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Social Interaction, Problem-Solving, Critical Thinking, and Creative Ability as Predictors' of Students' Digital Learning Readiness in Public Secondary School E-learning.

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Abstract
This study brings attention to the predictors of students' digital learning readiness which focuses on the interplay among their social interaction, critical thinking, creative ability, and problem-solving as fostering factors for digital education.The study employed a predictive correlational research design. The sample size was made up of 897secondary school students in Anambra State. Instrument for data collection were as follows; Problem Solving Inventory (PSI), Interpersonal and Communication Skills Questionnaire (ICSQ), California Critical Thinking Disposition Inventory (CCTDI), "How Creative Are You? Scale and Learners Readiness for Online Learning Scale (LROLS). The data were analyzed using standard multiple regression analyses. Our findings showed thatin the unique contribution, social interaction positively contributed to the predicting model, while critical thinking, creative ability, and problem-solving negatively contributed to the predicting model. Also, the analysis of variance shows that the regression equation was significant (4, 892) = 17.292, p <. 05. This implies that at least one of the independent variables significantly predicted students' digital learning readiness scores. Based on these findings, it was recommended that students should be motivated to participate actively in the digital learning instructional process and technological driven workshops to update their knowledge on digital education.

Keywords: Digital Learning Readiness, Social Interaction, Problem-Solving, Critical Thinking, andCreative Ability

Introduction

Effective use of technology in delivering the curriculum has begun to play significant role in many public secondary schools in Nigerian. The principal business drive for enhancing e-learning including enhancing the quality of the students learning experience, facilitating learning desire on digital education, practice and innovative approaches to learning and teaching, providing flexibility of provision to support a diverse student population, and enriching the campus experience for students (Tang & Lim, 2013). Readiness for e-learning refers to three major aspects namely: (1) students' preference for online learning as opposed to face-to-face learning institutions (2) students' capability and confidence in using the technological tools collaboratively, and (3) student's ability to learn independently.

Since e-learning is rather a new driving force behind a new learning experience which will give the institution an advantage and competitive edge over other institutions that are not digitally equipped, almost all of which have yet to consciously embark on this path. When shifting into e-learning, the unique learning style of students and the nature of the content must be considered (Tang & Lim, 2013). Therefore, it is timely for the researchers to assess whether the students are ready for this new learning format and identify the important factors that could affect their readiness in order to ensure the successful implementation of e-learning instructions hence students' digital learning

readiness at the secondary schools which has embarked on foundational phase of the transformation process.

Recently, technology-driven learning experiences in university education have followed the changing educational paradigm from being instructor-led to becoming learner-centered learning strategies (Ituma, 2011).For example, in Korea university students in recent years have been engaging in university e-learning courses from the start of their academic lives, often before entering a precollege program. To develop higher quality and learner-centered education, universities have built enriching e-learning environments that meet various educational needs (Islam, 2013). These changes reflect the idea that traditional instruction can be enhanced by using e-learning environments. Thus, in Nigerian educational contexts, these were acknowledged as government is investing in the development of secondary schools e-learning environment as students' preferred method for instructional delivery or as a supplementary method to traditional face-to-face instructional practice. Considering secondary school students as digital natives implies that when students are engaged in a secondary school e-learning environment, they are expected to have experience and confidence in using such type of learning environment, hence facilitating digital learning readiness of the students. The Programme for International Student Association (PISA) provides a comprehensive definition of digital learning/literacy, framing it as the ability of students to meticulously evaluate information sourced from a variety of digital and non-digital texts. This includes the capacity to assess the usefulness and credibility of these texts by applying multiple established criteria, thereby fostering discerning information consumption (OECD, 2015).Digital learning, an umbrella term that includes online, distance, and blended learning (Siemens, Grasievi & Dawson, 2015), and incorporating mobile learning has profoundly influenced higher education on a global scale.

