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UNVEILING THE DYNAMICS IN LEARNING AND EDUCATION: INVESTIGATING THE IMPACT OF EFFICACY, LITERACY AND SUPPORT ON STUDENT ENGAGEMENT

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Abstract

This research explores the impact of remote learning on student engagement, focusing on behavioral, emotional, and cognitive dimensions. Prompted by the COVID-19 pandemic, remote learning has become essential, bringing to light its benefits and challenges. The flexibility and accessibility of remote learning are advantageous, especially for non-traditional students. However, issues such as reduced student engagement, digital divide, and varying digital literacy levels present significant obstacles. The study examines how digital self-efficacy, digital literacy, and teacher support influence student participation and engagement in online learning environments. High digital self-efficacy and literacy are anticipated to enhance student engagement, while effective teacher support is crucial for a positive remote learning experience. The findings of the study found a more significant impact of digital literacy compare to self-efficacy. The research offers a a comprehensive model illustrating the interaction between these factors, providing insights and practical solutions to improve distance learning approaches.

Keywords: Student Engagement, Technology, Self-Efficacy, Digital Literacy, Teachers` Support.

INTRODUCTION

Following global events such as the COVID-19 pandemic, remote learning is now a key feature in education. This mode of teaching which uses online platforms to enhance learning outside classroom walls has been attracting serious discussions about student engagement, effectiveness, and equality regarding academic results. Experts of digital distance learning argue that it is characterized by unmatched adaptability and availability allowing learners to study when they want and at their own pace. This flexibility may be particularly helpful for non-traditional students – those who work or have children to take care of – and who might experience challenges accessing face-to-face classes (Means et al., 2013). Moreover, remote learning can provide access to a broader range of courses and resources that might not be available locally. This way it further expands educational opportunities (Allen & Seaman, 2017).

However, some critics believe that there are significant limitations that impede the quality of education. One major concern is less student engagement. It has been found that students in virtual classrooms often suffer from isolation and lack of motivation which reduces their commitment and scholastic attainment (Bolliger & Inan, 2012). Unlike traditional classroom settings where face-to-face interactions with peers and

instructors foster a sense of community and belonging, remote learning can create a disconnect that hinders active participation and collaborative learning.

In addition the digital divide leads to education disparities. Some students do not have equal access to adequate technology as well as internet required for effective online studies (Van Deursen & Van Dijk, 2014). Consequently this inconsistency becomes responsible for great variations in accomplishment levels among these learners creating a gap between the achievers' advantaged counterparts like unprivileged ones. For example research conducted by Di Pietro et al. (2020) found out that lower social-economic status students experienced more difficulties in accessing or participating in online classes thereby affecting their academic achievements.

Another important issue here involves digital literacy. Effective e-learning heavily depends on the student's ability to navigate across various digital platforms and use a wide range of online tools. Nonetheless, not all students are digitally literate thus they cannot fully comprehend what is taught in the classroom as well as actively participate in learning processes (Eshet, 2004). This discrepancy in digital abilities can be more evident among young students or those who come from low technological backgrounds also contributing to disparities in education.

The quality of teaching is also influenced within remote learning environments. While e-teaching might involve different types of multimedia and interactive means that enrich studying, it requires teachers to change their teaching methodologies greatly. Consequently, efficient online instruction varies from traditional classroom training due to such aspects as making interactive lessons accessible via internet and generating engaging online content for them (Garrison & Cleveland-Innes, 2005). Instructors with no qualifications or experience in these areas may struggle to discharge quality education remotely thereby interfering with learners' experiences.

To sum up, despite many benefits such as flexibility and wider access to learning resources which are associated with distance education, it also has a number of notable shortcomings in terms of student involvement, justice and learning process improvement. These challenges have to be tackled together to connect the digital gap, promote digital competence and offer enough instruction for teachers on how to teach online. While rethinking the way we educate our children is very important, there is a need to design remote learning methods that take advantage of its pros while trying to control for cons so that all students can excel.

LITERATURE REVIEW

Student Engagement in Remote Learning Environments

It is important that students are actively involved in learning for remote education to be effective. There are three dimensions under this; behavioral, emotional and cognitive. For this purpose, the use of these tools enhances better learning.

Behavioral Engagement: It entails active participation through attending online classes and submitting assignments on time (Watts & Ellis, 2018). This kind of engagement can be improved by effective design of online courses with interactive features such as discussion boards and multimedia contents (Martin & Bolliger, 2018). Emotional Engagement: It involves interestedness, motivation and acceptance among learners (Martin & Bolliger, 2018). Therefore emotional engagement can be kept alive through regular feedbacks, personalized communication and supportive online community

(Bolliger & Martin, 2018). Cognitive Engagement: It refers to putting efforts into learning processes and mastering skills. Consequently by providing challenging relevant tasks that promote problem-based learning and critical thinking skills one can enhance cognitive engagement (Fredricks et al., 2004). Other means include being present in virtual classrooms, providing feedback when due, using different instructional techniques, and having an open line of communication with students. The digital landscape must also be addressed if all pupils are to learn from home (Van Deursen & Van Dijk, 2014). In short, student engagement during remote learning is complex which require attention to behavioral, emotional and cognitive aspects. Apart from this, use of interactive tools, supportive communities, and teaching practices can increase student engagement towards their studies while addressing the digital divide ensures equity.

Digital Self-Efficacy Role in Education

In Bandura's Social Cognitive Theory, there is a need for a strong belief in one's ability to utilize technology appropriately referred to as digital self-efficacy. Thus it affects greatly the level of students' involvement in school activities, ways they learn new materials and their academic achievements.

