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Utilizing SPADA UNTIRTA to enhance self-regulated learning among economics department students at Sultan Ageng Tirtayasa University

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ABSTRACT

SPADA UNTIRTA, the Sultan Ageng Tirtayasa University Online Learning System, was developed to transition from traditional classroom-based learning to a more flexible and accessible learning environment for all UNTIRTA students. It enables students to independently access learning materials, tests, and lecture explanations without attending classes or interacting directly with lecturers. However, SPADA UNTIRTA has not effectively addressed challenges related to facilitating discussion forums for assignments and materials, limiting its potential for collaborative learning. Effective technology integration in active learning environments is essential to promote critical thinking and self-directed learning. This study investigates the effectiveness of SPADA UNTIRTA in enhancing self-regulated learning (SRL) among first-semester economics students, focusing on motivation, time management, and learning strategies. Using a mixed-methods approach with pre- and post-test comparisons and qualitative interviews, the findings reveal significant improvements in SRL, particularly motivation and time management, despite challenges such as limited real-time interaction and technical issues. This study concludes with recommendations to enhance SPADA UNTIRTA by improving its technical infrastructure and incorporating synchronous communication features to better support collaborative learning.

1. Introduction

In recent years, information and communication technologies, or ICTs, have become essential tools in the global revolution of teaching methods. Indonesia has adopted this trend of using ICT to enhance access and quality in higher education (Means et al., 2016; Shea and Bidjerano, 2011). As part of these initiatives to improve learning outcomes and promote Self-Regulated Learning (SRL) among its students, Sultan Ageng Tirtayasa University uses SPADA UNTIRTA (Sistem Pembelajaran Daring UNTIRTA) as a hybrid learning management system.

Global educational methods have changed because of the development of information and communication technologies (ICT). Platforms like SPADA UNTIRTA are an example of initiatives in Indonesia (Hudha et al., 2018) to increase access and enhance the quality of education, especially in fostering SRL. Students can intentionally and independently manage their learning with SRL (Djami, 2022).

Self-regulated learning, or SRL, is the capacity of students to benefit from their education by setting goals, employing appropriate strategies, and adapting their efforts in response to feedback (Zimmerman, 2008; Panadero, 2017). The importance of SRL has grown in online and blended learning environments where students are usually expected to handle their education on their own (Broadbent and Poon, 2015; Schunk and Greene, 2018; Luo and Zhou, 2024). SRL has received a lot of attention in language learning contexts, but it has not received as much attention in subject-specific domains like economics, particularly in developing countries like Southeast Asia (Cho and Shen, 2013).

According to recent research, online learning environments like Google Classroom greatly increase student engagement (Kaspar et al., 2024) and motivation, particularly during the COVID-19 pandemic's restrictive times. By enabling flexible engagement, these platforms assist students in acquiring the critical autonomous abilities necessary for online learning (Cascolan, 2023). Therefore, it is

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essential to comprehend how SPADA UNTIRTA can support students' SRL.

This study explores the effectiveness of SPADA UNTIRTA in promoting SRL among Economic Department students. Specifically, it aims to answer (1) How does SPADA UNTIRTA enhance students' self-regulated learning outcomes in terms of motivation, learning methods, time management, physical and social environments, and performance in teaching English for Economics at Sultan Ageng Tirtayasa University? and (2) What challenges do students face while using SPADA UNTIRTA, and how can the platform be improved to better support SRL?

2. Literature review

This section of the literature review presents an overview of previous studies, theoretical research, and the conceptual or theoretical framework relevant to the topic.

2.1. Hybrid learning and SRL

SRL is a complicated concept that includes behavioral, motivational, metacognitive, and cognitive processes that enable students to effectively manage their own education (An et al., 2024). Learners who actively engage in goal setting, strategy choosing, progress monitoring, and outcome reflecting are said to be engaging in SRL. According to Panadero (2017), SRL is comprised of three primary stages: foresight (goal formulation and planning), performance (strategy application and self-monitoring), and self-reflection (self-evaluation and adaptation). Students can take control of their education during these phases, which enhances their academic achievement and aids in long-term memory retention (Henry and Liu, 2024; Ahmad, 2024).

Additionally, students can effectively govern their own learning using sophisticated cognitive and motivational processes that are part of self-regulated learning. Self-regulation abilities are crucial for academic achievement in online learning environments (Nabilah et al., 2024). By offering elements that encourage active participation, content interaction, and self-monitoring, online learning platforms have been demonstrated to assist students' SRL development (Adeyeye et al., 2022).

