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Original Article

The Role of ICT Self-Efficacy as Moderator in Relationship between Self-Directed Learning, with E-Learning Readiness and Student Engagement

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ABSTRACT

The COVID-19 pandemic forced institutions and organizations to adopt remote work policies, leading to numerous challenges for individuals, especially students. Thus, it is vital to examine the e-learning environment and the factors influencing the e-learning process to better comprehend and address the challenges students face in this context. **Objectives:** To explore the moderating role of ICT-SE in the relationship between SDL, ELR, and SE among adolescents. **Methods:** A convenience sampling technique was employed to select a sample of 300 school, college, and university students aged 15 to 21 years, including both boys and girls, from Rawalpindi and Islamabad. Reliable measures were used to collect data on the variables studied, including ICT self-efficacy, self-directed learning, e-learning readiness, and student engagement. **Results:** The study's findings revealed a positive correlation between self-directed learning, e-learning readiness, and student engagement. Additionally, e-learning readiness and student engagement exhibited a significant positive correlation. The study also discovered that ICT self-efficacy significantly moderated connection among self-directed learning and e-learning readiness, as well as between self-directed learning and student engagement. **Conclusions:** The study's findings suggest that promoting students' self-directed learning and e-learning readiness may result in improved engagement in e-learning environments. The study also emphasizes the significance of ICT self-efficacy in strengthening the relationship between SDL and SE. These results have implications for enhancing e-learning quality in Pakistani educational institutions by focusing on these factors.

INTRODUCTION

The utilization of ICT has become a crucial component in various industries, hospitals, and educational institutions worldwide in the 21st century. However, it was not until the onset of the COVID-19 pandemic that the usage of ICT gained attention in underdeveloped countries like Pakistan. Initially, many students from these countries were unfamiliar with this new mode of learning. Thus, this study aims to investigate the relationship between SDL, ELR, and student engagement, and the moderating effect of ICT self-efficacy (ICT-SE) in this context. The research provides fresh insights and examines these connections in the local context of Pakistan, given the significance of self-directed learning in producing positive outcomes as highlighted in previous literature. The current study's variables are detailed as follows: Self-Directed Learning (SDL) is considered a process in which individuals of any age, with specific goals, seek skills (motivation, self-control, monitoring, and management) to acquire information and outcomes [1]. A recent study suggested that individuals with SDL abilities demonstrated strong determination in performing online tasks [2]. Student Engagement (SE) is the degree to which a learner exerts mental, emotional, and behavioral efforts towards academic activities to achieve maximum results [3]. It is considered an essential outcome in learning and teaching, especially in e-learning environments [4]. E-Learning Readiness (ELR) is a self-directed activity and defined as the student's mental preparedness for learning online

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tasks on time [5]. Researchers have argued that e-learning readiness plays a crucial role in successfully implementing e-learning academic tasks for both teachers and students [6, 7]. Several studies have shown a positive correlation between self-directed learning and student engagement. For example, a study examining a sample of 333 undergraduate and graduate students from Saudi Arabia discovered a positive correlation between self-directed learning and student engagement while using smartphones for learning [8-11]. Furthermore, empirical evidence suggests that students with self-directed learning skills are mentally prepared for online learning activities [12-14]. Additionally, existing literature has also highlighted the positive relationship between e-learning readiness and student engagement. For instance, Prihastiwi *et al.*, and Ismail investigated the predictive role of e-learning readiness in student engagement among a sample of 125 students and teachers from various faculties, including psychology, law, and education. The study findings revealed a significant positive impact of e-learning readiness on student engagement [15, 16]. ICT Self-Efficacy refers to an individual's perception of their expertise in executing computer and internet-related tasks and assignments [17]. According to theorists, students with a high level of ICT self-efficacy are better able to engage with the e-learning environment. This is because such learners have a strong belief in their ability to adapt to the learning situation and overcome challenging conditions, rather than ignoring them [18-20]. Moreover, ICT self-efficacy was also found to be a significant predictor of e-learning readiness [7, 21, 22]. For example, Owusu-Agyeman et al. found that ICT self-efficacy moderated the relationship between online learning and student engagement [23, 24]. Latip *et al.*, discovered that self-efficacy played a moderating role in the relationship between performance expectancy and e-learning acceptance [25]. Based on these findings, it can be assumed that ICT self-efficacy plays a positive moderating role in both e-learning readiness and student engagement.

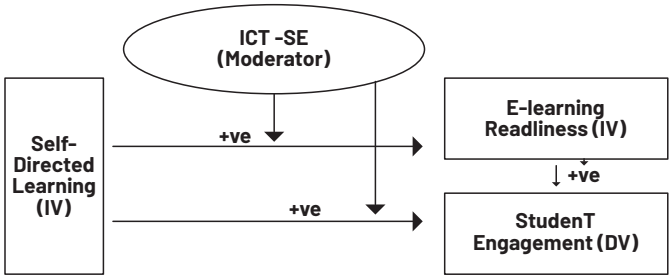

Figure 1: Proposed model.

