Relationship between Learners' Self-Efficacy and Achievement Mediated By Scaffolding

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ABSTRACT

Purpose: To establish the relationship between learners' self-efficacy and achievement mediated by scaffolding learning within the Zone of Proximal Development.

Methodology: Sequential explanatory design within the mixed methods approach was adopted involving 307 students and 10 teachers picked out through stratified sampling followed by purposive sampling. Quantitative data was collected using pre-post quasi experimental design which involved an experimental and a control group from their naturally occurring classrooms. Data was collected using a pretest on both the experimental and the control groups, scaffolding learning on the experimental group and eventually a post test on both groups. Quantitative data was analyzed and compared between the experimental and the control groups. Sequentially, qualitative data was collected using interview technique. Instruments of data collection were the pre-test and post-test self-efficacy questionnaires an Achievement Test, a scaffolding module and interview schedules. The relationship was established through Karl Pearson product moment correlation as well as the thematic framework for qualitative data.

Results: After scaffolding learning, Pearson Correlation showed a positive relationship between learners' self-efficacy and achievement (r=.428) for the experimental group. Similarly, for the control group, there was a weak positive relationship between self-efficacy and achievement (r=.228). Additionally, qualitative results established that learners achieved better results due to improved self-efficacy as a result of scaffolding pedagogies.

Conclusion: Scaffolding learning is necessary in boosting learners' self-efficacy and eventually the achievement of learning goals.

Key words: Self-Efficacy, Scaffolding, Learning, Achievement.

INTRODUCTION

While self-efficacy constitutes the belief in our abilities to execute courses of action in order to achieve our goals, (Bandura, 1994), a learner needs scaffolding from more knowledgeable others (Wood, Bruner and Ross) for them to achieve their learning goals. According to Vygotsky (1978), scaffolding is more successful if it happens within the learner's Zone of Proximal Development. Self-efficacy beliefs produce personal accomplishments; reduce stress and lower vulnerability to depression (Bandura 1994).

According to Luo, Chen, Yu and Zhang (2022) academic self-efficacy predicted achievement both directly and indirectly by means of learning engagement among students in China. This meant that high levels of self-efficacy mobilized and enhanced learning engagement. Moreover, supporting Vygotsky's belief on the significance of language, Guo, Wang and Martin (2023) stated that language proficiency is a significant moderator of the students' self-efficacy. Similarly, pre-service teachers' ability to perform difficult tasks was a result of scaffolded instruction, which boosted the efficacy of the student teachers to teach with robotics-based

activity (Jamani, 2023). Thus, according to Jamani (2023) scaffolded intervention resulted in greater gains in pre-service teachers' self-efficacy to teach with robotics based activities. According to Allagai (2024) , scaffolding intervention produces a positive effect on self-efficacy beliefs and learners' ability to organize ideas in writing. This improvement eventually leads to better performance in writing. These assertions highlight the importance of scaffolding strategies targeting self-efficacy to improve confidence in source based writing and hence writing performance (Allagai, 2024).

Moreover, Hassen, Adgna and Bogale (2023) reported a significant boost in self-efficacy beliefs among learners who had been subjected to scaffolding, improving students' writing achievement in each aspect of writing skills. Hence, the students developed a positive perception towards the value of the scaffolding strategies instruction for improving their writing skills. Additionally, scaffolding positively predicted achievement motivation for learning (Isoe, Mugambi, Koinange and Wawire, (2022), with a moderate statistically significant positive correlation between academic scaffolding and achievement motivation.

Thus, scaffolding learning is a predictor of self-efficacy beliefs. However, there is scanty literature about the relationship between self-efficacy and achievement when the two factors are mediated by scaffolding learning. The study therefore sought to establish this relationship.

Theoretical framework

Cognitive Load Theory (Sweller, 1988), builds upon Information Processing Theory (Miller, 1956) which outlines three information processing functions: sensory memory, working (short-term) memory and long-term memory. The working memory can hold 5 to 9 chunks of information at a time, hence has limited capacity (Miller, 1956). The concept of chunking and the limited capacity of the working memory is the basis upon which the Cognitive Load theory (Sweller, 1988) is built.

Thus, Cognitive Load relates to the amount of information that the working memory can hold at a time, which is 5-9 chunks. Cognitive Load Theory suggests that learners can absorb and retain information effectively if the information is provided in such a way that it does not overload the working memory or the mental capacity of the learners. Sweller (1988) argues that if a lot of information is provided to the learners at once, the students will most likely lose it since the information cannot fit in the working memory of the learners. For this reason, when teaching cognitively complex or challenging material, teaching techniques should be acquired to reduce the working memory load in order to facilitate the changes in the long-term memory associated with schema acquisition (Sweller, 2003).