Impact on Student Engagement: High digital self-efficacy students are more actively involved in digital learning, they are confident in navigating through platforms and confidently participating in virtual discussions which leads to depth of understanding as well as improved positive results (Ahmed et al., 2018; Joo, Lim, & Kim, 2013).

Facilitating Independent Learning: This has been facilitated by the advent of the internet age which has allowed students to go beyond the curriculum into exploring new ideas thereby developing critical thinking and problem-solving skills for survival within this era (Tsai & Tsai, 2003).

Influence on Academic Performance: Students' academic performance can be enhanced through improving their digital self-efficacy (Hodges et al., 2020). For instance such learners approach online tasks proactively resulting in high-quality work and better grades yet without technical issues worries.

Supporting Diverse Learners: Establishing digital self-efficacy is especially rewarding for diverse learners, helping bridge the digital divide and ensuring equal success opportunities. To create greater levels of self-efficacy among both boys' and girls' different literacy programs can be employed which ultimately help them build their confidence levels to comparable degrees (Van Deursen & Van Dijk, 2014).

Teacher's Role in Enhancing Digital Self-Efficacy: Quite a large number of teachers have made great efforts to get students familiar with these tools; they also try to establish a friendly atmosphere for effective communication. According to Tondeur et al. (2017), ensuring that teachers undergo professional development is important because they play a significant role in guiding learners.

Digital Literacy and Its Impact on Learning Outcomes

Digital literacy is considered mandatory for any modern educational system, as it empowers individuals with the ability to use digital tools effectively for finding, evaluating, creating and communicating information. The impact on learning outcomes is substantial in that it influences student's navigation and success in digital learning environments.

Definition and Components: Digital literacy is inclusive of media literacy; critical engagement with digital content; and information literacy (Eshet-Alkalai, 2004).

Enhanced Learning Engagement: Having proficient levels of digital literacy encourages participation in online discussions, group projects, and interactive learning that promotes deep learning via critical thinking and problem solving (Littlejohn et al., 2012).

Improved Academic Performance: Research shows that there to be a positive relationship between academic prowess of students relates positively with digital literacy. Such students can better access resources which help them research more at ease leading to high-quality work and thus improved grades (Claro et al., 2018).

Equitable Access to Education: Digital literacy safeguards equal rights to education. Learners without these competencies face difficulties in keeping up with their studies or participating successfully in online learning. Enhancing digital literacy could narrow this divide (Van Deursen & Van Dijk, 2014).

Critical Thinking and Information Evaluation: Digital literacy means being able to make sense of online information as much as it does misinformation management. Students are supposed to know how to distinguish trustworthy sources from deceptive ones based on certain criteria when it comes time for making choices while having respect for academicianship (Livingstone, 2004).

Preparation for the Workforce: A student's career readiness demands an understanding of what is meant by 'digital proficiency.' Integrating this knowledge into the curriculum will ensure that graduates are able to benefit from current employment opportunities (Bawden, 2008).

Challenges and Considerations: Universal understanding of digital reading skills is difficult to achieve in view of gaps in access to technology that are often educationally related. Schools and policymakers must address these gaps, and teachers need professional development to integrate digital literacy effectively (Ertmer et al., 2012).

Teachers' Support in Remote Learning

Teachers in distance learning have to provide emotional, instructional, and technical assistance in order to ensure that the students are engaged and successful. Teachers' support is indispensable for remote learning due to its peculiarities.

Emotional Support: An inclusive online environment can be created through empathy and encouragement to mitigate students' isolation and anxiety. Greater perceived emotional support is related to more student connection, engagement, motivation, and persistence (Pianta, Hamre, & Allen, 2012).

Instructional Support: Clear communication of objectives, timely feedback, and diverse teaching strategies adapted to digital platforms are the key elements. Multimedia tools coupled with interactive activities form an effective instructional support which enhances learners' comprehension as well as academic achievement (Garrison & Cleveland-Innes, 2005).

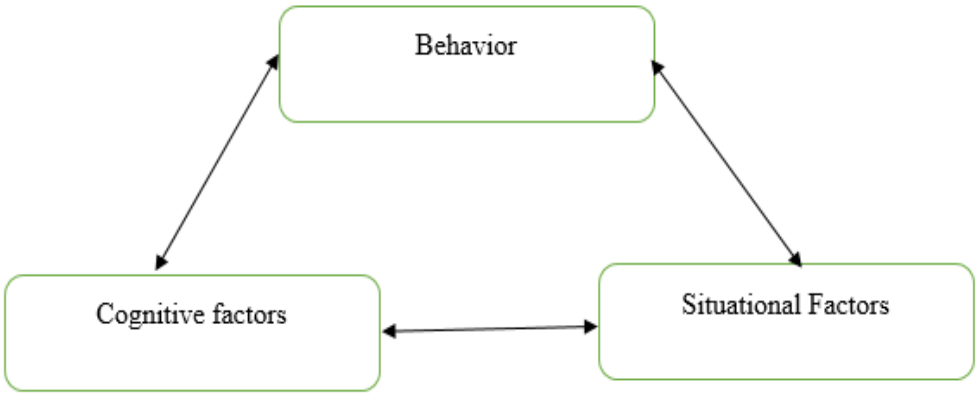
Technical Support: Assisting with technical issues, guiding how to use digital tools, and ensuring resource access are essential elements. Technical support is critical for students who lack digital literacy thus being capable of fully engaging them in online learning (Van Deursen & Van Dijk, 2014).

