

Self-Regulated Learning Design for Professional Teacher Development: Delivery of Measurement & Assessment Course in Blended Mode

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ABSTRACT

Learner-centeredness has been prioritized in the teaching-learning process, although the learner belongs to different psychological and cognitive departments. The constant digital transformation has made drastic changes in educational contexts related to course design, delivery and instruction, assisting systematic management of the diversified needs of learners in different departments. Potentially, blended learning plays a critical role in designing and implementing educational programmes while providing an effective and learner-centred approach for course delivery, resulting in learner satisfaction with learning outcomes. The study planned to investigate the extent of productivity of SRL, supported by the COPES model, in the accumulation of teacher professional knowledge in a blended teacher professional course. The sample was selected purposively from a university B.Ed. course, which accommodated in-service (N=28) and pre-service (N=35) teachers. The social constructivist theoretical underpinning was employed, and a quantitative dominant, quasi-experimental pre- and post-test design was adapted. Paired-sample t-test results indicated that the means of both groups are highly significant at $p < .001$. One-way ANOVA test indicated that there is no statistically significant association between the means at $p < .05$ in response to the independent variables, such as Age, Gender, Educational qualifications, and Residential area. Independent sample t-test results indicated that assessment knowledge improvement is partially significant at $p < .05$ in both groups. The efficacy of the COPES model was estimated via Multiple Linear Regression (MLR) analysis for both in-service and pre-service teachers. Results indicated that, respectively, 41% and 30% of the variance of the post-test results of in-service and pre-service teachers is accounted for by the psychometric properties of the model.

Keywords: *blended learning, copes model, educational measurements and assessment, self-regulated learning-srl, teacher professional development*

INTRODUCTION

Self-Regulated Learning (SRL) is an instructional strategy that has been mainly used in classroom learning for many years, and its effectiveness in learning has also been commended in different scenarios. In recent years, it has been employed in online and blended formats to deliver programmes, and its consequences have been reported in many research studies, while its scope and capabilities have been redefined and heightened (Broadbent & Fuller-Tyszkiewicz, 2018; Virtanen, Nevgi & Niemi, 2015). It is further understood that SRL enriches

the relationship between psychological engagement and learning achievements in blended learning contexts, particularly through two SRL skills, such as task strategies and self-evaluation (Li, Chen, & Liu, 2024; Zhao et al, 2025). Self-regulated learning (SRL) refers to guiding one's own learning through metacognitive reflection on the learning process and consciously selecting effective strategies to enhance that learning (Zimmerman, 2000; Zimmerman, 1998; Bandura, 1991). The COPES model is one of the models used to implement SRL effectively postulated by Winne and Hadwin (1998, p.279-285).

Blended Learning (BL) is a combination of face-to-face and online instruction that ensures greater flexibility in students' learning and congruity of course delivery (Danushka & Weerasinghe, 2020, p. 765). BL is the common prevalence in education since it combines physical and online learning opportunities, ensuring greater flexibility in student learning while providing a cost-effective platform for institutions, so that BL has been a productive choice to reach the maximum level of satisfaction for both ends. The blended classroom model, one of the popular models among other models, is used in many professional teacher development programmes as it creates an environment for students to learn the theory online and practice the content physically with the presence of an instructor or a mentor. It is observed that the demand for teacher training is increasing due to certain government rules imposed on the teaching profession recently, particularly in-service teachers tend to apply for teacher training programmes. In-service teachers are entitled for study leave for further training needs, but many of them are hesitant to apply for study leave because leave requests are discarded due to teacher scarcity. Optionally, in-service teachers apply for blended courses, as many teacher training faculties and private institutions are now running blended programmes in response to the ongoing learner requirements. So, it would be noteworthy of inquiring into the context to see how teacher training programmes could be effective in response to the use of SRL in a blended classroom setting, since it is believed that SRL could be successful in teacher training contexts. Therefore, the present study is based on the research question of *how effective SRL is at blended teacher development programme*. Aligning with the research question, two research objectives are set for the study: 1) To design SRL for Blended Learning of professional teacher development, and 2) To decide the effectiveness of SRL in blended teacher development programmes. The study aims to answer the objectives through a quasi-experimental design with a purposively selected sample from undergraduates who follow a blended B.Ed. degree course in a local university. Written consent was taken from the respondents to participate in the study, and the relevant university authorities were informed in writing and approval was taken to conduct the study in the University. All the stakeholders were appropriately informed of the consequences and the benefits of the study before it was implemented.

LITERATURE REVIEW

Empirical studies show that SDL (Self-Directed Learning) and SRL are often used synonymously despite their different meanings (Saks & Leijen, 2014). Even though the concepts of self-directedness and self-regulation are not the same, they both shed light on different facets of the learning process. SDL originated from the works of Knowles and was heavily influenced by his literature. The literature of Hiemstra (1994) and Merriam (2001) also contributed to the development of SDL. The distinction between SDL and SRL is clearly explained in the literature of Saks and Leijen (2014), which is of vital importance. According to their literature, SDL is of wider scope and can be used in areas outside the classroom setting, whereas SRL is specific and is only used in the school setting in the context of completing specific tasks. SDL is focused on the process, whereas SRL is focused on the execution of tasks. The supervision of SRL is done by the teacher, whereas SDL is focused on the independent nature of the learners. The concept of SDL is based on andragogy, which is different from the concept of SRL based on cognitive psychology (Saks & Leijen, 2014). "Self-Regulated Learning (SRL) refers to the strategies that students use to regulate their own thoughts and organise their own learning resources (Pintrich, 1999, p. 459).

