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Self-Regulated Learning Strategies as Predictors of Perceived Learning Gains among Undergraduate Students in Ethiopian Universities

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Abstract: Despite increasing focus on the importance of self-regulated learning for undergraduate students in universities in recent years, very little is known about its specific features in universities in developing countries, in general, and Ethiopia, in particular. This study examined the relationships of self-regulated learning strategies (SRLSs) with perceived learning and further assessed the relationships within the SRLS components in Ethiopian public universities. For this, the authors adopted Pintrich's self-regulation theory as a guiding framework and used structural equation modeling (SEM) analysis. The sample used in the analysis pooled survey data from three randomly selected public universities and included volunteer undergraduate students having a major in Business and Economics and Engineering and Technology fields ($n = 1142$; male = 700 and female = 442), with mean age = 21.98 and SD = 2.50. The results indicated that the student SRLS and perceived learning gains scores were average values in terms of the magnitude of those measured variables. A two-step hierarchical regression analysis showed that the five components of SRLS that emerged from SEM analysis significantly predicted students' perceived learning over and above the control variables ($\Delta R^2 \geq 0.38$ and 39%) for the total samples. Moreover, the regression results showed that greater predictions were observed for the help-seeking component ($0.35 \leq \beta \leq 0.47$) than others, significantly positively predicting the perceived learning for the total samples. Overall, the findings of this study indicate that the SRLSs are relevant mechanisms to aid student success in higher education. The implications of the study are highlighted.

Keywords: self-regulation; learning outcome; university; Ethiopia; structural equation modeling

1. Introduction

It is becoming increasingly clear that successful higher education (HE) students are those who can independently plan academic activities, collaborate with others, work in teams, and clearly communicate ideas both in the physical and digital spaces [1,2]. Moreover, they are active and informed citizens who act with moral and ethical integrity [3]. These stated descriptors of successful HE students are inarguably positive outcomes, representing a combination of both academic and non-academic results [4] of effective teaching and learning in universities [5]. Indeed, planning, collaboration, teamwork, and communication all require the motivation to engage [6], some cognitive understanding of

the tasks [7], and above all, cognitive and emotional capacity to self-monitor and regulate behavior [8].

The quality of undergraduate students' learning experience is a primary concern of higher education institutions (HEIs) in the 21st century [9]. At present, a pedagogical paradigm shift is underway in HE in many parts of the world. This paradigm is characterized by a shifting away from focusing purely on the substantive contents of subject matter towards examining the learning mechanisms and processes [10,11], and this shift is now widely considered as a best practice in undergraduate education [12]. Guided by this, more practical approaches and methods are included in undergraduate courses, for example, problem-based learning, inquiry learning, project work, and simulations of workplace environments using computer-assisted learning [13–16]. Similarly, many HE academics have designed a range of practices to equip students with job-related skills to ease their transition into the world of work [17]. These efforts are happening primarily to leverage 21st-century learning by creating caring, diverse classroom cultures and improving the quality of students learning experience, thereby advancing the outcomes of undergraduate education [18].

The stakeholders of HE understand that such positive outcomes do not occur by default and undoubtedly require the exertion of continual effort and commitment [19]. Scholars argue that the overarching development of student learning experiences and outcomes requires a change in the curriculum [20], a shift in pedagogical perspective [21,22], a conducive learning environment [23,24], relevant mechanisms and processes [25], and thought and self-reflection [26,27]. The self-regulated learning strategies (SRLSs) are generally accepted as playing a relevant role in undergraduate students' success [28].

Self-regulated learning (SRL) denotes "an active, constructive process whereby learners set goals for their learning and attempt to monitor, regulate, and control their cognitions, motivation, and behavior, guided and constrained by their goals and the contextual features in the environment" [29] (p. 453). In the context of undergraduate education, this could mean, for example, students spending time in extra thought regarding how they learn and the strategies they will need to succeed in their enrolled coursework [30]. To achieve a specific learning goal, a self-regulated learner uses metacognitive, motivational, and behavioral processes, for instance, goal setting, metacognitive monitoring, help-seeking, and self-regulation [31]. However, in most empirical studies focusing on the effectiveness of SRLSs on undergraduate student's learning, the relationship has been examined between the SRLSs and the learning outcomes (actual learning and perceived learning) [32]. It is important to clarify that actual learning and perceived learning are separate and distinct concepts [33], and also have variances in their assessment methods.

Actual learning reflects a change in knowledge identified by rigorous learning measures, and perceived learning represents the student's self-reported gains in knowledge or skills [34]. Seen from the perspective of assessment, actual learning is assessed using direct measures, whereas perceived learning is assessed using indirect measures of learning. Elbeck and Bacon [35] describe direct measures as "scoring a student's task performance or demonstration as it relates to the achievement of a specific learning goal" (p. 282). Direct measures of learning consist of diverse assessment tools far beyond multiple-choice exams. For example, case write-ups, practical tests, live and video simulations, or oral examinations scored with rubrics [14,36,37]. Perceived learning can be measured by self-reports of "the difference between the skills, competencies, content knowledge and personal development demonstrated by students at two points in time" [38] (p. xi) and via self-reports. In this sense, self-reporting of learning is a type of indirect measure obtained through a student's gains in knowledge, skills, and values, generally based on some reflection and introspection [39]. Hence, it is clear that direct measures are measures of actual learning, and self-reporting of learning gains, one type of indirect assessment, is a measure of perceived learning.