Moderating Role of Teachers' Support: Teacher's supportive actions help to enhance positive influences of the level of self-efficacy as well as rate of literacy on a student's involvement. By offering direction and access to resources, supportive teachers enhance confidence among students thereby boosting their potential for future learning (Tondeur et al., 2017).

Enhancing Engagement and Learning Outcomes: Creating interactive and enriching learning experiences among students makes supportive teachers very significant. By taking this holistic approach, instructors keep the motivation of learners alive as they overcome challenges associated with distance education (Ahmed et al., 2015; Mozammel et al., 2018; Richardson et al., 2017).

Challenges and Strategies: Comprehensive support provision in case of remote learning is not easy at all. For instance, teachers have to build relationships with their students while still remotely managing their needs including such issues like addressing technical glitches. These include training on internet teaching skills besides virtual communication, engagement techniques and technical skills in addition to troubleshooting (Ertmer et al., 2012).

Development of Research Hypothesis



Social Cognitive Theory

Social cognitive theory, developed by Albert Bandura, explains human behavior as a result of personal, behavioral, and environmental factors. Some of its key elements include reciprocal determinism, observational learning, self-efficacy, outcome expectations as well as behavioral capability.

Key Components:

1. **Reciprocal determinism**: According to Bandura (1986), this theory emphasizes the interplay between an individual's behavior, internal variables, and external stimuli. Changes in one of these areas may have an impact on other areas.
2. **Observational Learning**: Also called modeling, this process involves people learning by seeing the behaviors and results of others. Children mimic aggressive conduct they witness in others, as shown by Bandura's Bobo doll experiment (Bandura, Ross, & Ross, 1961).
3. **Self-Efficacy**: This is the conviction that one can carry out the actions required to achieve particular performance goals. Strong self-efficacy increases perseverance and motivation, both of which are essential for academic achievement (Bandura, 1997).

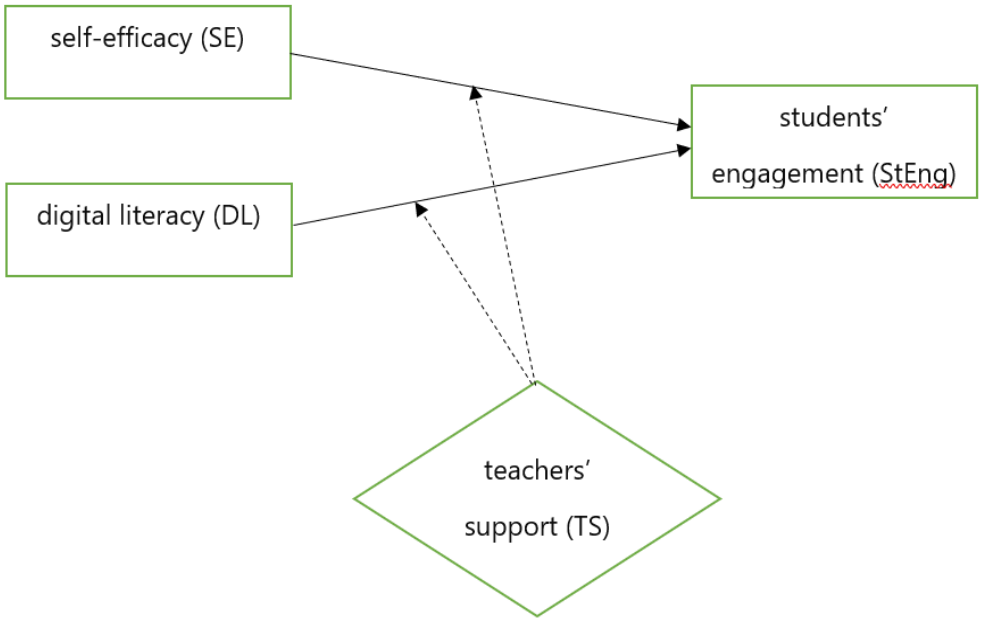
4. **Outcome Expectations**: These are convictions regarding how acts will turn out. Involvement can be encouraged or discouraged by expectations; positive expectations can foster involvement (Schunk, 1991).
5. **Behavioral Capability**: This incorporates knowing what has to be done along with having the skills needed for specific behavior. In order for learning to be effective enough understanding what needs to be done and how it should be done is necessary (Bandura 1986).

Social Cognitive Theory (Albert Bandura)

Applications in Education:

- **Modeling:** Teachers serve as examples for pupils, modeling social and intellectual behaviors that they expect them to follow.
- **Enhancing Self-Efficacy**: By giving constructive criticism and establishing realistic goals, teachers can help students become more self-assured and more engaged.
- **Supportive Environments**: Improving learning outcomes can be achieved by establishing a classroom environment that promotes constructive interactions and teamwork.

RESEARCH FRAMEWORK



Definitions of Key Variables

Independent Variable 1: Digital Self-Efficacy Digital self-efficacy refers to a student's belief in his/her capability to employ digital technology effectively for learning, which affects motivation and engagement in distance education learning settings (Bandura, 1997).

Independent Variable 2: Digital Literacy Involves the acquisition of skills necessary to find, evaluate, use and communicate information via digital platforms. Good digital literacy helps students easily navigate online educational resources (Eshet-Alkalai, 2004).

Dependent Variable: Student Engagement, this refers to how much attention, interest and being active is shown by the learner while participating in any educational activity. Learners who have better participation rates perform better academically (Fredricks et al., 2004).

