

Online Collaborative Learning Environment to Promote Leadership Roles: A Preliminary Study

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Abstract

This study aims to investigate the students' leadership roles in an online collaborative learning environment. Twenty students have participated in this preliminary study. During the study, students in a small group of learning were given one task to be discussed in the online collaborative learning environment within one week. The content analysis method was performed to analyze students' online discussion scripts to identify students' leadership roles. The descriptive analysis shows that students performed leadership roles during the discussion and the distribution of leadership roles occurred. Knowledge contribution shows the most leadership roles performed by students because an online collaborative learning environment offers students to share their knowledge and engage during learning. This strengthens them to organize their ideas and contribute to the group to ensure they accomplish the tasks given. Nevertheless, some types of leadership were distributed evenly among group members compared to others and more frequently performed by the group members, but others were dominated by certain individuals only. Furthermore, the sequential analysis was performed to investigate how leadership roles develop in an online collaborative learning environment. The result shows eight significant sequences and the transition diagram has been visualized. The sequential analysis diagram shows that code OM (Organizational Moves) promotes all leadership roles except for the code AA, Acknowledgement Affective. This indicates that OM is a critical leadership role in ensuring the team members are able to solve the tasks and achieve the group goals. However, further research should be extended by providing a few more tasks and weeks to observe their leadership roles over time.

Keywords: Online Collaborative Learning, Leadership Roles, Emergence Leadership, Online Learning Behaviour

Introduction

Promoting leadership skills at an early age can be a huge advantage. Leadership skills provide an opportunity to learn by building the relationships within the teams (Johnson & Voelkel, 2019), achieving the tasks effectively (Ngang et al., 2013), display effective communication as well as interpersonal skills (Ariatana et al., 2015). Individuals who possess these skills can cooperate well in the community and make a positive contribution to the

country. Ngang *et al* (2013) investigated the deans with high leadership soft-skills tend to collaborate in teams by regularly discussing the problems, encouraging two-way communication, and promoting their staff to work in teams. Moreover, Internal team leadership, shared leadership can contribute to team creativity (Lee et al., 2015) where creativity has become an essential skill and criterion that employers seek in multicompetent graduates (Yorke, 2005).

Theories about leadership can be viewed from the traits and skills approach. According to Katz (1955), leadership skills is the ability that can be learned and developed. Katz's ideas are dividing leadership skills into three basic skills: technical, human and conceptual. Technical skills involved the ability to work with things, the human skill involved working with humans and conceptual is the ability to work with ideas (Northouse, 2015). Skills are what leaders can accomplish and traits are who leaders are. Thus, leadership skills can be acquired and leaders can be trained. Emergent leaders are individuals who have significant influence over other group members, even though they do not have formal authority (Schneider & Goktepe, 1983). According to Li *et al* (2007), an emergent leader performs leadership functions spontaneously without appointed or elected. In a collaborative learning group, emergence leadership is reflected from each member's leadership move or role to help their group accomplish the goals (Sun et al., 2017). Examples of leadership moves encourage members to contribute their ideas, propose ideas to accomplish their task, and ensure members are on the right track of the topic discussion.

Study says leadership roles can emerge in online collaborative learning (Gressick & Derry, 2010) as it is a social process that occurs when individuals without formal authority become leaders (Neubert & Taggar, 2004). In the success of small group collaborative learning, emergence leadership is important in which the members in a group are able to highlight their leadership roles in different aspects of the collaborative learning process. Students who can show their leadership role in a group of learning can also influence others' behaviour and affect the community's function even though they are not a formal leader (Zhu et al., 2013). As a result, each individual's role can be organized and lead to successful group performance (Cheng et al., 2019).

Collaborative learning activities will help students interpret and reconstruct their knowledge by giving them the experience to explain their understanding of the subject matter to their group members (Van Boxtel et al., 2000). Hence, the discussion among students during collaborative learning activities may enhance their understanding and interpretation (Fall et al., 2000). Therefore, online collaborative learning can improve students' ability to pursue their learning objectives and improve their learning progress (Cen et al., 2016; Jeong, 2019) But, individual learning outcomes are influenced by their learning characteristics, such as learning ability and time spent. At the same time, effective collaborative learning involves individual contributions and depends on how the group works together to contribute (Cen et al., 2016).