The SRLS is relevant for undergraduate students being prepared for lifelong learning and the capacity to transfer skills, knowledge, and abilities [40]. Given the broader context

that requires university students to manage their day-to-day lives as part of their time management at university, it is important to conceptualize SRLSs more broadly through the strategic components, including metacognition, time and study environment management, peer learning, and help-seeking [41].

Metacognition refers to the student's awareness, knowledge, and control of cognition [42]. The metacognitive strategies comprise three general processes: planning, monitoring, and regulating, which makes the control and self-regulation aspects of metacognition apparent [43]. Another relevant component of the SRLS is that of time and study environment management. Time and study environment management is an important means to actively manage when, where, and for how long students engage in activities, if necessary, to reach their academic goals. Effort regulation is another component, in which a student manages their ability to control their effort and attention. Effort management reflects a commitment to completing one's study goals, even under challenging circumstances [44]. Another component of the SRLS is managing the support of others, which comes from peers and instructions [45].

Self-regulated learning strategies (SRLSs) are relevant mechanisms for students to learn effectively through the process [46]. However, minimal evidence exists that assesses whether the undergraduate curricula provide students the opportunities to develop such relevant skills [8]. A growing body of research shows that most undergraduate students face a range of new challenges when they study at university, primarily due to the changed circumstance in the learning and study environment, and a corresponding failure to use SRLSs [47]. This deficiency is one source of weakness in using effective learning skills, both in face-to-face and digital learning environments, and a contributor to poor academic performance [48].

Although many researchers have investigated the impact of SRLSs on academic outcomes such as grades [49–51], little is known about the use of SRLSs for perceived learning outcomes [52]. Moreover, there is limited empirical evidence in the HE research literature regarding how the SRLSs and perceived learning gains are related in the context of African higher education. Given this reality, it is important to study the SRLSs and other social-contextual factors and whether they contribute to students' learning, rather than focusing narrowly on outcome measures such as undergraduate students' acquired knowledge, values, and practical competence [53]. The purpose of the current study was to examine the relationships between SRLSs and perceived learning gains in order to determine whether evidence supports the connection between SRLSs and undergraduate learning. The following research questions guided the study:

1. What is the state of SRLSs and perceived learning among undergraduate students in Ethiopia?
2. To what extent do the SRLS components relate to one another as perceived by undergraduate students in the context of Ethiopian universities?
3. Do the SRLS components predict a university student's perceived learning after accounting for the control factors in universities in Ethiopia?

The following hypotheses were formulated:

Hypothesis H1. *There is a significant positive relationship between the SRLS components in undergraduate students in a university setting.*

Hypothesis H2. *There is a significant positive relationship between SRLS and the perceived learning in undergraduate students in a university setting.*

2. Materials and Methods

2.1. Study Design

This study used a cross-sectional survey design to collect quantitative data from the undergraduate students enrolled in majors in the college of Business and Economics and the college of Engineering and Technology, in three public universities in Ethiopia. This

cross-sectional study design was found to be appropriate because it allowed the authors to collect data from a large pool of undergraduate student participants.

2.2. Theoretical Framework and Empirical Background

Zimmerman [42] describe SRL and performance as “the processes whereby learners personally activate and sustain cognitions, affects, and behaviors that are systematically oriented toward the attainment of personal goals”. This corresponds to the view of Pintrich [29] that self-regulation is the regulation of cognition, motivation behavior, and context. Seen in this way, self-regulation is “an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and the contextual features in the environment” [31] (p. 453). A focus on SRL has emanated from the empirical evidence that shows that self-regulatory learning is an effective means to improve achievements of students [54,55]. Moreover, the potency of the SRL components has been empirically justified. For example, a study highlighted that “metacognitive skillfulness outweighs intelligence as predictor of learning performance” [56] (p. 159).

HE students having well-developed SRLs understand how to evaluate their academic abilities, monitor their learning and development progress over time, strategically make efforts, and utilize opportunities in the environment to help achieve their goals [46]. Moreover, they were found to achieve higher performance in terms of both academic and non-academic outcomes [52].

Triggered mainly by the heightened interest in learning strategies in HE, numerous studies have been undertaken on the corresponding measures of SRL. The SRL consists of the cognitive, metacognitive, behavioral, motivational, and emotional/affective aspects of learning. However, in contrast to the original version of the motivated strategies for learning questionnaire (MSLQ) [45], subsequent usage of this instrument did not capture the broad variants of SRL. Both Zimmerman and Schunk [57] and Pintrich [44] acknowledge the complexity of the research, which is due to a broad range of self-regulation perspectives, leading to varied assessment methods.

A systematic review of the self-report instruments of SRL in HE categorized the existing instruments into two broad categories of process-oriented and component-oriented instruments [58]. According to the same authors, process-oriented implies a focus on the nature of the process, whereas component-oriented implies a focus on the components. Hence, unlike the process-oriented self-report instruments, these component-oriented instruments focus on the self-regulation strategies.

In this study, the authors used a component-oriented self-report of SRLs including components suggested in the literature such as metacognitive strategies and resource management strategies [59]. Furthermore, resources are defined broadly in terms of time, study environment context, and peers and instructors [44,60]. The focus on SRLs is consistent with this study’s primary concerns to investigate the undergraduate students’ use of SRLs.

