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The Effect of Experiential Learning on Metacognitive Skills of Secondary School Students in Geography

Mr. Gawrav Shinde
Ph.D. Research Student
MES's Pillai College of Education and Research, New Panvel

Abstract

This study investigates the impact of Kolbs experiential learning model on enhancing meta-cognitive skills in geography education. Teaching Geography is a challenging task for any teacher. Due to lack of resources and passive learning methods. Thus, recognizing these draw backs, this research explores how active engagement through hands- on activities and field work influence students' Meta cognitive skills. The sample for the current study is students of std 7 from Mumbai region. A Quasi experimental design is employed to carry out the study. Sample comprising of 42 students in control group receiving conventional instruction and 42 students in experimental group exposed to experiential learning interventions. Student Metacognitive skills are measured by researcher made questionnaire and is validated by the experts in the field. Quantitative data analysis is conducted to determine the statistical significance or any differences in achievement between the two groups. The findings of this study revealed that there was significant difference found in the metacognitive skills of those students who had undergone intervention.

Keywords: Experiential learning, metacognitive skills, quasi experimental, secondary school students

Introduction

Academic achievement is not just for getting lucrative job but it helps to equip children

with essential skills for life. A study published in the *European Journal of Psychology of Education* found that cognitive well-being has positive correlation with academic achievement. A meta-analysis of 13 studies confirmed a significant positive relationship between mental health and academic achievement in adolescents. It helps fostering a sense of accomplishment in children. Hence, developing a strong sense ethics from an early age. Academic achievement helps children to get enrolment in a prestigious educational institution this could led to a prosperous future. Having a strong academic background helps the employers to make crucial decision to hire the deserving candidate.

A commendable academic record significantly improves a child's prospects in the job market. Employers often consider academic achievements when making hiring decisions, underscoring the importance of performing well in school for future career opportunities. Academic achievement can positively impact the essential life skills of a child.

Experiential learning

John Dewey

John Dewey coined the term 'learning by doing' (Dewey, 1915). Experiential education involves indulging learners in an experience and boost understanding about the experience leading to a development of dexterity, outlook and innovative thinking. By reducing passive communication in typical classroom, through experiential learning programme a teacher helps the students in improving their understanding. This type of learning is based on constructive approach of learning where students are given an opportunity to express their theoretical knowledge. It is further helpful in the development of self-management skills individually or in groups.

David Kolb

The concept of experiential learning was first explored by John Dewey and Jean Piaget, among others. It was made popular by education theorist David A. Kolb, who, along with John Fry, developed the experiential learning theory, which is based on the idea that learning is a process whereby knowledge is created through transformation of experience. National Education Policy (NEP) 2020 provides a special focus on the experiential learning approach. The worth of the experiential approach is well-established and has more relevance in today's competitive and complex learning environment. This method will help in motivating both students and teachers to respond to the diversity in the classrooms. As such this approach encourages hands-on experience, critical thinking, problem-solving approach, and learning by doing and empowers a deep engagement with the curriculum. However, the current study is based on Kolbs Learning cycle.

Kolbs learning cycle

The present study is based on Kolbs Experiential Learning model. In Experiential Learning: Experience as the Source of Learning and Development (1984), Kolb defined learning as “the process whereby knowledge is created through the transformation of experience”. This learning experience consists of four stages:

- Concrete Experience (CE): feeling
- Reflective Observation (RO): watching
- Abstract Conceptualization (AC): thinking
- Active Experimentation (AE): doing

These four stages, or steps, of learning typically move through a cycle that begins with a student having a concrete experience and ends with them actively experimenting with the knowledge they gained.

