Gender-Based Multigroup Analysis on the Mediating Role of Online Learning Self Efficacy to The Influence of Academic Interaction to Student Engagement

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Abstract. All schools and Universities in Indonesia have to implement online learning due to covid19 issue. This article examines gender as group moderator to the mediating role of online learning self efficacy (OLSE) to the influence of academic interaction to student engagement in e-learning system in Indonesia. This uses higher order construct of academic interaction comprising student-student interaction (SSI) and student-lecturer interaction (SLI), and also higher order construct of student engagement comprising agentic (AE), emotional (EE), cognitive (CE), and behavioral (BE) engagement. 378 students from several online classes participated in this research. This research found that academic interaction has positive influence to student engagement, academic interaction has positive influence to students’ online learning self efficacy, and students’ online learning self efficacy has positive influence to student engagement. This research also found that online learning self efficacy partially mediates the influence of academic interaction to student engagement and gender moderates all relationships in the research model.

Keywords: student engagement, online learning self efficacy, academic interaction.

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Introduction

Since April 2020, Indonesia’s education method should be changed to online learning due to covid19 issue (Jakarta Globe, 2020). No schools or universities is allowed to carry out conventional (classroom) learning due to physical distancing that must be kept among students. This condition forces Indonesian schools and universities to change their learning method to e-learning. However, this new method of learning is new to most university students in Indonesia, so many issues arise in this new education method implementation.

Students’ engagement is very important to the effectiveness of learning process, especially to e-learning (Redmond, Abawi, Brown, & Henderson, 2018; Reeve & Tseng, 2011). Therefore, research about student engagement to this new method of learning is very interesting to be conducted. There have been many e-learning researches focused on student engagement as the dependent variable, exploring some antecedents to students engagement in e-learning (Bond, Buntins, Bedenlier, Zawacki-Richter, & Kerres, 2020; Chakraborty & Muyia Nafukho, 2014; Chen, Lambert, & Guirdry, 2010; Gray & DiLoreto, 2016; Henrie, Halverson, & Graham, 2015; Kucuk & Richardson, 2019; Reeve & Tseng, 2011; Zimmerman, 2000), however none of them has ever studied massive e-learning process like what is happening in this covid19 pandemic before. All of those studies have setting e-learning as voluntary study process, not mandatory study process.

This research examines the influence of academic interaction to student engagement in E-learning in a mandatory study process due to internationally wide pandemic setting. This research also contributes in examining online learning self efficacy as the mediating variable between academic interaction and student engagement. Moreover, this research will examine gender as moderating variable in the relationship among academic interaction, online learning self efficacy, and student engagement.

Theory And Hypothesis Development

Student engagement is vital to any method of learning (Reeve & Tseng, 2011). When students are engaged, they tend to give extra effort to their study process. When this happens, the effectiveness of e-learning process will improve. There are four kinds of engagement: agentic (AE), emotional (EE), cognitive (CE), and behavioral (BE) (Kucuk & Richardson, 2019). Agentic engagement is students’ constructive contribution into the flow of the instruction they receive (Reeve & Tseng, 2011). Agentic engagement in e-learning has to do with students’ active participation in e-learning classes (Reeve & Tseng, 2011). When student agenticly engaged, they will pay attention to class, ask questions, and do anything to get the best of their classes. Emotional engagement relates with student enjoyment, curiosity, and interest in their e-learning classes. Cognitive engagement has to do with students effort to understand their e-learning classes. When cognitively engaged, students used to relate the knowledge they get with their prior
knowledge, trying to better understand the class material, go over what has been studied, etc. Behavioral engagement deals with students' behavior in online class such as listening carefully, pay attention to class, work hard in class, etc.

Students are social creatures that need social interdependence relationship among others. In their learning class, this interdependence relationship increases since students have a common goal: passing the class (Cottrell, Neuberg, & Li, 2007). Having intensive social interactions in their environment, will make students feel and work better, so they will be able to join their class well. There are two main social interactions in online classes that students use to get their knowledge: interaction with lecturer and also interaction with other students. We define these two kinds of interaction with academic interaction. Most research found that lecturer-student interaction and student-student interaction are positively correlated (Gray & DiLoreto, 2016; Kucuk & Richardson, 2019). This may be due to the nature of the students, when they are actively interacted with their friends, meaning that they have a good social skill, they will also build better interaction with their lecturer.