2.3. Participants of the Study

The study population included undergraduate students in the setting of Ethiopian public universities. The study samples were selected using a three-stage sampling strategy. First, the different public universities were classified into six clusters as proposed by the Ethiopian Higher Education Relevance and Quality Agency’s (HERQA’s) recent classification. From this, one cluster was selected. The selection of the cluster determined the universities to be involved in the study. Then, three universities were selected randomly from the specified cluster based on three generations of the universities’ schemes proposed by HERQA. Then, a stratified sampling technique was used to select 10% of the students from each of the sampled universities, stratified by college, class year, and gender.

The sample used in the analysis pooled survey data from three randomly selected public universities and included undergraduate students having majors in Business and

Economics and Engineering and Technology fields. Of the 1250 administered consent forms, 50 were deemed non-responders as they did not return the questionnaires. In addition, another 4.64% ($n = 58$) of participants' survey responses were discarded prior to data analysis because of partial response (i.e., more than 50% of the necessary information was not completed). Hence, the final sample participants consisted of 1142 undergraduate students. More detailed information about the study participants' demographic profile is presented in the results section.

2.4. Data Collection Instrument and Validity Evidences

In this study, the authors used a contextually modified SRLS questionnaire [61]. This questionnaire was originally extracted from the Motivated Strategies for Learning Questionnaire (MSLQ), which was developed to measure the types of learning strategies and academic motivation used by college students [62]. The original MSLQ has relevant components to measure the overall learning strategies and motivation, consisting of ten components [30]. Although empirical data exist on the validation of the MSLQ questionnaire, Boekaerts and Corno [63] identified substantial variability in SRL assessment methods across the existing empirical studies. Hence, following Pintrich [29], this study questionnaire consisted of 26 items used to measure the five SRLS's components, namely, metacognition, time and study environment management, effort regulation, peer learning, and help-seeking.

For this study, the measurement model was specified a priori, and the construct was analyzed using covariance-based structural equation modeling using the maximum likelihood estimation method [64] within the Stata statistical analysis package [65]. Accordingly, items were allowed to load on only one hypothesized factor, factors were allowed to correlate freely, factor variances were set to one, and error terms were not allowed to correlate. The factorial validity of the scores derived from the scale was assessed by examining the item factor loadings. Here, items were considered for deletion if they displayed large standardized residuals (>2) or if an item had a low factor loading <0.40 [66]. Of the total number of 27 items, only one produced a factor loading below 0.04 and was removed from the model.

2.5. Data Analyses Methods

This part of the report presents the analyses and interpretations of the results of the study. The summaries of results are presented in tables and figures so as to help readers easily understand the major results and the meanings attached to them. The tables and figures are also organized systematically so that the demographic characteristics of the students are first presented to give the general overview of the participants in the study. Second, the factor structures of the SRL construct and the correlation within the factors for all samples are presented to give basic information about the factor loadings and structures, and demonstrate the interrelationship between the SRL factors. Third, three separate partial correlation analyses are presented to demonstrate the levels of associations found between the anticipated independent variables (demographic and contextual factors) and dependent variables of interest (perceived learning and development outcomes). Finally, results of the regression analyses are presented using the regression models and summary tables representing the prediction of variables in a two-step hierarchical regression analysis.

In this study, the authors used a two-step hierarchical regression analysis, allowing the contextual variables to predict the outcomes measured, followed by the addition of the SRL variables in the second step. We entered potent contextual predictors in step one, followed by the SRL components in a second step to determine the degree of variance in each outcome explained by the second step (the SRL components). Figure 2 illustrates simplified visual models of the general regression model.

2.6. Preliminary Analyses

Estimates of internal consistency for the total scale and each subscale were calculated using a pilot sample of reliability of volunteer undergraduate students in the College of Education and Behavioral Sciences at Jimma University ($n = 44$). Estimates of internal consistency for the pilot study exceeded $\alpha > 0.70$. These alpha coefficients are acceptable according to the psychological research literature [67].

In order to identify the potent contextual variables, the authors ran three separate partial correlations analyses, testing the independent relationship of each contextual variables against each outcome measure. The partial correlation analysis presents the partial correlation coefficient of a specified variable with each variable in a variable list after removing the effects of all other variables in the variable list. The corresponding significance is also reported. The independent variables included the following ten variables: university, college, gender, age, resident, Ethiopian Preparatory School Completion Exam (EPSCE), attendance rate, study hours, overall academic preparation, and academic preparation during the regular program. Table 1 presents the partial correlation analyses results for the three dependent variables (gains in personal and social development, gains in general education, and gains in practical competence).

Table 1. Summary of the partial correlation analyses for the demographic and contextual factors and learning outcomes ($n = 1142$).

Independent Variables	Gains in Personal and Social Development		Gains in General Education		Gains in Practical Competence	
	Parr Corr.	<i>p</i> -Value	Parr Corr.	<i>p</i> -Value	Parr Corr.	<i>p</i> -Value
University	−0.027	0.368	−0.035	0.238	−0.039	0.195
Major Field	−0.042	0.162	−0.058	0.051	−0.056	0.060
Gender	−0.021	0.471	−0.028	0.344	−0.042	0.159
Age	0.007	0.811	0.015	0.609	0.015	0.619
Resident	−0.070	0.018 *	−0.074	0.012 *	−0.075	0.012 *
EPSCE	0.010	0.739	0.007	0.824	0.013	0.669
Class Year	−0.083	0.005 *	−0.085	0.004 *	−0.080	0.007 *
Attendance	0.092	0.002 *	0.079	0.008 *	0.065	0.030 *
Study hours	0.013	0.669	0.020	0.494	0.009	0.761
Academic preparation	0.129	0.000 *	0.132	0.000 *	0.116	0.000 *

EPSCE = Ethiopian Preparatory School Completion Exam, * *p* values significant < 0.05.