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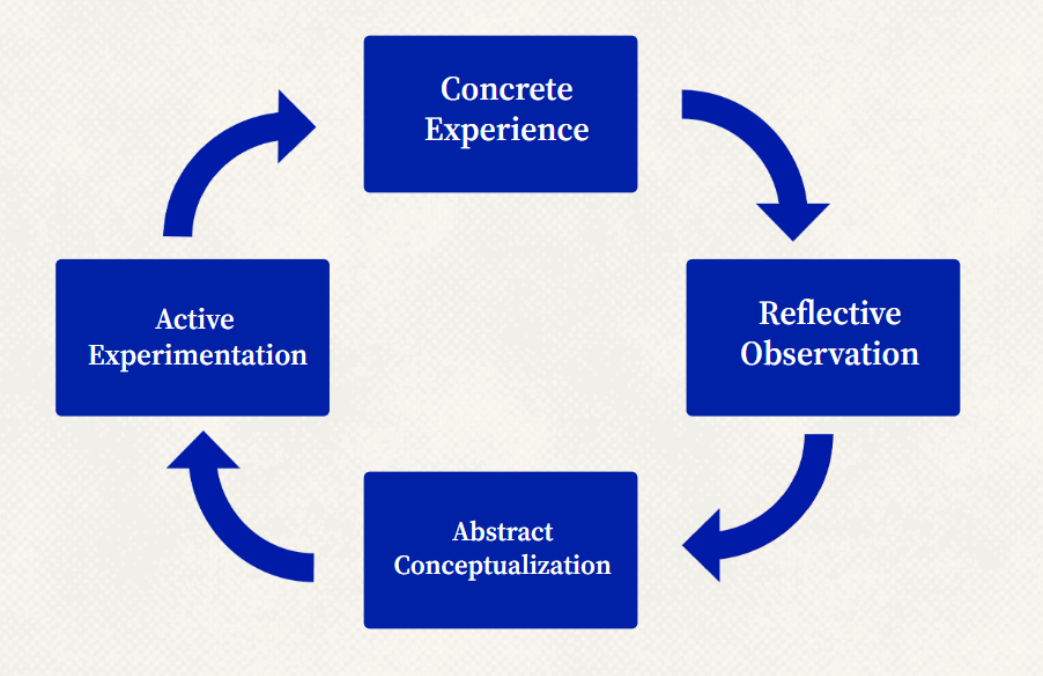

Metacognition

In today's world there is a significant importance gained by Science, Mathematics and other subjects. On the other hand, Learner tends to lose interest in those subjects where there is a need to first-hand experience but are not taught in that manner. Geography is one of these subjects. It is the only subject to provide a broad view of the world and how it functions. This is important because it allows learner to build a deeper understanding of the world we live in, the natural environment and human landscapes and all the connections between them. This understanding can empower students (and teachers!) to be more responsible when it comes to climate change. This understanding could be achieved if the learner is taught in such a way that he develops the urge to learn more knowing their cognitive process and regulating it. Senemoğlu (2007, p. 336) metacognition is "generally the knowledge of one's own cognitive system, its structure, its functioning; in other words, the awareness of one's own cognitive structure and the learning characteristics and the ability to monitor and regulate one's own cognitive processes." According to Gagne et al. (1988, p. 70), metacognition is the internal processes that employs

cognitive strategies to monitor and control the memory and learning processes. Metacognitive practises help the learner to learn better by regulating and controlling their cognitive process and learning activities. They are occasionally referred to as Executive Skills (Kluwe, 1987). These skills can be acquired and eventually executed implicitly.

Metacognitive skills are important organizers of all of the tasks that learners perform. They enable planning, setting goals, initiating work, sustaining future - oriented problem-solving activities, monitoring and managing progress on tasks to detect and correct errors, and keeping track of the effect of one's behaviour towards others. Metacognitive Skills appear to be highly interdependent, by means of thorough orientation of a task; a meta-cognitively skilled student is likely to focus on relevant information given in the task assignment necessary for building an adequate task representation. Metacognitive skills are –

- Task Analysis or Planning
- Monitoring
- Self-Regulation
- Self-Evaluation

Studies conducted by Isgör and Isa (2016) found a positive significant relationship between metacognitive skills and academic success average.

Neeru(2015) in her study aimed at examining the academic achievement of the secondary school students in science with reference to their meta-cognitive skills and emotional intelligence. It was found that male and female students with high meta-cognitive skills showed better academic achievement than low metacognitive skills male students.

Landline (1998) conducted a study on a sample of 108 students of 12th grade. The main aim of the study was to expose the relationship between Metacognition and certain personality variables. In this study researcher used Model of metacognition (Biggs' 1987) as theoretical framework. The result of the study indicated that there existed a significant positive relationship

between metacognition, motivation, locus of control, self-efficacy and academic average. Further, it was also concluded that metacognition and these personality variables are related with academic achievement.