SRL describes the learning techniques employed to manage learning resources and facilitate cognitive development. Saks and Leijen (2014) explain that SRL represents a dimension of SDL. The current study focuses on the preference for SRL within a blended learning approach, which eliminates the need to further elaborate on terminology and concepts. Additional information concerning concepts and terminology may be found within the work of Pintrich, Zimmerman, and Azevedo (Pintrich, 1999; Zimmerman, 2002; Azevedo, 2009). At the moment, three propositions are associated with a motivational belief that promotes and enhances SRL. Blended learning environments may assist in promoting these propositions, as suggested by Pintrich (1999). Self-efficacy represents a motivational factor that promotes self-awareness and beliefs about one's ability to learn and acquire the necessary skills, promoting the use of self-regulated learning techniques. Task-value beliefs describe the perceived engaging, meaningful, and applicable nature of the learning activity. The adoption of a mastery orientation represents the selection of techniques that consistently enhance learning and understanding.

SELF-REGULATED LEARNING IN ONLINE AND BLENDED CONTEXTS

Research on the implementation of self-regulated learning (SRL) in online and blended contexts is adequately represented in the literature. Ting and Chao (2013) and Samruayruen et al. (2013) refer to Artino and Ioannou (2008), who considered SRL to be an effective and appropriate strategy for online education. In addition, these results and recommendations are consistent with the SRL adaptive profile of motivational beliefs, as proposed by Pintrich (1999). Other studies that support these results are also available (Vovides et al., 2007; Wang, 2011; Barnard-Brak et al., 2010). Barnard-Brak et al. (2010) found that SRL leads to better student performance, as far as students in online contexts are concerned, and suggest that these results are further explored in different contexts of education, varying in terms of student self-regulatory characteristics. This study is based on these results. McLoughlin and Lee (2010) concluded that SRL is advantageous in online contexts, although they highlight that these contexts need to be personalised, flexible, and adaptive in order to improve SRL.

Self-Regulated Learning (SRL) helps students manage their time, communicate with instructors, and access course content, and flexibility is a key feature of SRL (Bergamin et al., 2012). Carneiro and de Cima (2005) suggest that SRL can support learning in online contexts for employees, as long as the learning environment adequately exploits their strengths and overcomes their weaknesses. The technology knowledge of students is considered to be of critical importance in SRL in online contexts of education. Effective construction of knowledge requires cognitive and metacognitive activities, as well as student engagement with technology in SRL.

According to research, management practices, demographics, and cultural diversity act as barriers to student achievement in self-regulated learning in an online environment. Students who possess higher language acquisition skills tend to show higher self-regulated learning compared to those who possess lower language acquisition skills. No significant differences exist in self-regulation based on gender when implementing blended learning. The study conducted by Broadbent (2017) shows that online and blended learning promote the development of self-regulated learning skills. Social media sites play an essential role in the development of effective self-regulated learning strategies. In general, the digital divide between different generations is considered to be a barrier to self-directed learning in an online environment. The literature shows that technological knowledge is positively related to self-regulated learning (SRL).

According to Clark (2012), formative assessment helps students develop metacognitive skills and boost self-efficacy, which are essential in determining student success in self-regulated learning (SRL), as Bandura (1993) emphasised. Shea & Bidjerano (2010) found that learning presence in an online learning environment is influenced by self-efficacy and

cognitive, behavioural, and motivational skills. Similarly, Wang & Lin (2007) found that personal, behavioural, and environmental characteristics significantly influence SRL in an online learning environment. SRL is considered an effective learning strategy for online and blended learning environments as it allows learners to be independent and motivated and caters to various learning styles using cognitive and metacognitive learning strategies. However, some limitations exist and indicate that there is a need to conduct further research on making effective SRL possible in blended learning. Recent research shows that SRL meets the demands and requirements of blended learners in today's society.

SELF- REGULATED LEARNING MODELS

Depending upon different theories, different Self-Regulated Learning models have been designed. Scholars interpret self-regulated learning as a precise theory that adopts the highest level of importance in elucidating the process of self-regulated learning. For instance, the constructivist theory focuses on activities that evoke mental operations, create and change external cognitive structures based on the experience with which students come into the classroom (Jakesova & Kalenda, 2015, p.179). Table 2.1 summarises available self-regulated learning models.