As shown in Table 1, independent variables such as resident, class year, attendance, and academic preparation had a significant *p*-value, meaning these independent variables had a consistent significant relationship with each outcome variable measure while controlling the effect of the other independent variables on each outcome measure. These four contextual variables were used in the regression models and in the description of the results.

3. Results

This section presents the findings of the study. For simplicity of the presentation the substantive contents are divided into three major sub headings: Section 3.1 Results of demographic information and descriptive analysis; Section 3.2. Results of factor structure and model fitness; and Section 3.3. Results of regression analyses using SEM.

3.1. Demographic Information and Descriptive Analyses Results

Demographic Information about the Student Participants

The study participants included in the final analysis were volunteer students ($n = 1142$; male = 700 and female = 442) from three universities in Ethiopia with Mean age = 21.98 and SD = 2.50. Table 2 presents the demographic information of the student participants.

Table 2. Students' demographic information and contextual factors ($n = 1142$).

University	Frequency	Percent		
Jimma	595	52.1		
Mizan-Tipe	325	28.5		
Metu	222	19.4		
College attended	Frequency	Percent		
Engineering	638	55.9		
BECO	504	44.1		
Gender	Frequency	Percent		
Female	442	38.7		
Male	700	61.3		
Age	Frequency	Percent		
16–19	147	12.9		
20–22	601	52.6		
23–24	228	20.0		
25–39	166	14.5		
Resident status	Frequency		Percent	
	Female	Male	Female	Male
Living on campus	321	589	73%	84%
Living off campus	121	111	27%	16%
Class year	Frequency	Percent		
1st Year	310	27.1		
2nd Year	238	20.8		
3rd Year	426	37.3		
4th and 5th Year ¹	168	14.7		
Student Attendance rate	Frequency	Percent		
Less than 50%	106	9.28		
51–74%	249	21.80		
75–94%	326	28.55		
95–100%	461	40.37		
Academic preparation	Frequency	Percent		
Not prepared	189	16.55		
Somewhat prepared	502	43.96		
Prepared	451	39.49		

¹ The students of the 4th and 5th years were merged as there were minimal 4th-year participants involved. The 4th-year students in the sample universities had fieldwork for the industrial attachment course.

As shown in Table 2, in our sample there were more male undergraduate students than female students. The reported gender proportion in this study, that is, 61.3% males and 38.7% females, is similar to that of a recent government report that revealed a similar proportion of males and females in the entire HE system in the country. In terms of major area discipline, a large majority (66%) of the sampled undergraduate students were Engineering majors, and the remaining 34% were Business majors. In terms of the residential status, most of the students lived on campus, accounting for 73% and 84% of the women and men students, respectively. Compared to the men students, the proportion of women students who lived off campus was slightly higher (11% more than the men participants). Of the total sample of undergraduate students involved in this study, only 20% were first-year students, 30% were second-year, 32% were third-year, and the remaining 18% were fourth- and fifth-year students. Almost all of the fourth- and fifth-year students were Engineering majors.

Seen from the attendance and preparation perspective, most of the students attended more than 75% of the regular classes, and were prepared or somewhat prepared. However,

it was concerning that nearly 10% of the students attended less than 50% of the regular classes. It was also concerning that another 16% of the students were not prepared for the academic activities.

3.2. Results of Descriptive Statistics for the SRL Components and Perceived Learning Gains

We also present a descriptive statistics table summarizing the scores for the dependent and independent variables. This is a helpful table for thinking about the data analysis and the statistical procedures. Table 3 shows the summary results of the descriptive statistics (means, standard deviations) for the SRLS and perceived learning gains components, in addition to the number of items and Cronbach alphas.

Table 3. Summary results of the descriptive statistics for the five SRLS components and the three perceived learning gains components.

Variable	Observation	Mean	Standard Deviation	Items in a Component	Cronbach Alpha α
Metacognition	1142	2.60	0.66	10	0.90
Time and study management	1142	2.62	0.67	6	0.81
Effort regulation	1142	2.38	0.75	3	0.72
Peer learning	1142	2.56	0.68	4	0.76
Help seeking	1142	2.60	0.78	3	0.78
			Total	26	0.92
Gains in personal and social development	1142	2.78	0.72	6	0.86
Gains in general education	1142	2.78	0.79	3	0.82
Gains in practical competence	1142	2.72	0.77	4	0.83
			Total	13	0.93

As shown in Table 3, the most prevalent self-regulatory strategy reported by the undergraduate student sample was students' time management and study skills ($M = 2.62$, $SD = 0.67$), whereas the least prevalent strategy reported was effort regulatory behavior ($M = 2.38$, $SD = 0.75$). In terms of perceived learning gains, the scores for the three components were above average and slightly higher than the scores for the SRL components, with the mean ranging between 2.72 and 2.78. As the results of the reliability analysis for each component indicate, the Cronbach alpha coefficient ranged between 0.72 and 0.90 (Table 3).

3.3. Results of the SRLS's Factor Structure and Model-Fit Using SEM

In this section, summary results of the SRLS factor structure, correlations between the SRLS model components, and model fit tests are briefly presented. The summary of the model fit tests is presented along with the standard criteria recommended in the psychology and education literature. Figure 1 illustrates the structure of the five-factor SRLS model.