The emergence of leadership in online learning is often overlooked because students are in different places and their interactions in a group are only through computer-mediated communications (Xie et al., 2017). A study conducted by (Chen et al., 2020) revealed that

students that group leaders will highlight more participating behaviour such as forum login, forum views, chat views and posts compared to group members.

The preliminary study aims at investigating the process of identifying students' leadership roles and how students develop leadership roles in an online collaborative learning environment. However, little research has examined students' leadership role in online collaborative learning based on the students' discussion scripts. This study systematically applied the content analysis method and sequential analysis procedure to address such research needs. More specifically, the research objectives are:

1. To identify students' leadership roles in an online collaborative learning environment
2. To analyze how students' leadership roles develop in an online collaborative learning environment.

Method

Participants

Participants were student teachers enrolled in the Philosophy and Education subject at one of the Institute of Teacher Education in Malaysia. This subject aims for students to develop their scientific skills, thinking skills, problem-solving skills, communication skills and information management skills. A total of twenty students voluntarily participated in this preliminary study and they were taught by same lecturer. The distribution of males was 40% and females 60% and all of them were first-year students. These students were randomly grouped into five small groups.

Instruments

There are two instruments used in this study; online discussion tasks and online collaborative learning environment.

Online Discussion Tasks

In this study, one online collaborative learning discussion task were used to analyze students' leadership roles. By conducting content analysis, the researcher able to identify students' leadership roles in an online collaborative learning environment. The tasks were developed based on the subjects learning objectives and implied the characteristics of collaborative tasks. The task given was as follows:

"Discuss in a group the implications of Western Education Philosophy, Eastern Education Philosophy and Islamic Education Philosophy on the development of education and curriculum in Malaysia. Detail your answer based on the educational institution, curriculum, educator and National Educational Philosophy.

In your opinion, do you agree/disagree with the implementation of Western Education Philosophy in education and curriculum in Malaysia? Explain your answer."

Online Collaborative Learning Environment

The researcher developed online collaborative learning environments to promote students' leadership roles and students participate in asynchronous online discussions in the learning environment. The teacher acts as a facilitator to guide students for effective participation. Table 1 shows that the implementation of an online collaborative learning environment aligns

with the characteristics stated by Kirschner (2001). Table 2 shows the instructions alignment with the characteristics of collaborative tasks by (Kirschner, 2001).

Table 1

The Implementation of Collaborative Learning Principles

Characteristics of collaborative learning by Kirschner (2001)	Implementation of collaborative learning principles in the online collaborative learning environment by Kirschner (2001)
Learning takes place in an active mode	<ol style="list-style-type: none"> 1. Students discuss the collaborative tasks in the web-based discussion board by using text, sharing multimedia, video and document asynchronously, 2. Students discuss the collaborative tasks within one week at the end of collaborative tasks, students reflect on their learning.
The teacher is more a facilitator than a "sage on the stage."	<ol style="list-style-type: none"> 1. The teacher will provide the collaborative tasks. 2. The teacher assists students if needed. 3. The teacher will trigger a question when students give questionable opinions. 4. Engage and interact with students throughout the discussions.

Table 2

Instruction for Students During Online Collaborative Tasks

Characteristics of the collaborative tasks by Kirschner (2001)	Instruction for students during online collaborative tasks:
Students participate in small-group activities	Form a group of four students
Students develop social and team skills through the give-and-take of consensus-building	Assign a leader for your group and the leader have to monitor and organize the group discussion.
Discussing and articulating one's ideas in a small-group setting enhances the ability to reflect on his or her own assumptions and thought processes	Discuss the tasks given in a group by sharing your opinions and knowledge. Provide the evidence and the resources to support your information. Students are encouraged to argue to reach a consensus. Make sure all the members take part in the discussion and the discussion can be held anytime. The instructor will always monitor the activities and guide you if needed
Students must take responsibility for learning	Before starting the discussions, make sure your group plans and organizes the learning by stating your group's goals and determining the outcomes you will get at the end of the discussions

Process

The study took one week for students to discuss the task in the online collaborative learning environment. Students were divided into five groups of learning and they discussed the online collaborative tasks in the allotted time.