A Hybrid Learning Management System supports these phases by integrating both in-person learning and online tools, offering the flexibility and resources needed for SRL development. Students are empowered to actively engage with their learning, making decisions about how, when, and where to learn. Hybrid learning systems integrate flexibility and structure, both essential for SRL development: asynchronous learning for independent study, synchronous learning for feedback and collaboration, and tools for reflection and encouragement of autonomy.

Some research shows that students in hybrid settings display higher levels of SRL, particularly in goal setting, time management, and self-reflection due to the blended structure of face-to-face support and online autonomy (Broadbent and Poon, 2015). SRL thrives in hybrid systems where students have flexible access to learning materials (Hermita et al., 2024), promoting intrinsic motivation and ownership of their learning process (Hrastinski, 2019). Challenges Lead to Skill Development: In hybrid systems, students often encounter challenges like managing schedules or navigating online tools. Overcoming these challenges helps them develop SRL competencies such as problem-solving, self-monitoring, and persistence.

Six key attributes: motivation, learning strategies, time management, physical and social environment management, and performance—have been identified in the context of SRL as being essential to controlling one's learning process.

Motivation, the driving force behind a learner's perseverance and effort in achieving their academic goals, is a crucial element of SRL. Extrinsic incentive (grades) and intrinsic drive (the desire to learn) are both involved (Jud et al., 2024). Being self-confident and confident in one's abilities is also crucial to motivation (An et al., 2024). Motivated students set challenging goals, use effective strategies, and stay calm when they fail (Henry and Liu, 2024). Motivation also affects self-regulation, especially in online learning, where there is less supervision (Shea and Bidjerano, 2010).

Learning methods are the methods and techniques that students use to process information and acquire knowledge. Students process information and learn using learning methods. Summarization, elaboration, critical thinking, and metacognitive strategies like planning, observing, and assessing understanding are examples (Zimmerman, 2008; Ranieri and Sangrà, 2024). Competent students adapt to challenges and choose appropriate strategies. SRL helps students maximize their cognitive abilities and achieve great results by using and improving these strategies (Panadero, 2017).

Time management is the capacity to effectively organize, prioritize, and allocate one's time among different learning tasks.

Time managers avoid procrastination, set realistic goals and deadlines, and give each task enough time (Zimmerman, 2008; Ranieri and Sangrà, 2024). In online learning, where students have more control over their schedules, SRL is especially important because poor time management can delay projects and miss deadlines (Adnan and Anwar, 2020). Self-regulated learners manage their time well and adjust their schedules to improve.

Managing one's physical environment has to do with how students modify their surroundings to support their learning. Controlling one's physical environment establishes an ideal context for SRL, which seeks to minimize distractions and improve concentration. This entails creating a tranquil, organized, and comfortable workspace, free from distractions such as noise or clutter (Ahmad, 2024).

This facilitates the maintenance of focus during study sessions. Dependable technology, including a stable internet connection and essential educational resources (Dong et al., 2024). By proactively modifying their environment to meet their requirements, learners can enhance their focus and efficiency, resulting in improved educational outcomes.

The social environment is an important factor in SRL, as it affects how learners engage with peers, educators, and other individuals within their educational ecosystem (Nan Cenka et al., 2024). Enhancing engagement and motivation can be achieved by fostering a supportive social environment that provides opportunities for collaborative learning, peer assessment, and emotional support (Alam and Mohanty, 2024). Students seeking social support in both traditional and online settings are more likely to sustain their motivation and achieve a deeper understanding of the material. Students may benefit from social interactions, such as study groups, discussion forums, or mentorship networks, which can clarify complex subjects, exchange strategies for overcoming challenges, and foster a sense of responsibility.

Effective social environment managers proactively seek assistance when necessary, engage in discussions, and leverage connections to improve their learning outcomes. Active participation in a social learning environment is particularly crucial in online education, where physical isolation may impede engagement and performance (Shea and Bidjerano, 2010).

SRL performance measures how well learners track and assess their progress toward learning goals. Learners self-monitor their comprehension, learning strategies, and progress during the performance phase. Effective learners regularly evaluate their performance and adjust their strategies to improve (Panadero, 2017). Thinking about past learning outcomes, such as test or assignment scores, can help students improve their approach to future tasks (Zimmerman, 2008). Continuous learning improvement requires reflection and adaptation.

