



Perceived Creativity Fostering Teacher Behavior and Student Engagement in Statistic Course: Academic Self Efficacy as Mediator

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Abstract: Students avoid statistics class because they believe it is tough, however, the topic will be easier to understand if they participate in the learning process. The purpose of this research is to discover the relationship between perceived creativity fostering teacher behavior and student engagement, as well as the role of academic self-efficacy as a mediator in statistics courses for undergraduate psychology students. This is a quantitative study that uses mediation analysis. The data was collected using the University Student Engagement Inventory, the Perceived Creativity Fostering Teacher Index, and the College Academic Self-Efficacy Scale, with 533 participants. The participant criteria were Bachelor of Psychology students who had completed and passed the Statistics course no more than three semesters before filling out the survey questionnaire. The findings reveal that the perceived creativity fostering teacher behavior has an effect on SE through the academic self-efficacy variable. However, because perceived creativity fostering teacher behavior can directly influence self-efficacy, there is a partial mediation effect between variables. This study implies that one way to improve students' involvement in statistics learning is to increase perceived creativity fostering teacher behavior and self-efficacy.

Keywords: self-efficacy, creativity fostering behavior, student engagement

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INTRODUCTION

Student engagement is an important research issue (Ansong et al., 2017; Chong et al., 2018; Coates, 2010; Liu et al., 2017) since it influences the quality of an educational experience. This concept departs from the assumption that how students participate in activities that aim to support the learning process itself (Coates, 2005), namely participating in activities that enrich their knowledge and experience, influences the learning process. This activity is significant since every action performed by students influences how they develop knowledge, making the learning process more productive, effective, and maximal (Coates, 2005; Qonita et al., 2021). There are various immediate benefits to student engagement, such as improved learning attitudes, values, and student behavior in the classroom. Furthermore, there are long-term benefits such as higher academic achievement, self-esteem, and social conduct of students in general (Widiasani, 2012). These multiple benefits make student engagement a topic that is frequently discussed, particularly the large effect of student engagement on learning outcomes, including success in finishing studies (Redmond et al., 2018).

Students who are engaged in the learning process will exhibit characteristics such as asking clarifying questions when something is unclear, taking assignments seriously, and participating actively in conversations and interactions with teachers and classmates. On the contrary, when students are not engaged in the learning and lecture processes, it is possible that they will not complete lectures optimally (Farrell & Brunton, 2020; Gunuc & Kuzu, 2015). Student engagement is defined as the active participation of students in the learning process (Krause & Coates, 2008). However, because students are not necessarily actively engaged in all the learning in which they participate, this learning engagement is contextual and cannot be generalized. According to Wong and Liem (2022), ambiguity is commonly generated by a lack of specification because involvement is heavily dependent on the item being occupied, such as a study program, learning activities, or level of education. The shapes, meanings, and degrees of involvement among pupils fluctuate due to the variety of these items (Wong & Liem, 2022). This means that even if students are actively engaged in a lesson, it is not certain that they will also be actively engaged in other learning.

One example is mathematics learning, where many students are still not actively engaged in class and attract researchers and policymakers to find ways to boost student's engagement in mathematics (Cooper, 2014; Kong et al., 2003; Lawson & Lawson, 2013; Sun et al., 2020). Statistics is one of the disciplines closely associated with mathematics at the Faculty of Psychology, where it is the main subject that all students must study. Statistics is a required subject because of its importance in conducting psychological research (Adiyo,

2010). Various views evolved from students towards this subject during the learning process, because some students found statistics interesting, while others found this course uninteresting. According to some students, mathematics is a material that produces worry and fear (Firmansyah, 2017). As a result, statistics courses relating to mathematics and numbers are regarded as the most difficult disciplines to fear and avoid (Ulpah, 2009). Statistics courses will be easier to understand if students participate in class, help each other understand the content, and complete assignments correctly (Alsa, 2011).

Because of the importance of student engagement, many studies attempt to investigate and characterize the aspects that can increase engagement (DeVito, 2016). The use of the flipped classroom learning method (Gilboy et al., 2015), web-based learning methods (Chen et al., 2010), classroom designs (Rands & Gansemer-Topf, 2017), creative learning environment (Jankowska & Atlay, 2008), and creative learning approaches (Januchowski-Hartley et al., 2018) are all characteristics that influence student engagement externally. However, external factors such as the environment, do not always have a direct impact on how students learn, but they are influenced by how students perceive them (Petegem et al., 2007). Because student perception is an internal component that influences student engagement, this study will focus specifically on how internal factors influence student engagement.

