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Teacher Instructional Scaffolding Improves Psychological Capital of Learners and Boosts their Self-Regulated Learning Capacities

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Abstract

The present paper investigated psychological capital as an intervening variable that explains how teacher instructional scaffolding accounts for self-regulated learning of senior high school students in a cross-sectional survey. Data were obtained with adapted standardised scales from a sample of 455 (192 males and 263 females) senior high students from 15 public schools and analysed with partial least squares structural equation modelling. The results indicated that instructional scaffolding positively predicted both psychological capital and self-regulated learning of the students. Psychological also positively predicted self-regulated learning, and partially mediated the relationship between instructional scaffolding and self-regulated learning. We therefore concluded that instructional scaffolding and psychological capital are critical for the development of self-regulated learning capabilities of students in senior high schools. In light of this, we recommend, among others, that senior high school teachers should be trained and empowered in the use of scaffolding strategies in their interaction with students to enhance their psychological capital and self-regulate in their learning.

Keywords: Psychological Learning Resources, Students' Self-Regulated Learning, Self-Engaged Learning, Learning Optimism

Introduction

Quality education is an essential factor in the development and progress of any society. As such, it is imperative that educational systems are designed to meet the educational needs of students. Meeting these goals and needs of students require more than just providing them with a curriculum. The use of appropriate and effective instructional methods and strategies are very core requirements to provide quality education. Likewise, the psychological resources and mindset of the students are equally critical for effective transfer of learning and the acquisition of knowledge and attainment of instructional objectives. The present study therefore argues that teachers' use of

instructional scaffolding for classroom interaction and students' level of psychological capital could interact to contribute to meeting the needs of students, and that the interaction of these variables would ultimately imbibe in students the capacity to engage in self-regulated learning senior high school students in Ghana.

Teacher instructional scaffolding would provide students with the support they need to learn and grow, while psychological capital enables them to overcome challenges and persist in their academic pursuits (Zimmerman, 2000). The development of psychological capital enhances self-regulated learning, which involves the use of strategies to actively manage and monitor one's learning process. Given that self-regulated learning involves ability to self-engage in planning, setting goals, monitoring progress, and evaluating performance (Zimmerman, 2000), it is our argument that students who have higher levels of psychological capital are more likely to be self-regulated learners.

Teacher instructional scaffolding has been found to enhance students self-regulated learning at various levels and in different subjects (e.g. Ansari & Saleh, 2021; Ihechukwu, 2020; Pereira et al., 2016; Tai et al., 2021). For instance, Ihechukwu (2020) found instructional scaffolding to be a critical learning facilitator and enhancing mathematical performance of secondary school students in Nigeria in a quasi-experimental study. Tai et al. (2021) also found instructional scaffolding to be an important element in the learning of students and academic success in motor and cognitive abilities writing and communication in English language. The dynamic support, assessment and feedback provided to the learner during the learning process shapes the confidence of the student and he/she gains the confidence to self-regulate and learn independently, with little support. This invariably leads to enhanced understanding and performance in learning. Self-regulated students are generally held to a higher standard in their consistent use of metacognitive, motivational, and behavioural strategies (Zusho, 2017). This requires self-belief and making efforts to meet the high expectations and often preparing for and reflecting on learning. They engage in effort management skills for working diligently and effectively with challenging tasks that are important in their academic success in the classroom (Pintrich, 2004).

Although educational scholars emphasise the relevance of the instructional scaffolding to the achievement of educational outcomes, it appears that it lacks precise definition. The concept has its roots in the socio-cultural theory of mind and the concept of Zone of Proximal Development (Shabani et al., 2010). Instructional scaffolding generally represents a teaching approach that provides temporary support and guidance to learners as they engage in challenging learning tasks or activities. Gonulal and Loewen (2018) defines instructional scaffolding as the support given during the learning process which is tailored to the needs of the student with the intention of helping them achieve their learning goals. The process involves breaking down complex tasks into manageable

steps, offering prompts, cues, and support, and gradually reducing the support as learners develop competence and independence (Windle & Miller, 2019). Scaffolding must therefore be linked to ongoing assessments of students' skills and must expand on what the learner already knows (van de Pol et al., 2010). As a result, instructing students verbally does not constitute scaffolding because it does not elicit and build upon what the students already know.