Cognitive Load theory (Sweller, 1988) informs the study in that academic achievement is fully dependent on the memory of the learner. A learner with good memory has high self-efficacy because he performs well in academic activities, and good memory calls for effective information processing. For this reason, there is need to apply sound instructional strategies such as scaffolding within the Zone of Proximal Development (ZPD). The teacher needs to determine the students' ZPD before preparing the learning material, and scaffold the learning process. A scaffolded learner is able participate actively in learning and in the process develop self-efficacy; the belief in his own ability to use the schemas in a variety of contexts. A learner with high self-efficacy performs well in tests and examinations which measure academic achievement. This is possible when scaffolding and the ZPD are in place.

METHODOLOGY

Sequential explanatory design within the mixed methods approach was adopted; hence data was collected in two phases. Figure 1 illustrates the data collection procedure

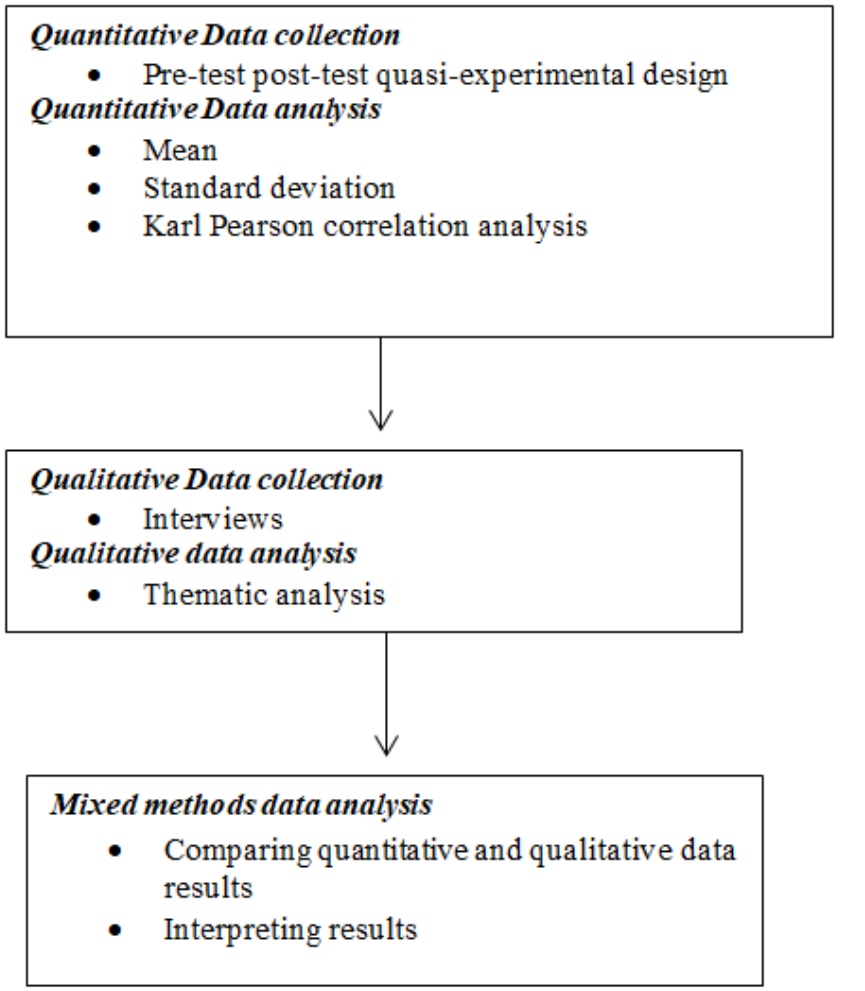

Figure 1: The Sequential Explanatory Design (Creswell 2014, p. 270)

Quantitative Phase

Quantitative data was collected using pre-test post-test quasi experimental design. Quasi experimental design was appropriate for this study because the researcher used participants in their naturally occurring groups which constituted the schools and the already existing classes. This means that sampling and assignment of subjects to the various study groups (experimental and control groups) was non-random (Jones and Bartlett, 2000).

The researcher sampled the two groups of students (n=307) from 2 schools and assigned them to the experimental group and the control group after which all students filled in the Self-efficacy questionnaires as well as sat for a pre-test examination to ascertain the level of their self-efficacy and achievement respectively before the application of scaffolding pedagogies. This was followed by the exposure of the experimental group to scaffolding learning for duration of 8 weeks and an eventual post-test where Self-efficacy questionnaires were filled in and a post-test Achievement Test done. Pretest and post-test data were analyzed using mean and standard deviation then compared to establish the effect of scaffolding on both self-efficacy and achievement. To find out the relationship between self-efficacy and achievement, Karl Pearson product moment correlation and linear regression were employed.

