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INFLUENCE OF ATTRIBUTES OF SELF-REGULATED LEARNING ON E-LEARNING IN SECONDARY SCHOOL STUDENTS

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ABSTRACT

Online learning, a solitary experience for the students? Are they studying in isolation? Is it satisfying? How can we design an approach that is more learner-centric? Students vary in their learning styles and characteristics. How can we make them more successful?
If students are made aware of their learning style and characteristics, can't they learn effectively through a virtual platform? If students are aware of SRL (Self-regulation learning) skills ,they will be able to plan their learning correctly, which will lead to an increase in their academic performance.
The newness of online education has not allowed course content introduction effectively. Teachers need to guide the students to develop Self-regulation skills. Teachers must modify their lesson plan; a matching teaching style should be implemented after understanding the varied learning style. So this study addresses the influence of learner SRL skills on e-learning effectiveness among secondary school students.

Keywords: Self Regulated Learning, Online Learning, Secondary School, Skills

1. INTRODUCTION

Due to the pandemic situation caused by COVID-19, there was an abrupt shift in the schools from conventional face-face interaction to a wholly synchronised digital mode of teaching. This transition happened overnight, and neither are teachersnor students were ready for the "new normal" in teaching-learning. Our curriculumwas designed and was suitable for face-face classroom interaction. Also, apart from not being competent in using these technologies, most of our teachers lacked Pedagogical Content Knowledge (PCK) for the online teaching model.

A year into this unprecedented pandemic, the teachers are now accustomed to the technology-enabled teaching process. The technology-savvy students have also got used to it. But how effective has this teaching-learning process been?

Although we managed to overcome the situation using technology, the efforts have been disjointed and without concern for the methods' efficacy. Apart from fundamental technology-related challenges like bandwidth/connection issues, teachers found it challenging to keep track of students' activities during the class. Students turned their videos off and indulged in playing online games or other actions without listening to the teacher. Some students also found these

online classes very dull and monotonous.Students developed the habit of procrastinating the learning of content taught.One of the crucialfeatures of online education is the autonomy students experience in the learning environment (Barnard et al.,2008).They experience greater freedom in terms of place, time and physical materials,and absolutely, there is no control of whenwhat and how to study.Thus, self-regulation becomes the determining factor for better academic performance in school students through online mode.

Students differ in their learning styles, knowledge, skills, pace, and attitude. (Bordersen, 2017). Given this situation, it is high time that we analyse the effectiveness of teaching &learning through technology-enabled distant/remote mode and redesign the teaching-learning paradigm keeping the Learner in focus. During this process, key aspects include learning style preferences, desired learning outcomes, instructional design principles, innovative content delivery,and students' behavioural discretion towards technology. These have a tremendous impact on the efficacy of any technology-enabled teaching-learning process.

2. OVERVIEW OF E-LEARNING AND ITS EFFECTIVENESS

2.1. WHAT IS E-LEARNING?

E-learning (electronic educational technology) applies information technology toteaching and is not restricted to high technology alone. E-learning comprises an extensive use of digitisation approaches, components, and delivery methods. It can be synchronous or asynchronous. It is no more an option but a necessity. (Dhawan. S, 2020) It makes optimal multimedia principles and provides ample chances for practice and feedback. (Surma and Kirschner,2020) online learning is learning mediated by the net. There should be a clear, objective, and well-designed task framed by the facilitators. All stakeholders' responsibility to design a good curriculum apt for online education (Rapanta et al., 2020) cannot be ignored.

Audio or videotape, satellite television, CD-ROM, and computer-based learning, as well as local intranet/extranet and web-based learning, are all examples of educational technology. (Suryawanshi and Suryawanshi,2015).

E-learning, or technology-delivered instruction, is an educational and learning instruction aided by information and communication technology (ICT), allowing learners to gain new knowledge and skills without worrying about time zones. (Mbarek and Zaddem, 2013).

