There is much focus on prevailing students' active participating measures based on verbal counts in the existing literature, creating a limitation on assessing the impact of group discussion from wider perspectives. Thus, this study attempted to identify students' active participation on several measures of predictors, namely, cognitive process, physical movements, expressing opinions, motivation, and confidence.

Several authors have expressed that active participation in a group discussion occurs when students are engaged in activities such as questioning, expressing ideas, and giving opinions during discussion sessions (Liu, 2001; O'Connor, Michaels, Chapin & Harbaugh, 2017; Hirshfield & Koretsky, 2018). Based on this premise, this study found that students actively participated in the group discussion and were keenly interested in the topic of the session; this is indicated through physical movements

(behaviour), expressing opinions, motivation, and confidence (cognitive process and psychological state), group skills and personal value as well as oral expression.

The students perceived that they were actively participating in the session when they had activated their cognitive process through several activities. The participation was particularly obvious when they argued over ideas, agreed with the opinions of others, and asked relevant questions, indicating their contribution to the discussion and cooperation with other team members. Previous studies have highlighted the importance of students asking the right questions, listening to others, and active participation, which would bring about fruitful discussions (van Blankenstein et al, 2009; Dallimore, Hertenstein & Platt, 2010). Asking appropriate and relevant questions requires guidance from the facilitator who is present to prompt the students to think about a variety of possibilities, organise the group discussion, and affirm or correct the students' answers during the discussion (Finn & Schrodt, 2016).

In addition, the students demonstrated a high level of personal value or characteristics during the group discussion session. Students perceived that they were actively engaged in the group discussion and they were inclined to openly accept proposals or ideas from other group members with minimal argument. Similar findings were highlighted in the study carried out by Huang et al. (2018); students within a group must have consensus when making a decision. Minimal arguments indicate the agreement of the majority of the students of the group, while some of the members may remain silent during the discussion session. The silent participants tend to go along with the opinions of other members or try to adapt to the practices of the group, and thus they have no confidence to voice out their opinions. In the study from Sudarmika, Santyasa and Hendra Divayana (2020), group discussion has improved students' character values (i.e. wisdom, fairness, respect, and commitment) through active participation, as a result of cooperative learning that encouraged social interaction, group dynamic, and interpersonal development amongst students.

Students' behaviours are indicated by their physical movements and interactions, which include verbal or non-verbal form of participation in the group discussion, from the beginning to the end of the session. In this study, students moved around and did not just sit on their chairs; this indicates that they were actively participating in the group discussion session. Passive students in a discussion group typically lack physical movements and tend to give minimal responses during a discussion session (Remedious et al*.,* 2008). Thus, active participation is evidenced by

the students' physical movements and interactions with other members in debating or arguing over ideas in a group discussion.

Group skills are a part of the behavioural aspect of the students' participation in a group discussion. Students perceived that they had actively participated in the discussion when they possess excellent group skills; some group members lack the skills and need more training, and hence they are passive participants in the group. Most of the group members with poor group skills could not forge cooperation or develop mutual understanding with other team members, and therefore they were unable to participate actively in the group discussion. According to Bani-hani, Al Shalabi, Al Khatib, Eilaghi and Sedaghat (2018), in a group discussion, students are responsible for their own learning as well as the team members' learning. Each member of the group must be fully committed to the cause of discussion so that the objective of the group session can be achieved.

In this study, the students' pace of participation was quite slow at the beginning of the group discussion session, but the discussion gradually became vibrant in the later part of the session. It is argued that the students' psychological state determines the enthusiasm of participation, and this is the most important ingredient of a successful group discussion. Students' psychological state can be observed from their confidence, motivation, curiosity, and willingness to participate in a discussion. In this study, the students appeared confident in asking questions, and voicing their opinions; they were motivated to participate in the discussion, and they cooperated with other team members during the discussion session. The findings of this study are similar to those of the study conducted by Masek, Yamin and Aris (2016), in which several group members demonstrated their confidence through their action, behaviour, communication, contributing ideas, and face expressions. However, it was observed that a few participating students exhibit a very low level of confidence in voicing their ideas, questioning, arguing and debating ideas in the group discussion, and hence they were deemed to have participated passively.

There is no significant difference between genders in students' participation, which means that gender is not a predictor of students' participation in group discussion. The same findings are noted in the study carried out by Mohamed (2012): there is no significant difference between the genders of the students in learning participation under the cooperative learning setting. Also, the study conducted by Hirshfield and Koretsky (2018) reveals similar findings-- no significant difference

between the genders of the group discussion participants in Problem-Based Learning. On the contrary, based on a study from Opie, Livingston, Greenberg and Murphy (2019), students and teachers of the same gender in a small discussion group had resulted in a high level of participation for that particular gender. Nevertheless, Kennedy (2009) found that after participation in a debate with an active classroom strategy, the rating of the experience for an instructional strategy increased from approximately 75% to about 85%, and the same occurred among students who were initially reticent to participate. Through observation, there is something very fascinating about the male students both before and after the debate; they showed a stronger preference for debate over female students.

Here is a pertinent point about the samples of this study: the students selected were seniors who used to work with the same gender counterparts in previous semesters. In addition, their communication skills were developed throughout the learning process and experience in the previous years of studies (Biswas, Das & Ganguly, 2018). Different findings could have been yielded for the junior students, especially those from the first semester, who needed more guidance, encouragement and facilitation during group discussion. Students are expected to be the centre of active learning, and their cognitive and affective learning experiences will steer the class into an effective discussion session. In the student-centred classroom, there is a necessity for the roles of a teacher and students to change, so that the teacher changes from the "sage on the stage" to the "guide on the side" (Weimer, 2002). A teacher or instructor acts as the facilitator and supporter to complement the students so that the latter could harness the current knowledge for their developmental journey.

Conclusion

This paper is intended to suggest a framework in order to have a deeper understanding of active participation in group discussion, especially for engineering education students. Active participation should be seen beyond the verbal count by considering the cognitive process, behaviour, psychological state, and personal value. In this study, students actively participated in the group discussion and activated their cognitive process through participating in activity which included arguing over the ideas, agreeing with the opinions of others, and asking relevant questions. Also, students demonstrated a high level of personal value or characteristics during the group discussion session

indicated by their inclination to openly accept proposals or ideas from other group members with minimal argument, and have the consensus in making a decision, as well as adapting to the practices of the group. Students also participated actively in a group discussion through their physical movements, interactions, and demonstrating excellent group skills. All this evidence was however not associated to students' gender; which means that gender is not a predictor of the students' participation in group discussion. The implication is that in conducting a group discussion during a teaching and learning session, teachers, acting as good facilitators, should be aware of these predictors, so that critical discussions will occur. Further research should investigate how learning transfer occurs and the pivotal role of the cognitive process when a critical discussion takes place.

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