Data Analysis

The study used the content analysis technique to analyze students' discussion scripts to investigate students' leadership roles in the online collaborative learning environment. Then, a sequential analysis technique was performed to identify how students develop leadership roles across their collaborative groups.

Content Analysis Procedure

Content analysis is applied to students' discussion scripts in an online learning discussion board based on a coding scheme. Upon characterization based on the coding scheme, this study applied a unit of meanings for objectivity. This research adopted the coding scheme by Gressick and Derry (2010) who evaluated students' leadership roles in small groups of learning as shown in Table 3.

Table 3

Description of leadership roles coding schemes

Leadership roles	Descriptions	Examples of use
Acknowledgement affective	Positive – use a language to motivate or inspire group members and encourage positive group interactions Negative: use language in a negative critical way that may prevent the success of the group	<i>"I agree with your opinion. Its sound interesting"</i>
Argument development	Encourage others to give reasons, evidence, and clarification; extending others' arguments through elaborating on them or making comments about them. Responsible for holding group for justifying their ideas.	<i>"Can you give examples for your suggestion? It is unclear"</i>
Seeking input	Seeking general information from other members of the group, seeking help, advice and ideas on the work	<i>"If my opinion is lack of information, can someone share their thought about it?"</i>
Knowledge Contribution	Contributing to the academic knowledge by working on the academic goal of the project by contributing new ideas and extending the meaning	<i>"From my opinion, teachers should create collaborative and cooperative learning. This helps students to improve their interaction, leadership and thinking skills...."</i>
Organizational moves	Planning, organizing and monitoring both discussion space and ideas, statements and other movements that provide structure to the situation	<i>"Okay, let's start our discussion. We start with giving our opinion, then we can get a response to other's opinion"</i>
Topic Control	Statements that influence the topic of discussion or direction of work by ensuring the members are on the right track of topic by looking at another side of an issue, getting back to the original topic and taking up a new topic	<i>"Enough with the introduction. Lets answer the question"</i>

In the online learning environment, students send messages during the discussion to solve the task. The researcher applied each individual message as a unit of meaning during the content analysis because the script may have more than one theme or idea. There was no limit to the number of units per message. Two researchers discussed each individual message

to assign segments for the discussion scripts and there were a total of 235 segments from 181 messages. Then, the researchers completed 30% of them separately at the first stage. The inter-rater reliability was examined by calculating the Kappa coefficient, which was 0.8471, indicating a high rate of consistency between the two coders (Zheng, 2015). Then, the remaining number of units of meaning was coded to complete the analysis. The 235 segments were coded based on the coding scheme adapted from Gressick and Derry (2010) to achieve the research objectives.

Sequential Analysis Procedure

To investigate on how students develop their leadership roles, this research used a sequential analysis technique. The sequential analysis technique shows the significant sequences of the students' leadership roles during an online collaborative learning activity. It will be able to explain on how students develop leadership roles in an online collaborative learning environment. The coded 235 segments were analyzed through a sequential transition matrix calculation. In this study, a z-score greater than 1.96 were considered as a sequence of a row and a column to be statistically significant ($p < 0.05$) (Berk et al., 1992). Finally, the transition state diagram was illustrated based on the significance gathered.

Result

This section presents the findings to achieve the research objectives

Students' leadership roles in an online collaborative learning environment

The frequencies obtained from the content analysis were used for the descriptives analysis to answer the first research question. Table 4 shows an overall descriptive analysis of leadership roles for all groups involved. From the table, all groups did perform the leadership roles during the online collaborative learning activity. Group 1 demonstrated the most leadership roles with $F = 57$. The KC code ($M = 5.75$, $SD = 0.50$) shows the highest mean and the smallest standard deviation compared to other codes. This indicates that KC is the most demonstrated by the group members and the frequency for each member tends to be close to the mean. While group 5 demonstrated the least leadership roles with $F = 32$. The KC code also shows the most demonstrated leadership roles ($M = 3.50$, $SD = 0.58$). Although the KC code was very few, all group members still contributed to this leadership role.

