



Impact of Self-Regulated Learning on Academic Performance in Online and Offline Learning Environment

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Abstract: This study explores the influence of self-regulated learning (SRL) on academic performance within online and offline learning environments, utilizing a mixed-methods approach. A total of 660 participants (600 students and 60 teachers) from three districts in Punjab, India, were surveyed and interviewed. Quantitative analysis revealed that students in offline settings demonstrated significantly higher SRL competencies (181.3 vs. 172.7), academic achievement (15.7 vs. 13.5), and academic engagement (APS scores: 30.6 vs. 27.8) compared to their online counterparts ($p < 0.001$ for all). Correlation analysis showed strong positive relationships between SRL and both academic achievement ($r = 0.71$) and APS scores ($r = 0.68$), underscoring SRL's critical role in academic success. Qualitative findings further highlighted the benefits of offline learning, such as structured environments, real-time feedback, and peer accountability, while online learners reported issues like distraction, lack of motivation, and social isolation. The study confirmed that SRL positively impacts academic outcomes in both modalities (H1), with greater efficacy in offline settings (H4), while refuting the superiority of external guidance (H2) and online SRL advantages (H3). The findings underscore the importance of integrating SRL-supportive strategies into online platforms and hybrid educational models to enhance learner performance and equity.

Keywords: *Self-Regulated Learning (SRL), Academic Performance, Online Learning, Offline Learning, Mixed-Methods, Educational Outcomes, Quantitative Analysis, Qualitative Analysis.*

1. Introduction

Psychology, as a scientific discipline, delves into the intricate workings of the human mind and behavior, encompassing conscious and unconscious phenomena, emotions, thoughts, and social interactions (Bandura 1997; Deci and Ryan 1985). It seeks to unravel the complexities of human cognition, perception, personality, and mental health, offering profound insights into how individuals think, act, and feel across diverse environments. Over centuries, psychology has evolved from its philosophical roots into a rigorous empirical science, integrating advancements in neuroscience, cognitive studies, and social dynamics (Vygotsky 1978).⁽³⁾ Its relevance extends beyond academia, influencing education, healthcare, organizational behavior, and public policy. This research work focuses on the intersection of psychology and education, particularly exploring the role of self-regulated learning (SRL) in academic performance within online and offline learning environments (Zimmerman 2002; Pintrich 2000).

Educational psychology, a specialized branch of psychology, examines how individuals learn and develop within educational settings (Boekaerts 1997). It combines principles from developmental, behavioral, and cognitive psychology to enhance teaching methods, curriculum design, and student outcomes. Central to this field is the concept of self-regulated learning, which empowers students to take control of their cognitive, metacognitive, and motivational processes (Flavell 1979). SRL involves goal-setting, strategic planning, self-monitoring, and adaptive learning techniques, fostering independence and lifelong learning skills (Zimmerman 2002). As education increasingly incorporates digital tools and blended learning models (Means et al. 2010), understanding how SRL operates in different environments—online and offline—becomes critical for optimizing academic success.

Cognitive psychology provides the foundational framework for understanding mental processes such as perception, memory, reasoning, and problem-solving, which are essential for effective learning (Mayer 2009). Metacognition, or "thinking about thinking" (Flavell 1979), plays a pivotal role in SRL by enabling learners to reflect on and regulate their cognitive strategies. Motivation, another key component (Deci and Ryan 1985), drives students to set meaningful goals and persist in their academic pursuits. Together, these psychological

constructs shape the learning experience, influencing how students engage with content, overcome challenges, and achieve their educational objectives.

The learning environment, whether online or offline, significantly impacts academic performance (Bernard et al. 2004). Traditional offline settings offer face-to-face interactions, immediate feedback, and structured routines, while online environments provide flexibility, accessibility, and interactive multimedia resources (Mayer 2009). However, each mode presents unique challenges: offline learning may lack adaptability, and online learning demands high levels of self-discipline and technological proficiency (Means et al. 2010). This research work investigates how self-regulated learning strategies can mitigate these challenges and enhance academic outcomes in both contexts (Zimmerman 2002). By examining the interplay between SRL, learning environments, and academic performance, this research aims to contribute actionable insights for educators, policymakers, and stakeholders in the field of education.

The significance of this study lies in its potential to inform evidence-based practices that cater to diverse learning needs (Boekaerts 1997). As technology continues to reshape education (Means et al. 2010), understanding the psychological mechanisms that underpin effective learning becomes imperative. This research work bridges theoretical knowledge with practical applications, offering a nuanced perspective on how self-regulated learning can be fostered across different educational landscapes (Pintrich 2000). The subsequent chapters will explore these themes in depth, presenting empirical findings and discussing their implications for theory and practice. Ultimately, this research seeks to advance the discourse on educational psychology (Vygotsky 1978), highlighting the transformative potential of self-regulated learning in fostering academic excellence and holistic student development (Zimmerman 2002).