Moderator: Teachers' Support, this comprises the emotional support offered by educators; instructional assistance given as well as technical help provided. By mitigating difficulties faced by the learners and creating conducive learning environment in remote areas this support boosts student engagement (Pianta et al., 2012).

Objectives of the Study

The research study entitled "Revealing Unseen Changes: Analyzing the Influence of e-Learning on Involvement among Pupils" is designed to comprehend what factors contribute to students' involvement in distance learning. The study's principal objectives are as follows:

First, the study aims at investigating how digital self-efficacy, which refers to students' confidence levels in using technology, impacts their participation and engagement. It is anticipated that high self-efficacy will correlate with increased motivation and engagement (Bandura, 1997). Secondly, it tries to examine how digital literacy – skills necessary for efficient use of digital technologies influences student engagement. Strong digital literacy is expected to improve students' ability of navigating online learning environments thereby enhancing the level of their involvement (Eshet, 2004). Thirdly, it assesses teachers' supportiveness including emotional and technical support provided by them during remote instructional process among others that can affect participation in any instruction program. Effective teacher support will be paramount for remote learning experiences (Pianta, Hamre & Allen, 2012). Fourthly, it seeks to establish a comprehensive model illustrating how digital self-efficacy and digital literacy interact with respect to teachers' support resulting in overall student engagement. Moreover this model is meant to direct future studies and provide practical solutions for improving distance learning approaches (Fredricks et al., 2004).

Based on the above, the specific objectives of the study are to test the following hypothesis,

H1: It is hypothesized that digital self-efficacy would significantly influence students' engagement in remote learning.

H2: It is hypothesized that digital literacy would significantly influence students' engagement in remote learning.

H3: It is hypothesized that teachers' support would moderate the relationship between digital self-efficacy and student engagement

H4: It is hypothesized that teachers' support would moderate the relationship between digital literacy and students' engagement.

Research Design

The framework under which a researcher intends to conduct a study is known as research design. It encompasses the type of study, purpose, methodology, population, data analysis, and procedures for the study, determining what is included and the criteria for evaluating the findings. For this study, a cross-sectional survey

methodology was employed to quantitatively analyze the impact of digital self-efficacy and digital literacy on student engagement in remote learning environments, with teachers' support acting as a moderator.

Sample and Population

The target population for this study comprised high school and college students involved in remote learning. A structured questionnaire was distributed to 300 students online, utilizing a convenience sampling technique to ensure accessibility and ease of data collection. Data were gathered through a Google Forms survey, ensuring wide distribution and ease of response. This method facilitated the efficient collection of data from the target population. By the end of the survey period, 243 questionnaires had been received, with a response rate of 81%. 44 surveys were eliminated from the 243 returned questionnaires because the majority of them were incomplete. The remaining 199 (including no missing value and outliers) questionnaires were deemed suitable for data analysis in the current study, with a valid response rate of 75.33%. A minimum response rate of 30% is sufficient for the survey approach (Livingston, 2012). Furthermore, Kimball & Loya (2017) proposed that a 35% response rate is enough for organizational research projects. Sekaran (2003) asserts that a sample size larger than 30 and smaller than 500 would be appropriate for the majority of non-probability techniques. As a result, the current study's legitimate response rate of 66.66% is deemed appropriate for data analysis, which is 199. Table 1 provides a full summary of the questionnaire responses for the current study.

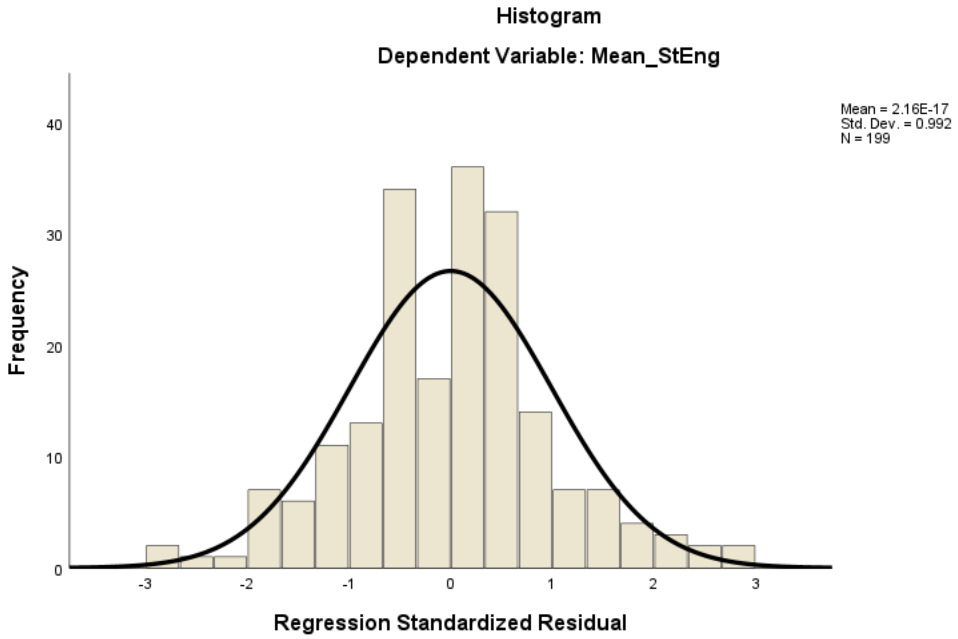
Table 1: Summary of the questionnaire responses for the current study Response rate