Qualitative Phase

Qualitative data was collected using interview technique using unstructured and generally open-ended questions that were few and intended to elicit views and opinions from participants (Creswell, 2014). Interview was appropriate for this study because it touches on human psychological variables; hence the respondents were expected to give their own views, feelings and experiences that would not be captured by the pre-test and

post-test questionnaires and the Achievement test. Thus, teachers and students were able to give their experience on scaffolding and its effects on learner aspects. At the same time, interviews enabled students give open-ended information on the effects of scaffolding on their psychological aspects. Moreover, interview data allowed the researcher to compare, confirm, support and explain the findings of the experiment (Creswell, 2014). Therefore, interview questions were formulated based on quantitative data findings as a follow up to the findings.

Qualitative data was analyzed using the thematic framework (Braun and Clarke 2012)

RESULTS

The study carried out correlation analysis between the pre-test and posttest scores of the experimental group and the control group participants and the results on table 1 and 2 were obtained.

Table 1: Correlation between self-efficacy and achievement posttest scores of experimental group

Correlations			
		Exp. grp efficacy post-test	experimental group achievement post test scores
exp grp efficacy post	Pearson Correlation	1	.428
	Sig. (2-tailed)		.000
	N	103	103
experimental group achievement post test scores	Pearson Correlation	.428	1
	Sig. (2-tailed)	.000	
	N	103	103

Table 21: Correlation between Self-efficacy and achievement posttest scores of control group

Correlations			
		Control group self- efficacy post	Control group achievement post test scores
exp2 efficacy post	Pearson Correlation	1	.427
	Sig. (2-tailed)		.000
	N	101	51
control grp 2 achievement post test scores	Pearson Correlation	.427	1
	Sig. (2-tailed)	.000	
	N	51	51

Tables 38 and 39 show that r = 0.428, p< .005 and r =0.427, p <.005 respectively. The positive r values are a clear indication of a positive relationship between self-efficacy and achievement, meaning, as the learners' self-efficacy increases, their achievement also increases. This explains why the learners improved in the

performance of the Achievement posttest. Moreover, p<.005 in both the experimental group and the control group, suggesting a statistically significant relationship between self-efficacy and achievement among the learners. Therefore, the study established that the increase in self-efficacy positively led to the improvement in achievement. This meant that high levels of self-efficacy mobilized and enhanced learning engagement.

The study went on to probe the learners on whether the improvement in self-efficacy might have led to the overall improvement in achievement and the following were their remarks.

I think I can learn on my own. This is because I do the topics that I can handle and our teacher comes in to help on more difficult topics or questions. .. I am able to learn without much assistance and I am happy about it because if I can learn on my own, then even exams I am sure I will perform wonderfully. (LoE3)

Another respondent said:

My learners do not only believe in their abilities but they are surely putting that belief in practice… Earlier the learners could go to the exam room with written materials, now I think they believe that they can perform well without the materials. And surely they have proved that. At the beginning, I asked them to freely set their targets, I did not interfere. Though they set very low targets, many of them achieved, and those who did not achieve are striving to achieve them. So I think my students believe that they can do better. That could be the reason why their performance is better. (ToE2)

From the responses by LoE 3 and ToE 2, the students achieved better results due to the increase in self-efficacy. This is confirmed by the fact that the learners started to believe that they can not only learn on their own but also do revision on their own successfully. Moreover the learners started setting achievable targets which they believed they could achieve, and ToE confirms that many of the learners achieved the set targets. The belief in their abilities was extended to the examination room. ToE states that minimum invigilation was done during exams but still there was better achievement among the learners. Therefore, learners who underwent scaffolding learning performed better because their self-efficacy had improved.

DISCUSSION

The results establish that experimental groups recorded a higher posttest mean scores than the control groups. The difference between the intervention and control groups indicated that learners who were subjected to scaffolding method significantly improved in their self-efficacy, hence their achievement. Thus, it is clear that scaffolding learning method improved the self-efficacy of the learners and this increase in self-efficacy led to better performance in the achievement test. Therefore, for learners to perform better in tests, scaffolding method is necessary. The school principals should therefore employ permanent counselors in schools to keep watch and guide learners towards attaining high levels of self-efficacy. This is because the study found out a positive relationship between the self-efficacy and achievement.

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