Academic emotion (Kahu et al., 2015), adaptability (Castro et al., 2017; Zhang et al., 2021), gender (Kinzie et al., 2007), and perceived teacher behavior (Zepke et al., 2014) are all characteristics that influence student participation internally. How students perceive their teacher's behavior is crucial since Zepke et al. (2014) discover a gap between student views and the behavior required by teachers to improve learning engagement. Furthermore, because the judgment or giving of meaning will be provided according to their particular perspective (Wahyuni & Muzdalifah, 2010), each student will have a different perception. As a result, various research has been conducted to ascertain the impact of student views on teacher behavior and learner engagement (Bockmier-Sommers et al., 2017; Havik & Westergard, 2020; Klem & Connell, 2004; Tao et al., 2022). According to Widyastuti et al. (2022), necessary instructor behavior, particularly in learning statistics, includes posing challenges that might sharpen students' thinking, allowing students to make mistakes, and mentoring students so they can find answers on their own. It is intended to encourage pupils to become more involved in their learning. According to Soh (2000), this behavior is part of Creativity Fostering Teacher Behavior (CFTB).

Cropley (1997) defines CFTB as "a consistent effort by lecturers to encourage students to use their knowledge to think creatively." Creativity encourages pupils to produce diverse ideas to help tackle statistics problems, allowing them to find fresh, different, and unconventional answers. As a result, students will be more engaged in the learning process by addressing issues in novel ways (Grégoire, 2016). However, the lecturer's behavior will have a greater impact if the students see it as such (Petegem et al., 2007). As a result, when students believe that their lecturers encourage them to be creative, they will devote more time and effort to understanding statistical information. According to (Regier & Savic, 2020), teachers' attempts to foster student creativity can boost academic self-efficacy in mathematics sessions. This study is founded on the idea that mathematics, as a science related to numbers, necessitates the ability to find new or different answers from those found previously.

Students require creativity to develop their abilities and see challenges in new ways and discover solutions to them. To accomplish this, teachers must assist students in developing various definitions, attempting to solve problems, learning from numerous instances, and obtaining diverse solutions (Fried, 2006). With the many possibilities provided by the teacher, students can gain confidence in their abilities to solve problems in class, particularly those linked to classes such as mathematics and statistics (Regier & Savic, 2020). Academic self-efficacy refers to an individual's assessment of his or her abilities in an educational situation where individuals believe they are capable of getting good academic results (Elias & Macdonald, 2007). This indicates that when people believe they can perform well and achieve good academic results, their academic engagement increases. Academic self-efficacy is the most powerful predictor of student involvement in learning. According to Chang and Chien (2015)'s meta-analytic analysis, academic self-efficacy is the strongest predictor of student involvement. Based on the explanation above, this study explores the direct impact of P-CFTB on student engagement. This study also analyzes the role of academic self-efficacy in mediating the relationship between P-CFTB and student engagement.

METHODS

A quantitative research design was used in this study, with data collected using a convenience sample technique (Gravetter & Forzano, 2016). The participant criterion was Bachelor of Psychology students who had completed and passed the Statistics course no more than three semesters before filling out the survey questionnaire. This was done with memory experience in mind. With the assistance of instructors, the BEM of the Faculty of Psychology, and the Psychology Student Association from several tertiary institutions,

questionnaires were disseminated both online and offline. The total number of participants in this study was 671. However, only 533 persons met the respondent's requirements. The majority of respondents were between the ages of 18 and 20 (86.87%), female (81.61%), third-semester students (60.41%), and attended state universities (61.73%). Table 1 describes the demographic information of the respondents.

Table 1. Demographic Data of Participants (N= 533)

Demography		n	%
Sex	Female	435	81.61
	Male	98	18.39
Age (year)	18 - 20	463	86.87
	21 - 23	61	11.44
	>23	9	1.69
Semester	3	322	60.41
	4	3	0.56
	5	183	34.33
	7	21	3.94
	8	1	0.19
	>8	3	0.57
University Type	Public/ State	329	61.73
	Private	204	38.27

The University Student Engagement Inventory (USEI) developed by [Maroco et al. \(2016\)](#), the Teacher Creativity Index (CFTIndex) developed by [Soh \(2000\)](#), and the Indonesian version of the Higher Education Academic Self-Efficacy Scale (CASES) developed by [Ifdil et al. \(2019\)](#) were used in this study. These three instruments were selected because they were theoretically appropriate and usable by the intended respondents. The USEI and CFTIndex instruments, however, were in English, therefore the researchers modified them to Indonesian. An adaptation was also developed to the CFTIndex so that it can be used to assess lecturer creative fostering from a student perspective, called the Perceived CFTIndex (P-CFTIndex). The adaptation technique outlined by [Beaton et al. \(2000\)](#) was followed, which included translation, synthesis, back translation, expert committee evaluation (two experts for each instrument), and pre-testing.