Certainly, researchers investigated how students perceived the value and impact of critical thinking, creative ability, problem-solving, and social interaction on their digital learning readiness in the e-learning environment mostly at the end of the academic section. From the perspective of Hurst, Walace, and Nixon (2013) there is a little social interaction taking place in many of today's classroom from kindergarten through college.For this reason, Hurst *et al* (2013) defined social interaction as meaningful dialogue among learners. Socially interactive learners are engaged learners because students learn more when they are able to talk to one another and be actively involved. Historically,supporting this withsocial constructivism and cognitive theory, which is based on the beliefs that individuals actively construct knowledge and understanding and that constructing understanding of one's world is an active, mind-engaging process (Vygotsky, 1978). In other words, information must be mentally acted upon in order to have meaning to the situation and restructuring initial knowledge. Since learners have different background knowledge, experience, and interests, they make different connection in building their knowledge over time.

With the nature of social interaction, students could promptly commit to educational activities that will help to improve their willingness to foster digital learning readiness. On these premises we hypothesized that students' social interaction could predict their digital learning readiness in the e-learning environment.It could be one of the facilitators in digital learning readiness if connected with other factors likecritical thinking, creative ability, problem-solving.

Understanding that problem-solving is one of the innovative learning techniques that can influence students' digital learning readiness.Basalo and Salvador (2022), describeProblem-solving as the cognitive, affective, and behavioral processes and particular set of skills people employ in order to find solution for the challenges of everyday life. In addition, problem-solving is often conceptualized as the knowledge and skills that are required to deal effectively with complex learning situation (Funka *et al*, 2018). In this aspect, a student must identify necessary actions, possible gaps, and steps to obtain information. For example,in the study of Basalo and Salvador (2022),there are some research evidences suggesting that people who feel they can control elements of their life condition also tend to be better at solving their problems. This suggests that when people expect that they can affect to some extent what happens to them, their attitude towards their problem-solving ability becomes more positive. On the basis of the roles of problem-solving in shaping the perception of individuals in solving problem in challenging situations, we hypothesized that students' problem-solving can impact and predict their digital learning readiness in the e-learning environment.Important, examining the intricate interplay that exists among the perceived students' problem-solving, social interaction, creative ability, and critical thinkingin predicting their digital learning readiness becomes

imperative in the literature.

The level of critical thinking is one of the determining factors for the student's success in the learning process. This indicates that critical thinking strengthens the ability to question the validity of mathematical arguments and to test hypotheses logically (Peter, 2012). This argument views critical thinking not only as an analytical process but also as the continuous questioning and development of one's own thoughts. In alignment with this view, van Laar *et al* (2020) broadly refer to critical thinking as making informed choices about obtained information and communication by using sufficient reflection and reasoning. This indicates that critical thinking is concerns with the ability to think reflectively and judge skillfully, so as to decide what information or communication is relevant in a given context.

Supporting this observation, Hasret and Fatma (2024) described critical thinking as individual's ability to analyze complex problems, evaluate information from a critical perspective, and reach an objective conclusion. This should be evaluated in terms of both skill and disposition, as critical thinking reflects an individual's willingness and readiness to use this skills (Lipman, 2023). It is on these observations that we hypothesized that students' critical thinkingif properly developed and utilized during digital education process, could potentially predict their digital learning readiness in the e-learning environment, mostly when it has a link with digital awareness and creative thinking ability.

Of note, technological advancements signify creative changes in the skills demanded by the educational institutions. Creative ability and critical thinking are among the skills that are needed by the students to engage in digital learning as an approach to facilitate knowledge based development through teaching and learning. At this point, it should be noted that education is the source of the development of these innovative and intellectual facilitating skills for learning. For example, research made it clear that creative ability is closely related to divergent thinking pattern where an individual is able to provide more than one solution in solving a particular problem (Warren, *et al,* 2018). An individual's level of creative ability enables him/her to combine unrelated topics in unique and different ways to find new and flexible ideas (Krumm *et al,* 2016).

