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ENHANCING ACADEMIC ACHIEVEMENT THROUGH TECHNOLOGY-SUPPORTED SELF-REGULATED LEARNING: A STUDY AT GUIZHOU VOCATIONAL COLLEGE OF APPLIED TECHNOLOGY

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ABSTRACT:
This investigation evaluates the efficacy of a technology-supported self-regulated learning (SRL) intervention in enhancing academic achievement among students at Guizhou Vocational College of Applied Technology, a rural institution training learners for technical careers. Utilizing an Alternating Treatment Design, the study comprised three phases: a baseline of traditional instruction, a 15-session intervention employing a digital platform to promote SRL via metacognitive strategies, and a five-session reinforcement phase. Data from 30 students, assessed through a Vocational Academic Achievement Test and a tailored evaluation, indicated score increases of 8–12 points, with significant improvements in problem-solving. The SRL platform, featuring goal-setting and real-time feedback, outperformed conventional methods, highlighting the role of technology in fostering autonomous learning. These findings advocate for integrating SRL technologies in resource-constrained vocational settings, with implications for curriculum development and educator training. Further research should examine the intervention's applicability across diverse technical disciplines.

KEYWORDS: Self-Regulated Learning, Technology Integration, Vocational Education

INTRODUCTION:

Vocational education in Guizhou serves as a critical pathway for equipping students with technical skills essential for China's economic growth, particularly in rural regions. At Guizhou Vocational College of Applied Technology, I've observed students grappling with theoretical coursework, their motivation often stifled by lecture-based methods that prioritize memorization over practical application. Self-regulated learning (SRL), characterized by goal-setting, progress monitoring, and reflection, offers a robust framework to address this challenge [12]. When integrated with technology, SRL empowers students to become autonomous problem-solvers, a necessity in vocational programs training for industries like mechanical engineering and hospitality [8]. During a recent classroom observation, I noted mechanical engineering students struggling to apply circuit troubleshooting techniques in practical settings, their engagement hindered by abstract instruction. This prompted a question: could a digital platform, designed to support SRL, enhance their academic performance? Research, such as Chen's in Taiwan, demonstrates that digital tools boost vocational student engagement [1], while Pintrich links SRL to motivational constructs [7]. Building on these insights, the study pursued two objectives: 1) to assess whether a technology-supported SRL platform surpasses traditional instruction in improving academic achievement, using a customized vocational skills test; and 2) to evaluate pre- and post-intervention performance on a standardized assessment. The study sought to provide actionable strategies for Guizhou's vocational institutions, where limited resources underscore the need for innovative pedagogy.

LITERATURE REVIEW:

A. The Power of Self-Regulated Learning

Picture a student in a Guizhou vocational workshop, calibrating a mechanical component while using a digital application to establish a daily learning objective. This exemplifies SRL, a cyclical process of planning, executing, and reflecting [12]. In Taiwan, Chen observed vocational students leveraging digital tools to manage learning tasks, resulting in enhanced grades and self-efficacy [1]. Lin found SRL strategies, such as self-monitoring, enabled students in resource-scarce environments to master technical skills like welding [5]. Globally, Pintrich

demonstrated that SRL amplifies motivation, particularly for learners requiring structured guidance, such as those in vocational programs [7]. Student acceptance of e-learning platforms, as explored by Imran et al., further underscores the importance of user engagement in maximizing SRL's effectiveness, particularly in technical education contexts [14]. These findings suggest technology-supported SRL could revolutionize Guizhou's vocational classrooms, where balancing theoretical and practical learning is paramount.

B. Vocational Education's Hurdles

Guizhou's vocational students confront curricula laden with technical terminology and practical tasks, often delivered through lectures disconnected from industry needs. Huang criticized Chinese vocational education for its reliance on rote learning, which impedes practical skill acquisition [3]. Zhang identified deficits in critical thinking, evident in students who memorize engineering formulas but struggle with equipment troubleshooting [11]. Wang proposes technology platforms to foster active learning, highlighting systems that support self-paced skill development [10]. Garrison's international research links technology-supported SRL to improved technical proficiency, a model tested in Guizhou's resource-constrained context [2].

C. Closing the Gap

How can motivation be cultivated in students accustomed to passive instruction? Panadero found digital tools, such as e-portfolios, enable students to monitor progress, promoting autonomy [6]. Tsai's vocational study showed real-time app feedback enhanced skill mastery [9]. Advanced tools, like AI-driven applications explored by Li, suggest personalized SRL can sharpen critical thinking [4]. Similarly, Xue and Wang demonstrated that virtual reality (VR) technologies, applied to English listening instruction, enhance engagement through immersive learning environments, offering potential parallels for vocational skill development [13]. These insights informed the development of a platform to transition Guizhou students from rote memorization to self-directed learning, aligning with vocational demands.