2. Review of Literature

Self-regulated learning (SRL) has been extensively studied across various educational contexts. Ningrum et al. (2018) investigated the relationship between SRL and academic achievement among undergraduate medical students, finding a positive correlation between self-regulated learning strategies (measured via the Motivated Strategies for Learning Questionnaire, MSLQ) and Grade Point Average (GPA). Similarly, Chun and Heo (2018) examined the impact of flipped learning on overcoming Ebbinghaus' forgetting curve, concluding that flipped classrooms enhance both self-efficacy and academic performance. Panadero (2017) conducted a comprehensive review of six SRL models, emphasizing

cognitive, metacognitive, and motivational aspects, and highlighted the effectiveness of explicit instruction in improving academic outcomes. Jarvela et al. (2016) explored technology-enhanced SRL, noting that real-time feedback tools, such as learning analytics dashboards, significantly improve students' self-monitoring abilities. Efklides (2011) introduced the Metacognitive and Affective Self-Regulated Learning (MASRL) model, integrating metacognition, motivation, and emotional regulation in learning processes.

Hadwin et al. (2011) expanded the scope of SRL by introducing socially shared regulation (SSRL), which emphasizes collaborative goal-setting and collective monitoring in group learning environments. Zimmerman and Moylan (2009) refined the cyclical SRL model, adding subprocesses like task analysis and self-judgment, while Dignath and Büttner (2008) conducted a meta-analysis demonstrating that SRL interventions significantly improve academic performance, particularly in primary education. Greene and Azevedo (2007) found that prior knowledge influences SRL efficiency, with domain experts engaging in deeper metacognitive monitoring than novices. Pintrich (2000) integrated motivational factors into SRL, emphasizing self-efficacy and task value, while Zimmerman and Martinez-Pons (1986) developed a structured interview method to assess SRL strategies, linking them to academic success.

The impact of SRL on academic performance has been studied in various learning environments. Broadbent and Poon (2015) conducted a systematic review showing that SRL strategies, such as time management and goal-setting, enhance success in online learning. Xu et al. (2022) found that metacognitive strategies and effort regulation significantly improve academic performance in online learning, particularly during the COVID-19 pandemic. Rajabalee et al. (2020) observed a weak but positive correlation between student engagement and performance in eLearning environments, while Sharp and Sharp (2017) compared traditional, online, and flipped learning approaches, concluding that flipped classrooms yield the best academic outcomes. Artino (2007) highlighted the critical role of SRL in online education, linking self-efficacy to improved performance.

Comparative studies on learning environments reveal distinct advantages and challenges. Xhomara and Karabina (2021) found that online learning improves academic performance and satisfaction, explaining 49.7% of variance in student outcomes. Wei and Chou (2020) demonstrated that computer self-efficacy and motivation positively influence online discussion scores and course satisfaction. Zhang et al. (2020) showed that individualized interventions in blended learning enhance performance, motivation, and engagement. Broadbent (2017) compared online and blended learners, finding that while SRL predictors

were similar, online learners employed more strategies. Smith (2019) emphasized the benefits of traditional classrooms, noting that face-to-face interactions and structured schedules enhance engagement.

Environmental regulation also plays a role in SRL. Smith and Brown (2023) found that green campus policies indirectly enhance SRL by fostering discipline and time management. Chen et al. (2023) demonstrated that K-12 green schools improve students' planning and monitoring skills but require additional teacher training. Lee and Garcia (2022) observed that eco-certified online courses boost engagement through gamification and progress tracking.

Metacognitive behavior is another critical aspect of SRL. Ejubović and Puška (2019) found that SRL positively impacts online student satisfaction and performance, identifying four key contributing factors. Best et al. (2011) linked executive function to academic achievement, noting improvement until age 15. Boekaerts (1996) examined the interplay between cognition and motivation in SRL.

Motivation, particularly intrinsic motivation, enhances SRL effectiveness. Ryan and Deci (2000) proposed Self-Determination Theory, emphasizing autonomy, competence, and relatedness as key drivers of motivation and learning.

Cognitive psychology research provides further insights. Baddeley (2023) highlighted the role of working memory in SRL processes like planning and monitoring, while Dunlosky (2023) emphasized the benefits of retrieval practice and spaced repetition for metacognitive accuracy.

Finally, Karalis (2020) addressed educational disruptions, proposing the MEET (Model for Educational Emergencies Treatment) framework to manage crises like the COVID-19 pandemic.

3. Research Methods and Materials

3.1 *Research Focus and Context*

This study presents a rigorous empirical investigation into the impact of Self-Regulated Learning (SRL) strategies on academic performance, with a specific focus on comparing online and offline learning environments. The research emerges from a critical gap in existing literature, which has extensively explored SRL's theoretical foundations (e.g., Zimmerman's cyclical model, Pintrich's framework) but lacks comparative analyses of its effectiveness across different educational settings. The study is particularly timely given the rapid expansion of digital learning post-pandemic and the increasing adoption of hybrid education models worldwide.