Online students must manage all six dimensions independently, making SRL even more important because they rarely have direct supervision. Successful SRL learners have higher engagement, academic performance, and information retention (Krismanto and Tahmidaten, 2022). As more schools adopt online and hybrid learning methods, self-regulation skills are crucial for students' success.

2.2. E-learning and SRL

SRL performance measures how well learners track and assess their progress toward learning goals. Learners self-monitor their comprehension, learning strategies, and progress during the performance phase. Effective learners regularly evaluate their performance and adjust their strategies to improve (Panadero, 2017). Thinking about past learning outcomes, such as test or assignment scores, can help students improve their approach to future tasks (Zimmerman, 2008). Continuous learning improvement requires reflection and adaptation.

However, SRL can benefit from e-learning platforms beyond educational resources. Platform usability and internet access issues prevent students from fully participating in learning. If students have trouble accessing information or using technology, they may lose interest in self-directed learning. To enable SRL, e-learning systems must be reliable, easy to use, and supported by a solid technical foundation (Graham et al., 2013). These platforms must be developed and maintained by universities and other institutions to reduce disruptions and improve student learning.

In addition to technology, e-learning platforms should emphasize active learning to engage students. SRL is difficult, especially online, where the lack of physical presence may demotivate. Interactive content, real-time quizzes, and peer collaboration keep students engaged (Hrastinski, 2019). Real-time communication tools like video conferencing and live discussions allow students to interact with instructors and classmates, enhancing learning. Successful SRL requires emotional and cognitive engagement from these active learning components.

Google Classroom studies show that structured online learning environments (Wu, 2024) can boost student motivation, reduce anxiety, and improve learning outcomes. Recent research shows that SRL is crucial for academic success in digital environments because students have more control over their learning pace and methods (Cascolan, 2023).

Finally, effective e-learning environments must provide resources and a dynamic learning environment that promotes SRL skill improvement. E-learning platforms like SPADA UNTIRTA address both technical and motivational aspects to help students stay motivated, engaged, and in control. As they implement and improve e-learning, schools must consider the pedagogical and technological elements needed to create self-regulated learning environments (Cho and Shen, 2013). A comprehensive strategy ensures that students have the tools and skills they need to succeed in digital learning environments.

2.3. SPADA UNTIRTA and its role in higher education

SPADA UNTIRTA, a component of the broader SPADA Indonesia effort, is crucial in improving the quality and accessibility of education at Universitas Sultan Ageng Tirtayasa (UNTIRTA) by utilizing digital resources to facilitate both online and hybrid learning settings. The hybrid learning approach that the platform establishes enables students to engage with course content with greater flexibility by combining traditional face-to-face teaching with

online learning resources (Hudha et al., 2018). This integrated approach is especially crucial in the promotion of SRL as it provides students with the liberty to independently manage their learning environments and plan their learning schedules (Sun and Chen, 2016). This autonomy is facilitated by SPADA UNTIRTA's providing of tools, including asynchronous feedback, assignment submission, and access to learning materials, which enable students to manage their academic progress in accordance with SRL principles.

SPADA UNTIRTA's primary strength is its support for hybrid learning, which combines the greatest features of traditional and digital educational methods by allowing students to participate in both online and in-person sessions. This hybrid method not only accommodates a wide range of student learning preferences but also encourages flexibility. SPADA UNTIRTA enhances both intrinsic and extrinsic motivation by providing tools. Students feel empowered to take ownership of their learning, which strengthens their persistence and engagement in the course. It enables students to personalize their learning experiences by enabling them to determine the timing and method of engagement with learning content, whether through recorded lectures, interactive online modules, or in-person discussions. Students develop better habits in organizing their workload, reducing procrastination, and meeting deadlines. This approach promotes improved time management and deeper engagement (Broadbent and Poon, 2015). This adaptability is consistent with SRL methods, which prioritize strategic planning, goal setting, and introspection. Students who can adapt to their learning techniques and timetables are more likely to maintain motivation and optimize their performance, which are essential components of academic success. Students learn to select and apply appropriate strategies to understand, retain, and apply course materials effectively.