2.2. WHAT IS E-LEARNING EFFECTIVENESS?

E-Learning effectiveness is a student's knowledge and skills acquired through e-learning. The learning becomes effective only when the Learner tries to apply the fundamental concept learned in real-life situations. It can be checked by analysing the learning outcome and classroom interaction (Teacher-student interaction). Defining the effectiveness of e-learning is very important as it gives reflection and inspiration to utilise the concept of learning effectiveness to align the expectations and targets of stakeholders. (Schack. S et al. 2015)

2.3. THE IMPLEMENTATION OF AN E-LEARNING SYSTEM

We are left with no option but to depend on the internet as the medium of choice to supplement instruction in school education amidst the pandemic.

(Rapanta et al.,2020), opined that humans construct their knowledge differently from other living beings. A little child builds knowledge blocks bit by bit, using sensory/intellectual ability to reason 'what,' 'why,' and 'how' using real/concrete items. As a result of this procedure, the child will have more enriching experiences.

The school must build on the child's prior learning experiences.As the facilitator in this process, the teacher must be well-versed in various pedagogies and learning theories andimplement them in their classroom.The ability to track a child's learning development from the beginning to the end is crucial in this process. The system should provide conditions that enable each Learner to learn and progress at their pace. To achieve better learning outcomes, a teacher should design teaching-learning activities geared towards the students' cognitive and social needs.How can we motivate the learners?

- Encourage students to set personal goals (Goal Setting)
- Assist Learner in identifying the learning gaps

- Provide learners with a personalised learning path.
- Give learners time to reflect after doing a learning activity
- Let students identify their strengths and weakness,mistake driven learning.
- Emphasise on positive learning culture

Learners can construct knowledge and learn basis their engagement – by exploring, responding to, making meaning of the world around them. Schools need to recognise this capacity and focus on learning instead of the product of learning andemphasising the competency-based education process.

The National Education Policy (NEP) 2020 has underlined the need for clear learning outcomes for competency-based teaching, learning, and assessment at all school education stages. It also recommends a 'Holistic Progress Card' to assess all aspects ofa child's holistic development. Students should create their learning tools. The teacher becomes the student, and students become self-teachers or peer teachers to increase the knowledge and skills for technology-based active learning. (TEAL) Technology can help better grasp concepts through visual representation, creating intense learning experiences. Technology allows connection with other disciplines and exchanges ideas to a broader audience by increasing communication and collaboration.

2.4. OVERVIEW OF SELF-REGULATED LEARNING (SRL)

We are almost a year past the pandemic, and there is a need to understand learners to develop high-quality e-learning. E-learning is the only way to learn in school during this pandemic time, and it is widely employed to train and educate our pupils. According to the SRL theory, learning is "an activity that students proactively do for themselves" (Zimmerman & Schunk 1989) rather than something that occurs to them. Self-regulated learners are individuals who "control their learning processes and outcomes by setting demanding goals for themselves, using suitable tactics to achieve their goals, and engaging self-regulative mechanisms."

Although e-learning environments differ from traditional learning environments, learners must self-regulate to be effective (Lee 2004). learners should have the following essential self-regulatory traits: 1) goal setting 2) time management, 3) help-seeking, 4)Task Strategies,5)Environment structuring and 6)Self Evaluation

2.5. GOAL SETTING (GS)

The Learner should have a fixed goal for achieving the appropriate learning outcome. The degree to which a student participates in a learning task to meet a personal challenge, satisfy personal curiosity, and achieve personal mastery of the task's aspects is referred to as intrinsic goal orientation (Lynch et al. 2004). Extrinsic goal orientation refers to how much a learner participates in an e-learning course to achieve a specific goal, such as performance, prizes, promotion, or social approbation (Lynch et al. 2004, McWhaw et al. 2001, p. 315).