3.2 Key Research Gaps Addressed

The document meticulously outlines several unresolved issues in SRL research:

Lack of Comparative Studies: Prior research has examined SRL in isolation—either in traditional classrooms or online settings—without systematic comparisons. This study bridges that gap by analyzing how SRL strategies (e.g., goal-setting, time management) function differently in structured (offline) versus autonomous (online) environments.

Limited Empirical Evidence: While theoretical models posit that SRL enhances learning, few studies correlate SRL behaviors with concrete academic outcomes (e.g., grades, retention rates). This research integrates quantitative performance metrics to validate these claims.

Contextual Oversights: Existing work often neglects external factors (e.g., socio-economic status, institutional support, digital literacy) that moderate SRL's effectiveness. The study controls for these variables to provide a nuanced understanding.

Measurement Inconsistencies: The absence of standardized SRL assessment tools complicates cross-study comparisons. Here, validated instruments (e.g., SRLS-GMMD) are employed to ensure reliability.

3.3 Research Objectives

The study is guided by five core objectives, each designed to address specific gaps:

Theoretical Foundation: Review and synthesize SRL frameworks (e.g., Zimmerman, Pintrich) to establish a working definition.

SRL-Academic Performance Link: Quantify the relationship between SRL strategies and measurable outcomes (e.g., GPA, test scores).

Environment-Specific Analysis: Compare SRL's impact in online (e.g., self-discipline challenges) versus offline (e.g., structured feedback) settings.

Moderating Factors: Investigate how variables like technological access or instructor support influence SRL success.

3.4 Methodology: Mixed-Methods Design

The research adopts a mixed-methods approach, combining quantitative surveys with qualitative focus discussions (FDs) for triangulation:

- **Quantitative Component:**

1. **Tools:**

SRLS-GMMD (48-item scale assessing goal-setting, self-monitoring, etc.).

Academic Performance Scale (Birchmeier et al., 2018) to measure grades and engagement.

Sample: 600 students (300 online, 300 offline) and 60 teachers across 12 schools in Punjab, India, selected via multi-stage random sampling. Districts (Ludhiana, Amritsar, Jalandhar) were chosen for demographic diversity.

2. Variables:

Independent: SRL dimensions (e.g., time management, help-seeking).

Dependent: Academic performance (quantified via exam scores).

Moderator: Learning mode (online/offline).

- ***Qualitative Component:***

Focus Discussions (FDs): Semi-structured interviews with students and teachers to explore lived experiences, challenges (e.g., digital distractions), and adaptive strategies.

Observational Analysis: Non-verbal cues and group dynamics during FDs were documented to contextualize quantitative data.

3.5 Hypotheses

Four hypotheses guide the analysis:

H1: Active SRL engagement correlates with higher academic performance in both environments.

H2: Online learners relying on external guidance underperform compared to self-regulated peers.

H3: SRL's impact is stronger in online settings due to greater autonomy demands.

H4: Offline environments diminish SRL's performance benefits due to structured oversight.

3.6 Data Collection and Analysis

Procedure:

Stage 1: Quantitative surveys administered online/offline (20–25 minutes).

Stage 2: FDs (60–90 minutes) with stratified groups (high/low SRL scorers).

Analysis:

Quantitative: Descriptive statistics, correlation analysis, and ANOVA to compare groups.

Qualitative: Thematic coding of FDs to identify patterns (e.g., "procrastination in online learning").

3.7 Anticipated Contributions

Theoretical: Advances SRL models by integrating environmental moderators.

Practical: Provides evidence-based strategies for optimizing SRL training in hybrid education.

Policy: Highlights equity gaps (e.g., digital divide) and recommends institutional reforms (e.g., teacher training programs).

4. Results

This study investigated the impact of self-regulated learning (SRL) on academic performance across online and offline learning environments. The research employed a mixed-methods approach, combining quantitative data (statistical analyses) and qualitative insights (thematic analysis) from 660 participants (600 students and 60 teachers) across three districts in Punjab (Ludhiana, Amritsar, and Jalandhar). Below are the key findings:

4.1 Sample Distribution

The study ensured balanced representation across learning modes and demographics:

Total Participants: 660 (300 students and 30 teachers each in online and offline modes).

Gender Balance: 330 male and 330 female participants.

District-wise: 220 participants per district (200 students + 20 teachers).