Furthermore, SPADA UNTIRTA's involvement in hybrid learning contributes to the improvement of student engagement and motivation, particularly when combined with synchronous components such as real-time collaboration and live discussions. Research suggests that the incorporation of synchronous sessions, such as interactive group work or live video lectures, might materially enhance students' motivation and general involvement with the coursework (Harper et al., 2024). Creating a more dynamic and interactive learning environment that helps reduce the isolation sometimes associated with entirely online courses, these live interactions enable possibilities for rapid feedback and debate (Pardede and Astri, 2021). The hybrid approach supported by SPADA UNTIRTA at Sultan Ageng Tirtayasa University promotes active engagement, hence fostering a stronger academic community and improving students' learning outcomes by fostering a stronger connection with their classmates and teachers. Besides, SPADA UNTIRTA plays a pivotal role in improving the quality and accessibility of education at Sultan Ageng Tirtayasa University, especially through hybrid learning. The hybrid approach allows students to engage with content more flexibly (Krisna, 2024) and supports them in managing their learning environment, aligned with SRL principles (Djami, 2022).

Additionally, SPADA UNTIRTA facilitates the development of essential SRL competencies, including self-monitoring, self-reflection, and time management. The platform enables students to take control of their learning path by providing a blend of synchronous and asynchronous learning possibilities, allowing them to determine when and how to engage with the subject (Mubango and Ngirande, 2024). This is especially crucial in higher education, when students are required to manage intricate schedules and juggle several commitments. Students are equipped with the resources necessary to assess their own learning progress, make informed modifications, and enhance their academic performance using the platform's capabilities, including progress monitoring, individualized feedback (Nan Cenka et al., 2024), and self-paced modules (Shea and Bidjerano, 2011). These components are essential for the promotion of SRL, since students who are capable of self-regulation are more likely to persist in the face of difficulty and accomplish their academic objectives.

Finally, the success of SPADA UNTIRTA in cultivating a hybrid learning environment at Sultan Ageng Tirtayasa University is contingent upon the resolution of the technological and pedagogical obstacles associated with the integration of digital platforms into higher education. It is essential to guarantee that the platform is user-friendly, stable, and accessible to prevent technological challenges from disturbing the learning process and to preserve student involvement. Additionally, the potential of SPADA UNTIRTA is significantly enhanced by the contributions of instructors. Instructors must possess the ability to combine traditional teaching methods with creative digital strategies to produce interesting and successful learning experiences, thereby maximizing the platform's capabilities through the design and delivery of information. Sultan Ageng Tirtayasa University is well-positioned to lead in hybrid learning models that encourage SRL and equip students for success in an increasingly digital academic landscape by continuously enhancing both the technical and pedagogical aspects of SPADA UNTIRTA.

3. Methodology

This investigation implemented a mixed methods approach to investigate the influence of SPADA UNTIRTA on SRL among Economic Department students in their first semester at Sultan Ageng Tirtayasa University. The research employed both quantitative and qualitative data collection methodologies to offer a thorough comprehension of the platform's efficacy. This study used pre-tests and

post-tests to assess the effectiveness of SPADA UNTIRTA in enhancing SRL among students. This design aligns with methods used in previous studies to measure cognitive gains in online learning environments through pre-test and post-test metrics (Ramadhanti et al., 2023). In addition, in-depth interviews were conducted to identify students' experiences with the SPADA UNTIRTA platform.

3.1. Research design

The study employed a sequential explanatory design, which begins with the gathering of quantitative data through pre- and post-tests, followed by qualitative interviews to further investigate the experiences of students utilizing SPADA UNTIRTA (Creswell and Plano Clark, 2017). This approach allows for the identification of patterns in pre- and post-test results while contextualizing these findings through detailed student narratives. However, potential limitations include the risk of subjective interpretation in qualitative analysis and challenges in merging both datasets effectively. Additionally, the design's reliance on a small, homogeneous sample may affect the generalizability of results.

3.2. Sample

Two groups of first-semester students who were enrolled in the English for Economics course were chosen for this investigation. The experimental group consisted of 35 students who utilized SPADA UNTIRTA. The control group consisted of 45 students who were provided with standard classroom instruction without the platform. While the sample size was sufficient for initial comparisons, its limited diversity poses challenges for generalizing findings to broader contexts. To address this limitation in future studies, researchers should consider including participants from multiple disciplines and universities to capture varied educational environments and learner profiles. Additionally, strategies like stratified sampling could enhance representation and ensure more comprehensive insights into the platform's impact.