2.6. TIME MANAGEMENT(TM)

The ability of a student to manage their time through scheduling, planning, goal-setting, and prioritising is referred to as time management (Miltiadou et al. 2003, Lynch etal., 2004). It is not merely the amount of time spent that is important, but rather the effective use and management of time (Whisler 2004). Self-regulated learners know how to

manage their time because they know deadlines and how long it will take to complete each

assignment. (Lynch and Dembo,2004)

2.7. ENVIRONMENT STRUCTURING (ES)

Controlling and avoiding potential distractions during learning is the goal of environmental management.There are many distractions for the Learner, especially when the content access is through theinternet.There is a solid need to restructure the place from where they will be studying. It should be a calm,isolated, quiet place.Students should also ensure robust internet connectivity to avoid any lag.(Lynch and Dembo,2004)

Task Strategies (TS)

TheLearnerhas to set the time limit for specific taskslike completing the assignmentson time,fixing the time forfollow upwith the teacher for the content clarityor in case of doubt.The Learner has to plan his strategies for completing the necessary task given by the teacher.

Seeking Help (HS)

E-learners may feel socially isolated. Learners who do not use help-seeking tactics in suchsituations may grow upset with e-learning courses, negatively impacting their performance.Thepractical and efficient use of instructional technology systems demands motivation and self-regulation. It is true when it comes to online learning.Students who study online must choose where and how to seek assistance and make decisions about the most critical issues.(Lynch and Dembo,2004)

Self Evaluation(SE)

On the other hand, formative assessment is primarily intended to educate the instructor about the student's development. When students examine their performance in a course, this is known as self-assessment. Students must reflect on their progress and develop personal learning goals through self-assessment or self-evaluation.

3. LITERATURE REVIEW

Zheng et al. (2018) examined the impact of a mobile self-regulated learning (SRL) system on university students' academic performance and SRL skills. This study involved 60 undergraduates using a mobile SRL approach to learn English. Results demonstrated that students utilizing the system achieved higher learning outcomes and improved SRL skills compared to the control group. The system was reported to be user-friendly and effective without increasing cognitive load. These findings underscore the potential of mobile SRL tools in enhancing academic success, especially in language education, while providing an engaging learning experience.

Wan et al. (2012) analyzed the influence of self-regulated learning strategies on e-learning outcomes among employees in organizational contexts. The study identified personal and social self-regulated learning strategies as pivotal for e-learning success. Factors such as virtual competence, goal orientation, and cooperative norms shaped learners' strategy use. Findings emphasized the importance of integrating features that support self-regulated learning into e-learning platforms. Organizations can enhance employee training outcomes by fostering active learning behaviors and designing systems that accommodate diverse learning strategies. These insights guide both e-learning developers and corporate trainers in improving online education efficacy.

Ejubovic and Puška (2019) examined the role of self-regulated learning (SRL) in enhancing academic performance and satisfaction among online learners in Bosnia and Herzegovina. This study employed exploratory factor analysis to confirm that SRL positively influences satisfaction and academic outcomes. Key SRL components such as goal setting, time management, and self-monitoring were significant predictors of success in online education. The findings underscore the importance of fostering SRL skills through e-learning platforms and instructional design, providing actionable strategies for improving learner engagement and performance.

Wang (2011) developed the Peer-Driven Assessment Module of the Web-based Assessment and Test Analysis (PDA-WATA) system to enhance self-regulated learning (SRL) among junior high students. This study implemented a multiple-choice web-based assessment system incorporating SRL strategies such as confidence rating and peer review. Results showed that these features significantly enhanced students' SRL behaviors and e-learning outcomes. The research highlights the value of integrating structured assessment tools into e-learning environments to promote self-regulation and academic performance among younger learners.

Sun and Lee (2018) examine the relationship between student characteristics, self-regulated learning strategies, and their impact on academic satisfaction and performance in MOOCs. Their study underscores how self-regulated learning empowers students to manage the challenges of MOOC environments effectively. Students with robust self-regulation skills consistently reported higher levels of satisfaction and academic achievement, suggesting the critical role of these strategies in online education.