This requires that the selection of the ideal level of support for the learner is always based on outcome of a dynamic assessment of the progress of the learner. Support is decreased if the outcome of the dynamic assessment indicates that the learner is developing their abilities to complete the learning task independently (Pea, 2018), and increase support if the learner is finding it difficult to make meaningful progress (Koedinger & Alevan, 2007).

It is very important that the learner completes the task as unassisted as possible, and so the teacher only tries to assist the student in tasks that are beyond his/her current ability. Learner mistakes are expected, but the student can achieve the task or goal through teacher feedback and inspiration.

Psychological capital represents the positive psychological resources that are inherent in individuals that enable them to resilient, overcome challenges to rebound from difficulties (Avey et al., 2009). It encompasses hope, efficacy, resilience, and optimism, and these components can be nurtured and enhanced, thus facilitating both personal and organizational growth (Luthans et al., 2007). Optimism entails positive expectations for the future, while hope represents the driving that motivates an individual to establish and pursue goals to facilitate personal growth. Self-efficacy represents positive psychological state of individuals that is exhibited in self-belief their abilities, while resilience entails a proactive mindset to persevere through challenges, the capacity to recover from setbacks (Avey et al., 2011). These psychological resources are essential for cultivating and nurturing personal growth, well-being, and performance in various contexts.

Hope and optimism are personality characteristics linked to the physiological and mental well-being (Du et al., 2015). Therefore, Hope is an awareness-raising process that motivates the finding of will-power (goal determination) and path-power (planning ways to achieve goals) (the expectation of meeting desired goals).

Psychological capital has been found to be an important determinant of self-regulated learning of students (e.g. Mannion et al., 2021; You, 2016; Riolli et al., 2012). For instance, Mannion et al. (2021) found that teacher dialogic scaffolding with students is importance for the development of psychological capital (self-efficacy, optimism, hope, and resilience) in students as well as effective encouragement in student learning. Interestingly, psychological capital is not only relevant for student learning, but also for teacher to better engage in the academic environment (Mannion et al., 2022). Thus, the

psychological resources of the teacher, such as hope, self-efficacy, resilience, and optimism generally give the teacher the capacity to effectively engage with students. We therefore postulate accordingly that psychological capital of senior high student will significantly predict their self-regulated learning behaviour.

Self-regulated learning entails a process where the student actively and purposefully controlling his/her behaviour, motivation, and cognition on academic activities (Wolters & Brady, 2021). Self-regulated learning is also explained as the control and modification of motivational beliefs, such as efficacy and goal orientation, in order to help students to adjust to the demands of a course (Huh & Reigeluth, 2017). Additionally, students can learn effective methods for managing their emotions and affects, such as anxiousness, to enhance their academic performance. That is, self-regulated learners critically analyse what they read to see if they understood it and take appropriate action, such as rereading, to increase her understanding (Carpenter et al., 2020). The process involves goal setting, task-strategy development, self-monitoring, and self-evaluation (Dabbagh & Kitsantas, 2013). Self-regulated learning (SRL) provides a core framework for an understanding of the cognitive and motivational aspects of learning. In the end, students who self-regulate can improve academic performance, value their own learning process and become efficient learners as soon as they become employees in the future. As a result of moving from a teacher-centered approach to a learning environment that is more student-centered, students must be more responsible and control their learning processes. Alsancak Sirakaya and Ozdemir (2018) state that SRL is advocated as an important competence in learning environments for students where students are actively engaged in knowledge development and interpretation. The characteristics of self-regulated learning (SRL) are presented by students via a range of learning strategies to control and monitor their cognizance, motivation and behaviour (Bin Jwair, 2018).

Zumbrunn et al. (2011) conclude that self-regulated learning appears to be an influential concept that has a great deal of bearing on the academic success and failure of many students. Hence, effective student self-regulation, task requirement analysis, productive objectives and strategies to be selected, adapted or invented for its objectives must be selected carefully by the learners (Zumbrunn et al., 2011). Students must also monitor their own progress, as the task is comprehensive, manage intrusive emotions, decrease motivation and adapt successful policies. Seker (2016) added that these are the students who ask questions, take notes, and allocate the time and resources for themselves. That is, good self-regulators cultivate their abilities and routines necessary to be successful students, displaying successful study techniques, effort, and tenacity. Therefore, understanding how to develop and practice these skills in all students is crucial for educators.