Table 1

Characteristics of SRL Models

Models	Description	Perspectives		
		Personal Attributes	Process	Context
General Model of self-regulated learning (Pintrich, 2000)	Self-regulation comprises four phases: planning and goal setting, controlling, and reflecting	Regulation of cognition, motivation, behaviour, context and self-efficacy, performance goal-oriented learners	Student's ability to be cognitively, motivationally, and meta-cognitively active in learning	The environment where learning takes place.
Boekaerts (2002)	Diversity of self-regulation and self-control	Students invest time and effort to study hard. Regulate attention, motivation, will and attention	Motivation control, metacognitive control, action control and emotion control	A system concept that integrates activities in different control systems
Cyclical Analyses of SRL for the online environment (Zimmerman 2008)	Three-phase model: forethought, performance and self-reflection	Students' motivational beliefs, perception of their competence, orientation and interest, manage learning, imagination and attention	Cyclical process - Based on the Social cognitive theory of Albert Bandura. This model looks at SRL as the interaction of an individual's personality.	In an environment where individual perseverance is entrusted.
COPEs Model of Study Tasks (Winne and Hadwin, 1998)	Four-phase model: task definition, goal setting and planning, Enactment, Adaptation	Learner motivation	Students pass through the conditions of the different phases, operations, results (products), goals (standards) and evaluations.	Contextual
Process Oriented Model (Borkowski, 1996)	Winne's theory (1995) of Self-Regulation as a metacognitive process driven towards the development of	Student motivation and frequency of use of self-regulatory strategies	Focuses on effective teaching	Contextual

FOUR-PHASED MODEL OF MOTIVATED SELF-REGULATED LEARNING – COPEs MODEL (Winne & Hadwin, 1998, P.279-285)

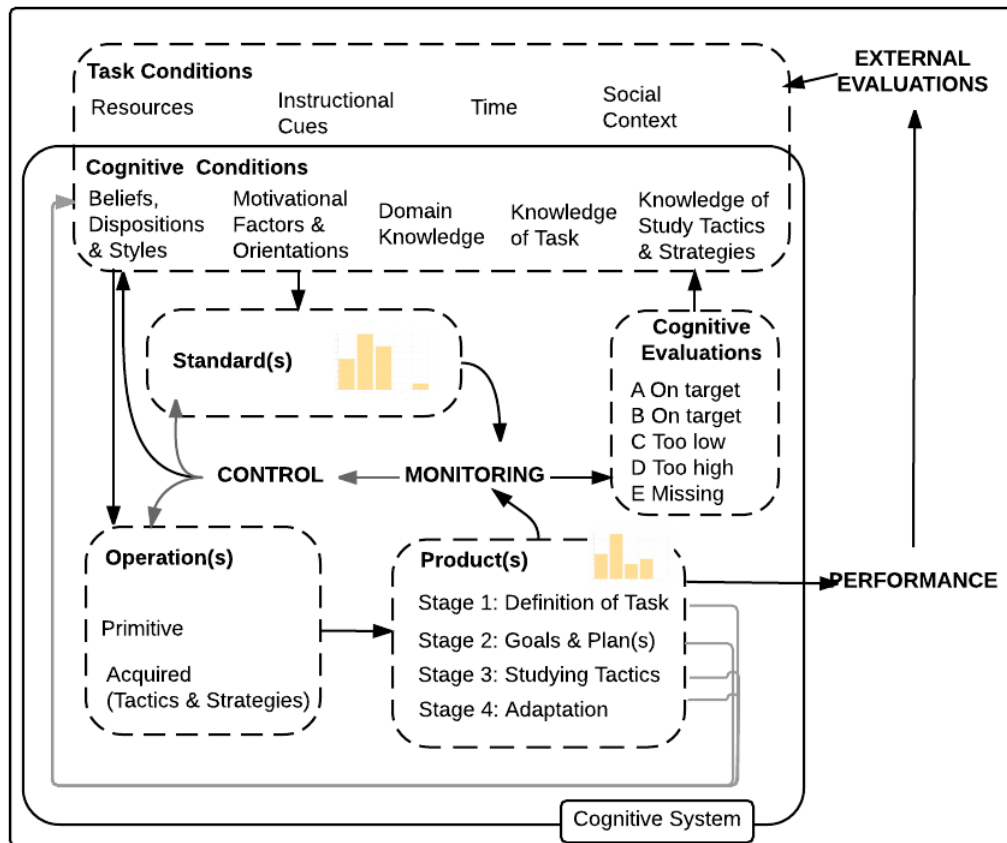


Figure 1

Four Phase Model for SRL (Winne & Hadwin, 1998)

Winne & Hadwin (1998) proposed a four-phase model of SRL accompanied by a typology of five facets, which enabled the characterisation of episodes of studying along conventional dimensions of Conditions, Operations, Products, Evaluations of products, and Standards for products. The acronym COPEs encapsulates these five facets of SRL that accompany the four-phase model of SRL proposed by Winne & Hadwin (1998). According to these researchers, SRL is essentially a motivational condition of individual learning (Van Laer, Stijn, & Jan, 2016). Both internal and external motivators exert considerable impact on SRL to achieve optimal learning outcomes in terms of knowledge and skill acquisition. The five facets of SRL are interconnected; conditions established during each of these phases impact subsequent phases of SRL. Overall, all phases of SRL operate within a unified framework. The four phases of SRL proposed by Winne & Hadwin (1998) are Task Definition, Planning and Setting of Goals, Enactment of SRL, and Adaptations. Figure 2.1 below illustrates the model of SRL proposed by Winne & Hadwin (1998, p. 280).