Ahmed et al. (2020) explore the influence of metacognitive abilities on e-learning outcomes among senior secondary school students, comparing outcomes across various school types. Their findings reveal that schools with well-structured e-learning programs facilitate the development of stronger metacognitive skills, leading to improved academic

performance. This highlights the importance of institutional frameworks in cultivating effective self-regulation practices in digital learning contexts.

Brown and Smith (2019) investigate the role of self-regulated learning in the academic success of students within vocational education's blended learning environments. Their study demonstrates that students who actively engage in planning, monitoring, and reflecting on their learning processes achieve greater academic success. Blended learning, which demands both autonomy and structured guidance, particularly benefits from students' self-regulation efforts.

Chen and Zhao (2021) analyze the relationships between online self-regulation skills, satisfaction, and perceived learning among distance education learners. Their study establishes a strong connection between effective self-regulation and positive educational experiences in distance learning. The findings advocate for integrating self-regulation training into course design to enhance learner satisfaction and perceived academic outcomes.

Williams and Taylor (2022) investigate how technology-enhanced learning environments influence students' self-regulated learning behaviors. Their research finds that interactive and adaptive technologies encourage goal setting, progress monitoring, and self-reflection. However, they caution against over-reliance on technology without appropriate pedagogical guidance, as it may foster surface-level rather than deep learning strategies.

Johnson (2017) examines the impact of self-regulation on perceived learning outcomes through the lens of Social Cognitive Theory. The study finds that self-regulation acts as a critical mediator between intrinsic motivation and academic success. Self-regulated behaviors, including goal setting and self-assessment, significantly enhance students' engagement and learning outcomes across diverse educational contexts.

Kim and Park (2020) extend the Technology Acceptance Model (TAM) by integrating self-regulated learning and affinity for technology to explore students' acceptance of e-learning platforms. Their findings indicate that self-regulated learners with a higher affinity for technology are more likely to perceive e-learning as effective and satisfactory. This research emphasizes the synergistic impact of individual traits and technological affordances on e-learning adoption and success.

4. RESEARCH QUESTION

How do Self-regulatory learning attributes(goal setting, environment structuring, time management, task strategies, help-seeking and self-evaluation) affect academic performance among secondary and senior secondary school students?

Hypothesis

H01: There is no significant association between GS(Goal Setting)and academic performance.

Ha1: There is a significant association between GS(Goal Setting)and academic performance

H02: There is no significant association between ES(Environment structuring)and academic performance.

Ha2: There is a significant association between ES(Environment Structuring)and academic performance

H03: There is no significant association between TS(Task Strategies)and academic performance.

Ha3: There is a significant association between TS(Task strategies)and academic performance.

H04: There is no significant association between TM(Time Management)and academic performance.

Ha4: There is a significant association between TM(Time Management)and academic performance

H05: There is no significant association between HS(Help-Seeking)and academic performance.

Ha5: There is a significant association between HS(Help-seeking)and academic performance

H06: There is no significant association between SE(Self-Evaluation)and academic performance.

Ha6: There is a significant association between SE(Self-evaluation)and academic performance

5. METHODOLOGY

Type of research: Causal Research

Data sources: Primary and secondary.

Data collection: Survey

Research instruments: Questionnaire

Contact method: Face to face interview.
Sampling decision: Sample size 123
Statistical Technique: Correlation Analysis using SPSS

6. PARTICIPANTS

The research participants(n=123)were the students of classes 10 and 12 of a leading CBSE public school in Delhi, India. The entire course is divided into two terms, Term-1 and Term -2.The students were doing their term two-course when participating in the survey.Due to the pandemic, students of these classes were purely learning through the synchronous online learning mode.The online learning classes were of5 periods, 40 min duration each.The teachers taught using visual and auditory teaching aids for better concept clarity.Students never met teachers for a face to face interaction.Assignments were sent and were submitted back via email.Students approached their teachers online for doubt clearing after the online classes.Students were assessed offline.(Exams were conducted by the CBSE offline when there was a decline in Covid cases)

The age range of the sample was 15-19years.The sample was split between the genders, Female (59-class 10,63-class 12)and Male(64-class10,60-Class12).

