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Relations between Students' Perceptions of Transactional Distance and Self-Efficacy in Online Peer Learning

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Abstract: This study aimed to explore the relationship between students' perceptions of transactional distance and self-efficacy within an online peer learning environment. The research involved 240 higher education students who completed three tasks over three weeks. The first task required students to write an argumentative essay. In the second week, students provided feedback on their peers' essays. In the third week, students revised their essays based on the received feedback from peers and completed two questionnaires on transactional distance and self-efficacy. The study showed that there is a significant relationship between students' perceptions of transactional distance and their self-efficacy in online peer learning. The findings indicated that students' perceptions of transactional distance had an impact on their self-efficacy in online peer learning. The findings of this research highlight the necessity of considering how students' perceptions of transactional distance contribute to their self-efficacy in online peer learning, emphasizing its influential role in the learning process.

Keywords: Online Peer Learning, Self-Efficacy, Transactional Distance

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Introduction

In recent times, online learning has become an essential component of the education system, especially following the Covid-19 pandemic (Banihashem et al., 2023a; van Puffelen et al., 2022). Online learning has demonstrated significant potential in delivering adaptable and accessible education (Badali et al., 2022;

Banihashem et al., 2023b; Hasanzadeh et al., 2016; Khalifeh et al., 2020; Taghizade et al., 2020). One of the learning strategies in online learning is online peer learning (Kerman et al., 2023; Latifi et al., 2021; Noroozi et al., 2023).

Online peer learning is an increasingly popular educational approach that allows students to engage in collaborative learning activities in an online environment (Akhteh et al., 2022; Noroozi, et al., 2016, 2022). While this approach offers many benefits, such as improving argumentative essay writing (Latifi et al., 2023; Taghizadeh Kerman et al., 2022), learning (Vale Haro et al., 2023), decision-making skills (Bayat et al., 2023), it also poses unique challenges. One of the most significant challenges is the concept of transactional distance, which refers to the psychological and communication space that separates learners and instructors in online learning environments (Moore, 1997). This distance can have a significant impact on learners' self-efficacy, or their belief in their ability to succeed in a given task or situation (Bandura, 1997). Understanding the relationship between transactional distance and self-efficacy is critical to developing effective online peer learning environments that support student success.

Transactional distance theory, first introduced by Michael Moore in 1989, has been extensively studied in the field of online education (Moore, 1989). According to this theory, the transactional distance between learners and instructors is influenced by three main dimensions: cognitive, social, and teaching presence (Anderson, 2003). The cognitive dimension refers to the distance between students and content, while the social dimension refers to the distance between students. The teaching presence dimension refers to the distance between students and technology, including the tools and resources used in the online learning environment (Garrison et al., 2000). Each of these dimensions can either increase or decrease the transactional distance, and the resulting impact on learners' self-efficacy can vary. For example, a lack of interaction between students may increase social distance and decrease self-efficacy, while a lack of access to relevant resources may increase cognitive distance and decrease self-efficacy (Vrasidas & McIsaac, 1999).

Although there is a growing body of literature on transactional distance and self-efficacy in online learning, there is still much to be understood about this relationship, particularly in the context of online peer learning (Yang & Chang, 2013). Through this paper, we aim to investigate the relationship between transactional distance and self-efficacy in online peer learning environments. Specifically, we will examine the impact of students' perceptions of transactional distance (between students, between students and content, and between students and technology) on self-efficacy. By shedding light on this relationship, we hope to provide insights for educators and instructional designers to create effective online peer learning environments that support students' self-efficacy and enhance their learning outcomes. The research questions are as follows:

RQ1. What is the relationship between transactional distance and self-efficacy in online peer learning?
RQ2. To what extent do students' perceptions of transactional distance impact their self-efficacy in online peer learning?

Method

Context and Participant

This study was carried out at a Dutch university, involving 240 higher education students enrolled in five courses related to life sciences during the academic year 2021-2022. The study's final sample included 141 since 99 students (40%) did not complete the survey.

Study Design

This is an exploratory study where students followed an online module called “Argumentative Essay Writing” for three consecutive weeks within the Brigthspace platform. The “Argumentative Essay Writing” was designed to last for three consecutive weeks, during which students completed one task each week. In the first week, students were required to write an argumentative essay. *In the second week, students were invited to give written/asynchronous feedback individually and provide comments on two argumentative essays of their peers based on the given criteria.* And, in the third week, students revised their first essays based on the received feedback and then they submitted a second version of their essays in Brightspace. In the end, students were asked to complete the survey about students’ perceptions of transactional distance and self-efficacy.