The COPEs model of SRL was chosen to inform the process of content delivery to the participants of the present study owing to its relatively systematic nature and effectiveness of SRL implementation.

METHODOLOGY

The study employs a quantitative dominant approach, mainly aligned to a pre-test and post-test included quasi-experimental design. The study population consists of pre-service and in-service undergraduates selected from a local government university. The University conducts full-time and part-time B.Ed. degree. The sample was selected from the academic year 2018/2019 purposively. Accordingly, 35 pre-service teachers (n=35) and 28 In-service teachers (n=28) represent the sample of the study.

The design of the study was pre and posttest based quasi-experimental, leading to quantitative dominant approach. Further, the study philosophically aligned to epistemology and it deals with social constructivism as is believed that the learner collaborates each other in the knowledge production process (The identical pre-test and post-test were developed to assess the teachers' learning achievements before and after the study intervention. The intervention was planned in alignment with the COPES Model of SRL. Test modes (Formal & Informal, Formative & Summative, Subjective & Objective, and Criterion-referenced (CRT) & Norm-referenced tests (NRT)) were taught to the teachers (Study respondents) for four weeks using the blended mode of delivery, which consists of three hours of online content delivery and three hours of face-to-face practice. Online content was delivered via Zoom, and the study materials were distributed via Google Classroom.

The study utilised basically two data collection instruments.

1. Pre-Test and post-test (identical – See Annexure - 1) – Instrument is validated via the pilot survey, and the reliability and validity were tested with Cronbach's Alpha Matrix (See Table 2)
2. Self-Rating Likert Scale Questionnaire – Questionnaire was used to collect data to test the delivery model: COPES Typology of tasks (See Table 3)

Table 2

Reliability of the test paper

Sections	Cronbach's Alpha (α)	Interpretation
Formal & Informal	0.93	Excellent
Formative & Summative	0.77	Acceptable
Objective & Subjective	0.96	Excellent
NRT & CRT	0.76	Acceptable

The power of the COPES model is measured using the Likert-Scale questionnaire developed by Barnard et. al. (2009). As it is a validated questionnaire, significant modifications were not made, but six (06) additional items were added for study purposes. The reliability of the questionnaire was tested with random units of the group. The results are reported in the Table 3.2. Cronbach's Alpha values show that the Likert-Scale Questionnaire is highly reliable ($\alpha = 0.933$) for the study purpose.

Table 3

Results of the Reliability Test for Likert-Scale Questionnaire

Results of Reliability Test for Likert-Scale Questionnaires	
Questionnaire	Cronbach's Alpha (α)
COPES Model – Likert-Scale Questionnaire (SRL)	.933

RESULTS AND FINDINGS

As it is important, a normality test was conducted to decide whether the test results are normally distributed. The pre-test results ($W(28) = .951, p > .206$) and post-test results ($W(28) = .931, p > .066$) of SRL in-service teachers are normally distributed as Shapiro-Wilk test shows that there is no a statistically significant departure from the normality in this situation, the null hypothesis do not reject as the p -value is above the significant level ($P > 0.05$). Similarly, the pre-test results ($W(35) = .971, p > .476$) and post-test results ($W(35) = .972, p > .489$) of SRL pre-service and in-service teachers are normally distributed as Shapiro-Wilk test shows that there is no a statistically significant departure from the normality in this situation, the null hypothesis fail to reject as the p -value is above the significant level ($P > 0.05$).

Table 4

One-way ANOVA – In-service teacher Group – SRL Strategy

#	IVs	DV	Results	Interpretation
1	Gender	Post-test results	$F(1,26) = 0.057, p = .813, (p > 0.05)$	There is no difference in means between groups
2	Age		$F(2,25) = 2.215, p = .130, (p > 0.05)$	There is no difference in means between groups
3	Work experiences		$F(4,23) = 1.205, p = .336, (p > 0.05)$	There is no difference in means between groups
4	Educational qualifications		$F(1,26) = 0.203, p = .656, (p > 0.05)$	There is no difference in means between groups
5	Residential area		$F(5,22) = 1.097, p = .390, (p > 0.05)$	There is no difference in means between groups

Table 5

One-way ANOVA – Pre-service teacher Group – SRL Strategy

#	IVs	DV	Results	Interpretation
1	Gender	Post-test results	$F(1,33) = 1.758, p = .194, (p > 0.05)$	There is no difference in means between groups
2	Age		$F(1,33) = 4.791, p = .036, (p < 0.05)$	There is a difference in means between groups
3	Residential area		$F(8,26) = 0.865, p = .557, (p > 0.05)$	There is no difference in means between groups

One-way ANOVA test could be used to understand whether test results significantly differed based on the levels of gender, age, work experiences, residential areas and educational qualifications (See Tables 4.1 & 4.2). Then, H_0 would be, there is no difference in means in groups, and consequently, H_1 would be, at least one mean is different from the others. Further, some of the independent variables in the study do not have two or more categories or groups (i.e. Work experiences and Educational qualifications of Pre-service teacher groups). Hence,

such independent variables could not be used in One-way ANOVA analysis, and thus, such variables were neglected.