Table 4

Overall Descriptive Analysis for Students' Leadership Roles in an Online Collaborative Learning Activity

Variables	KC	SI	TC	AA	AD	OM	Total
Group 1:							
Frequency	23	2	8	9	8	7	57
Percentage (%)	40.35	3.51	14.04	15.79	14.04	12.28	100
Mean	5.75	0.50	2.00	2.25	2.00	1.75	
SD	0.50	0.58	2.16	1.5	1.15	1.71	
Group 2:							
Frequency	14	8	6	11	3	8	50
Percentage (%)	24.56	14.04	10.53	19.30	5.26	14.04	100
Mean	3.50	2.00	1.50	2.75	0.75	2.00	
SD	1.29	2.16	1.00	1.71	1.50	2.16	
Group 3:							
Frequency	19	5	3	8	5	11	51
Percentage (%)	33.33	8.77	5.26	14.04	8.77	19.30	100
Mean	4.75	1.25	0.75	2.00	1.25	2.75	
SD	2.87	1.50	0.50	1.15	1.50	2.22	
Group 4:							
Frequency	20	3	1	9	7	5	45
Percentage (%)	35.09	5.26	1.75	15.79	12.28	8.77	100
Mean	5.00	0.75	0.25	2.25	1.75	1.25	
SD	1.41	0.50	0.50	1.50	0.96	1.50	
Group 5:							
Frequency	14	4	1	5	5	3	32
Percentage (%)	24.56	7.02	1.75	8.77	8.77	5.26	100
Mean	3.50	1.00	0.25	1.25	1.25	0.75	
SD	0.58	1.41	0.50	0.50	0.50	1.50	

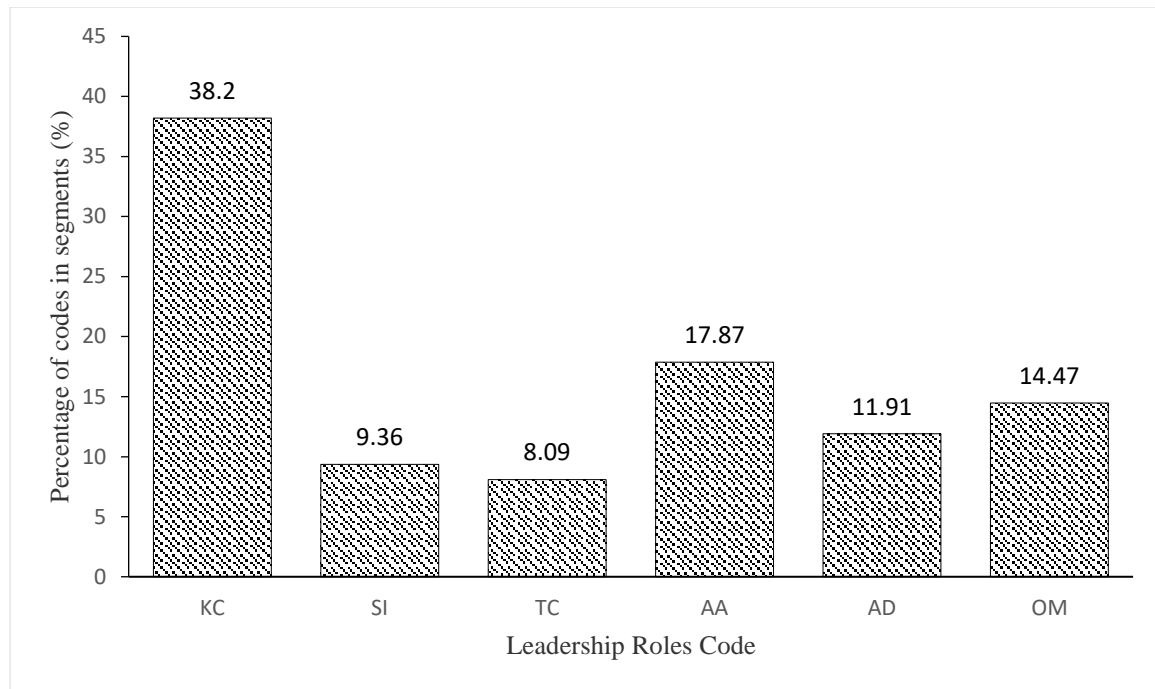


Figure 1: Distributions of students' leadership roles during an online collaborative learning activity