Interestingly, Agnoli *et al*, (2018) opined that creative ability is related to originality of ideas, openness to new experiences, willingness to accept something new and different or perhaps unreasonable, willingness to accept risks in thoughts and ideas, and sensitive to the beauty of the character of these ideas. It is on this assertion that Warren *et al* (2018) suggested three factors that could influence creative ability such as; fluency (number of ideas), flexibility (diversity of ideas), and authenticity (new and useful idea). In addition to these, (Agnoli *et al*, 2018a, Agnoli *et al*, 2018b) assert that two factors such as; attitude of openness to new experiences and intrinsic motivation that comes from within the students (conation) can predict the level of creative ability.Given the burgeoning evidence of the numerous benefits of creative ability on individuals, we hypothesized that students' creative ability can independently influence and predict their digital learning readiness in the e-learning environment. Obviously, in a digital context research, determinants for digital learning readiness such as; social interaction, critical thinking, creative ability, and problem-solving skill are hardly studied. Notably, critical thinking is a significant predictor of digital literacy skills (Risis & Najdah, 2025). For example, Hurst *et al* (2013) reveal that students perceived social interaction improved their learning by enhancing their knowledge of literacy and teaching and their critical thinking and problem-solving skills. Interestingly, digital learning readiness was not examined in this study, but the observation that interacting with their classmates contributed greatly to their learning in the class.

The knowledge of promoting students' digital learning readiness in the e-learning environment through the role and impact of creative ability, critical thinking, problem-solving, and social interaction has a range of psychological and cognitive benefits for mental,physical wellbeing, prosocial behavior and academic development.These behaviors need to be prioritized and incorporated into students learning beliefs system and be aligned with international guidelines for the promotion of digital education at the secondary school level. On this premises, we hypothesized that students' social interaction, problem-solving, critical thinking, and creative ability could jointly predict their digital learning readiness in the e-learning environment.Recognizing the paucity of studies on the intricate interplay and roles of students' social interaction, problem-solving, critical thinking, and creative ability in fostering their digital learning readiness, we unlocked the role of

social interaction, problem-solving, critical thinking, and creativeability in fostering students' digital learning readiness in the public secondary schoole-learning instruction.

Research Questions

1. To what extent are the assumptions of multiple regression equation for predicting students' digital learning readiness scores using social interaction, problem-solving, critical thinking,and creative ability scores met?
2. What is the nature of the regression equation for predicting students' digital learning readiness scores using social interaction, problem-solving,critical thinking, and creative ability scores?
3. What are the unique contributions of social interaction, problem-solving,critical thinking, and creative ability scores in predicting students' digital learning readiness scores?
4. Which of the independent variables such as; social interaction, problem-solving,critical thinking, and creative ability scores best predicted students' digital learning readiness scores?

Hypotheses

1. The regression equation does not significantly predict students'digital learning readiness scores using social interaction, problem-solving,critical thinking, and creative abilityscores.
2. The unique contributions of social interaction, problem-solving, critical thinking, and creative ability scores do not significantly predict students'digital learning readiness scores.
3. Social interaction, problem-solving,critical thinking, and creative ability scores do not significantly predict students' digital learning readiness scores.

Method

The researchers adopted a predictive correlational design and used questionnaires to collect data for the study. The sample size of our study consisted of 1020 secondary school students in Anambra State.Multi-stage sampling procedure was used to select the respondents. The first stage consisted of randomly sampling 30 secondary schools (five from each education zone) that made up six Education Zones in Anambra State. At the second stage, a simple random sampling technique was used to select 34 students from each secondary school, which resulted to1020 students. The study adapted five standardized research questionnaires for data collection. For example, problem-solving was examined using Problem Solving Inventory (PSI) that was developed by Heppner and Peterson (1982). Interpersonal and Communication Skills Questionnaire (ICSQ) which was developed by Obiekwe and Uwaezuoke (2021) was used for social interaction. California Critical Thinking Disposition Inventory (CCTDI) developed by Facione, Facione and Giancarlo (1998) was used to examine critical thinking. The "How Creative Are You? Scale developed by Whetton and Cameron (2002) was used to examine creative ability. Digital learning readiness was examined with Learners Readiness for Online Learning Scale (LROLS) which was developed by Hung *et al* (2010). Participants were directed to rate the support provided by each source on six different items using a scale of six-point rating from Very Untrue (VU) = 1, Mostly Untrue (MU) = 2, Somewhat Untrue (SU) = 3, Somewhat True (ST) = 4, Mostly True (MT) = 5, and Very True (VT) = 6. The students' achievement scores were obtained from the schools before the start of the administration of the other two questionnaires. The achievement scores used in the study were the results of the state wide SS1 promotion examination in Data Process examination.