Theoretical Foundation: Self-Determination Theory (Deci & Ryan, 1985)

The Self Determination Theory (Deci & Ryan, 1985) was modified in the year 2000 to encompass all aspects of the motivation and personality of an individual. This theory indicates that three fundamental psychological resources are required for to support the intrinsic motivation of individuals to be engaged in a certain behaviour. These resources are autonomy (volitional feeling), skill or competence (effectiveness) and relatedness are important (Deci & Ryan, 2000). Autonomy takes place when people feel that their behaviour is caused by themselves. However, autonomy is not independence or full freedom, but an internal acceptance and commitment to a motivated conduct. Supporting autonomy means choosing and providing a meaningful justification where choices cannot be made (Filak & Sheldon, 2003). Competence on the other hand, occurs when the behaviour is effective and its support means trusting and providing sensitive mentoring and feedback on the ability of students to face challenges. Relatedness occurs when one feels linked to or understood by others and this brings about the self-determination structure. This structure is similar to the need for belongingness and support connectivity seen in accepting, respecting, and caring for others (Filak & Sheldon, 2003). The Theory of Self-Determination provides the theoretical foundation for this study to explain the dynamic interplay between classroom environment, a supportive system and the personal growth of the learners through exhibited through mastery of self-regulation.

Statement of the Problem

Instructional scaffolding and psychological capital are regarded important human tools for the efficiency of learning such as self-regulated learning (Combs et al., 2009). Despite the fact that teachers' instructional scaffolding and psychological capital are key determinants of students' self-regulated learning, research studies treating instructional scaffolding and psychological capital, self-regulated learning as a system of nomological network where each would play a complimentary role appear limited in the Ghanaian context. While some studies in this area examined the relationship between instructional scaffolding and student engagement (e.g. Nguyen et al., 2020), others have investigated the impact of psychological capital on academic performance (Appiah-Kubi, 2020; Ortega-Maldonado & Salanova, 2017). There is a paucity of studies that examined the direct and indirect roles of both instructional scaffolding and psychological capital in promoting self-regulated learning among senior high school students in Ghana.

Previous studies investigated, for instance, the influence of instructional scaffolding (Dignath, 2016; Zhu & Mok, 2018), students' need satisfaction (Liu et al., 2014; Sierens et al., 2009), psychological capital (You et al., 2014) on students' self-regulated learning, without looking at any intervening nomological system of interaction

between these constructs in student learning. Also, previous studies on self-regulated learning have been done largely outside Africa (e.g. Dignath, 2016; Liu et al., 2014; Sierens et al., 2009; Zhu & Mok, 2018). It is important to obtain Ghanaian context specific evidence for relevant interventions strategies to be designed and implemented to improve self-regulated learning of senior high school students in Ghana. *The present study examined the mediating roles of psychological capital in the relationship between teacher instructional scaffolding and self-regulated learning of senior high school students.* The partial least square structural equation modelling (PLS-SEM), using the SmartPLS 4.0 was used to test the proposed model of nomological system of interaction between the variables as afore-mentioned.

The following hypotheses we formulated based on the research problem and purpose of the study as well as the theoretical and empirical literature reviewed:

1. Teacher instructional scaffolding will significantly predict psychological capital
2. Teacher instructional scaffolding will significantly predict self-regulated learning
3. Psychological capital will significantly predict self-regulated learning
4. Psychological capital will significantly mediate the relationship between instructional scaffolding and self-regulated learning

Methods

Study Design

The study was a cross-sectional survey involving 455 students sampled from 15 public senior high school in the Bono region of Ghana, with an accessible population of 18,548 Form 2 students. The cross-section survey enabled us to collect reasonably large amount of data at the same point in time from different schools and students with different characteristics that have implications for possible differences across the variables of interest (Kothari et al., 2017). An initial sample of 510 students was taken from the accessible population based at a confidence level of .05 (Krejcie & Morgan, 1970). The final sample used for the analysis was the 455 (192 males and 263 females), due to non-response and screening of incomplete responses and bad data, a response rate of 89 percent. The ages of the students ranged between 15 and 21, with average age of 17 years.

Data Collection Instruments

The data were collected with adapted standardised scale as described below. The measurement model (see Table) presents the construct validity and reliability coefficients obtained in the present study.