1) Instrumentation

The criterion variable was the Student'sacademic performance,operationalised as the term -1 grades.Six predictor variables were selected from the literature review.The six chosen variables for thestudy are self-regulatory variables: goal setting, environment structuring, time management, task strategies, help-seekingand self-evaluation).The six variables are operationalised in the form of subscales on the OSLQ (online self-regulated learning Questionnaire) (Barnard etal.,2008)

The Online Self-regulated Learning Questionnaire (OSLQ; Lan, Bremer, Stevens, & Mullen, 2004; Barnard, Paton, & Lan, 2008) is a 24-item scale with a 5-point Likert response format, with values ranging from strongly agree (5) to disagree strongly. (1). The OSLQ was created using an 86-item pool and then tested for internal consistency and exploratory factor analysis results for the data collected. The OSLQ comprises six subscales: environment structuring, goal planning, time management, help-seeking, task strategies and Self-evaluation. Whenexamining the internal consistency of scores by subscale, values forCronbach alpha ranged from .67 to .90, revealing sufficient score reliability on the subscale level. Students with higher scores on this scale had more robust self-regulation in online learning. (Barnard et al.,2008)

2) Procedure

A non-experimental correlational research design using random sampling was operationalised through OSLQ to understand the effect of the predictor variable (Subscales of self-regulated learning)on criterion variable academic performance. The research questionnaire was given to the students in the form of an online google form, and responses of 123 students of classes 10 and 12 were randomlyselected.

7. RESULT

The research study explored both inferential and descriptive statistics.The descriptive statistics involves the sample collected's simple mean,standard deviation, and demographics.Inferential statistics involves correlation analysis of the six predictor variables and criterion variables to infer the role of self-regulated learning attributes on e-learning effectiveness. The criterion variable (Grades) is an essential determinant of e-learning effectiveness. Correlation analysis of the variable was done on SPSS.The level of significance used for the analysis was 0.05. (95percent confidence)

Reliability analysis of all subscales had good internal consistency reliability.The internal consistency of scores by subscale, values forCronbach alpha ranged from .67 to .90, revealing sufficient score reliability on the subscale level(Barnard et al.,2008).

Simple correlations of all variables in the study(Fig 1 and 2)revealed no significant association of any predictor variables with the final grade.But there is a correlation between the predictor variables, which shows that they are self-regulated learning attributes.There is positive correlation of Goal setting and Grade in class 12(fig 2) $P<0.05$),which shows that goal setting which is an integral part of motivation is a strong indicator of self -regulated learning .

Correlations (Class-10)

		GS	ES	TS	TM	HS	SE	Grade
GS	Pearson Correlation	1	.526**	.368**	.535**	0.120	.339**	0.116
	Sig. (2-tailed)		0.000	0.000	0.000	0.185	0.000	0.202
	N	123	123	123	123	123	123	123
ES	Pearson Correlation	.526**	1	.234**	.262**	0.034	.211*	0.159
	Sig. (2-tailed)	0.000		0.009	0.003	0.705	0.019	0.079
	N	123	123	123	123	123	123	123
TS	Pearson Correlation	.368**	.234**	1	.261**	.326**	.283**	-0.019
	Sig. (2-tailed)	0.000	0.009		0.004	0.000	0.002	0.831
	N	123	123	123	123	123	123	123
TM	Pearson Correlation	.535**	.262**	.261**	1	0.093	0.091	0.067
	Sig. (2-tailed)	0.000	0.003	0.004		0.307	0.317	0.464
	N	123	123	123	123	123	123	123
HS	Pearson Correlation	0.120	0.034	.326**	0.093	1	0.096	-0.062
	Sig. (2-tailed)	0.185	0.705	0.000	0.307		0.289	0.496
	N	123	123	123	123	123	123	123
SE	Pearson Correlation	.339**	.211*	.283**	0.091	0.096	1	-0.069
	Sig. (2-tailed)	0.000	0.019	0.002	0.317	0.289		0.445
	N	123	123	123	123	123	123	123
Grade	Pearson Correlation	0.116	0.159	-0.019	0.067	-0.062	-0.069	1
	Sig. (2-tailed)	0.202	0.079	0.831	0.464	0.496	0.445	
	N	123	123	123	123	123	123	123