As per the One-way ANOVA analysis conducted in relation to the independent variables (IVs) found in two Groups, there is only one situation found where there is a statistically significant difference between means and groups; the independent variable 'Age' has had a significant effect on post-test results of the SRL Pre-service teacher group.

Further, Paired sample t-test results indicated a significant increase in the marks of the students (In-service teachers – SRL) pre-test ($\mu = 49.29$, $SD = 19.14$) to post-test ($\mu = 60.54$, $SD = 18.68$), $t(27) = -10.14$, $p < 0.001$ (Two-tailed). The mean increase in the test scores was 11.25 with 99% confidence interval ranging from -14.33 to -8.18. Cohen's $d = (-1.9)$ indicates a huge effect size. Similarly, Paired-sample t-test results indicated a significant increase in the marks of the students' (Pre-service teachers – SRL) pre-test ($\mu = 48.71$, $SD = 12.74$) to post-test ($\mu = 59.86$, $SD = 12.63$), $t(34) = -7.46$, $p < 0.001$ (Two-tailed). The mean increase in the test scores was 11.14 with 99% confidence interval ranging from -15.22 to -7.46. Cohen's $d = (-1.2)$ indicates a huge effect size.

ACHIEVEMENT TEST PERFORMANCE OF IN-SERVICE TEACHERS

An independent sample t-test was conducted to compare performance over the test modes, Informal and Formal assessment, Formative and Summative assessment, Subjective and Objective assessment and Criterion-referenced and Norm-referenced assessment measured in pre-test and post-test scores with a merged data set. Results indicated that for post-test scores $\mu = 3.39$, $SD = 1.07$, while for pre-test scores $\mu = 2.68$, $SD = 1.16$. P-value of the test ($t(54) = -2.403$) is 0.020, and it is less than 0.05. So we can reject H_{0e} where there is a significant difference in Informal and Formal assessment at 5% level of significance. Therefore, there is a significant difference in Informal and Formal assessment in pre-test and post-test. Results indicated that for post-test scores $\mu = 2.82$, $SD = 0.94$, while for pre-test scores $\mu = 2.39$, $SD = 1.23$. P-value of the test ($t(54) = -1.464$) is 0.149, and it is higher than 0.05. So we do not reject H_{0f} where there is no significant difference in Formative and Summative assessment at 5% level of significance. Therefore, there is no significant difference in Formative and Summative assessments in pre-test and post-test.

Results indicated that for post-test scores $\mu = 2.21$, $SD = 0.86$, while for pre-test scores $\mu = 1.93$, $SD = 0.94$. P-value of the test ($t(54) = -1.177$) is 0.244, and it is higher than 0.05. So we do not reject H_{0g} where there is no significant difference in Subjective and Objective assessment at 5% level of significance. Therefore, there is no significant difference in the subjective and Objective assessment in the pre-test and post-test. Results indicated that for post-test scores $\mu = 3.54$, $SD = 1.29$, while for pre-test scores $\mu = 2.82$, $SD = 1.16$. P-value of the test ($t(54) = -2.181$) is 0.034, and it is less than 0.05. So we can reject H_{0h} where there is a significant difference in Criterion-referenced and Norm-referenced assessment at 5% level of significance. Therefore, there is a significant difference in Criterion-referenced and Norm-referenced assessment in pre-test and post-test.

ACHIEVEMENT TEST PERFORMANCE OF PRE-SERVICE TEACHERS

An independent sample t-test was conducted to compare test performances over the test modes, Informal and Formal assessment, Formative and Summative assessment, Subjective and Objective assessment and Criterion-referenced and Norm-referenced assessment, measured in pre-test and post-test scores with the merged data set. Results indicated that for post-test scores $\mu = 3.60$, $SD = 0.81$, while for pre-test scores $\mu = 2.89$, $SD = 0.93$. P-value of the test ($t(68) = -3.42$) is 0.001, and it is less than 0.05. So, we can reject H_{0e} where there is a significant difference in Informal and Formal assessment at 5% level of significance. Therefore, there is no significant difference in the Informal and Formal assessments in pre-test and post-test.

Results indicated that for post-test scores $\mu = 2.91$, $SD = 1.12$, while for pre-test scores $\mu = 2.46$, $SD = 1.01$. P-value of the test ($t(68) = -1.79$) is 0.078, and it is higher than 0.05. So do not reject H_{of} where there is no significant difference in Formative and Summative assessment at 5% level of significance. Therefore, there is no significant difference in Formative and Summative assessments in pre-test and post-test. Results indicated that for post-test scores $\mu = 2.20$, $SD = 0.87$, while for pre-test scores $\mu = 1.91$, $SD = 0.82$. P-value of the test ($t(68) = -1.42$) is 0.161, and it is higher than 0.05. So, we do not reject H_{og} where there is no significant difference in Subjective and Objective assessment at 5% level of significance. Therefore, there is no significant difference in the subjective and Objective assessment in pre-test and post-test. Results indicated that for post-test scores $\mu = 3.23$, $SD = 0.98$, while for pre-test scores $\mu = 2.51$, $SD = 0.98$. P-value of the test ($t(68) = -3.06$) is 0.003, and it is less than 0.05. So, we can reject H_{oh} where there is a significant difference in Criterion-referenced and Norm-referenced assessment at 5% level of significance. Therefore, there is a significant difference in Criterion-referenced and Norm-referenced assessment in pre-test and post-test.