As shown in Figure 1, for all SRLS components, moderate to high proportions of the common variance were explained by the items with the factor loadings ranging between 0.53 to 0.79. In terms of the association, the five-factor SRLS model components had low to moderate correlations, with r mainly ranging between 0.36 and 0.63. However, a number of factors exhibited relatively higher correlations (i.e., the correlations between the metacognition and time and study environment management components ($r = 0.70$), and between peer learning and help-seeking components ($r = 0.84$)).

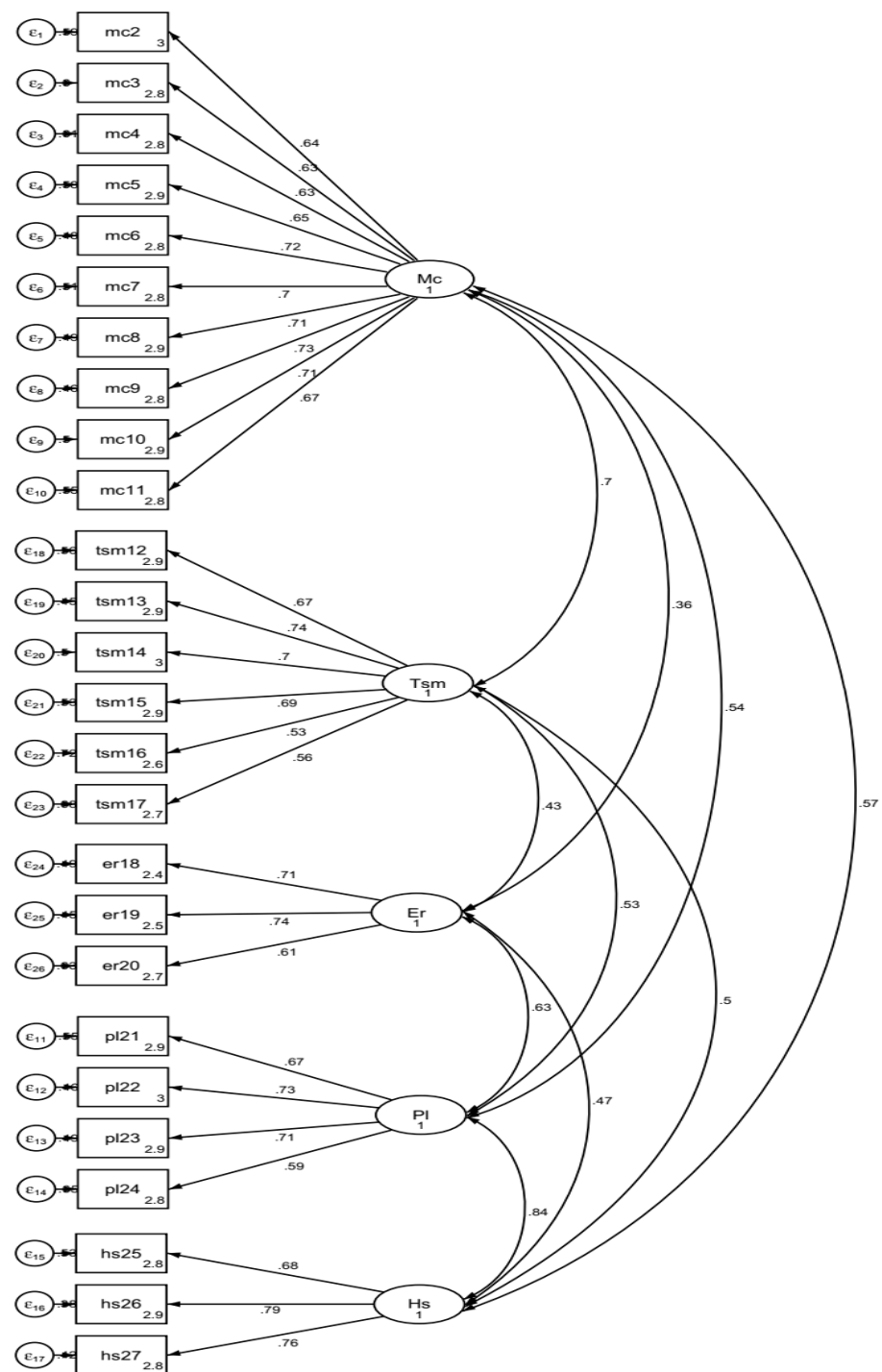


Figure 1. Structural representation of the 5-factor SRL model. Rectangles represent observed variables. Ovals represent latent variables. The εs values are residual terms denoting measurement errors. A single arrow head drawn from the oval to the rectangle represents the path connection between the measurement variable and the latent factor. A double-headed arrow drawn between two ovals represents correlation. The acronym Mc represents metacognition, Tse represents time and study management, and Er represents effort regulation; Pl represents peer learning and Hs represents help seeking.