Response	Number of questionnaires	Percentage
Number of questionnaires distributed	300	100%
Total returned questionnaires	243	81%
Un-usable questionnaires	44	
Usable questionnaires	199	66.33%
Questionnaires deleted due to missing values	00	
Questionnaires deleted due to outliers	00	
Remaining usable questionnaires	199	66.33%

Normality Assessment:

Assessing normality is a vital multivariate analysis for comparing possible and expected scores of dependent variables (Burdenski, 2000). This is where PLS-SEM can be used to assess models under both normal and non-normal data conditions (Reinartz et al., 2009). There are many common tests for normality like skewness, kurtosis, stem and leaf plots, normal (p.p.) plots as well as Kolmogorov-Smirnov test most frequently used in social sciences (Mooi & Sarstedt, 2011). Correlations may become biased or results from multivariate analysis may be affected by the lack of normally distributed data (Chernick, 2011) which necessitates that data is checked for compliance with normality assumptions before proceeding to any analysis (Hair et al., 2014). The researchers made use of histograms and normal probability (p.p.) plots in order to check on the distribution of data along skewness and kurtosis lines. All

research variables were found to be normally distributed as indicated by Figures 1 and 2.



Figures 1

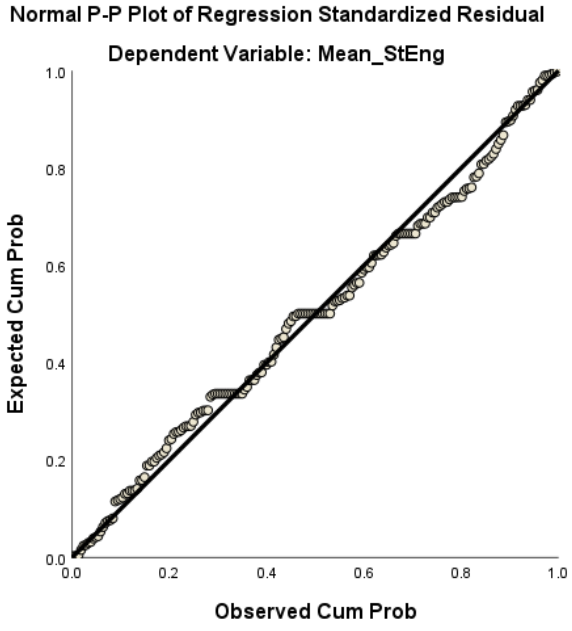


Figure 2

The researcher retests the data distribution for skewness and kurtosis through a second normality test (Tabachnick & Fidell, 2007). Data distributions with positive kurtosis are peaked-shaped; this suggests that the data is sharply clustered towards

the center with long tails. Negative kurtosis indicates a flattened distribution. On the left, it is said to be positively skewed; on the right, negatively skewed. Skewness and kurtosis should be near zero for a normal distribution. If skewness is greater than 1 there's skewness and if it's above +1 then it has too much peakiness though if it is less than -1 then there's flatness in its shape. Hair et al. (2010) provide acceptable ranges of ±2 skewness and ±7 kurtosis. Tables 2 and 3 have acceptable values of skewness and kurtosis around one which indicate normality respectively within an acceptable range of ±2 (Hair et al, 2010).

Table 2: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Mean_SE	199	2.00	5.00	3.8731	.71106	-.217	.172	-.484	.343
Mean_DL	199	2.25	5.00	3.9623	.66796	-.200	.172	-.552	.343
Mean_TS	199	2.50	5.00	3.9736	.68736	-.046	.172	-1.086	.343
Mean_StEng	199	2.25	5.00	3.9585	.66703	-.152	.172	-.572	.343
Valid N (listwise)	199								

Table 3: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
SE1	199	1	5	3.87	.864	-.371	.172	-.307	.343
SE2	199	2	5	3.81	.853	-.126	.172	-.791	.343
SE3	199	1	5	3.88	.818	-.288	.172	-.225	.343
SE4	199	2	5	3.92	.849	-.246	.172	-.792	.343
DL1	199	2	5	3.94	.857	-.273	.172	-.815	.343
DL2	199	2	5	3.94	.836	-.210	.172	-.881	.343
DL3	199	2	5	3.99	.816	-.319	.172	-.673	.343
DL4	199	2	5	3.97	.825	-.280	.172	-.764	.343
TS1	199	2	5	3.89	.815	-.133	.172	-.805	.343
TS2	199	2	5	3.95	.851	-.251	.172	-.868	.343
TS3	199	2	5	4.03	.775	-.175	.172	-.964	.343
TS4	199	2	5	4.03	.822	-.276	.172	-.939	.343
StEng1	199	2	5	4.03	.881	-.417	.172	-.839	.343
StEng2	199	2	5	3.97	.837	-.369	.172	-.610	.343
StEng3	199	2	5	3.87	.852	-.151	.172	-.876	.343
StEng4	199	2	5	3.95	.843	-.323	.172	-.688	.343
Valid N (listwise)	199								

Table 3

Table 4.1: GENDER

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	97	48.7	48.7	48.7
	Male	102	51.3	51.3	100.0
	Total	199	100.0	100.0	

Table 4.2 AGE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	15 - 20 years	35	17.6	17.6	17.6
	20 - 25 years	85	42.7	42.7	60.3
	25 years and above	79	39.7	39.7	100
	Total	199	100	100	

Gender Distribution in Remote Learning

Table 4.1 presents the gender distribution of respondents in the study "Unveiling the Dynamics: Investigating the Impact of Remote Learning on Student Engagement". This table shows that out of a total of 199 respondents, 97 were female constituting approximately half (48.7%) of all respondents and 102 males representing 51.3%. This near equal split allows for a balanced understanding regarding how remote learning affects engagement among students across genders. The cumulative percent column indicates that when both gender categories are considered, all the respondents have been taken into account translating into complete gender representation in this study.