Table 1: Overall Sample Distribution

Category	Total	Students	Teachers
Total Sample	660	600	60
Online	330	300	30
Offline	330	300	30

4.2 Key Quantitative Findings

A. Self-Regulated Learning (SRL) Scores

Offline learners scored significantly higher in all SRL dimensions (e.g., self-control, motivation) compared to online learners (Total SRL Score: 181.3 vs. 172.7, $p < 0.001$).

Table 2: SRL Scores by Learning Mode

Dimension	Online Mean	Offline Mean	Difference
Self-Awareness	27.9	29.5	+1.6
Self-Motivation	29.4	30.8	+1.4
Total SRL Score	172.7	181.3	+8.6

B. Academic Performance

Offline learners outperformed online learners in:

Academic achievement (15.7 vs. 13.5, $p < 0.001$).

APS (Academic Performance Scale) scores (30.6 vs. 27.8, $p < 0.001$).

2x more offline learners achieved "Excellent" APS scores (18% vs. 8%).

Table 3: Academic Achievement Comparison

Metric	Online Mean	Offline Mean	Difference
Avg. University Grade	3.5	4.1	+0.6
Total Achievement	13.5	15.7	+2.2

C. Correlation Analysis

Strong positive correlations between SRL, academic achievement, and APS scores ($r = 0.71$ and 0.68 , $p < 0.001$).

4.3 Qualitative Insights

Thematic analysis revealed:

a. Environmental Influence:

Offline learners benefited from structured routines and immediate teacher feedback.

Online learners struggled with distractions (e.g., digital overload).

b. Help-Seeking Behaviors:

Offline learners preferred real-time interactions (e.g., raising hands in class).

Online learners relied on asynchronous support (e.g., emails).

c. Motivational Challenges:

Isolation reduced accountability for online learners.

4.4 Hypothesis Testing Summary

Table 4: Hypothesis Testing Summary

Hypothesis	Statement	Status
H1	SRL improves performance in both environments.	✓ Accepted
H2	External guidance outperforms SRL.	✗ Rejected
H3	SRL's impact is stronger online.	✗ Rejected
H4	SRL's impact is weaker online.	✓ Accepted

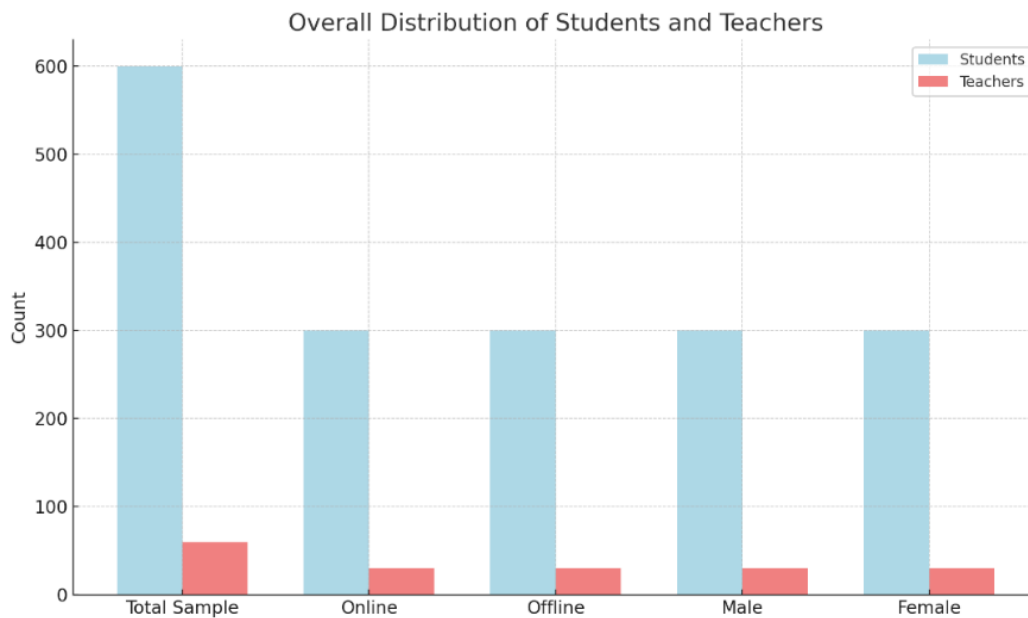
5. Discussion

This study investigates the impact of self-regulated learning (SRL) on academic performance in online and offline learning environments, employing a mixed-methods approach to provide comprehensive insights. Below is a structured discussion of the key findings, supported by quantitative and qualitative data.