The methods used for validating the instruments were face and construct validity by the three experts from the Faculty of Education, Nnamdi Azikiwe University Awka. Cronbach's alpha reliability method was used to determine the internal consistency of the items in the research questions and 0.74, 0.86, 0.66, 0.79, and 0.61 were obtained for social interaction, problem-solving, critical thinking, creative ability, and digital learning readiness respectively. The data were analyzed using standard multiple regression analyses. Research question 1 was answered using multiple regression equation. Research question 2 was answered using unstandardized β. Research question 3 was answered using adjusted R^2. Research question 4 was answered using unstandardized β. Hypothesis 1 was tested F-test for regression model. Hypothesis 2 was tested using t-test for adjusted R^2. at .05 alpha level

significance. While hypothesis 3 was tested using t-test for β. Then, using multiple regression tool for investigating the study is significant because it is convenient to examine the relationships between multiple variables by relating one variable to a set of variables. This helped to identify the effect of one variable while adjusting for other observable differences. The decision rule for research questions was that the proportion for variable that is below 10% is low, 11% to 30% is moderate, 31% to 50% is high while 51% and above is considered very high according to Cohen's *d* (1988) statistics guideline. The decision rule was to accept the null hypotheses if the p-value was greater than 0.05 level of significance ($p > 0.05$). Reject the null hypotheses if the p-value was less than 0.05 level of significance ($p < 0.05$). Also, Reject the null hypotheses if the p-value was equal to 0.05 level of significance ($p = .05$).

Results

Presentation of Results

The data were first screened for missing values, and 123 respondents had missing values representing 12.05%. Hence likewise deletion approach was adopted. After deleting the 123 respondents, the sample size was reduced to 897. Thereafter, analysis of the study was carried out using standard multiple regression analysis with SPSS 25.

Research question 1: To what extent are the assumptions of the regression equation for predicting students' digital learning readiness scores using their social interaction, problem-solving, critical thinking, and creative ability scores?

Table 1: Correlation and descriptive statistics of independent and dependent variables in the regression model for this study (N = 897).

Variables	SI	PS	CT	CT DLR	X	SD	VARSKKUTF	VIF
SI	1		20.45	3.863	14.929	-.229	.732	.933 1.072
PS	.253**	1			20.41	3.865	14.940	.119 1.217 .921 1.085
	,000							
CT	-.051	-.067*	1		20.803.804		14.477	.227 -.504 .896 1.116
	.127	.044						
CA	-.087**	-.140*	.321**	1	20.92	3.716	13.812	.024 -.712 .881 1.136
	.009	.000.000						
DLR	.059	.017	-.212**	-.218**	123.09	3.687	13.597	-.416 -.336 …... …….
.078	.609	.000 .000						

Std. Residual Min = -2.689, Std. residual Max = 2.822, Durbin Waston statistics = .951. SI = Social Interaction, PS = Problem-solving, CT = Critical Thinking, CA = Creative Ability, and DLR = Digital Learning Readiness.

Fig 1 the normal P.P plot of standardized residuals data points of students' digital learning readiness.

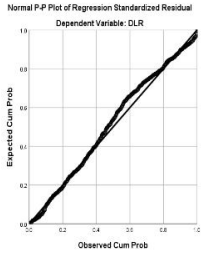


Fig 2 the normal distribution curve of standardized residuals data points of students' digital learning readiness.

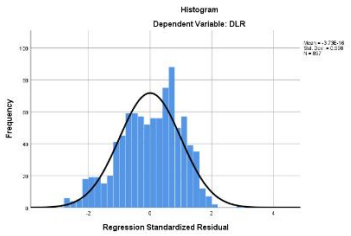
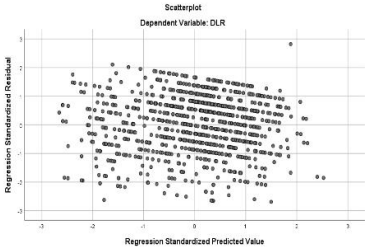


Fig 3 the scatter plot of standardized residuals data points of students' digital learning readiness.