Teachers Instructional Scaffolding

We measured instructional scaffolding with the uni-dimensional 12-items instructional scaffolding scale (Cho & Cho, 2016). Cho and Cho (2016) reported a reliability coefficient of .95. The items are rated on a six-point Likert-type scale, ranging from 1 (not at all true) to 6 (very true). Totals scores range from 12 to 72, and higher score indicate higher level of teacher instructional scaffolding.

Psychological Capital

The 12-item uni-dimensional psychological capital scale (Lorenz et al., 2016) was used to measure psychological capital. The scale has four dimensions: hope (3-items, $\alpha = .85$), optimism (3-items, $\alpha = .60$), resilience (3-items, $\alpha = .91$) and self-efficacy (3-items, $\alpha = .80$). The responses are rated on a six-point Likert-type scale, from 1(not at all true) to 6 (very true), with total composite scores ranging from 12 to 72. Higher score indicates higher level of psychological capital.

Self-Regulation Learning

The 22-item short self-regulation questionnaire (Chen & Lin, 2018) was adapted for the to measure student's self-regulate learning. The scale had five dimensions such as goal attainment (7-items, $\alpha = .88$), mindfulness (7-items, $\alpha = .86$), adjustment (3-items, $\alpha = .84$), proactiveness (3-items, $\alpha = .80$) and goal setting (2-items, $\alpha = .82$). The responses are rated on a six-point Likert-type scale of 1 (strongly disagree) to 6 (Strongly agreed), and overall composite scores range from 22 to 132, with higher score denoting higher level of Self- regulated learning.

Ethical Issues

We obtained ethical approval from the University of Cape Coast Institutional Review Board (ID number: UCC-IRB/CES/22/113). Copies of the letter of approval were sent to the Municipal and District Directorates of Education and the head masters of the selected schools to obtain their approval. Ethical issues such as confidentiality, anonymity, right to withdraw from the study at any time without suffering a penalty and other issues pertaining to research were discussed with respondents. The data collection process lasted three weeks.

Results

This study sought to investigate how teacher instructional scaffolding relates with

self-regulated learning of senior high school students through their psychological capital. The data were analysed using the PLS-SEM to test the hypotheses. PLS-SEM involves evaluation of measurement and structural models to assess the quality of the measures and the path coefficients and their significance to test the hypotheses simultaneously.

Common Method Bias and Measurement Model

Meaningful and accurate findings are obtained when the measures meet relevant quality criteria (Hair et al., 2019). In view of this, relevant measurement criteria and data quality requirements were tested, including test for Common Method Bias. The Variance Inflation Factor (VIF) was used to ascertain the presence of common method bias (CMB) of the responses that may influence the validity of the findings (Podsakoff et al., 2012). A VIF of less than 5.0 (Becker et al., 2015) indicated non-existence of CMB.

The indicator loadings and construct validity and reliability were assessed to evaluate the quality of the measurement model. Indicator loadings of 0.7 and above are generally considered good, but loadings between 0.4 and 0.7 could be retained if their deletion would not improve the overall model reliability and the average variance extracted (Hair et al., 2016). We evaluated construct validity with average variance extracted (AVE) for convergent validity, and heterotrait-monotrait (HTMT) for discriminant validity, while reliability was established with Cronbach's alpha and composite reliability (Hair et al., 2019; 2021). AVEs equal to or greater than .50 is considered good convergence because it means the indicators account for more 50% of variance in the construct. Heterotrait-Monotrait ratios less than lower than 0.90 (Henseler et al., 2016) signify sufficient discriminant validity. The results presented in Tables 1 and 2 indicated that all the constructs had good measurement quality, meeting all the criteria afore-presented.

Table 1: Construct reliability and validity coefficients of the measures

Variable	Cronbach's alpha	Composite reliability	AVE
PC	0.767	0.831	0.58
SRL	0.778	0.829	0.50
TIS	0.812	0.851	0.52

PC = Psychological capital, TIS = Teacher Instructional Scaffolding, SRL = Self-regulated Learning

Table 2: Heterotrait-monotrait (HTMT) ratio between the pairs of constructs for Discriminant Validity

Paths	HTMT Ratios
SRL <-> PC	0.640
TIS <-> PC	0.609
TIS <-> SRL	0.593

Evaluation of Structural Model

The structural model presents the path coefficients that indicate the nature and strength of the relationships between the exogenous and endogenous variable to test the hypotheses. Figure 1 presents the analytical model and the path coefficients with their respective significant values.