Model fit was assessed according to the chi-square (χ^2) test and multiple indices. The chi-square test [68] was used to assess the absolute fit of the five-factor SRLS model to the data, but this test rejected the five-factor model, as is often the case when applied to

large samples [69,70]. In addition, the authors used five additional indices, namely, the comparative fit index (CFI), the Tucker–Lewis index (TLI), coefficient of determination (CD), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR), to assess the model fit. The CFI, TLI, and CD range from 0 to 1, with the common value for an acceptable model fit being 0.90 or greater [69,71,72]. The interpretation of the RMSEA and SRMR was based on suggested values, namely, less than 0.05 represents a close model fit, 0.05 to 0.08 represents a reasonable fit, 0.08 and 0.10 indicates a mediocre fit, and greater than 0.10 represents an unacceptable fit [73,74]. Based on these standard indexes as reference points, post-estimation analyses were performed to evaluate the goodness of fit of the five-factor SRLS model. According to the summary results, CFI = 0.90, TLI = 0.89, CD = 1.00, RMSEA = 0.06, and SRMR = 0.05. These results of the goodness-of-fit statistic tests indicated that the five-factor SRLS model had acceptable fit indexes.

3.4. Results of Hierarchical Multiple Regression Analyses

In this study, the authors used a two-step hierarchical multiple regression, where the controlling (personal and social-contextual) variables and the five-factor SRLS components entered the model in separate steps called “blocks”. The authors used this to statistically “control” the selected controlling variables and examine whether adding the SRLS components significantly improved the regression models’ ability to predict the criterion variables (perceived learning gains). Accordingly, the authors wanted to know whether the five-factor SRLS components predict the outcome variables (perceived learning gains) over and above the control variables.

In this analysis, the three perceived learning gains variables were the outcome variables. As shown in Figure 1, in the first step, the authors included the four controlling variables (predictor variables) independently (resident, class year, attendance rate, and academic preparedness). In the second block, the authors added the SRLS components representing the interaction between controlling variables and the SRLS components combined. If the interaction term (SRLS) statistically predicts each outcome variable above and beyond the controlling variables, then we conclude there is a significant second block or step-2 prediction effect. Figure 2 illustrates the structural representation of the 2-step hierarchical multiple regression model.

As illustrated in Figure 2, there were two clusters of regression models drawn from the independent variables, including the controlling variables (personal and social-contextual) variables and the outcome variables. Step two extended the models further to include the five-factor SRLS components as predictors, along with the controlling variables, to measure the net effects of the SRLS components.

In the first step, the control variables statistically predicted the perceived learning outcomes for the total sample, when first entered into the regression model (step 1: Model 1 Adjusted $R^2 = 0.6$, $F[4, 1137] = 20.33$, $p < 0.001$; Model 2 Adjusted $R^2 = 0.6$, $F[4, 1137] = 19.65$, $p < 0.001$; Model 3 Adjusted $R^2 = 0.5$, $F[4, 1136] = 14.87$, $p < 0.001$). When the SRLS components were added to the regression models, they resulted in significant changes in the overall prediction of the three models (step 2: Model 1 Adjusted $R^2 = 0.44$, $\Delta R^2 = 0.38$, ΔF for $\Delta R^2 [9, 1132] = 78.98$, $p < 0.001$; Model 2 Adjusted $R^2 = 0.45$, $\Delta R^2 = 0.39$, ΔF for $\Delta R^2 [9, 1132] = 86.19$, $p < 0.001$; Model 3 Adjusted $R^2 = 0.43$, $\Delta R^2 = 0.38$, ΔF for $\Delta R^2 [9, 1132] = 79.83$, $p < 0.001$). It is clear from the ΔR^2 of the three regression models that the added five-factor SRLS components show a significant improvement in the adjusted R^2 (the proportion of variance in DV explained by the model). These results indicate that the inclusion of the five-factor SRLS components resulted in substantial changes in the models’ capacity to predict the measured outcomes. Table 4 presents a summary of the two-step hierarchical regression analysis for the controlling variables and the five SRLS components predicting the three student learning outcomes.