To answer research question 1, seven assumptions of multiple linear regression were tested in this study. First, the assumptions of normality of the data were tested using Skewness and Kurtosis. The assumptions were made since none of the Skewness and Kurtosis values of each of the variables do not exceed + 3 and – 3 as recommended. Second, the assumptions of absence of multivariate outliers was checked using standardized residual statistics and Cook's distance statistics (1977). Result of standardized residual values indicated that the (Std, Residual Min = -2.689, Std, Residual Max = 2.822). It lies between -3 to 3 as recommended by (Tabachnick and Fidell, 2018). While the result of the Cook's distance shows a maximum value of .018 which is less than 1 as recommended by (Cook, 1977). Hence, the assumptions of absence of multivariate outliers was not violated. Third, the assumptions of absence of multicollinearity among the predicting variables were checked using Variance Inflated Factor (VIF), and Tolerance Factor (TF). The Tolerance Factors and Variance Inflated Factors (Social Interaction, TF = .933, VIF = 1.072, Problem-Solving, TF = .921, VIF = 1.085; Critical Thinking, TF = .896, VIF = 1.116; Creative Ability, TF = .881, VIF = 1.136 of the independent variables show that the values were less than 10 for Variance Inflated Factor and greater than .20 for Tolerance Factor respectively as recommended by (Schumaker, 2015). Hence, this assumption of absence of multicollinearity was made. Forth, the assumption of independent of error was tested using Durbin Waston statistics. The result shown a Durbin Waston statistics of .951 which is less than 3 but greater than 0 as recommended by (Denis, 2020). Hence, the assumption of independent of error was not violated. Fifth, the assumptions of normality of error distribution were tested using normal P.P plot of standardized residual. Figure 1shows that the normal P.P plot of standardized residual data points were normally distributed. Histogram of the standardized residual in figure 2 also testified to that. Sixth, the assumption of homogeneity of variance and linearity was tested using scatter plot of standardized predicted values. The result in figure 3 shows that the data met the assumption of homogeneity of variance and linearity as the predicted values were distributed above zero in both dimensions and do not show any pattern. Seventh, the assumptions of non-zero variance were tested using variance statistics and the data also met the assumptions of non-zero variances (Social Interaction, Variance = 14.929; Problem-Solving, Variance = 14.940;Critical Thinking, Variance = 14.477; Creative Ability, Variance = 13.812; Digital Learning Readiness, Variance = 13.597) as there is no zero variance for the variables in the study as shown in the table 1.

Research Question 2: What is the nature of the regression equation for predicting students' digital learning readiness scores using their social interaction, problem-solving, critical thinking, and creative ability scores?

Table 2: Regression coefficient for social interaction, problem-solving, critical thinking, and creative abilityscores (N = 897).

del	Unstandardized βeta	Std. Error	Standardized βeta
ıstant	29.447	1.229	
ːial Interaction	.041	.032	.043
blem-solving	-.027	.032	-.028
tical thinking	-.153	.033	-.158
ːative ability	-.166	.034	-.167

Using the information in table 2, the nature of the regression equation for predictingstudents' digital readiness scores using their social interaction, problem-solving, critical thinking, and creative ability scores follows:

Y = b0 + b1x 1 + b2 x 2 + b3 x3 + b4 x 4

Y = 29.447 + .041 x 1+-.027 x2 +-.153 x3 +-.166 x 4

DLR = 29.447 + 0.041 – 0.054 – 0.459 -.0664

DLR = 29.447+ 0.041SI - 0.054PS - 0.459CT - .664CA

SI = Social Interaction, PS = Problem-Solving, CT = Critical Thinking, CA = Creative Ability. The equation shows that for every unit increase in student' social interaction, students' digital learning readiness increased by 0.041. For every unit decrease in problem-solving, students' digital learning readiness decreased by -0.054. For every unit decrease in critical thinking, students' digital learning readiness decreased by - 0.459. For every unit decrease in creative ability, students' digital learning readiness decreased by - .664.

Research Question 3: What is the unique contributions of students' social interaction, problem-solving, critical thinking, and creative ability scores in predicting their digital learning readiness scores?

Table 3: Regression model summary ofsocial interaction, problem-solving, critical thinking, and creative abilityscores in predicting their digital learning readiness scores (N = 897).