Figure 1 shows the percentages of the coded segment from the content analysis procedure. Generally, the students' leadership roles were evenly distributed even though some students dominated certain leadership roles. The highest percentage is accumulated at the KC code (38.30%) indicating that the KC code was most demonstrated when the students shared any task information. Most of the students shared information to ensure their group could solve the task given. On the other hand, the TC code shows the lowest percentage (8.09%) indicating that students were not aware to ensure their group discussions were on the right track. TC code is more concerned by group leaders compared to group members.

Students' leadership roles development across collaborative groups

This study further investigates how students' leadership roles develop across the group using the sequential analysis technique. Table 5 represents the findings of the z-scores obtained and Table 6 represents the summary of significant sequences at $p < 0.05$, showing that from overall 36 sequences, only eight sequences are significant.

Table 5

Overall value of z-score

z	KC	SI	TC	AA	AD	OM
KC	0.17	0.96	-2.57*	0.87	0.49	-0.41
SI	1.29	-1.55	-0.64	-0.50	-0.31	0.87
TC	0.75	0.18	-1.39	1.56	-1.65	-0.33
AA	-1.20	-0.40	-1.46	0.85	3.01*	-0.55
AD	3.33*	-0.31	-0.90	-1.49	-0.01	-2.09*
OM	-3.57*	0.52	7.43*	-1.55	-2.29*	2.55*

Table 6

The significant sequences of leadership roles

Significant sequence	z-scores
KC → TC	-2.57
AA → AD	3.01
AD → KC	3.33
AD → OM	-2.09
OM → KC	-3.57
OM → TC	7.43
OM → AD	-2.29
OM → OM	2.55

Figure 2 shows the transition state diagram of students' leadership roles during an online collaborative learning activity. It is interesting to note that code OM (Organizational Moves) promotes all leadership roles except for the code AA, Acknowledgement Affective. This indicates that OM is an essential leadership role that is able to promote other leadership roles. It is also shown that OM will induce another OM to be elicited by the students during the discussion indicating that OM is an important leadership role to ensure the team members are able to solve the tasks and achieve the group goals. When the group members monitor the discussions, the other members will respond by demonstrating other leadership roles. Among all the significant sequences, the z-score for OM – TC shows the highest, indicating that when OM role is elicited, the probability of the TC role to follow is not by chance.

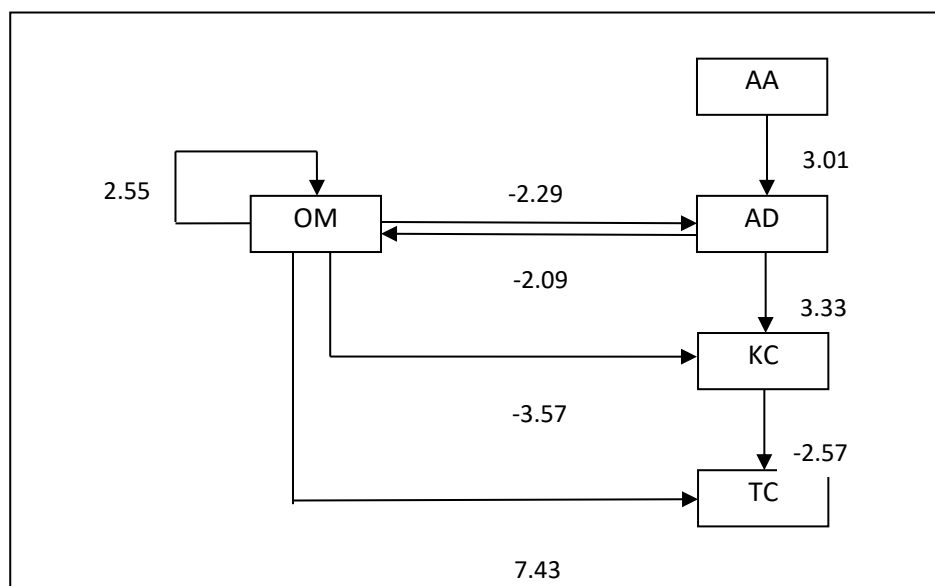


Figure 2: The Transition Diagram of Students' Leadership Roles during an Online Collaborative Learning Activity