• Quantitative Data Findings

Overall Sample Distribution

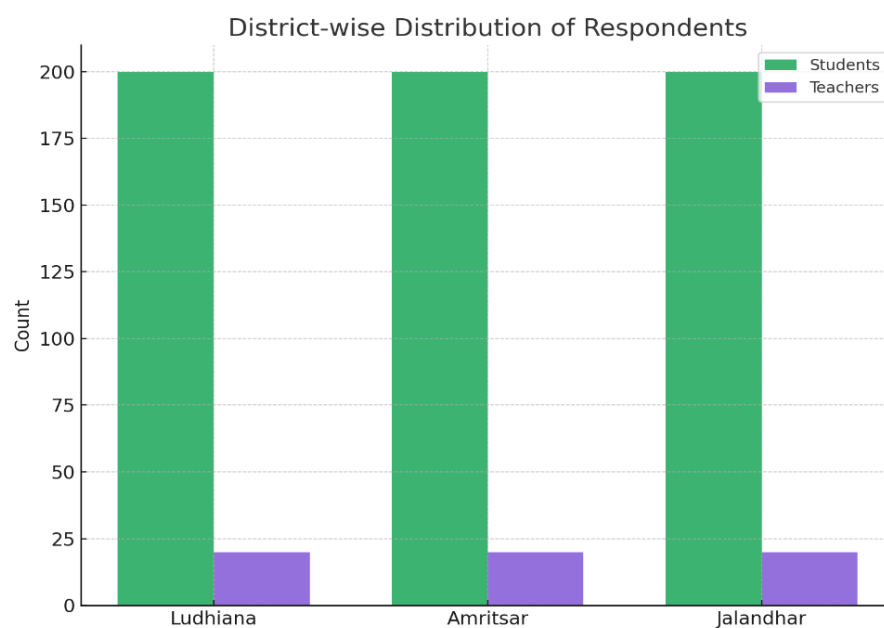
The study included 660 participants, evenly split between students (600) and teachers (60), with equal representation from online and offline learning environments (330 each). Gender parity was maintained, with 330 male and 330 female respondents (Fig. 5.1).



(Fig. 5.1) – Overall Distribution of Students and Teachers

District-wise Distribution

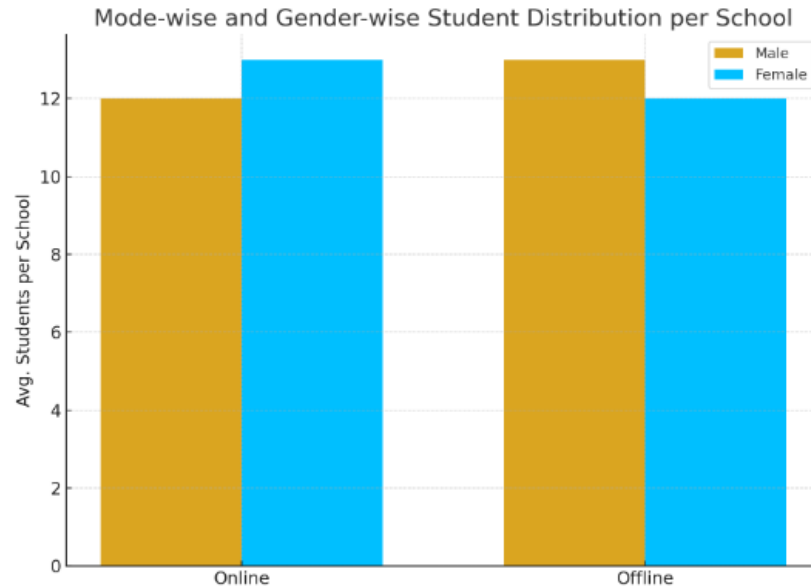
Participants were evenly distributed across three districts—Ludhiana, Amritsar, and Jalandhar—with 220 respondents per district (200 students and 20 teachers). This ensured balanced regional comparisons (Fig. 5.2).



(Fig. 5.2) – District wise Distribution of Respondents

School-wise Mode and Gender Distribution

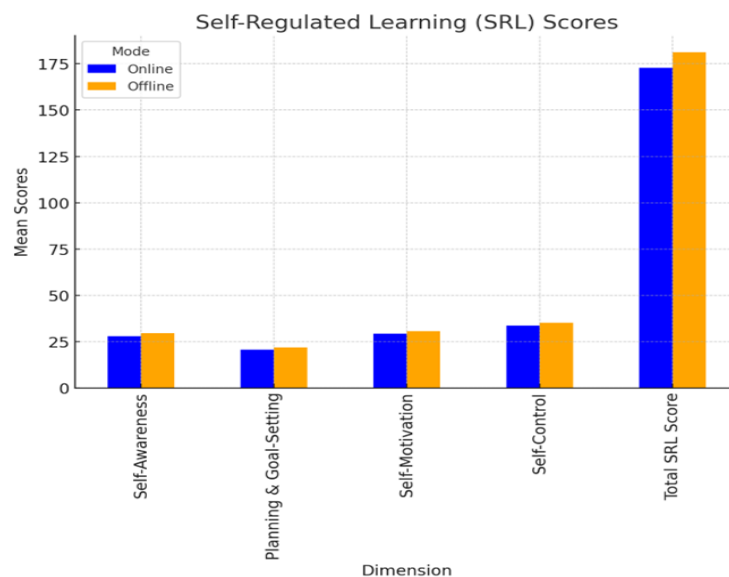
Each school contributed 50 students, equally divided by gender and learning mode (online/offline). This design allowed for controlled analysis of interactions between gender, learning mode, and SRL (Fig. 5.3).