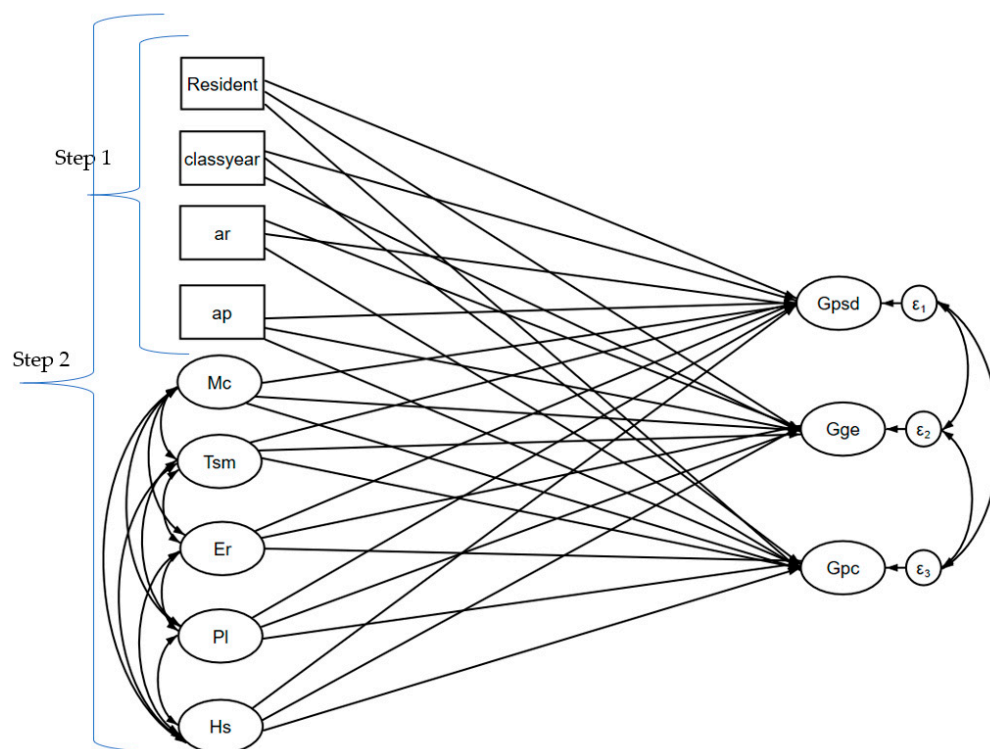


Figure 2. Structural representation of the 2-step hierarchical multiple regression model. Rectangles represent observed variables. Ovals represent latent variables. The ε values are residual terms denoting measurement errors. A single arrow head drawn from the oval to the rectangle represents the path connection between the measurement variable and the latent factor. A double-headed arrow drawn between two ovals represents correlation. The acronym ar represents attendance rate, ap represents academic preparation, Mc represents metacognition, Pl represents peer learning, and Hs represents help-seeking; TSE represents time and study management and Er represents effort regulation.

In step 1, by entering the control variables, the three models accounted for 0.05 to 0.06 of the variances explained in the three perceived learning outcomes, and these were statistically significant according to the corresponding F -statistics and p -values (Table 4). In step 2, the control variables and the five-factor SRLS components together accounted for 0.43 to 0.45 of the variances explained in the three models ($R^2 = 0.43$ to 0.45), and these results show an increase in the variance explained compared to the variances explained in step one of the three regression models. Hence, by adding the SRLS components, the models explain additional variance ($\Delta R^2 = 0.38$ to 0.39), and these ΔR^2 were also statistically significant according to the corresponding ΔF -statistics and p -values.

A further analysis of the results in Table 3 shows that only two of the controlling variables, student residence type and academic preparation, had a statistically significant prediction in the three models. Moreover, it was clear that three of the five SRLS components had significant positive predictions for the three perceived learning outcomes. The beta values for each predictor in the three models indicate that the help-seeking component of the SRLS was the best predictor of the perceived learning outcomes ($\beta = 0.35$ to 0.47), followed by peer learning ($\beta = 0.18$ to 0.20), and time and study management ($\beta = 0.10$ to 0.14) components. However, the two controlling variables of resident type and academic preparation were the worst predictors ($\beta = 0.05$ to 0.07). These results, in addition to the additional variance explained, collectively indicate that, in step 2, the SRLS components, rather than the control variables, contributed to the predictions of the outcome measures (the three perceived learning gains). The results of these regression analyses show that the variance in students' perceived learning can be attributed to the SRL components, over and above the control (personal and social-contextual) variables, with ΔR^2 of 0.38 to 0.39

for the three regression models where the addition of the SRLS components resulted in a significant positive change.

Table 4. Results of hierarchical multiple regression analyses for SRLS and perceived learning gains ($n = 1142$).

Step One	General Education		Personal and Social Development				Practical Competence					
	B	β	B	β	B	β	B	β	B	β		
Constant	-0.18				-0.17				-0.09			
Resident	-0.12	-0.08**			-0.13	-0.08**			-0.12	-0.08**		
Class Year	-0.06	-0.10**			-0.06	-0.09**			-0.05	-0.09**		
Attendance Rate	0.07	0.11***			0.06	0.10**			0.04	0.08*		
Academic preparation	0.11	0.13***			0.12	0.13***			0.10	0.12***		
Adjusted R ²	0.06				0.06				0.05			
F	200.33				190.65				140.87			
Step Two												
Constant			-0.04				-0.01				0.06	
Resident			-0.07	-0.04			-0.08	-0.05*			-0.07	-0.05*
Class year			-0.02	-0.03			-0.01	-0.02			-0.01	-0.02
Attendance rate			0.01	0.01			-0.00	-0.00			-0.02	-0.03
Academic preparation			0.06	0.07**			0.06	0.07**			0.04	0.05*
Metacognition			0.03	0.03			0.00	0.00			0.00	0.01
Time and study management			0.11	0.10**			0.14	0.12**			0.15	0.14***
Effort regulation			0.05	0.04			0.01	0.01			0.01	0.01
Peer learning			0.07	0.06			0.21	0.18*			0.21	0.20*
Help seeking			0.51	0.47***			0.43	0.39***			0.34	0.35***
Adjusted R ²			0.44				0.45				0.43	
ΔR^2			0.38				0.39				0.38	
ΔF			780.98				860.19				790.83	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

4. Discussion

According to the findings of this study, the use of SRLSs by the undergraduate students and the perceived learning scores were moderate, which indicates average performance. Furthermore, the use of the effort regulation strategy was found to be low. These results coincide with Arum and Roksa [75] and reports indicating limited academic engagement and learning outcomes in undergraduate education. The use of these strategies would not be adequate to cope with the challenges of the 21st century and the development of essential employability skills among the undergraduate students. This may be because HEIs' cultures and practices do not allow having a great concern for students' learning [76,77] or lack the mechanisms and processes to promote students' success [78,79]. SRLSs are generally accepted as playing a relevant role in undergraduate students' success Zimmerman and Schunk [57] because high self-efficacy and the goal-directed use of learning strategies are critical [80]. Hence, applying instructional strategies that promote SRLSs in undergraduate programs would contribute positively to promoting students' learning.