Discussion

This study contributes to investigating the leadership roles in an online collaborative learning environment. The content analysis method and sequential analysis technique were used to analyze students' online discussion scripts in order to accomplish the stated objectives.

The Importance of Leadership Roles in an Online Collaborative Learning Environment

It has been observed that discussing in an online collaborative learning environment is able to promote students' leadership roles. Leadership can also be widely distributed among group members and can be performed regardless of whether it is a follower or a leader (Sun et al., 2017). However, not all leadership roles were performed by students, and students preferred to perform leadership roles that could help them accomplish their tasks.

Leadership did emerge and was distributed among group members in online collaborative learning activities (Gressick and Derry, 2010). In this study, each group member had demonstrated leadership roles though they did not demonstrate all the leadership roles. Nevertheless, shared leadership occurs when the leadership is distributed among group members. According to Lee et al., (2015), shared leadership influence knowledge sharing and effect groups' creativity. Thus, it is crucial for group leaders to encourage other group members to bring up shared leadership. When one group member demonstrates leadership roles, other members were influenced to do so. Hence, knowledge sharing between group members is more comprehensive.

Furthermore, developing leadership roles in an online collaborative learning environment can help students develop their problem-solving skills and critical thinking. An online collaborative learning environment allowed students to brainstorm different ideas, defend an argument, reach a consensus and finally solve the task. Students always contribute by sharing their knowledge to ensure their group is able to solve the collaborative task given. Research by (Cheng et al., 2019) proves that shared leadership in a group able to influence students' creativity, problem solving and critical thinking. Thus, when students are able to discuss critically, they can correct the wrong concepts as well as enhance individual learning performance.

The Importance of Organizational Moves in Leadership Roles

This study found that Organizational Moves were able to promote other leadership roles. Organizational Moves is one of the leadership roles in which students plan, organize, and monitor the discussions to achieve the group goal. Thus, when students perform organizational moves, other students will respond with other leadership roles. This might be due to the characteristics of the Online Collaborative Learning Environment that encourage them to solve the task. According to Xie et al (2015), one member can facilitate communications among team members then another member may mediate to resolve conflicts. It can be said that organizational moves are the leadership moves that can be broken down into more specific leadership roles in helping students solve the tasks. Hence, it is essential to encourage students to perform organizational moves to trigger them to perform other leadership roles.

Limitation, Suggestions and Conclusions

Trying to measure students' leadership roles is challenging because students were interacting in different places and their interactions were only through computers. As a researcher, we need to consider their network ability because they might be a factor in being less active due to network problems. Thus, it is better if we can give them more time to develop their relationship among members as well as in leadership roles. Therefore, it is worth extending further research by providing a few more tasks and a few more weeks to observe their leadership roles over time.

This study focused on students' leadership roles in an online collaborative learning environment, utilizing the content analysis method on students' discussion scripts. Leadership roles have been discussed in the current literature about leadership emergence, and the study shows that leadership can emerge even without formal authority. In a collaborative learning group, emergence leadership is reflected in each member's leadership move or role to help the group accomplish the goals (Sun et al., 2017). Examples of leadership moves are encouraging members to contribute, proposing ideas to accomplish their tasks and ensuring members are on the right track of the topic discussion. When the team members emerge as leaders in an online collaborative learning environment, they are expected to facilitate team functioning and team effectiveness (Gilson et al., 2015; Hoch & Dulebohn, 2017). However, the research on the extent of how leadership roles can emerge in online collaborative learning is limited. Therefore, this study shows a difference by creating an online collaborative learning environment to encourage students to demonstrate leadership roles.

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