This information is necessary to understand how remote learning works differently for different sexes in terms of engaging with various digital education platforms through which it is done. Such findings can indicate whether there are any significant issues or benefits pertaining to one sex while studying remotely based on almost equal representation. These finer distinctions can be applied to tailored interventions aimed at addressing needs unique to every girl and boy learner thereby facilitating overall participation alongside academic outcomes during remote learning.

Age Distribution in Remote Learning

In this study named 'Unveiling the Dynamics: Investigating the Impact of Remote Learning on Student Engagement', Table 4.2 outlines age distribution amongst participants involved as respondents. The data suggests that there are 17.6% who fall between fifteen and twenty years old, there is a percentage of 42.7% coming from those aged between twenty and twenty-five years while those who are above twenty five years also account for 39.7%. This implies that there is a wide range of ages represented by people who took part with majoority being within 20-25 years old.. The cumulative percentages reveal that once all these age groups are summed up, they yield one hundred per cent which implies comprehensiveness concerning age data utilized in sampling these subjects.

The understanding of the age distribution is crucial for analysis of different remote learning engagement by different aged people. Younger learners may have different digital literacy levels and learning preferences compared to older ones. This diversity can show how age impacts on digital self-efficacy, the effectiveness of teacher support, and overall student engagement within the research. These findings may be important in designing intervention measures that are suitable for each age level and promote quality remote learning environment irrespective of one's chronological years from birth to maturity.

Assessment of Measurement (outer) Model

The outer measurement model is an essential building block of SEM, which focuses on the relationships between observed variables (indicators) and their underlying latent constructs. This is a process of assessing reliability and validity of constructs to ensure that the indicators can legitimately be assumed to reflect the latent variables

they are designed to measure. Cronbach's alpha and composite reliability are among typical measures of reliability in this context while for validity purposes; average variance extracted (AVE) is often used (Hair et al., 2017; Henseler et al., 2015).

Table 5: Construct Reliability and Validity-Overview

Construct	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
DL	0.813	0.837	0.883	0.662
SE	0.862	0.862	0.907	0.709
StEng	0.789	0.792	0.864	0.615

The above table no 3 provides key information about three factors: Digital Literacy(DL), Self-Efficacy(SE), and Student Engagement(StEng). For instance, Alpha Cronbach was deemed high at .813 indicating that its indicators have good internal consistency. The composite reliability values rho_a = .837 and rho_c = .883 were above the threshold of 0.70 confirming that the construct has strong internal consistency. The AVE=0.662 which indicates that most of the variances in indicators are accounted for by this construct therefore supporting convergent validity.

Self-Efficacy records an Alpha Cronbach value as high as .862 suggesting excellent internal consistency. Similarly, both Composite reliabilities rho_a=rho_c=0.862 and 0.907 reveal great reliability characteristics towards it too. Another indication is its AVE being at 0.709 also pointing out high levels of convergent validity with almost all indicator variances being due to self efficacy.

Internal consistency was moderate with Cronbach's alpha equaling α = 0.789 whereas both rho_a=.792 and rho_c=.864 indicated desirable thresholds for reliability within the construct Composite Reliability values respectively… An average variance extracted score equal to 615 also confirms acceptable convergent validity where more than half of its indicator variances results from a single latent factor.

From the above table, we can see that these constructs: Digital Literacy (DL), Self-Efficacy(SE), and Student Engagement(StEng) – have all reached a good level of reliability and validity for which the Cronbach's alpha, composite reliability, and average variance extracted can provide evidence.

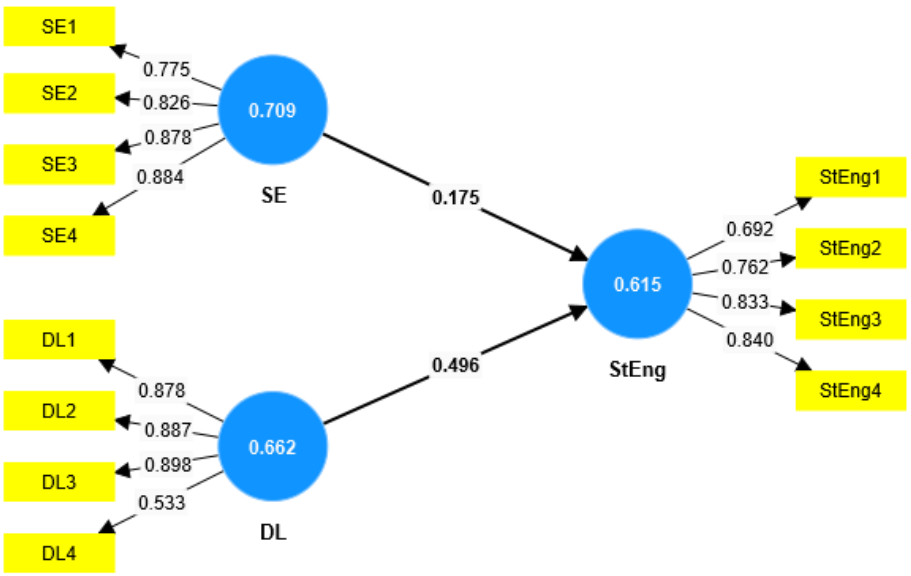


Figure 3

Assessment of Structural (inner) Model

The assessment of the structural (inner) model in structural equation modeling (SEM) involves evaluating the relationships between latent constructs, which helps in understanding the strength, significance, and relevance of the hypothesized paths within the model (Hair et al., 2017). The table below shows important statistics for Digital Literacy (DL) vs Student Engagement (StEng) and Self-Efficacy (SE) vs. Student Engagement (StEng).