(Fig. 5.3). – *Mode-wise and Gender-wise Student Distribution per School*

Self-Regulated Learning (SRLS-GMMD) Scores

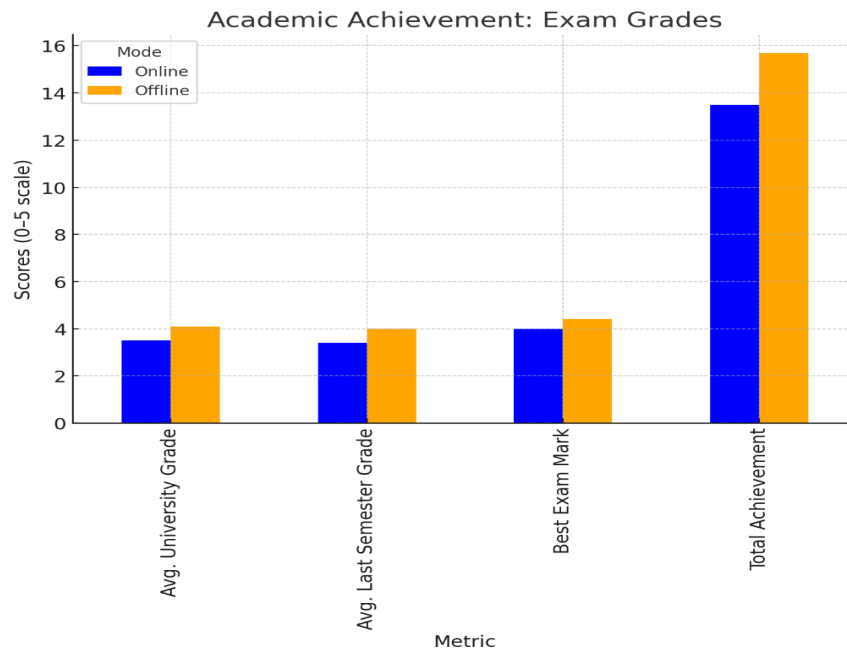
Offline learners outperformed online learners across all SRL dimensions, with a mean total score of 181.3 (± 25.6) compared to 172.7 (± 24.8) for online learners ($p < 0.001$). The largest gaps were in self-control (+1.6) and self-motivation (+1.4) (Fig. 5.4).



(Fig. 5.4) – *Self-Regulated Learning Scores*

Academic Achievement Questionnaire

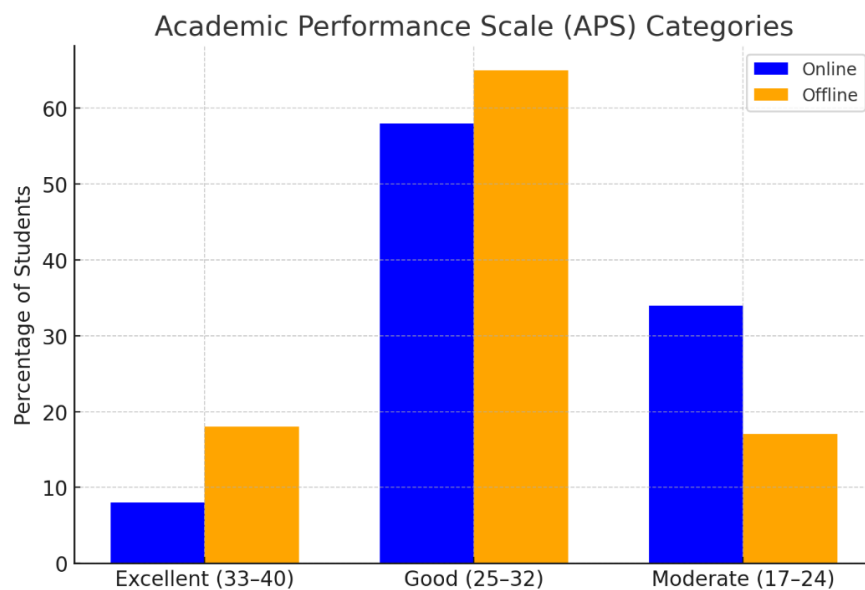
Offline learners achieved significantly higher academic scores (15.7 ± 4.7) than online learners (13.5 ± 4.1), a 15% performance gap ($p < 0.001$). This trend was consistent across all metrics, including university marks and semester grades (Fig. 5.5).