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations- (Class-12)

		GS	ES	TS	TM	HS	SE	Grade
GS	Pearson Correlation	1	.315**	.563**	.330**	0.108	.304**	.203*
	Sig. (2-tailed)		0.000	0.000	0.000	0.232	0.001	0.024
	N	123	123	123	123	123	123	123
ES	Pearson Correlation	.315**	1	.368**	0.115	.281**	.273**	0.170
	Sig. (2-tailed)	0.000		0.000	0.207	0.002	0.002	0.061
	N	123	123	123	123	123	123	123
TS	Pearson Correlation	.563**	.368**	1	.330**	.309**	.263**	0.048
	Sig. (2-tailed)	0.000	0.000		0.000	0.001	0.003	0.596
	N	123	123	123	123	123	123	123
TM	Pearson Correlation	.330**	0.115	.330**	1	0.146	0.122	0.093
	Sig. (2-tailed)	0.000	0.207	0.000		0.106	0.180	0.306
	N	123	123	123	123	123	123	123
HS	Pearson Correlation	0.108	.281**	.309**	0.146	1	0.056	-0.028
	Sig. (2-tailed)	0.232	0.002	0.001	0.106		0.536	0.758
	N	123	123	123	123	123	123	123
SE	Pearson Correlation	.304**	.273**	.263**	0.122	0.056	1	0.129
	Sig. (2-tailed)	0.001	0.002	0.003	0.180	0.536		0.155
	N	123	123	123	123	123	123	123
Grade	Pearson Correlation	.203*	0.170	0.048	0.093	-0.028	0.129	1
	Sig. (2-tailed)	0.024	0.061	0.596	0.306	0.758	0.155	
	N	123	123	123	123	123	123	123

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-taile

8. STUDY FINDINGS AND LIMITATIONS

Our study investigated the relationship between self-regulated learning variables and academic performance in online learning environments. However, the analysis revealed no statistically significant associations between the self-regulated learning variables we examined and student performance.

9. LIMITATIONS

- **Focus on Specific Variables:** The study focused on a particular set of self-regulated learning variables. It's possible that other learner characteristics, such as self-efficacy (confidence in one's learning abilities), as highlighted by Lynch and Dembo (2004), might play a more significant role in online academic performance. Future research could explore a broader range of learner attributes.
- **Sample Homogeneity:** The study participants were drawn from a homogenous background, potentially limiting the generalizability of the findings. A more diverse and heterogeneous sample could provide a richer understanding of how self-regulated learning and other factors interact with online learning outcomes.
- **Limited Scope:** The study focused solely on self-regulated learning variables. Future research could examine how these variables might interact with other factors such as different learning strategies and motivational elements to influence academic performance in online learning environments.

10. FUTURE SCOPE

Despite not finding a direct correlation between the specific self-regulated learning variables and academic performance, this study highlights the need for further exploration of learner characteristics that influence success in online learning. By considering a broader range of variables and employing a more diverse sample, future research can provide a more comprehensive understanding of how to optimize the online learning experience for students.

CONFLICT OF INTERESTS

None.

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