EFFECTIVENESS OF THE COPEs MODEL

To measure the effectiveness of the COPEs Model for two independent groups, Multiple Linear Regression was conducted. Originally, the questionnaire, which consists of 30 items, was divided into five subscales, and with the new subscale, there were six scales with a 5-point Likert-type response design ranging from strongly agree (1) to strongly disagree (5). The subscales are Goal Setting, Environment Structuring, Task Strategies, Help Seeking, Self-evaluation and Content delivery (See Annexure – 2). In the analysis, responses were reverse-coded in SPSS (v. 25). Cronbach's Alpha test was conducted to decide the internal consistency of the items. The results are shown in Table 4.3.1.

Table 6

Internal Consistency of Sub-scales of SRL Questionnaire (Cronbach's Alpha)

Subscales	Item No	No of Items	Cronbach's Alpha
Goal Setting	1,2,3,4,5	5	.848
Environment Structuring	6,7,8,9	4	.617
Task Strategies	10,11,12,13,14,15,16	7	.830
Help Seeking	17,18,19,20	4	.631
Self-evaluation	21,22,23,24	4	.847
Content effectiveness	25,26,27,28,29,30	6	.843

As shown in Table 4.3.1, the consistency of each subscale is acceptable because Cronbach's Alpha values are above 0.6. Therefore, it could be decided that items are consistent and reliable. As the consistency of sub-scales included in both questionnaires has been acceptable (See Table 4.3.1), a Linear Regression model was used to see the power of psychometric properties of the models (x) on the respondents' post-test marks (y). Regression analysis (R^2 value) says how powerful x (*independent/predictor variables*) to make a change in y (*dependent variable*).

COPEs MODEL FOR IN-SERVICE TEACHERS

The COPEs model, which was used to deliver the blended content, was checked for its effectiveness using the multiple linear regression analysis. The assumptions of multiple linear regression analysis were tested and met. The objective of this study is to explore the relationship between Goal Setting (GS), Environment Structuring (ES), Task Strategies (TS), Help Seeking (HS), Self-Evaluation (SEV), and Content Effectiveness (CE) in relation to Post-test Results (PTR) of blended learning, using the COPEs model for in-service teachers.

HYPOTHESES

H_{oa}: There is no significant relationship between Goal Setting (GS) and Post-test results.

H_{ob}: There is no significant relationship between Environment Structuring (ES) and Post-test results.

H_{oc}: There is no significant relationship between Task Strategies (TS) and Post-test results.

H_{od}: There is no significant relationship between Help Seeking (HS) and Post-test results.

H_{oe}: There is no significant relationship between Self-Evaluation (SEV) and Post-test results.

H_{of}: There is no significant relationship between Content Effectiveness (CE) and Post-test results.

Table 7

Means, Standard Deviations, and Intercorrelations between Post-test Achievement and Predictors (N=28)

Variables	M	SD	With post-test
Post-test	61.15	19.25	-
Predictors			
1 Goal Setting (GS)	9.15	2.81	.340*
2 Environment Structuring (ES)	7.42	1.79	.455*
3 Task Strategies (TS)	14.21	4.78	-.406*
4 Help Seeking (HS)	6.23	2.03	.316*
5 Self-Evaluation (SEV)	7.42	2.72	.419*
6 Content Effectiveness (CE)	8.11	2.85	.070*

Note: *p<.05, M: Mean, SD: Standard Deviation

Table 8

Simultaneous Multiple Regression Analysis Summary for predictors predicting Post-test achievement (N=28)

Hypotheses	Regression Weights	B	T	p-value*	Hypothesis supported
H _{oa}	GS → PTR	1.393(2.11)	.659	.581	Fail to reject H _o
H _{ob}	ES → PTR	7.590(2.79)	2.74	.014	Reject H _o
H _{oc}	TS → PTR	2.164(1.26)	1.72	.102	Fail to reject H _o
H _{od}	HS → PTR	-2.969(3.28)	-.91	.377	Fail to reject H _o
H _{oe}	SEV → PTR	-.618(2.16)	-.287	.778	Fail to reject H _o
H _{of}	CE → PTR	-2.962(1.65)	-1.79	.089	Fail to reject H _o
	(Constant)	8.394(16.78)	.500	.623	
R	.643				
R ²	.414				
Adjusted R ²	.229				
F(6,19)	2.235			.084	
SE	16.908				