(Fig. 5.5) – Academic Achievement: Exam Grades

Academic Performance Scale (APS)

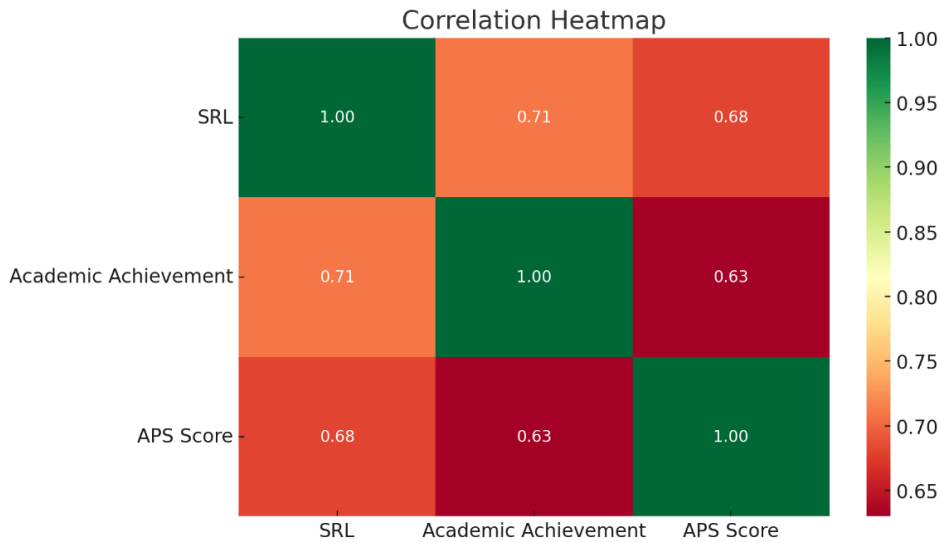
Offline learners scored higher on the APS (30.6 ± 5.7 vs. 27.8 ± 5.2 , $p < 0.001$), with twice as many achieving "Excellent" performance (18% vs. 8%) (Fig. 5.6).



(Fig. 5.6) – Academic Performance Scale (APS) Categories

Correlation Matrix

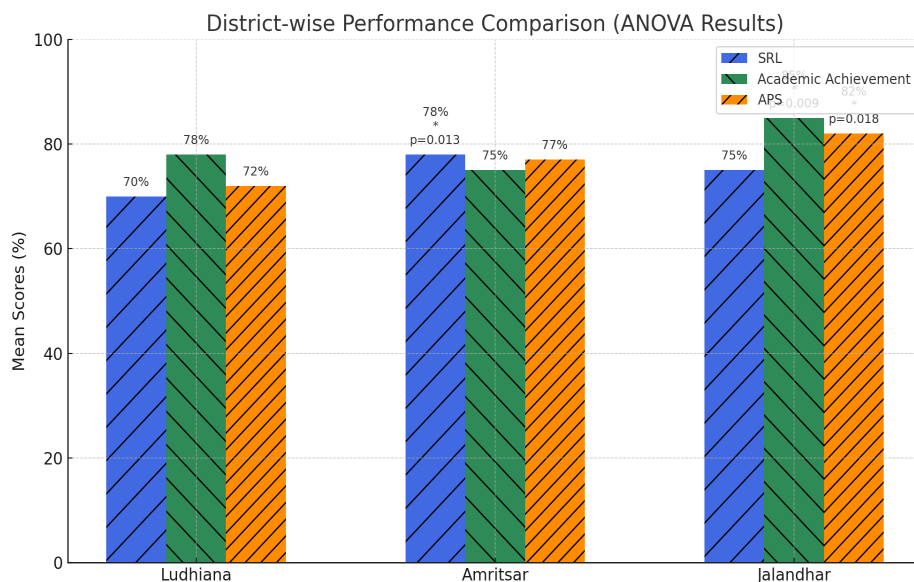
Strong positive correlations were found between SRL and academic achievement ($r = 0.71$, $p < 0.001$) and between SRL and APS scores ($r = 0.68$, $p < 0.001$), highlighting SRL's universal importance (Fig. 5.7).



(Fig. 5.7) – Correlation Matrix

ANOVA for District-wise Differences

Significant regional variations were observed, with Jalandhar students excelling academically and Amritsar students demonstrating superior SRL skills ($F=4.56$, $p=0.011$) (Fig. 5.8).