Kolb and Kolb (2008) an article published in a Journal based on Simulation Gaming the Learning Way: Meta-cognitive Aspects of Experiential Learning, have argued that contemporary research on meta-cognition has reintroduced conscious experience into psychological research on learning and thereby stimulated a fresh look at the works of classical experiential learning scholars who gave experience a central role in the learning process. Researcher have suggested a modified meta-cognitive learning model based on ELT that includes concepts of learning self-identity, the learning spiral, learning style, and learning space. Based on these concepts, researchers have outlined meta-cognitive strategies that individuals can use to improve their learning effectiveness. The researchers have emphasized two cycles of learning; the cycle of learning at the object level represents the learner's actual concrete learning experience. The cycle at the Meta level describes the learner's normative model of how his or her learning should be. A closer look into the study reveals the relation between monitoring and control of one's meta-cognitive model of experiential learning and one's learning experience complete another cycle of experiential learning. This third learning cycle describes how individuals develop their meta-level model of learning, that is, how they learn about their learning process.

S., S. Estawul, S., et. al.,(2016*)* Effect of fieldtrip strategy on senior secondary school students' academic achievement in geography in Numan Educational Zone, Adamawa state, Nigeria. This study investigated the Effect of Fieldtrip Strategy on Senior Secondary School Students' Academic Achievement in Geography in Numan Educational Zone, Adamawa State, Nigeria. Two research questions and two hypotheses were formulated and tested in the study. The study adopted the quasi-experimental research design. A sample size of 138 Senior Secondary (SS II)

students offering geography from two public senior secondary schools in Numan Educational Zone was used for the study. The groups consisted of an experimental and control groups which were taught for six weeks. The research instruments used to obtain data was the Teachers' Qualification Assessment Checklist (TQAC), Fieldtrip Facilities Inventory (FFI) and the Geography Achievement Test (GAT). The reliability index of the instrument (GAT) was determined using Guttmann Split-half Statistic. This yielded a reliability coefficient of 0.70. The research questions were answered using frequency counts and percentages and the hypotheses was tested using Kolmogorov Smirnov two-sample test. The result showed that most geography teachers in Numan educational zone are B.Sc. holders, who do not possess the basic qualification of teaching. The study also revealed inadequate facilities for conducting fieldtrips in Numan educational zone. There was a statistically significant difference in the academic achievement of students taught geography using fieldtrip strategy and conventional method. Male students in the experimental group performed better in geography than their female counterparts. Since fieldtrip strategy improved students' achievement in Geography, it was recommended that Government should employ qualified graduate teachers in geography education to teach the subject. Government should also provide secondary schools with adequate facilities for conducting fieldtrips. Geography teachers teaching in secondary schools should endeavour to adopt or incorporate this instruction technique while teaching for a better achievement of students in geography.

Joshi (2015) studied the Effectiveness of Kolb's experiential learning model for students of Std. IX. A two group only post-test design was used for the study. 60 students of 9th standard were selected by using convenient sampling technique. The results revealed that the programme was effective among students towards Experiential Learning. Moreover, the activities of the programme were found interesting, relevant and effective to students. However, it pays insufficient attention to the process of reflection.

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Rationale

In a period of fast change and multifaceted problem-solving needs, learners' capacity to reflect on their own thinking – metacognition- has grown more vital. Metacognitive abilities like planning, monitoring, and assessing one's cognitive functioning is vital for successful learning, academic success and lifelong learning. But conventional teaching approaches are usually ineffective in developing these higher order thinking capacities.

Experiential learning, rooted in the works of John Dewey, David Kolb, and others, focuses on active participation, reflection, and applicability to the real world. The method introduces students to learning through doing, decision making, experiencing consequences, and reflecting on results. These processes inherently support students' evaluation of their knowledge, revising as needed, and gaining awareness of their thinking strategies—key elements of metacognition.

Secondary students are at a developmental phase where metacognitive abilities can be greatly influenced and developed. Incorporating experiential learning into their curriculum can not only develop mastery of content but also independent, reflective thinkers who are academically as well as real-world challenge ready.

In spite of the theoretical basis, empirical work is called for to support the connection between experiential learning and metacognitive development at this age. The current research seeks to bridge this gap by investigating the ways in which strategies of experiential learning influence secondary school students' metacognitive competencies, thus informing more responsive and efficient pedagogical interventions.