Note: *p<0.05, B: Unstandardised beta, t: t-value, GS: Goal Setting, ES: Environment Structuring, TS: Task Strategies, HS: Help Seeking, SEV: Self-Evaluation, and CE: Content Effectiveness, PTR: Post-Test Results, SE: Std. error of estimates

The dependent variable, which consists of the post-test results, was regressed against the predictor variables: Goal Setting (GS), Environment Structuring (ES), Task Strategies

(TS), Help Seeking (HS), Self-Evaluation (SEV), and Content Effectiveness (CE). The predictor variables do not significantly predict the post-test results of self-regulated learning (SRL) among in-service teachers, $F(6, 19) = 2.235$, $p < 0.05$. This suggests that the six factors examined have little to no impact on the post-test outcomes. Additionally, an R^2 value of .414 indicates that the model accounts for 41% of the variance in the post-test results. Tables 4.3.1.1 and 4.3.1.2 present a summary of the findings. The multiple linear regression analysis model summary shows $R = .643$, $R^2 = .414$ and Adjusted $R^2 = .229$ (See Table 4.3.1.2). Concerning the estimated values, the multiple correlation coefficient is positive ($R = .643$), and it is a fairly good correlation. As $R^2 = .414$, it can be concluded that 41% of the variance of the dependent variable is explained by the predictor variables altogether. According to Cohen (1988), this is a medium effect size (See Table 4.3.1.2).

COPES MODEL FOR PRE-SERVICE TEACHERS

While adhering precisely to the same statistical procedure, the effectiveness of the COPES model (SRL) for the pre-service teacher group was tested under the blended classroom condition. As more than one predictor variable is found in the model, multiple linear regression analysis was performed to identify how the predictor variables could predict the variation in the dependent variable (continuous variable, normally distributed). As per the correlation table output generated by SPSS, it was understood that some predictor variables are highly correlated with each other, which means that if a predictor variable changed, it would cause a change to another, and, thereby, model results could fluctuate significantly. Further, this could lead to multicollinearity issues. The independent variables, *Self-evaluation* and *Help seeking*, correlate with each other by 0.617 and *Task strategies* and *Environment structuring* correlate with each other by 0.559 as per Person's r correlation matrix in the model. One way to handle this issue is that these predictor variables could be combined only if these combinations make a sensible and meaningful variable. Accordingly, *Self-evaluation* and *help-seeking* predictor variables were combined to compute an independent variable called 'Self-learning' as the two independent variables are talking about student self-learning skills. The other two predictor variables, *Task strategies* and *Environment structuring*, were combined to compute an independent variable called 'Task generation' as the predictor variables deal with student task generation in SRL. The assumptions of multiple linear regression analysis were, then, tested and met. Then, a regression model was run with the computed predictor variables, *Self-learning* and *Task generation*, and the results are reported.

The study problem is to investigate the association between Goal Setting (GS), Content Effectiveness (CE), Self-Learning (LS), and Task Generation (TG) on Post-test Results (PTR) of blended learning via the COPES model for Pre-service teachers.

Hypotheses

H_{0a} : There is no significant association between Goal Setting (GS) and Post-test results

H_{0b} : There is no significant association between Content Effectiveness (CE) and Post-test results

H_{0c} : There is no significant association between Self-Learning (LS) and Post-test results

H_{0d} : There is no significant association between Task Generation (TG) and Post-test results

Table 9

Means, Standard Deviations, and Intercorrelations between Post-test Achievement and Predictors (N=35)

Variables	<i>M</i>	<i>SD</i>	<i>With post-test</i>
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Post-test	24.68	11.22	-
Predictors			
1 Goal Setting (GS)	10.52	2.53	.419*
2 Content Effectiveness (CE)	8.12	2.49	.119*
3 Self-Learning (LS)	32.20	4.16	.145*
4 Task Generation (TG)	41.40	5.22	-.060*

Note: * $p < .05$, M : Mean, SD : Standard Deviation

Table 10

Simultaneous Multiple Regression Analysis Summary for predictors predicting Post-test achievement (N=35)

Hypotheses	Regression Weights	B	T	p-value*	Hypothesis supported
H _{0a}	GS → PTR	2.540(.982)	2.599	.017	Reject H ₀
H _{0b}	CE → PTR	.504(.901)	.560	.582	Fail to reject H ₀
H _{0c}	LS → PTR	1.056(.613)	1.724	.100	Fail to reject H ₀
H _{0d}	TG → PTR	.103(.498)	.207	.838	Fail to reject H ₀
	(Constant)	-44.540(30.88)	-1.443	.165	
R	.554				
R ²	.307				
Adjusted R ²	.169				
F(6,19)	2.219			.104	
SE	10.229				

Note: * $p < 0.05$, B: Unstandardised beta, t: t-value, GS: Goal Setting, CE: Content Effectiveness, LS: Self-Learning and TG: Task Generation, PTR: Post-Test Results, SE: Std. error of estimates.