Model	R	R-Square	Adjusted R-Square	Std. Error of the Estimate
	.268[a]	.072	.068	3.56027

To answer this research question, the adjusted multiple regression R square was used. The result of study shows that using students' social interaction, problem-solving, critical thinking, and creative ability scores yielded an adjusted R squared of .068. This implies that predictors accounted for about 6.8% of the variance in students' digital learning readiness scores.

Research Question 4: Which of the independent variables such as, students' social interaction, problem-solving, critical skill, and creative ability scores best predicted their digital learning readiness scores?

Table 4: Regression coefficient for predicting students' digital learning readiness scores using their social interaction, problem-solving, critical thinking, and creative abilityscores (N = 897).

del	Unstandardized βeta	Std. Error	Standardized βeta
ıstant	29.447	1.229	
ːial Interaction	.041	.032	.043
blem-solving	-.027	.032	-.028
tical thinking	-.153	.033	-.158
ːative ability	-.166	.034	-.167

Table 4: Regression coefficient for students' digital learning readiness scores using their social interaction, problem-solving, critical thinking, and creative ability scores. To answer this research question 4, the standardized regression coefficient (β) in table 4 was used for comparison. The regression coefficients presented in table 4 shows unstandardized (β) and standardized regression coefficient (β) social interaction scores are .041 and .043. For problem-solving scores are -.027 and -.028. For critical thinking are -.153 and -.158. For creative ability scores are -.166 and -.167. Using the standardized (β) for comparison, students' social interaction mostly predicted digital learning readiness as shown by the β of .043. Students' creative ability is the second most predicted digital learning readiness as shown by the β of -.167. Students'critical thinkingis the third mostly predicted digital learning readiness as shown by the β of -.158. Students'problem-solving is the fourth most predicted digital learning readiness as shown by the β of -.028 respectively.

Hypothesis 1: The regression model does not significantly predict students'digital learning readiness scores.

Table 5: F- test for regression model ofsocial interaction, problem-solving, critical thinking, and creative ability scores (N = 897).

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	876.736	4	219.184	17.292	.000[b]
Residual	11306.584	892	12.676		
Total	12183.320	896			

The analysis of variance in the table 5 shows that the regression equation was significant (4, 892) = 17.292, $p < .05$. This implies that at least one of the independent variables significantly predicted students' digital learning readiness scores.

Hypothesis 2: The unique contributions of students' social interaction, problem-solving, critical thinking, and creative ability scores to predict their digital learning readiness scores is not statistically significant.

Table 6. t-test of adjusted R square of the regression model for this study (N = 897).

Model	R	R- Square	Adjusted R- Square	Std. Error Estimate	t – cal for adj. R^2	DF	t- crt.	Remark
.268[a]	.072	.068		3.56027	8.6396934932	895	1.960	S

To test hypothesis 2, t-test for adjusted R square was conducted. Results of the study shown in table 6 indicates that t-critical for adjusted R square is 1.960 while that of the t-calculated is 8.6396934932. Since the t-calculated for adjusted R square 8.6396934932 is greater than t-critical 1.960, the null hypothesis which states that the unique contributions of students' social interaction, problem-solving, critical thinking, and creative ability scores to predict their digital learning readiness scores is not statistically significant is rejected and the alternative hypothesis is accepted. In other words, the unique contributions of students' social interaction, problem-solving, critical thinking, and creative ability scores to predict their digital learning readiness scores is statistically significant. Effect sizes were also evaluated using adjusted R^2 comparing it with Cohen's *d* statistics guideline, where $d < 0.20$ indicates a minimal effects size, $0.20 < d < 0.50$ indicates a small effect size, $0.50 < d < 0.80$ indicates a moderate effect size and $d > 0.80$ indicates a large effect size. The value of R adjusted square .068 indicates a large effect size.

Hypothesis 3: Students'social interaction, problem-solving, critical thinking, and creative ability scores do not significantly predict their digital learning readiness scores.

Table 7: t-test of regression coefficient of students' digital learning readiness scores using theirsocial interaction, problem-solving, critical thinking, and creative ability scores(N = 897).