3.3. Instruments

1. Pre-test and Post-test: Both groups were offered a content-based test to evaluate their academic performance before and following the intervention.
2. Self-Regulated Learning Strategies Questionnaire (SRLSQ): To assess their SRL outcomes in six dimensions: motivation, learning methods, time management, physical and social surroundings, and academic performance, the experimental group completed a survey (Jud et al., 2024). The SRLSQ rubric in English is presented here (Table 1). It is intended to assess six critical dimensions: motivation, learning methods, time management, physical environment, social environment, and academic performance. The rubric offers instructions on how to interpret the findings of each dimension according to the Likert scale (1 = Strongly Disagree, 5 = Strongly Agree).
3. Interviews: Ten students from the experimental group participated in in-depth interviews to collect qualitative data regarding their SRL outcomes and their experiences with the platform.

3.4. Data analysis

To examine whether there were significant differences in performance between the two groups, quantitative data from pre- and post-tests were analyzed using paired t-tests. This statistical method is commonly used to compare mean scores within the same group before and after an intervention. However, it relies on certain assumptions, such as the normal distribution of data and the independence of observations. In this study, the relatively small sample size and variation in student performance may limit the extent to which these assumptions are met, potentially affecting the validity of the findings.

Following the quantitative analysis, descriptive statistics were used to summarize the results of the questionnaire. In addition, qualitative data from interviews were examined through thematic analysis using coding techniques, as suggested by Miles et al. (2014), to identify recurring patterns and student experiences.

To strengthen the reliability of the study's findings, future research should include a power analysis during the planning stage to determine an appropriate sample size for detecting meaningful effects. A sensitivity analysis is also recommended to assess how the results might change when faced with outliers or violations of statistical assumptions. By incorporating these methods, researchers can improve the robustness and credibility of their conclusions, especially when working with small or diverse samples.

4. Results and discussion

This study shows how SPADA UNTIRTA improves student academic performance and SRL. Experimental and control groups were given pre- and post-tests and analyzed for SRL characteristics to determine the intervention's impact. The descriptive analysis compares these two groups, focusing on academic achievement and SRL techniques before and after the intervention.

The experimental group's SRL procedures and test scores improved after incorporating SPADA UNTIRTA into their learning methodology. The control group, which used standard learning methods, improved only slightly. The study also examined SRL factors like motivation, learning approaches, time management, physical and social environments, and performance to determine where students excelled.

Table 1: SRLSQ rubric

Dimension	Description	Score range	Score interpretation
Motivation	A measure of self-confidence and internal motivation in the learning process, which encompasses the effort required to comprehend materials and the establishment of objectives	5–10	Low: The student is not motivated and does not have a clear understanding of their learning objectives
		11–19	Moderate: The student indicates moderate motivation; nonetheless, they may be inconsistent in their ability to establish objectives or sustain their efforts
		20–25	High: The learner is highly driven, has a strong sense of confidence in accomplishing learning outcomes, and has clear goals
Learning Methods	Evaluates the student's utilization of effective learning processes, including summarization, idea mapping, and content review	5–10	Low: The student employs ineffective learning strategies or employs them seldom
		11–19	Moderate: The student employs some learning tactics; nevertheless, they are not implemented consistently or to their full potential
		20–25	High: The student consistently and effectively employs a diverse array of learning tools to enhance comprehension
Time Management	Examines the student's ability to effectively manage time, which encompasses work prioritization, meeting deadlines, and scheduling	5–10	Low: The student frequently procrastinates and has trouble managing his or her time
		11–19	Moderate: Time management is a challenge for the student, who frequently delays tasks
		20–25	High: The student effectively manages time, keeps to plans, and completes tasks punctually
Physical Environment	Assesses the student's capacity to establish a learning-friendly physical environment, which encompasses the organization of study space and the utilization of technologies	4–8	Low: The student's learning environment is not favorable to focus on, or they fail to optimize their study equipment
		9–14	Moderate: The students' surroundings are somewhat conducive to learning; yet, it could be more ordered or concentrated
		15–20	High: The student's learning environment is very supportive, with little distractions and well-organized equipment
Social Environment	Evaluation of the student's ability to use social support, including collaborating with peers and seeking assistance from teachers or instructors	4–8	Low: The student typically operates in isolation and employs social support frequently
		9–14	Moderate: The student occasionally employs social assistance; however, they do not completely capitalize on this asset
		15–20	High: The student actively engages in social support systems, connects with peers, and seeks assistance as needed
Performance	The students' perspective on their academic achievements, which includes reflection on results and satisfaction with their performance, is conveyed	4–8	Low: The student is unsatisfied with their academic achievement and believes that they have made minimal progress
		9–14	Moderate: The students are relatively content with their academic success, but they recognize that there is still potential for development
		15–20	High: The student is very satisfied with their academic performance, perceives strong progress, and reflects on results effectively