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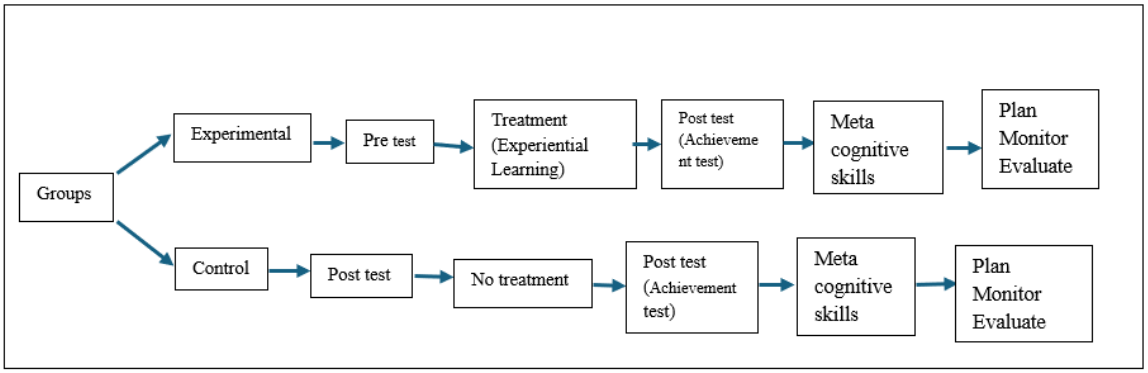
Methodology

Design of the Study

For the proposed study, the Quasi-experimental design will be employed. Looking into the nature of the investigation, pre–test and post–test will be employed to deal with the two groups concerned. In this design, the experimental group and the control group will be formed and pre-test will be administered for academic achievement in Geography. To check the metacognitive skills a questionnaire is developed by the researcher which will be given to both the groups before and after the pre and post-test.



Research Question

Is experiential learning effective in enhancing the secondary school students' metacognitive skills?

Hypothesis

There is no significant effect of experiential learning in geography on metacognitive skills of secondary school students.

Variables of the Study

Independent Variable: Experiential Learning Approach

Dependent Variable: Metacognitive skills- Plan, Monitor, Evaluate

Sample

As it is not feasible to bring all the Standard VII students studying in Maharashtra State Board schools in Mumbai under the proposed study, one of the schools will be selected randomly to carry out the experiment. The sample for the proposed study will be comprised of 100 students studying in standard VII in Secondary School in Mumbai district.

Tools of the study

The following researcher made tools will be used for the proposed study to collect the essential quantitative data.

Researcher made questionnaire on metacognitive skills

Statistical Analysis

I. Descriptive Data Analysis

a) Descriptive statistics of Control group and Experimental Groups

Table 1

Planning as One of the Meta Cognitive Skills for Control Group

	Mean	Median	SD	sk	Ku
Pre test	98.8	96	32.07	-0.57	1.04
Post test	98.8	91	26.4	0.98	0.19

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Figure 1

Graphical Presentation of pre and post Test Sscores of Planning as one of the Metacognitive Skills for Control Group

Interpretation

Both the tests' means are the same (98.8), but their distributions are quite different. The pre-test is higher in standard deviation and variance, showing more spread-out data than the post-test. The skewness indicates that the pre-test scores are more even, whereas post-test scores are positively skewed, which means there are some higher outliers. The confidence intervals indicate that the pre-test estimates have a broader range of uncertainty compared to the post-test.

Table 2

Self-Monitoring as one of the Meta Cognitive Skills for Control Group

	Mean	Median	SD	sk	Ku
Pre test	114	115	37.98	-1.35	1.99
Post test	114	115	24.11	-0.73	0.22