In terms of the SRLS factor structure, there were moderate to high factor loadings for the five SRLS factors (Figure 1). These item-level factor loadings indicated the adequacy of the model in creating a common factor space for the measured factors. However, due to the lack of an a priori-tested SRLS model, it was not possible to compare the factor loadings with those of other similar studies. It is important to note that the overall reliability of the scale is very high ($\alpha = 0.92$) and no single item had a loading below the recommended threshold of $\lambda = 0.40$ [81]. Moreover, the results of the reliability analyses for the different components were found to be acceptable for all the measured SRLS components >0.70 [67]. In summary, the factorial validity of the construct was verified. The acceptability of the different model testing indices provides supporting evidence for the adequacy of the model to fit with the student sample data.

As illustrated in Figure 1, the different factors did not show any excessive correlations between the five-factor SLRS components. It is clear that there are low to moderate, and high, correlations among the variables, with the correlation coefficients varying between

0.36 and 0.84; the majority of these have moderate correlations [82]. The correlations between the SRLS components reported in this study are similar to the correlation results previously reported for the SRLS, although fewer or other components may be included in previous studies. For example, a study conducted on college students found a significant positive correlation between metacognitive self-regulation, time and study environment management, and effort regulation [83]. A similar study reported that the correlations within the cognitive and metacognitive self-regulation strategies ranged from 0.54 to 0.77 [84]. The present study correlation results (Figure 1) corroborate the findings reported in the literature, albeit with a greater variety in SRLS components. These testify to the interdependence among the factors, and the absence of excessive and negative relationships between the SRLS components.

The regression analysis results indicated that three of the five SRLS components consistently predicted the three perceived learning gains, indicating the relevance of these components in the Ethiopian HE context. The SRLS components of academic preparation and residence type predicted students' perceived learning. Among the five SRLS components, time and study environment management, peer learning, and help seeking showed higher prediction ability. Regarding undergraduate students' SRLS components, help-seeking showed a higher prediction ability for perceived learning. The strength of this association remained fairly stable across the three perceived learning types. This is similar to the findings of studies reported in the literature. For example, a study found significant correlations between the MSLQ self-reported scores and academic performance [51]. Similarly, Varasteh, Ghanizadeh [85] reported that learners' self-regulation had a significant influence on language achievement.

In the 21st century, the need for HE academics to utilize SRLSs in undergraduate education is crucial [40]. Different strategies exist to promote undergraduate students' use of SRL, which have been associated with higher levels of students' success in higher education. These include the teaching of the SRLSs by a HE academic member, supporting the students' efforts to self-regulate, using students' study logs, and scaffolding [86].

Study Limitations

This study was not without limitations. First, the sample included in this study comprised students from the selected public universities and included undergraduate students having majors in the Business and Economics and Engineering and Technology fields. Future research should include students from a large pool of major fields to fully represent the HE populations. Future research should include the motivational components of the self-regulation. It is clear from the reviewed literature that actual learning and perceived learning are indeed separate and distinct, both conceptually and methodologically. Although the current study utilized the perceived learning outcomes, this does not represent actual learning. Based on this, future research should focus on utilizing a combination of the actual and perceived measures to triangulate the findings and provide more robust evidence of the relationships between SRLSs and learning, in the HE context.

This study's specifications of the four contextual factors, five components of undergraduate students' SRLSs, and three components of their perceived learning outcomes are limited by the nature of theoretical and empirical work in these areas. Thus, there is considerable conceptual and item-content restrictions across these measures. Our evidence was also hindered by the use of the SRLS components instead of SRLS strategies of the same SRLS's construct. Overall, the current range of the nine potential factors of undergraduate students' perceived learning outcomes are indicative of measures representing fewer underlying mechanisms by which students' perceived learning outcomes maybe predicted. However, these were not exhaustive of the correlates of perceived learning outcomes.

5. Conclusions and Implications

Among the international literature, this study is the first to empirically test the factor structure of the five-factor SRLS model and analyze the relationships between these com-

ponents as predictors of perceived learning in HE. The results are generally congruent with similar studies reporting the relationships between the SRLS components and learning in general. The results offer empirical support for current debates on the quality of teaching and learning in HE. Aspects of the SRLS components that are far higher than the selected social–contextual factors are substantially associated with perceived learning in HE. This result indicates the relevance of the SRLS components in HE. Among the five SRLS components, help seeking showed the highest prediction ability for the three measures of the perceived learning gains. Time and study management and peer learning were significantly positively associated with the perceived learning components. However, metacognition and effort regulations predicted none of the perceived learning components.

High-achieving students in HE are characterized by qualities that, in part, are affected by academic preparation and attendance, and the use of SRLS. Thus, universities should consider this carefully to improve the quality of teaching and learning for undergraduate programs.

The findings of this study provide a new way of understanding SRLSs from a component perspective via the five-factor model to promote students' perceived learning. The findings of this study specifically highlight the time and study environment management, peer learning, and help-seeking components of self-regulated learning strategies as the potential components that are useful for promoting the perceived learning of undergraduate students, thereby increasing their likelihood of success in undergraduate education. Further research regarding university students' SRLSs and their contributions toward developing students' actual learning with more robust measures of outcomes is needed. Empirical research is needed to analyze the implications of incorporating a holistic intervention in light of these findings. Moreover, there is a need to understand how best to utilize SRLSs to drive positive non-academic outcomes in a university learning environment.

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