Tabel 6: Path Coefficient (direct relationship)

Construct	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
DL -> StEng	0.496	0.501	0.102	4.858	0.000
SE -> StEng	0.175	0.175	0.102	1.715	0.086

The original sample path coefficient (O) on Digital Literacy-Student Engagement relationship is 0.496 which indicates a moderate positive correlation. Moreover, the sample mean(M) of 0.501 is quite close to that of the first sample thus showing stability across samples indicating that this relationship has remained constant across different samples. In addition, there was low typical deviation (STDEV = 0.102), which implies greater constancy in estimating the path coefficients at a low level of variation. Besides, t-value (|O/STDEV| = 4.858) is significantly high than common threshold value at alpha=.05 and above it indicating that there is statistical significance between two variables or relationships has been statistically proven true beyond any doubt as p-value=0(Henseler et al.,2015).

On the other hand, we have an original sample path coefficient of 0.175 showing a weak positive correlation for Self-Efficacy-Student Engagement. Also, this mean value was observed to be at the same point with initial estimate therefore providing consistency. The standard deviation was equal to that for Digital Literacy to Student Engagement path (0.102), this represents similar estimation variability. However, the T statistic (1.715) <1.96 which is very low hence implying the relationship is not statistically significant which is also evident by the P-value= .086 (Fornell & Larcker,1981).

Overall, structural equation modeling confirms that digital literacy significantly impacts positively on student engagement by offering a large pathway coefficient accompanied by significant T-statistic and p-value, which ulti. In contrast, self-efficacy is seen to have a weaker and marginally significant positive relation with student engagement. In general, this means that while improvement in digital literacy will enhance student engagement significantly, the impact of self-efficacy is less significant but still positive.

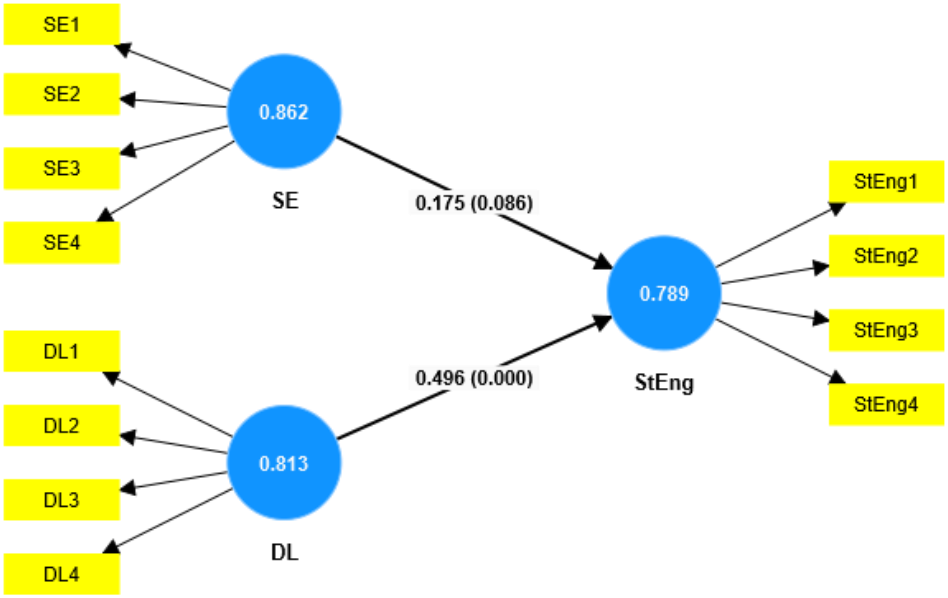


Figure 4

Assessment of the Significance of the Moderating Path Coefficient

The significance of the moderation path coefficient is crucial in determining how much a moderator variable impacts the relationship between an independent and dependent variable. This includes assessing the results in terms of path coefficients, standard deviations, t-statistics and p-values obtained using bootstrapping. The high t-value (usually larger than 1.96 at 95% confidence level) and low p-value (typically lower than 0.05) indicate that a significant effect of interaction term on dependent variable (Hair et al., 2017; Henseler et al., 2015).

Table 6: Path Coefficient with Moderator

Construct	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
DL -> StEng	0.212	0.211	0.095	2.23	0.026
SE -> StEng	0.155	0.156	0.075	2.062	0.039
TS -> StEng	0.486	0.489	0.074	6.607	0
TS x DL -> StEng	0.039	0.037	0.071	0.557	0.577
TS x SE -> StEng	-0.027	-0.024	0.072	0.373	0.709

The above table no 6 summarizes path coefficients with statistical significance for direct effects and moderating effects on Student Engagement (StEng). As for Direct Effect of Digital Literacy (DL), sample original (O) path coefficient was found to be 0.212 with a t-value of 2.23 and a corresponding p-value of 0.026 indicating statistically significant positive relationship. Similarly, Self-Efficacy (SE) has got a path coefficient of 0.155, a t-value equal to 2.0620,and its p-value (0.039) meaning that it has significant influence on Student Engagement.