Score Interpretation: Low: The student demonstrates low or no application of effective SRL methods within that dimension; Moderate: The student exhibits some utilization of SRL methods; nonetheless, there is potential for improvement in their successful application; High: The student consistently employs SRL tactics to improve their learning results and exhibits a strong, consistent approach

Table 2 shows the percentage of students who improved in each SRL dimension and pre- and post-test comparisons. These results explain how the intervention affected the experimental group's learning compared to the control group's learning. In the experimental group, time management (72%) and motivation (60%) improved more than the social environment (48%).

Table 2: SRL test result (descriptive analysis)

	N	Minimum	Maximum	Mean	Standard deviation
Pre-test experimental class	35	50	70	61.2	6
Post-test experimental class	35	75	90	83.7	4.8
Pre-test control class	45	55	75	64.5	5.3
Post-test control class	45	65	80	73.2	6.1
Valid N	N/A	N/A	N/A	N/A	N/A

The study's results, shown in Table 3, describe the experimental and control groups' pre- and post-test scores. The 35-student experimental class scored 50–70 on the pre-test. The mean score was 61.2, and the SD was 6.0. After the SPADA UNTIRTA intervention, participants' post-test scores improved to 83.7 and 4.8, ranging from 75 to 90. As shown by the reduced score variability and improved academic achievement, the intervention benefited most students. In contrast, the 45-student control group improved slightly. The mean pre-test score was 64.5, with a standard deviation of 5.3, and the range was 55 to 75. Following regular learning, their post-test scores rose to 65 to 80, with a mean of 73.2 and a standard deviation of 6.1, without the SPADA UNTIRTA platform. This group improved, but its mean score and percentage gain were significantly lower than the experimental group's, proving the intervention's efficacy in the experimental class. Pre- and post-test analysis showed significant academic and SRL improvements in the experimental group:

Table 3: Improvement result

Group	Pre-test mean	Post-test mean	Improvement (%)
Experimental group	61.2	83.7	36.8 %
Control group	64.5	73.2	13.5 %

In the experimental group, time management (72%) and motivation (60%) improved more than the social environment (48%). The SPADA UNTIRTA platform improved student academic performance and SRL, focusing on time management and learning methods. However, the platform's social interaction improvements were less significant, suggesting that online learning environments may need more peer collaboration mechanisms. SPADA UNTIRTA-using experimental students reported improved SRL

dimensions. Table 4 shows the percentage of students who reported gains in motivation, learning techniques, time management, physical environment, social environment, and performance.

Table 4: Self-regulated learning dimensions – improvement percentage

SRL dimension	Students reporting improvement
Motivation	60%
Learning methods	65%
Time management	72%
Physical environment	55%
Social environment	48%
Performance	70%

Student learning outcomes and study schedule control improved significantly, with time management and academic performance improving the most (72% and 70%, respectively). Students' improved motivation (60%) and learning methods (65%) indicate that they developed better learning strategies and remained committed to academic success. However, the physical (55%) and social (48%) environments improved much less. Over half of students reported improving their study spaces, but fewer saw social environment growth. This suggests online learning platforms may struggle to encourage peer interaction and collaboration. The data below show how SPADA UNTIRTA affected SRL components. Table 4 shows self-regulated learning improvements in several parameters. The results showed the greatest improvements in academic achievement (72%) and time management (70%). These high percentages indicate that students were better at organizing and managing their study schedules, which improved learning. Learning methods (65%) and motivation (60%) also improved, indicating that students developed better study strategies and maintained their motivation.

However, 48% of students reported progress in the social environment dimension, indicating significant obstacles. This suggests the platform promoted peer relationships and social collaboration less effectively. On the physical environment dimension, 55% of students reported improvement, indicating moderate progress in creating suitable learning environments. However, it highlights areas for further assistance.