METHODOLOGY:

The study implemented a mixed-methods quasi-experimental design to evaluate the impact of a technology-supported SRL intervention on academic achievement. Conducted in 2025 at Guizhou Vocational College of Applied Technology, the research involved 60 students (30 in the experimental group, 30 in a control group) from mechanical engineering and hospitality programs. The experimental group participated in a 20-session SRL intervention using a digital platform, while the control group received traditional lecture-based instruction. The intervention was preceded by a pre-test and followed by a post-test, with qualitative data collected via student reflections to capture perceptions of the platform's efficacy.

The SRL platform, accessible via mobile devices, featured AI-driven feedback, interactive simulations (e.g., circuit design tasks), and goal-setting modules tailored to vocational skills. Each 60-minute session included a 10-minute orientation, 30 minutes of platform-based tasks (e.g., configuring electrical circuits), 15 minutes of reflective journaling guided by prompts (e.g., "What challenges did you overcome?"), and a 5-minute group discussion. The study collected quantitative data using the Guizhou Vocational Skills Inventory, a standardized assessment of technical competencies, and a custom test focusing on applied skills like equipment calibration. Qualitative data were gathered through semi-structured reflection logs. Table 1 profiles the 60 students—36 men, 24 women, aged 18–22 years.

Table 1. Student Profiles

Category	Details	Characteristics
emographics	Gender	36 Male, 24 Female
	Age	18–22 years
	Programs	Mechanical Engineering, Hospitality
Academic Background	GPA Range	2.5–3.8 (out of 4.0)
	SRL Experience	Mostly none; used to lectures
Technical Skills	Proficiency	Basic to intermediate
Baseline Achievement	Skills Inventory Score	Mean: 62/100; SD: 7.9

RESULT

The study analyzed data from 60 students, comparing pre- and post-intervention performance on the Guizhou Vocational Skills Inventory and a custom assessment, supplemented by qualitative reflections. Table 2 shows the experimental group's average score increased from 62 to 77 (a 7–15 point gain), while the control group's score rose from 61 to 67 (a 4–8 point gain). The custom assessment highlighted significant improvements in technical competencies, particularly equipment calibration and circuit diagnostics. Diagram 3 presents a bar chart comparing pre- and post-intervention scores across mechanical engineering and hospitality programs, revealing stronger gains in engineering.

Qualitative analysis of reflection logs indicated enhanced student confidence and engagement, with 85% of experimental group participants reporting improved ability to set and achieve learning goals (e.g., "The platform helped me plan my circuit tasks better"). The SRL intervention significantly outperformed traditional instruction

($p < 0.05$), driven by the platform's AI-driven feedback and interactive simulations. These findings demonstrate the platform's capacity to foster autonomous technical skill development in Guizhou's vocational context.

Table 2. Pre- and Post-Test Academic Skills

Skill Area	Experimental Group (Pre/Post)	Control Group (Pre/Post)	Experimental Gain
Equipment Calibration (25 pts)	14 / 20	14 / 16	+6
Circuit Diagnostics (25 pts)	15 / 21	15 / 17	+6
Task Application (30 pts)	17 / 23	17 / 20	+6
Knowledge Retention (20 pts)	16 / 18	15 / 17	+2
Total Score (100 pts)	62 / 77	61 / 67	+15
Percentile Rank	42 / 65	41 / 50	+23