On the other hand, Teacher Support (TS) has the maximum direct impact on student engagement among other factors as evident by its path coefficient which stands at 0.486, t-value (6.607), and p-value (0). TS x DL has a path coefficient of 0.039, t = 0.557, p = 0.577, while TS x SE has a path coefficient of -0.027, t = 0.373, p = 0.709. These results provide an indication that Teacher Support (TS) does not significantly moderate the relationships between digital literacy or self-efficacy and students' engagement.

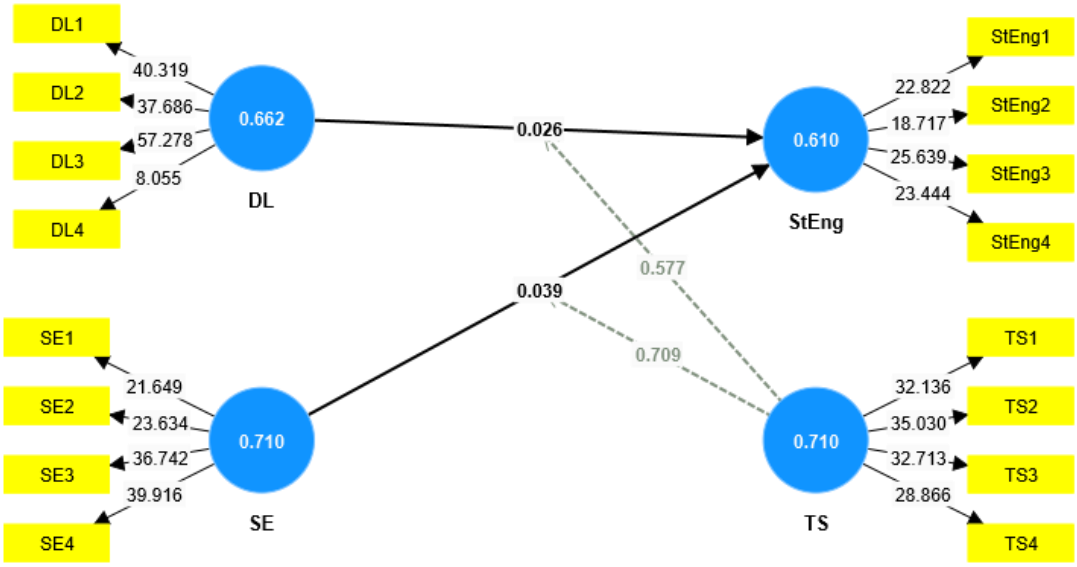


Figure 5

To summarize, Digital Literacy, Self-Efficacy and Teacher Support all have significant direct effects on Student Engagement, however, the moderating effects of Teacher Support on the relationships between Digital Literacy and Student Engagement as well as Self-efficacy and Student Engagement are not significant. It shows that presence of Teacher Support does not change the strength or direction of these relationships.

CONCLUSION

This study, "Unveiling the Dynamics: Investigating the Impact of Remote Learning on Student Engagement," is an application of Social Cognitive Theory to investigate the relationship of self-efficacy, digital literacy, and student engagement with teacher support as a potential moderator. The results of the path coefficient (direct relationship) show that self-efficacy is insignificantly associated with student engagement (path coefficient = 0.175, p = 0.086). Hence, hypothesis H1 is not supported. On the other hand, self-efficacy is significantly associated with students' engagement when interplayed with the moderation of teacher support (path coefficient = 0.155, p = 0.039), which means that the more confident students are in their abilities, the higher levels of their involvement will be. In this case, hypothesis H1 is supported. Similarly, digital literacy significantly increases student engagement (path coefficient = 0.212, p = 0.026), meaning those learners who have more technological proficiency are likely to be more involved in their distant learning activities. Hence, hypothesis H2 is supported.

Teacher support, which represents technical skills, has the most powerful direct impact on student engagement (path coefficient = 0.486, p < 0.001), underscoring that teacher support is critical for fostering learner participation in a remote learning environment. However, teacher support does not moderate the influence between digital literacy and student engagement (path coefficient = 0.039, p = 0.577) or between self-efficacy and student engagement (path coefficient = -0.027, p = 0.709). Hence, hypotheses H3 and H4 are not supported. This finding indicates that even though teacher support is important for engaging students while learning online, it does not change how much they use technology or feel about themselves when faced with new academic concepts.

With a quantitative analysis of self-efficacy, digital literacy, and student engagement within a remote learning context, this paper fills a gap identified by other studies on remote learning that have gained attention due to its increasing reliance on online education delivery modes. Prior research usually examines these elements singularly or within a typical classroom environment. By addressing this gap, this piece of investigation provides a comprehensive framework that highlights the importance of enhancing students' digital literacy and self-efficacy to improve their engagement in remote learning. Through this investigation, the researcher successfully tested the hypothesis and advocates for an all-inclusive approach that amplifies students' digital literacy and self-efficacy to enhance their engagement in remote learning. While teacher support is highly crucial in directly stimulating student engagement, it doesn't serve as a moderator of digital literacy and self-efficacy effects on the same. Based on these results, it can be concluded that educators and policymakers who aim to get the most out of remote learning should focus on both students' digital literacy and supportive teaching practices.

Limitations and Scope for Future Research

The study focused in cross-sectional research design therefore, future studies may consider longitudinal approach to bring forward generalizable results. Accordingly, the study examined employees from a single geographical setting and thus, a wider geographical target sampling of respondents would be ideal for future scholars. In addition, future studies may also consider testing mediating variables in the framework towards the prediction of student engagement.

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