The study found that SPADA UNTIRTA motivated 60% of students. Self-Determination Theory says autonomy, competence, and relatedness are influenced by motivation (Deci and Ryan, 2000; Evans et al., 2024). SPADA UNTIRTA enabled self-paced learning, progress tracking, and student ownership. Zimmerman (2008) and Ranieri and Sangrà (2024) noted that intrinsic motivation is essential to SRL, and SPADA UNTIRTA can boost it by promoting learner autonomy and providing consistent performance feedback. 72% of students said time management was the best SRL feature for organizing their study schedules. Broadbent and Poon (2015) found that time management is crucial in online learning. Student organization, deadline reminders, progress tracking, and flexible material access helped SPADA UNTIRTA students avoid procrastination and maximize academic results (Shea and Bidjerano, 2011).

Academic performance improved by 70%. Quizzes and assignments on the platform helped students adjust their learning strategies and self-assess their progress. This supports Panadero's (2017) claim that SRL development requires consistent input. Students also liked being able to review previous tests and materials to consolidate their knowledge and identify areas for improvement (Wong et al., 2019). Despite the platform's many collaborative options, only 48% of students saw social environment gains. Despite supporting asynchronous peer contact, SPADA UNTIRTA may not meet real-time collaboration and community building requirements. Hrastinski (2019) suggested adding synchronous features like live video discussions to e-learning platforms to improve social learning. Many students wanted more real-time engagement with professors and peers, suggesting that improving this domain could improve the entire learning experience (Harper et al., 2024). About 20% of students reported system slowness and file upload issues. These obstacles are typical of online learning. The platform's effectiveness and usability would likely be improved by addressing technological issues, even though most students were unaffected (Lourenço and Paiva, 2024). SPADA UNTIRTA should prioritize server capacity and user interface simplification to increase engagement and reduce annoyance (Cho and Shen, 2013).

SPADA UNTIRTA supports SRL dimensions well, but its collaborative features and technical barriers limit its potential. Adding live interaction tools and improving system reliability can help overcome these issues. The study found significant improvement in students' self-regulation, particularly motivation and time management. This supports previous findings that self-regulation improves academic performance (Nabilah et al., 2024). Students reported better time management, learning environment control, and learning strategies after SPADA UNTIRTA. Social interaction in online learning was limited. Platform-based interaction can boost engagement, but technical and real-time issues remain.

Using SPADA UNTIRTA as an example, the hybrid platform supports SRL in the following ways: First, asynchronous materials: students manage their own time to review lectures, submit assignments, and complete quizzes, fostering time management and goal-setting skills. Second, task feedback: SPADA UNTIRTA provides students with immediate feedback on quizzes and assignments, encouraging self-monitoring and performance evaluation. Third, interactive tools: Forums and discussion threads promote collaborative learning, helping students seek peer support and clarify doubts, important for managing the social dimension of SRL. Then, progress tracking: students monitor their academic progress through built-in tracking tools, which encourage reflection and adaptive learning.

5. Conclusions and recommendations

This study shows that SPADA UNTIRTA is an effective tool for promoting Self-Regulated Learning in Economics students, focusing on motivation, academic achievement, and time management. However, fixing technical issues and adding real-time engagement could boost the platform's performance. As online learning grows, platforms like SPADA UNTIRTA must adapt to student needs.

SPADA UNTIRTA improves student motivation, time management, and academic performance through Self-Regulated Learning. However, addressing technical issues and adding real-time interaction could improve its effectiveness. As educational institutions adopt online platforms, SRL development technology must be continuously integrated to help students succeed in digital environments. SPADA UNTIRTA can boost economics students' motivation, time management, and academic performance through SRL. Technical issues and a lack of real-time interaction limit its effectiveness.

More diverse disciplines and institutions should be sampled in future research to improve generalizability. Based on these results, it is recommended that to enhance the effectiveness of SPADA UNTIRTA, it is crucial to integrate real-time communication tools, such as live discussions and peer collaboration features, while improving system stability and user interface design. Furthermore, future research should expand the scope of the study to include participants from various disciplines and institutions to improve the generalizability of the findings. Overall, SPADA UNTIRTA represents a significant step forward in hybrid learning models, emphasizing the need for continuous technological and pedagogical innovation to support student success in an increasingly digital academic environment.

Compliance with ethical standards

Ethical considerations

All participants were informed about the study, gave their voluntary consent, and were assured of anonymity and confidentiality.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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