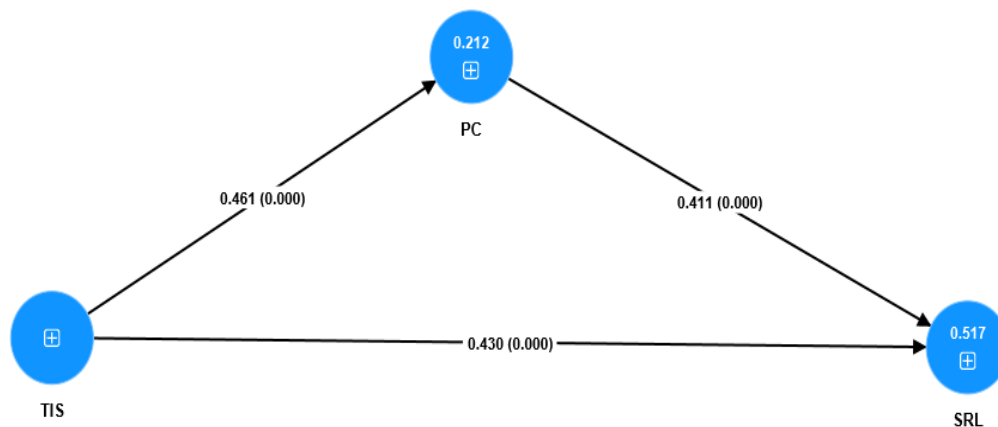


Figure 1: Structural model of the study

*PC = Psychological capital, TIS = Teacher Instructional Scaffolding
SRL = Self-regulated Learning*

Table 3: Results of the structural model

Paths	Standardised Effects (β)			f^2	R^2	Sig.
	Direct	Indirect	Total			
TIS -> PC	.461	-	.461	.269	.212	<.001
PC -> SRL	.411	-	.411	.276		<.001
TIS -> PC-> SRL	.430	.189	.619	.301	.517	<.001

PC = Psychological capital, TIS = Teacher Instructional Scaffolding, SRL = Self-regulated Learning

The first hypothesis sought to test the relationship between instructional scaffolding and psychological capital. The results (see Table 3) indicated that instructional scaffolding positively predicted psychological capital ($\beta = .461$, $p < .001$) and accounted for 21.2% of the variance in psychological capital. The results therefore support hypothesis 1. Also, hypothesis 2 postulate that psychological capital would significantly predict self-regulated learning of senior high school students, and this was supported by the results ($\beta = .411$, $p < .001$). Hypothesis 3 that sought to test assess the relationship between teacher instructional scaffolding and self-regulated learning was also supported ($\beta = .430$, $p < .001$). Instructional scaffolding and psychological capital together accounted for 51.7% of the variance in self-regulated learning.

Hypothesis 4 tested the mediating role of psychological capital in the relationship between instructional scaffolding and self-regulated learning of SHS students. The results showed that psychological capital partially mediated the relationship between instructional scaffolding and self-regulated learning ($\beta = .189$, $p < .001$) of SHS students. Psychological capital thus, played a critical role in how teacher instructional scaffolding could enhance self-regulated learning capabilities of students in SHS.

Discussion of Findings

The present paper found that instructional scaffolding positively predicted psychological capital of the students. This implies that the more teachers adopt instructional scaffolding in their lessons, the better the psychological capital of the students would become. This finding is consistent with previous studies (Lorenz et al., 2016; Mannion et al., 2021). Thus, instructional scaffolding could enhance the self-efficacy, optimism level, hope and resilience of the student when they encounter difficult situation in their learning and discovery process. Also, through instructional scaffolding, the self-efficacy of students is enhanced and they find their way around difficult academic tasks and cope with challenges situations (Lorenz et al., 2016). The finding in

the current study supports the propositions of the self-determination theory (Deci & Ryan, 2000), suggesting that the provision of the requisite support and guidance to students enable them to handle challenging academic situations and become focused and self-directed.