Items in each instrument were measured by using a 6-point Likert scale, ranging from 1 (never) to 6 (always). Each measuring tool was validated and reliable. The test findings revealed that all measuring instruments were valid because they met the goodness of fit criteria, which were CFI > 0.90, RMSEA 0.08, and SRMR 0.08 ([Hu & Bentler, 1999](#); [Schermelleh-Engel et al., 2003](#)). The results of the reliability tests demonstrate that each measuring instrument has good reliability, $\alpha < 0.8$ ([Kaplan & Sacuzzo, 2017](#)). The USEI instrument had a reliability $\alpha = 0.862$. The CFA results reveal that the USEI measuring tool is valid with a chi-square value = 3.72 ($X^2 = 320.355$; $df = 86$, $p < 0.001$), CFI = 0.905, RMSEA = 0.072, and SRMR = 0.067. The P-CFTIndex has a reliability $\alpha = 0.944$ indicating that the instrument was reliable. The CFA results suggested that the P-CFTIndex measuring instrument was a valid measurement tool with a chi-square value = 3.25 ($X^2 = 936,660$; $df = 288$, $p < 0.001$), CFI = 0.904, RMSEA = 0.065, and SRMR = 0.047. The reliability of CASES was $\alpha = 0.914$. The CFA results suggested that the CASES assessment tool was valid with a chi-square value = 2.36 ($X^2 = 1092.270$; $df = 462$, $p < 0.001$), CFI = 0.901, RMSEA = 0.051, and SRMR = 0.056. The research procedures and instruments were carefully evaluated and approved by the Faculty of Psychology's ethics committee under the number 136/FPsi.Ethics Committee/PDP.04.00/2022.

RESULT AND DISCUSSION

To determine the correlation between the variables listed in Table 2, the Pearson correlation test was used. According to the findings, all variables demonstrated a correlational relationship. The correlations between P-CFTB and SE ($r = 0.593$, $p < .001$) and P-CFTB and ASE ($r = 0.535$, $p < .001$) demonstrated a moderate correlation. The correlation between the ASE and SE ($r = 0.742$, $p < .001$) demonstrated a strong correlation.

Table 2. Pearson's correlations

Variable	1	2	3
1. SE			
2. P-CFTB	0.593***		
3. ASE	0.742***	0.535***	

* $p < .05$, ** $p < .01$, *** $p < .001$

According to Figure 1, P-CFTB has significant effects on ASE ($\beta_a = 0.590$, $p < .001$), ASE has a significant effect on SE ($\beta_b = 0.272$, $p.001$), and P-CFTB has a significant effect on SE ($\beta_c = 0.138$, $p.001$). The mediation analysis test findings also revealed that P-CFTB had a significant effect on SE through ASE ($\beta = 0.161$, 95% CI [0.133, 0.188]). These findings suggest a partially mediating effect in which the effect of P-CFTB on SE through ASE is stronger than the direct effect. Because the independent factors have a direct influence on the dependent variable but also have an effect when mediated by the mediator variable, this study can be said to have a partial mediating effect. It means that the P-CFTB variable has a direct influence on the SE variable, but this influence is stronger if it is mediated by the ASE variable.

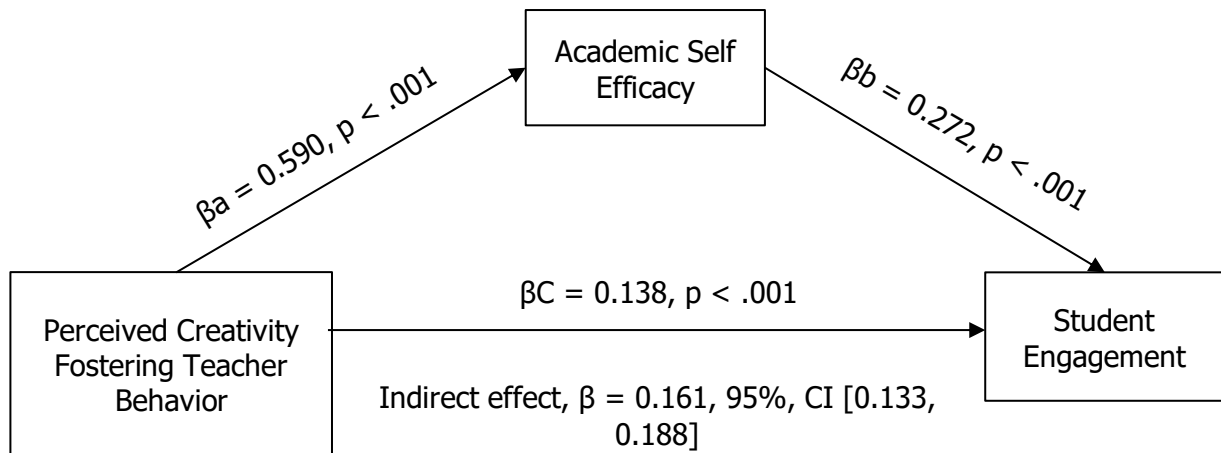


Figure 1. Mediation analysis of Academic Self Efficacy in the relationship between Perceived Creativity Fostering Teacher Behavior and Student Engagement