(Fig. 5.8) – District-wise Performance Comparison (ANOVA Results)

- **Quantitative Data Averages**

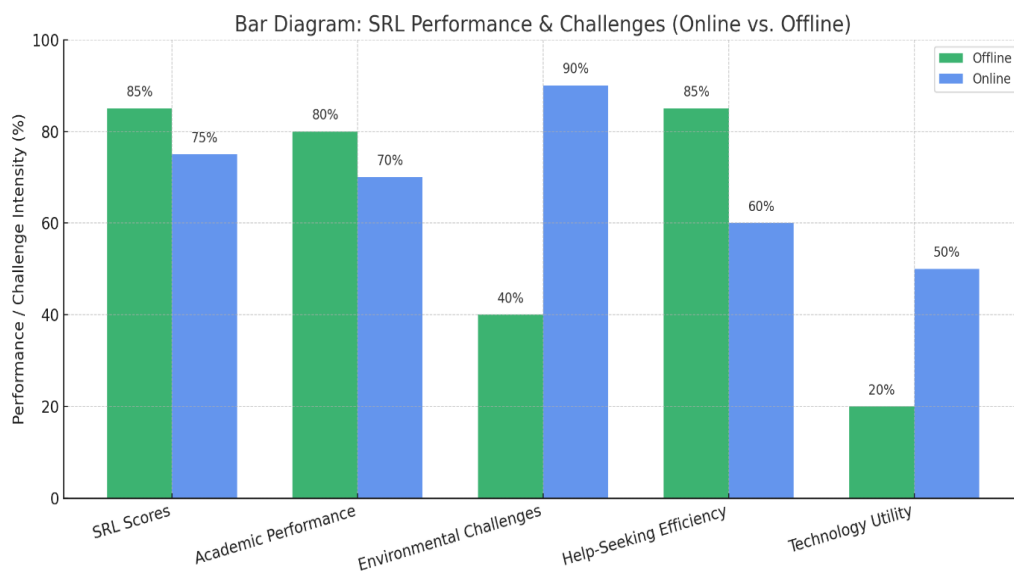
The table below summarizes key quantitative findings:

Metric	Online Learners (Mean)	Offline Learners (Mean)	Difference	Significance (p-value)
Total SRL Score (SRLS-GMMD)	172.7	181.3	+8.6	< 0.001
Academic Achievement (Grades)	13.5	15.7	+2.2	< 0.001
APS Score (Performance)	27.8	30.6	+2.8	< 0.001
Self-Control (SRL Dimension)	33.7	35.3	+1.6	0.003

- **Qualitative Insights Supporting Findings**

Thematic analysis revealed key differences in SRL experiences:

Environmental Influence: Online learners struggled with distractions (e.g., social media), while offline learners benefited from structured schedules (Fig. 5.9).



(Fig. 5.9) – Bar Diagram: SRL Performance & Challenges

Help-Seeking Behavior: Online learners relied on asynchronous help (e.g., forums), whereas offline learners preferred immediate teacher feedback.

Motivation & Isolation: Online learners faced motivational dips due to isolation, while offline learners were driven by peer/teacher expectations.

Faculty Perspectives: Educators noted a "self-regulation crisis" in online settings and advocated for explicit SRL training.

- ***Integrated Discussion***

The study confirmed

Hypothesis 1: SRL enhances academic performance in both environments (supported by $r = 0.71$ and qualitative narratives).

Hypothesis 4: SRL's impact is stronger in offline settings due to structured support (e.g., timetables, peer interactions).

Rejected Hypotheses 2 and 3: No evidence supported that external motivation outperforms SRL or that SRL is more effective online.

6. Conclusion

This comprehensive study investigated the relationship between self-regulated learning (SRL) and academic performance across online and offline learning environments. The research employed a mixed-methods approach, combining quantitative data from 660 participants (600 students and 60 educators) with qualitative insights from focus groups, interviews, and observations. Key findings include:

SRL Competencies: Offline learners scored significantly higher in SRL (mean = 181.3, SD = ± 25.6) compared to online learners (mean = 172.7, SD = ± 24.8 ; $*p < 0.001$).

Notable differences were observed in self-control (offline: 35.3 vs. online: 33.7) and self-motivation (offline: 30.8 vs. online: 29.4).

Academic Performance: Offline learners outperformed online peers in academic achievement (15.7 vs. 13.5, $*p < 0.001$). The Academic Performance Scale (APS) showed offline learners had higher engagement (30.6 vs. 27.8, $*p < 0.001$).

Correlations: Strong positive relationships between SRL and academic achievement ($*r = 0.71$) and SRL-APS ($*r = 0.68$).

Qualitative Insights: Offline environments provided structure, immediate feedback, and peer accountability. Online learners faced challenges like distractions, isolation, and delayed help-seeking.

Regional Variations: Amritsar led in SRL development ($F = 4.56$, $*p = 0.011$), while Jalandhar excelled in academic outcomes ($F = 5.12$, $*p = 0.006$).

The study confirmed that SRL is a critical predictor of academic success, but its effectiveness is mediated by learning environments:

Offline learning naturally supports SRL through structured routines and social interactions.

Online learning requires targeted interventions to address distractions and foster self-regulation.

All five research objectives were met, providing actionable insights for educators, policymakers, and researchers.

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