Interaction is essential in any learning. In case of e-learning, previous researches defines several forms of interaction: student-student interaction, student-lecturer interaction, student content interaction (Alqurashi, 2018; Kuo, Walker, Schroder, & Belland, 2014). This research focuses on the social aspect of interaction comprising student lecturer interaction and student student interaction. Student-student interaction is interaction among students in e-learning class. The more intensive the interaction, student will be able to do their assignments well, so they will be more engaged to their e-learning class.

The second type of interaction is student lecturer interaction. This kind of interaction happens when students are intensively interact with their lecturer in the e-learning process. Interaction may use several channels such as instant messaging in e-learning process using sms, whatsapp message, and also video call. When there is a highly intensive interaction between student and lecturer, this might increase students engagement.

When there is a high interaction among students and also a high interaction between lecturer and students, student will be more engage in the online learning. Higher intensity of academic interaction will motivate student to study better in the online learning system, creating a higher engagement. When the interaction is good, students will have greater intention to use the e-learning system. Interaction will influence motivation to use e-learning (creating intention to use e-learning system) since interaction enable someone who has trouble in their e-learning study might get help from their friends or instructor (Rodrigues, Almeida, Figueiredo, & Lopes, 2019). So the higher intensity of the academic interaction, students’ engagement to e-learning may increase. Based on previous description, hypothesis 1 is developed as follows:

H1: Academic interaction positively influences student engagement.

This research argues that academic interaction will create higher self efficacy which will then influence students’ engagement. Self efficacy is very important especially
for a challenging learning environment (Shen, Cho, Tsai, & Marra, 2013). In case of e-learning, students’ self efficacy is referred to online learning self efficacy. Shen et al. (2013) defined that there are five factors in online learning self efficacy. This research will focus on one dimension (self efficacy to complete an online course) since this dimension is the most general dimension that applies to many setting in e-learning. When student are actively interacting with their fellow classmates and their lecturer, their confidence in joining the e-learning class will be higher. Based on previous description, hypothesis 2 is developed as follows:

H2: Academic interaction positively influences students’ online learning self efficacy.

This research argues that students’ online self efficacy (OLSE) will influence students engagement. OLSE is students confidence that they can do their e-learning classes well (Shen et al., 2013). When there is a high OLSE, student will be motivated to do better in their online class resulting in higher student engagement in e-learning. Based on previous description, hypothesis 3 is developed as follows:

H3: students’ online learning self efficacy positively influences student engagement.

However, this relation might not be always direct. There may be also indirect effect of academic interaction to students engagement. This research explores online learning self efficacy as the mediating variable between academic interaction and students engagement. Academic interaction will have positive influence to online learning self efficacy, which will then influence student engagement. Having intensive academic interaction with their friends or lecturer will increase students’ self efficacy to do their e-learning classes. Increasing self efficacy will also make students have higher intention to do their best in their e-learning classes, indicating an increase in student engagement. Based on previous description, hypothesis 4 is developed as follows:

H4: Online learning self efficacy mediates the influence of academic interaction to student engagement.

Male and female used to have different characteristics (Del Giudice, 2015; Feingold, 1994; Wille, Wiernik, Vergauwe, Vrijdags, & Trbovic, 2018). At work, female tend to be more passive than male, resulting in they have less motivation to pursue high growth in their career (Wille et al., 2018). Meta analysis by Feingold (1994) also explores that male and female have different orientation toward work. Even though those arguments are at working places, we argue that this might apply to academic environment as well. Therefore, we define the fifth hypothesis as follows:

H5: Gender will moderate all relationship in this research model.
Research Method

Online learning self efficacy (self efficacy to complete online learning) is someone’s confidence that he/she can complete the online learning. We measure this variable with items developed by Shen et al. (2013). Sample item for this measure is “I believe I will be able to complete an online course with a good grade”.

Student engagement is a student attachment to the e-learning system. This may include agentic engagement, behavioral engagement, emotional engagement, and cognitive engagement. We measure this variable by items developed by Reeve and Tseng (2011). Sample item to measure agentic engagement is “During class, I ask questions”. Sample item to measure behavioral engagement is “I listen carefully in class”. Sample item to measure emotional engagement is “I enjoy learning new things in class”. Sample item to measure cognitive engagement is “When doing schoolwork, I try to relate what I’m learning to what I already know”.