Measurements

Measurement of Students’ Perceptions of Ttransactional Distance

The Weidlich and Bastiaens (2018) questionnaire utilized a 19-item scale to measure students' perceptions of transactional distance. Each item on the scale was designed on a five-point Likert scale, ranging from *"strongly disagree = 1" to "strongly agree = 5"*. The questionnaire was divided into three sections, which included transactional distance between students and content, transactional distance between students, and transactional distance between students and technology. The reliability coefficient for all three scales of the questionnaire was high (Cronbach's $\alpha = 0.80$, 0.83, and 0.88).

Measurement of Students’ Self-Efficacy

The Toering (2012) questionnaire utilized a 10-item scale to measure students' self-efficacy. Each item on the scale was designed on a five-point Likert scale ranging *from "strongly disagree = 1" to "strongly agree = 5*". The reliability coefficient was high (Cronbach's $\alpha = 0.87$).

Analysis

In this study, Pearson's correlation was used to determine the relationship between students' self-efficacy and

their perceptions of transactional distance, as well as its components. Moreover, multiple regression was used to predict students' self-efficacy based on their perceptions of transactional distance. Additionally, the Kolmogorov-Smirnov test was utilized to verify data normality, and it was found that the data were normally distributed ($p > 0.05$).

Results

RQ1. What is the relationship between transactional distance and self-efficacy in online peer learning?

The results showed that there was a significant relationship between students' perceptions of transactional distance and their self-efficacy in online peer learning.

Table 1. The correlation coefficient between students' perceptions of transactional distance and their self-efficacy

Variables	Students' perceptions of transactional distance		
	Between students	Between students and content	Between students and technology
Students' self-efficacy	0.44**	0.40**	0.45**

RQ2. To what extent do students' perceptions of transactional distance impact their self-efficacy in online peer learning?

The results showed that students' perceptions of transactional distance impact their self-efficacy in online peer learning ($F(3, 137) = 20.75$, $p < 0.01$, $R^2 = 0.30$). The adjusted R square value indicated that 30% of self-efficacy difference could be explained by students' perceptions of transactional distance, including between students, between students and content, and between students and technology.

Table 2. The effects students' perceptions of transactional distance on their self-efficacy

Students' perceptions of transactional distance	Mean	SD	Results	Collinearity Statistics		Durbin-Watson
				Tolerance	VIF	
Between students	4.11	0.65	β=0.23, t = 2.82, p < 0.01	0.73	1.36	1.91
Between students and content	3.68	0.78	β=0.19, t = 2.37, p < 0.05	0.76	1.30	
Between students and technology	3.95	0.63	β=0.30, t = 3.72 , p < 0.01	0.80	1.24	

Conclusion

The findings of this study suggest that there is a significant relationship between students' perceptions of transactional distance and their self-efficacy in online peer learning. This result means that students who

perceive a lower transactional distance between their peers, content and technology used in the online peer learning are more to have higher levels of self-efficacy. This finding is consistent with previous research that has linked transactional distance to learner outcomes in online education (Garrison & Cleveland-Innes, 2005).

This study also revealed that the three dimensions of transactional distance (social, cognitive, and teaching presence) (Kuo & Belland, 2016) have a significant impact on students' self-efficacy in online peer learning. Specifically, students who perceived a lower social distance, indicating a greater sense of connectedness to their peers, reported higher levels of self-efficacy. Similarly, students who perceived a lower cognitive distance, indicating a greater sense of relevance and accessibility of the content, and a lower teaching presence distance, indicating a greater sense of support and guidance from the technology used in online peer learning, also reported higher levels of self-efficacy.

The adjusted R square value of 0.30 suggests that 30% of the variance in students' self-efficacy can be explained by their perceptions of transactional distance. While this is moderate effect size, it highlights the importance of addressing transactional distance in online peer learning to support students' self-efficacy and improve their learning outcomes. Educators and instructional designers can use the findings from this study to inform the design and implementation of online peer learning activities that minimize transactional distance and maximize opportunities for students to connect with their peers, the content, and the technology used in the online learning environment. Further research is needed to explore effective strategies for minimizing transactional distance in online peer learning environments and to investigate the influence of other factors on self-efficacy in these contexts. Moreover, as new artificial intelligence technologies such as ChatGPT and learning analytics has emerged (Banihashem et al., 2022; Farrokhnia et al., 2023; Noroozi et al., 2019) future studies should focus on the impacts of these innovations on online peer learning.

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