Model	Unstandardized βeta	Std. Error	Standardized β	T	P-value	Remark
Constant	29.447	1.229		23.956	.000	S

Social interaction	.041	.032	.043	1.300	.194	NS
Problem-solving skill	-.027	.032	-.028	-.833	.406	NS
tical thinking skill	-.153	.033	-.158	- 4.630	.000	S
Creative thinking ability	-.166	.034	-.167	- 4.872	.000	S

Table 7 shows that students' critical thinking, and creative ability scores significantly predicted their digital learning readiness scores since their p-values are smaller than .05. While students' social interaction and problem-solving scores does not significantly predict their digital learning readiness scores since their p-values are greater than .05.

Discussion of findings

The findings from the study indicated that the seven assumptions that were tested did not violate the statistical guides being consulted in the process of checking them. This is an indication that students' social interaction, problem-solving, critical thinking, creative ability and their digital learning readiness represent and reflect on the willingnessand preparedness of students and contexts for successful digital learning at the national domain of secondary education for technology-rich education.In the study, it was indicated that the relationship between students' social interaction and their digital learning readinesswas moderately and not significantly related. This supported the study of Hurst *et al* (2013) which revealed that students perceived that social interaction improved their learning by enhancing their knowledge of literacy and teaching as well as their critical thinking and problem-solving skills. The relationship between students' problem-solving skill and their digital learning readiness was very low andnot significantly related. The relationship between students' critical thinking and their digital learning readiness was negatively moderate and significantly related. The relationship between students'creative ability and their digital learning readiness was negatively low and significantly related. These relationships that existed among the variables of the study is an indication that students' digital learning readiness has intricate interplay with modern innovative learning techniques to become stable in the learning domain that incorporate technology-rich education experience.

The findings from the result revealed that on the nature of regression equation, students' social interaction, critical thinking, creative ability, and problem-solving contributed positively and negatively to the predicting model. While students' social interaction contributed positively in predicting the model, it indicates that for every unit increase in social interaction, their digital readiness increased positively. The negative contributions of critical thinking, creative ability, and problem-solving in predicting the model, indicate a negative decrease in displaying their preparedness and digital competencies.

Findings from the study also indicate that the independent variables have intricate roles to play on students' digital learning readiness. In the present study it was revealed that critical thinking skill significantly predicted their digital learning readiness. This was supported by the study of Risis and Najdah (2025) which revealed that critical thinking is a significant predictor of digital literacy skills. For example, when students' social interaction score is positively and moderately not significant in predicting their digital learning readiness, their level of willingness to engage in digital learning will also be positively moderate influenced. When students' problem-solving is very negatively low but not significant in predicting their digital learning readiness, their desire to be willing to learn digitally will be negatively low. When students' critical thinking is negatively low and significant, their eager to participate in digital learning will equally be negatively low during the e-learning instruction. However, if students' creative ability is negatively low and not significant in predicting their digital learning readiness, their readiness to be digitally educated will also be negatively low.Finding in the study using effect sizes to evaluate the contribution of adjusted R^2 tocompare it with Cohen's *d* statistics guideline, the value of R adjusted square .068 indicates a large effect. This shows that the level of intricate interplay among students' social interaction, creative ability, problem-solving, and critical thinking scores has large effect in predicting their digital learning readiness.

Conclusion

From the findings of the study, it was concluded that the relative and intricate interaction of students'

social interaction, creative ability, problem-solving, and critical thinkingscores significantly predicted their digital learning readiness. Conclusively, it was found in the present study that the regression model of students' social interaction, creative ability, problem-solving, critical thinking and their digital learning readiness scores was significant.

Reccomendations

Based on the findings, the following recommendations were made:

1. It was recommended that students should be motivated to participate actively in the digital learning instructional process and technological driven workshops to update their knowledge on digital education.
2. Students' should be flexible when interacting with the digital learning apperatus in the e-learning process as a means to improve their digital competences.
3. As the digital learning readiness involves a dynamic process as it was indicated in the findengs which revealed that students' social interaction, creative ability, problem-solving, and critical thinking strongly and significantly predicted their digital learning readiness, teachers should be armed with the required assessment skills to deal effectively with these innovative learning skills that will foster students' digital learning readiness to actualize digital competence at the secondary school.

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