Academic interaction may include students’ interaction with his/her fellow students and instructor. We measure this variable with items developed by Kuo et al. (2014). Sample item to measure student-student interaction is “Overall, I had numerous interactions related to the course content with fellow students”. Sample item to measure student-instructor interaction is “I had numerous interactions with the instructor during the class.”

Participants responses were acquired through google form. Valid participants are students who have completed one semester of their e-learning class. Questionnaire items validity was examined using exploratory factor analysis with varimax rotation. Reliability testing was conducted using Cronbach’s Alpha. Structural equation modelling with composite score using AMOS program for higher construct was used to test research hypothesis. Stats tools package developed by James Gaskin was used to test the moderation effect.

Result and Discussion

Since the of population is unknown, this research use non probability sampling with purposive sampling method resulting in 378 students from several online classes participated in this research. Table 1 below shows the demographic characteristics of the research participants.

| Table 1 Participants Characteristics | Σ    | %   | Σ    | %   |
|--------------------------------------|------|-----|------|-----|
| Gender                               |      |     |      |     |
| Male                                 | 162  | 43  | 18   | 5   |
| Female                               | 216  | 57  | 19   | 102 | 27 |
|                                      | 20   | 94  | 32   | 9   |
| Semester                             | 41   | 11  | 21   | 32  | 9  |

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Exploratory factor analysis was conducted to test instrument items validity. The factor analysis use eigen value >1 as determinant of the number factor explored. Varimax rotation was chosen to enable better grouping among items. The KMO measure as a result of factor analysis is 0.953 above minimum limit of 0.7 indicating that the sample is sufficient for the factor analysis. Table 2 shows factor loadings that show a high convergent and discriminant validity. When a certain item has no factor loading, it means that the factor loading is less than 0.5 indicating that the items are not valid and will not proceed for further analysis.

Table 2 Factor Analysis Result

|       | 1   | 2   | 3   | 4   | 5   | 6   | 7   |
|-------|-----|-----|-----|-----|-----|-----|-----|
| OLSE1 | .728|     |     |     |     |     |     |
| OLSE2 | .631|     |     |     |     |     |     |
| OLSE3 | .558|     |     |     |     |     |     |
| OLSE4 | .705|     |     |     |     |     |     |
| OLSE5 | .644|     |     |     |     |     | .634|
| OLSE6 | .682|     |     |     |     |     | .522|
| OLSE7 | .616|     |     |     |     |     | .707|
| OLSE8 | .694|     |     |     |     |     | .554|
| LII2  |     | .622|     |     |     |     |     |
| LII3  | .699|     | .814|     |     |     |     |
| LII4  |     | .730|     | .730|     |     |     |
| LII5  | .577|     | .607|     | .607|     |     |
| LII6  |     |     | .732|     | .732|     |     |
| LII7  |     |     |     |     |     |     |     |
|       |     |     |     |     |     |     |     |

Wahana: Jurnal Ekonomi, Manajemen dan Akuntansi; Agustus 2022 [206]
This research used AMOS based path analysis with composite scores which involves calculation of lambdas and epsilons for reaching better model fit to test the hypothesis. This method enables reduction of number of parameters to be estimated through using factor score weight to average items for a certain variable, so it will reduce the number of free parameters which will increase the goodness of fit. Below is the AMOS figure for the analysis:
Using structural equation modelling requires model fit test. Hypothesis testing is allowed to be conducted when fit values requirements are fulfilled indicated that the model is supported by research data. The fit values in shown in table 3 below. From the table 3, all the fit value in the modified model are fulfilled. So, it is concluded that the model is supported by the data, and the hypothesis testing can be executed.

### Table 3. Model Fit Evaluation

| Goodness-of fit Indexes | Criteria             | MODELS FIT          |
|------------------------|----------------------|---------------------|
|                        |                      | Calculated result   | Model Evaluation |
| Chi Square             | Small, not significant 1-2 over fit, 2-5 liberal limit | 22,7 P<0,01 | Good fit |
| CMIN/DF                |                      | 2,275               | Good fit         |
| GFI                    | > 0,9                | 0,985               | Good fit         |
| AGFI                   | > 0,8                | 0,959               | Good fit         |
| TLI                    | > 0,9                | 0,983               | Good fit         |
| CFI                    | > 0,9                | 0,992               | Good fit         |
| RMSEA                  | < 0,1                | 0,054               | Good fit         |

Table 4 shows the hypothesis testing report. The first hypothesis “academic interaction has positive influence to student engagement” was supported ($\beta=0,501$, $p<0,01$). The higher intensity of academic interaction including student-student interaction
and student-instructor interaction will increase student engagement to e-learning class. Interaction will enable students who have difficulties in learning to get support from their friends or lecturer, so their motivation to learn can be maintained. Then students motivation are maintained, they will be willing to do their best in their e-learning class. Therefore, the higher the interaction among students and between students and lecturer, student engagement will increase.