Teacher dialogic instructional scaffolding with their students enables students to become exposed to new insights that enhance their psychological capital (Mannion et al., 2021). Such students therefore demonstrate greater self-efficacy and optimism, become hopeful of successful academic engagement, and resilient (Mannion et al., 2021). Instructional scaffolding and guidance build the confidence of the student to be free to ask questions and receive resourceful feedback and support, not only from the teacher, but also from other colleagues. Teachers in learning new material. This process encourages the student to pay more attention in class and become interested in the learning process, and demonstrate effective learning skills and engage in analytical academic discourse with convictions (Benlahcene et al., 2021; Reeve et al., 2019).

The findings also indicate that instructional scaffolding positively predicted self-regulated learning of senior high school students. This finding is consistent with various studies from different countries. Extant literature indicated that teacher instructional scaffolding enhances students self-regulated learning at various levels and in different subjects (e.g. Ansari & Saleh, 2021; Ihechukwu, 2020; Pereira et al., 2016; Tai et al., 2021). For instance, Ihechukwu (2020) found instructional scaffolding to be a critical learning facilitator and enhancing mathematical performance of secondary school students in Nigeria in a quasi-experimental study. Tai et al. (2021) also found instructional scaffolding to be an important element in the learning of students and academic success in motor and cognitive abilities writing and communication in English language. The dynamic support, assessment and feedback provided to the learner during the learning process shapes the confidence of the student and he/she gains the confidence to self-regulate and learn independently, with little support. This invariably leads to enhanced understanding and performance in learning. Self-regulated students are generally held to a higher standard in their consistent use of metacognitive, motivational, and behavioural strategies (Guo & Wei, 2019; Zusho, 2017). This requires self-belief and making efforts to meet the high expectations and often preparing for and reflecting on learning. They engage in effort management skills for working diligently and effectively with challenging tasks that are important in their academic success in the classroom (Pintrich, 2004). Employing scaffolding progressively enabled students to become independent utilise self-regulated technique (Pereira et al., 2016), and have higher level of motivation (Guo & Wei, 2019; Hyland & Hyland, 2019; McMillan, 2014).

We also found that psychological capital further promotes self-regulated learning, consistent with extant literature (e.g. You, 2016; Riolli et al., 2012) and the self-determination theory. Riolli et al. (2012) noted that students with high psychological

resources have better perspectives of challenging academic activities, strategize and adopt appropriate learning strategies in their learning. This invariably boosts their appreciation and engagement with the learning environment appropriately regulate their learning activities (You et al., 2014) and perceive insightful possibilities that boosts their learning and personal growth. Psychological capital, as a psychological resource, thus empowers the student in the learning environment to self-regulate in the academic and learning process (Paloş et al., 2020) and directs the focus of the student to attain success in academics pursuit (Luthans et al., 2007) through the hope and willpower (Jafri, 2017) offer by the scaffolding process. As supported by our finding in the mediation analysis, instructional scaffolding both directly and indirectly influences self-regulated learning by first boosting the psychological capital of the students. The combined effect of teacher scaffolding and psychological capital on self-regulated learning is enormous, as observed in this study.

When the confidence of the students is enhanced through instructional supporting and guidance, they gain the capacity and the knowledge to take control and schedule their own learning activities (Paloş et al., 2020; You et al., 2014). Thus, the present study concludes that instructional scaffolding is a critical educational strategy that engenders confidence and resilience in students to take charge of their learning process and outcomes.

Practical Implications and Recommendations

Given the relevance of self-regulated learning in the academic experiences and learning outcomes of students, it is important for educational stakeholders to adopt pragmatic measures to promote self-regulated learning in students. We recommend that teachers should be trained and empowered in the use of scaffolding strategies in their interaction with students to enhance their psychological capital and self-regulate in their learning. Headmasters also need to encourage instructional scaffolding and other social and psychological processes to enhance psychological capital of students in senior high schools. In addition, educational administrators and authorities should ensure that educational curricula are designed to encourage instructional scaffolding within the learning environment. This, invariably would enhance the self-confidence, efficacy and resilience of the students to optimistically pursue their learning agenda.

Conclusions

In conclusion, our study emphasised the relevance of teacher instructional scaffolding in the development of psychological capital of students in senior high schools. It is also important to note that both scaffolding and psychological capital are critical for self-regulated learning of students. Psychological capital is one critical

intervening mechanism through which instructional scaffolding could boost self-regulated learning capabilities in students. Essentially, teacher instructional scaffolding feedback effectively enhance self-regulation learning of students through their use of metacognitive strategies, resilience, resource management strategies, intrinsic motivation, self-efficacy and other psychological resources.

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