The dependent variable (post-test results) was regressed on predictor variables of Goal Setting (GS), Content Effectiveness (CE), Self-Learning (LS), and Task Generation (TG). The predictor variables insignificantly predict post-test results of SRL – Pre-service teachers, $F(4,20) = 2.219$, $p < 0.05$, which indicates that the six factors under study have an insignificant impact on post-test results. Moreover, the $R^2 = .307$ depicts that the model explains 30% of the variance in post-test results. Tables 4.3.2.1 and 4.3.2.2 display the summary of the findings.

CONCLUSION

This study shows that using Self-Regulated Learning through the COPES model in a blended learning environment really helps teachers, both experienced and novice teachers, learn more about measuring and assessing student progress. The results clearly show that Self-Regulated Learning helps teachers learn and grow, and this is true for different types of teachers, such as pre-service and in-service teachers.

The study found that independent factors, like a teacher's age, can affect how well Self-Regulated Learning works. The rest of the factors, like whether the teacher is a man or a woman, how long they have been teaching and what kind of education, do not make a big difference. This means that Self-Regulated Learning can help different kinds of teachers. The way we give tests and assessments can also affect how well Self-Regulated Learning works. The study findings propose to keep studying this to see how it works with groups of teachers and different ways of teaching.

This research suggests that using Self-Regulated Learning in teacher training programs can help teachers keep learning and growing throughout their careers. As we keep

using learning frameworks like COPEs can help teachers feel confident and prepared to teach in new and different ways, which will make them better teachers and help their students learn more. Self-Regulated Learning and the COPEs model can really help teachers. This is critical for the future of education and for teachers who want to keep learning and growing.

DISCUSSION

Blended mode of course delivery has been the trend in recent years, especially in global higher education contexts (Mohammadi, Paasivara, & Kasurinen, 2025; Al-Mekhlafi et al., 2025). Its adaptability is proven and verified. Similarly, the study was planned to see the efficacy of SRL in professional teacher development contexts, as SRL lacks empirical studies in the field. Hirt et al. (2025) found that regardless of SRL skills, teachers benefit from the SRL strategy, and it needs to be further studied.

The study reveals that, as per One-way ANOVA analysis, only the 'Age' variable shows a statistically significant association with pre-service teachers' post-test results, and the rest of the independent variables do not show a statistically significant association. SRL has contributed a lot to both pre-service and in-service teachers' cognitive improvements, as paired-sample t-test results confirmed that there is a statistically significant mean difference between pre-test and post-test results, and it is verified by the effect size calculated via Cohen's *d*. Further, it is understood that the SRL strategy, once implemented via the COPEs Model, works effectively for cognitive content delivery in professional teacher development programs. Nguyen-Khoa et al. (2025) found that SRL contribute to knowledge development and improvements of teacher trainees when it is promoted tactically. Further, Kuhn et al. (2025) asserted that SRL promoted teacher trainees' ability of incorporating digital tools into university teacher education, and such tools complement the university teacher education (p. 1389). This particular finding is verified and adds further insight to the effective use of SRL in professional teacher development programs conducted by the universities. A similar study carried out by Porter and Peters-Burton (2026) revealed that SRL heightened the ability to prepare lesson planning skills, and the use of SRL is a hard process that requires more time to promote it among teachers. The present study sheds light on proposed empirical findings and widens the existing knowledge base of SRL utilisation in professional teacher education programmes.

An extended attempt was made to reveal the efficacy of using the SRL to instruct the theoretical component of the measurement and assessment course, particularly assessment modes, to teachers via a blended platform. The independent sample t-test was conducted, once both pre-service and in-service teacher sample data were merged into one, to test the effectiveness of SRL in response to the delivery of each assessment mode. The test results reported that only two modes, informal & formal and CRT & NRT, have been statistically significant for in-service teachers in learning, but the other two, formative & summative and subjective & objective, have reported statistically insignificant mean differences. For pre-service teachers, only CRT & NRT assessment modes reported a statistically significant mean difference, while the other three modes were insignificant. Accordingly, it could be justifiable to report that the SRL strategy shows a minimum effect for employing it in the delivery of an assessment course, but this decision needs to be verified via large sample empirical studies. The study findings partially match with Asadi (2025), as he mentioned that SRL has diverse benefits in promoting it among teacher trainees.

Eventually, the study made an attempt to test the effectiveness of using the COPEs model measured via five rating Likert scale questionnaire, which corresponded to six psychometric properties, and with such data, Multiple liner regression was performed to see how the data regressed from the post-test results of pre-service and in-service teachers in the achievement test. The model summary results showed that 41% ($R^2 = .414$) of the variance of the dependent variable is accounted for by psychometric properties included in the COPEs

model when it is tested with an in-service teacher sample. Similarly, the linear regression model summary shows that, for pre-service teachers, the COPEs model is 30% ($R^2 = .307$) accountable for the variance of the dependent variable. The regression result revealed that the COPEs model of SRL has medium-size effect (Cohen, 1988) on both in-service and pre-service teachers' professional knowledge development.

The study shows that SRL has significant contributions in terms of improving teacher professional knowledge requirements related to student measurements and assessment, but it suggests that SRL has to be promoted for a long time to see critical implications for the teacher development programs in universities.

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