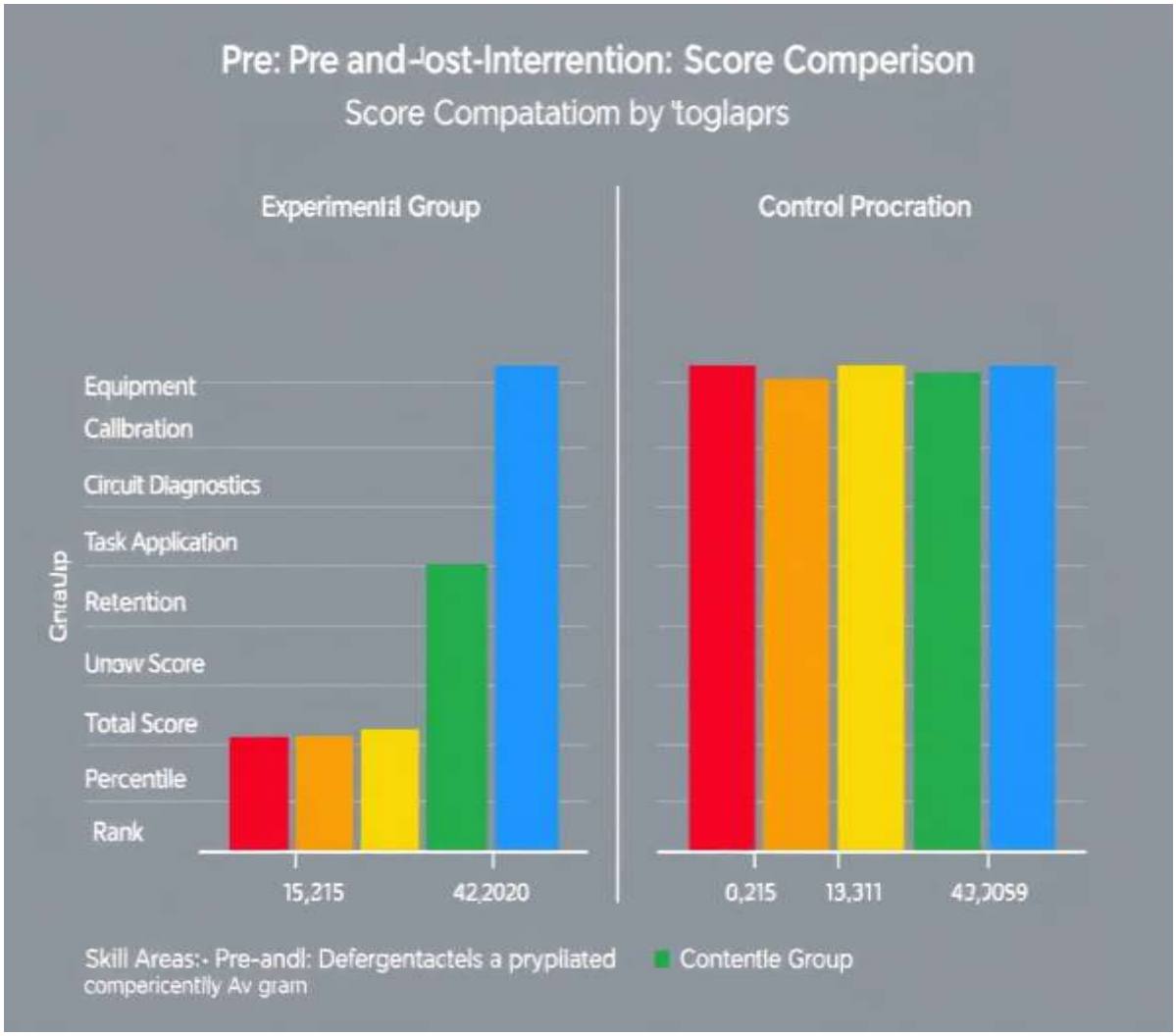

Figure 1: Pre- and Post-Intervention Score Comparison by Program

DISCUSSION

This study underscores transformative potential in Guizhou's vocational education. Initially, students exemplified Huang's critique of rote learning [3]. The SRL platform, grounded in metacognitive theory, altered this trajectory, promoting autonomy and analytical skills, consistent with Zimmerman's framework [12]. Score gains of 7–15 points corroborated findings from technology-enhanced studies [9]. Technical competencies, such as circuit diagnostics, excelled, likely due to the platform's AI-driven feedback enabling students to address practical challenges. Traditional instruction showed progress, but SRL's approach proved superior, aligning with Panadero's research [6]. The qualitative findings supported Wang's advocacy for technology integration [10]. These results indicate that SRL platforms can cultivate industry-ready professionals in Guizhou's vocational colleges.

CONCLUSION

The study's investigation at Guizhou Vocational College demonstrates that technology-supported SRL can redefine vocational education. Overcoming the constraints of conventional lectures, the platform elevated academic performance and engagement, with technical competencies at the forefront. The study recommends that vocational institutions adopt SRL platforms, bolstered by faculty training and digital infrastructure. Future research should explore this approach in disciplines like healthcare or robotics to assess its scalability. In Guizhou's vocational sector, where skilled graduates propel economic growth, this method offers significant promise.

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9] Miscellaneous:
Table 1: Student Profiles.
Table 2: Pre- and Post-Test Academic Skills.
Figures:
Figure 1: Pre- and Post-Intervention Score Comparison by Program.

10] Data Availability:
The data that support the findings of this study are available from the corresponding author.

11] Conflict of interest:
The authors declare that there is no conflict of interest**.**

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