The second hypothesis “academic interaction has positive influence to students’ online learning self efficacy” was supported (β=0.817, p < 0.01). Academic interaction includes interaction between students and lecturers and among students. When there is good interaction between lecturer and student, lecturer will be able to give better assistance for student to study. Therefore students can ask for lecturer’s help when they have difficulty in their study. Good interaction among students will also enable students to help one to another. Being supported and get help from lecturer and other students will increase students’ believe that they will be able to finish the study, therefore enhancing students’ online learning self efficacy.

The third hypothesis “students’ online learning self efficacy has positive influence to student engagement” was supported (β=0.390, p < 0.01). When students have confidence that they will able to finish the class well or to do assignments in class, they will be willing to give their extra effort to their online classes. In other words, self efficacy will strengthen students engagement. It means when students have a high level of self efficacy, they will be more engage in their online class.

The fourth hypothesis “Online learning self efficacy mediates the influence of academic interaction to student engagement” was tested comparing standardized indirect effect and standardized direct effect of academic interaction to student engagement. Standardized indirect effect from academic interaction to student engagement is 0.318. Standardized direct effect from academic interaction to student engagement is 0.501. Since the standardized indirect effect value is less than standardized direct effect, we can not find support for hypothesis 4 for full mediation. However, since all relationship among all variables are significant, we can conclude partial mediation exists in the

| Hypothesis | Estimate | S.E. | C.R. | P     | Label               |
|------------|----------|------|------|-------|---------------------|
| H1: Academic interaction positively influences student engagement. | 0.501 | 0.064 | 4.838 | 0.0001 | Hypothesis supported |
| H2: Academic interaction positively influences students’ online learning self efficacy. | 0.817 | 0.053 | 14.934 | 0.0001 | Hypothesis supported |
| H3: students’ online learning self efficacy positively influences student engagement. | 0.390 | 0.096 | 4.243 | 0.0001 | Hypothesis supported |

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influence of academic interaction to student engagement through online learning self efficacy.

The fifth hypothesis “gender will moderate all relationship in this research model” was tested using specific program. Stats Tools Package developed by James Gaskin (http://statwiki.kolobkreations.com) was used to examine the differences between male and female in three influences exist in the research model. This analysis is basically a multigroup analysis comparing all influences in the research model. The z score calculation in table 6 revealed the result. This table shows that gender moderates all influences exist in the model. The influence of academic interaction to student engagement was stronger in female ($\beta=0.958, p<0.01$) than male ($\beta=0.76, p<0.01$). The difference was significant indicated by the z score of 1.7. The influence of academic interaction to students’ online learning self efficacy engagement was stronger in male ($\beta=0.337, p<0.01$) and not significant in female ($\beta=0.128, p>0.01$). The difference was significant indicated by the z score of 1.87. The influence of students’ online learning self efficacy to student engagement was female ($\beta=0.417, p<0.01$) than in male ($\beta=0.195, p<0.01$). The difference was significant indicated by the z score of 1.69.

| Table 6. Gender Based Comparison |
|----------------------------------|
| MALE                             | FEMALE                        | z-score |
| Estimate | P     | Estimate | P     |          |
| H1: Academic interaction has positive influence to student engagement. | 0.76 | <0.01 | 0.958 | <0.01 | 1.7* |
| H2: Academic interaction has positive influence to students’ online learning self efficacy. | 0.337 | <0.01 | 0.128 | 0.127 | -1.87* |
| H3: students’ online learning self efficacy has positive influence to student engagement. | 0.195 | <0.01 | 0.417 | <0.01 | 1.69* |

*indicates significant difference.

Conclusion

This article the relationship among academic interaction, student engagement, students’ online learning self efficacy with gender as moderating variable. 378 students who have finished their e-learning class from several online classes participated in this research. This research found that academic interaction has positive influence to student engagement, Academic interaction has positive influence to students’ online learning self efficacy, and students’ online learning self efficacy has positive influence to student engagement. This research also found that online learning self efficacy partially mediates the influence of academic to student engagement and gender moderates all relationships in the research model.
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