METHODS

A positive relationship exists among SDL, ERL, and SE. ICT self-efficacy serves as a moderator between self-directed learning and e-learning readiness. ICT self-efficacy acts as a moderator between self-directed learning and student engagement. In this study, a cross-sectional research design was employed. A sample of 300 adolescents was selected through convenient sampling from various schools, colleges, and universities in the twin cities of Rawalpindi and Islamabad during the period of 2020-2022. The participants' age range was between 15 and 21 years. Students who were suffering from mental illness and had not attended online classes were excluded from the sample. Before conducting the study, the researchers obtained prior permission from the competent authorities and participants of the academic institutions. Four reliable instruments were used for data collection: SDL with Technology Scale, E-Learning Readiness Scale, Student Engagement Scale in E-Learning Environment, and ICT Self-Efficacy Scale [26-29]. After collecting the data, the researchers expressed gratitude to the participants for their cooperation in the study. Data analysis, including descriptive, correlational, reliability, and regression analyses, was performed using SPSS-21. Mean ± SD was calculated for quantitative variables and frequency and percentages for Qualitative variables. Correlation was conducted to see the relationship among study variables. p-value less than 0,05 was considered as significant.

RESULTS

Table 1 shows descriptive statics and alpha reliability coefficients of the study variables on samples of study variables (*N*=300). The normality assumption for regression analysis was met as evidenced by the acceptable range of Skewness and Kurtosis values falling between -1 and +1.

Table 1: The descriptive statics and Alpha Reliability Coefficients of the Study Variables (n=300)

Variable	n	Mean ± SD	A	Range		Skewness	Kurtosis
				Actual	Potential		
ICTSE	23	87.68 ± 16.87	.95	27-115	23-115	-.65	.35
SDL	6	26.64 ± 5.99	.85	6-36	6-36	-.75	.09
ELR	17	82.73 ± 15.44	.90	34-119	17-119	-.49	.25
SE	24	77.32 ± 18.85	.91	24-120	24-120	-.38	.15

The table 2 demonstrates that all the variable of study is positive correlated with each other at (p<.001). The correlation values range from 0.45 -0.71.

Table 2: Inter scale correlation for SDL, E-learning Readiness, and SE (n=300)

Variable	SDL	ELR	SE	ICT- SE
SDL	–	.71***	.59***	.67***
ELR		–	.58***	.66***
SE			–	.45***
ICT-SE				–

Table 3 demonstrates the impact of ICT self-efficacy as a moderator on the association among SDL and SE. The

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model was statistically significant with an R2 value of .35 and an F-test of (3, 296) = 54.23, p < .000, indicating that self-directed learning had a positive effect on student engagement, and ICT self-efficacy played a significant moderating role in the relationship between SDL and SE.

Table 3: Moderation Analyses of ICT Self-efficacy as a Moderator between Self-directed Learning and Student Engagement (n=300)

Predictors	Estimate	St. Error	95% CI		t	p-value
			LL	UL		
SDL	1.81	.20	1.41	2.20	8.99	000
ICTSE	.12	.07	-.02	.25	1.72	.087
SDL x ICTSE	.03	.01	.01	.04	3.37	.000

Table 4 presents the moderating effect of ICT self-efficacy on the relationship between self-directed learning and e-learning readiness. The overall model was statistically significant, with R2 = .56, F (3, 296) = 125.95, p < .001. Self-directed learning exhibited a significant and positive association with e-learning readiness, and ICT self-efficacy significantly moderated this relationship between self-directed learning and e-learning readiness.

Table 4: Moderation Analyses of ICT Self-efficacy as a Moderator between Self-directed Learning and E-learning Readiness

Predictors	Estimate	St. Error	95% CI		t	p-value
			LL	UL		
SDL	1.32	.13	1.05	1.58	9.816	000
ICTSE	.31	.05	.22	.40	.772	.000
SDL x ICTSE	.01	.01	.00	.02	.62	.009

DISCUSSION

The objective of this study was to explore the moderating role of ICT self-efficacy in the relationship between SDL, ELR, and SE. Table 1 revealed that the alpha reliability coefficients for all four research variable instruments were satisfactory and within an acceptable range. Furthermore, the data exhibited normal distribution. The findings for alpha values satisfied the criteria for an acceptable range of alpha values, as outlined by Nunnally and Berstein, which are above 0.6 to 0.7, respectively [30] (Table 1). The study's first hypothesis proposed a positive relationship between SDL, ELR, and SE. The results demonstrated that all variables were significantly and positively correlated with each other, as displayed in Table 2. The results indicated that students possessing robust self-directed learning abilities exhibited higher levels of commitment and motivation within the e-learning environment, resulting in increased student engagement [2]. These findings are consistent with those reported in previous studies [12, 13, 21, 31, 32]. The study's second and third hypotheses were designed to investigate the moderating role of ICT self-efficacy in the relationship between self-directed learning and student engagement. The findings confirmed the moderating impact of ICT self-efficacy on both self-directed learning and student engagement, as well as on e-learning readiness (Table 4). The results implied that adolescents with higher ICT self-efficacy and self-directed learning are more likely to be engaged in e-learning environments [23, 24]. Similarly, the Mushtaque *et al.*, findings also suggested that students with greater ICT self-efficacy and more self-directed learning are better prepared for e-learning [25, 33].

CONCLUSIONS

The aim of this study was to examine how ICT self-efficacy affects the relationship between SDL, ELR, and SE among Pakistani youth. The study found that these variables were positively associated and that ICT self-efficacy played a moderating role in their relationships. The outcomes emphasized the significance of ICT self-efficacy in promoting e-learning readiness and student engagement for Pakistani youth in an e-learning setting.

Conflicts of Interest

The authors declare no conflict of interest.

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