According to research, students' perceptions of how teachers foster student creativity influence their engagement in statistics classes at the psychology faculty. The findings of this study provide an explanation for the first research question, which is whether the P-CFTB has a direct effect on SE. The findings of this study are consistent with the findings of [Setiamurti et al. \(2023\)](#), who found that a perspective on CFTB can boost learner engagement. Students' perceptions of how the teacher's fostering of creativity influences how they engage in the learning process because the development of students' creative potential must begin with their teacher. Teachers can provide opportunities for pupils to develop their original ideas, make mistakes, and solve difficulties ([Grégoire, 2016](#)). This means that students will be more interested in engaging with the learning process if they believe the teacher provides them the opportunity to attempt, to be incorrect, and to solve their own difficulties.

Furthermore, in number-related learning processes such as mathematics and statistics, there may be multiple paths to an answer. When a teacher encourages a creative environment, pupils have the opportunity to demonstrate to themselves that they can solve challenges that they believe are tough. As a result, students who previously thought statistics classes were tough and dull can become more engaged. This study's findings are also compatible with [Golder's \(2018\)](#) research on student perceptions of teacher behavior. It shows that how students perceive their teachers has a significant impact on their attitudes toward learning. Students will feel more comfortable interacting in class if they believe their teacher has good communication abilities, is ethical in his career, employs suitable teaching methods, and manages the classroom well. This contact increases the activity and effectiveness of the learning process ([Golder, 2018](#)). It can be said that how students perceive their teacher is an important factor because it can affect the effectiveness of learning.

This study also discovers that ASE is conducted as a moderator in the association between P-CFTB and SE. This study's findings address the second research question, which is whether ASE mediates the link between P-CFTB and SE. This demonstrates that when students believe their teacher teaches in a way that fosters creativity, student self-efficacy rises. According to [Regier and Savic \(2020\)](#), teacher efforts to increase student creativity can increase academic self-efficacy. This means that allowing students to develop original thinking and problem-solving skills in a new and different way will increase their confidence that they are capable of solving problems or taking courses that they believe are difficult. This self-assurance might subsequently improve how they engage in the learning process. This is consistent with prior research, which found that self-efficacy is the best predictor of student engagement ([Helsa & Lidiawati, 2021](#); [Linnenbrink & Pintrich, 2003](#); [Pramisjayanti & Khoirunnisa, 2022](#)). This is because pupils who believe they can reach a goal are more engaged in the classroom learning process.

This belief is also influenced by a variety of factors, including how lecturers establish a learning environment and how students perceive it. When students believe that their teacher is allowing them to think,

try, and find their own way to reach their goals through trial and error, they grow more confident in their ability to solve the issues they meet in that course (Regier & Savic, 2020). When students first believe that statistics classes are difficult, dull, and should be avoided, but the lecturer provides an opportunity for them to explore alternative approaches to problem-solving, the idea that they are capable develops. According to research findings, self-efficacy plays a role in improving the relationship between P-CFTB and SE. This means that P-CFTB has an impact on SE, where students perceive that their lecturers provide opportunities for them to be more creative, so they are more involved. However, with the ASE, the effect of P-CFTB on SE becomes higher, implying that, rather than engaging students, the possibilities provided by lecturers for students to be creative might raise self-efficacy, giving them a boost and making them more engaged.

However, this study has several limitations because it solely used a questionnaire tool to collect data. Even though, in practice, the researcher felt that creativity was insufficient to be assessed solely through a questionnaire, the results of this study suggest that it would be interesting to conduct interviews with students as a form of fostering creativity carried out by lecturers, whether students have similar perceptions or not. Then it is fascinating to do observations in class to determine if the teacher's method of promoting creativity is consistent with what pupils perceive. This could be a research topic for the future.

CONCLUSION

The study's findings support the following hypotheses to determine whether P-CFTB has a direct impact on student engagement and whether academic self-efficacy mediates the relationship between P-CFTB and student engagement. The findings indicate that the P-CFTB has a direct impact on student engagement. According to the mediation test, academic self-efficacy mediates the relationship between P-CFTB and student involvement. Thus, there is a partial mediation effect between the three factors. This research implies that pupils who perceive their teachers foster creativity in the classroom will have higher efficacy in their abilities. Students who believe they can answer statistical problems will devote more time and effort to learning statistical information. The findings also suggest that future research on perceived creativity fostering teacher behavior in students can develop data collection methods to learn more about the suitability of teachers' fostering creativity behavior and how students perceive this behavior. Furthermore, it can help in better understanding the variances and similarities in student perceptions of fostering creativity.

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