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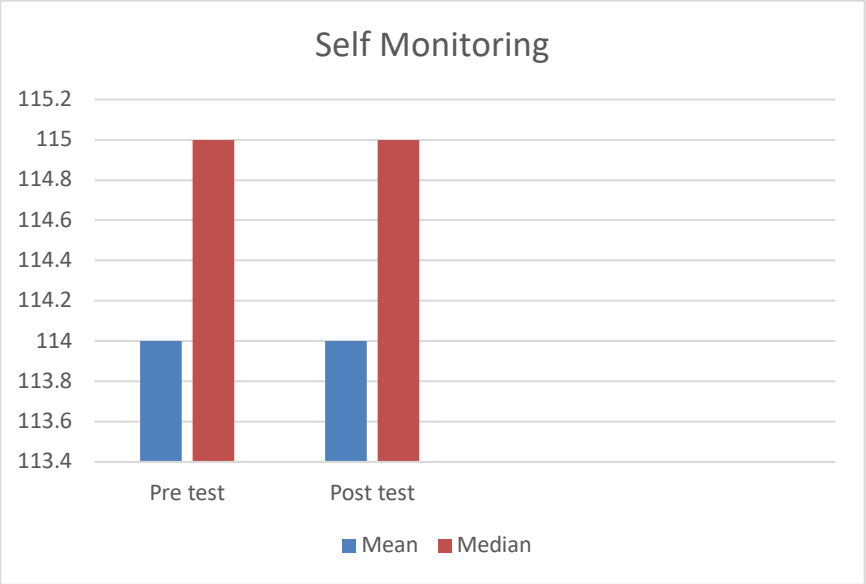
Figure 2

Graphical Presentation of Pre and Post Test Scores of Self-monitoring as One of the Metacognitive Skills for Control Group



Interpretation

Both pre-test and post-test share the same mean (114), but the variance has reduced in the post-test. The post-test has considerably lower variance and standard variation, reflecting less distribution of scores. Pre-test kurtosis indicates a distribution with more extensive tails, and the post-test shows that it is moving closer to being normally distributed. The negative skewness tells us that in both tests, scores are clustered on the right-hand side but are less skewed in the post-test.

Table 3

Self-Evaluation as one of the Meta Cognitive Skills for Control Group

	Mean	Median	SD	sk	Ku
Pre test	98.8	95	45.24	0.31	-2.16
Post test	98.8	102	28.53	0.44	-0.84

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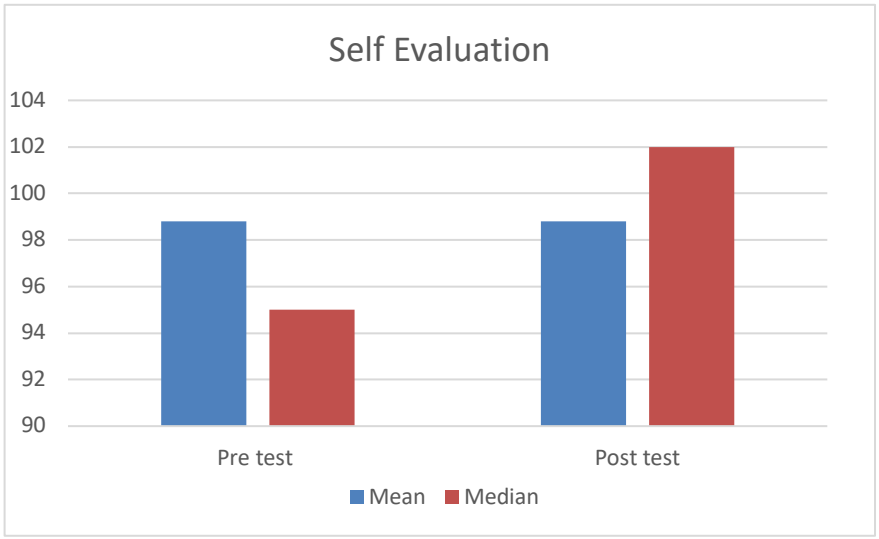
Figure 3

Graphical Presentation of Pre and Post Test Scores of Self-Evaluation as one of the Metacognitive Skills for Control Group



Interpretation

The means are identical (98.8) for both tests, indicating consistency in overall performance. The post-test shows a significant reduction in standard deviation and variance, suggesting improved consistency among scores. The kurtosis values indicate that the pre-test scores are more spread out with lighter tails, while the post-test distribution is closer to normal. The skewness indicates a slight positive skew in both tests, but it is more pronounced in the post-test, suggesting a shift in score distribution.

Conclusion

Throughout the three tables overall, the mean scores were equal in each instance yet post-test scores demonstrate significant changes in score distribution, consistency, and central tendency, providing significant insight into performance dynamics. In two of the three instances, the median dropped, indicating decreased typical performance in spite of unaltered means—almost certainly because outliers skewed the mean. Yet in the third set, the median increased,

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indicating enhanced typical performance. Notably, all the standard deviations reduced in the post-tests, signifying that scores were more uniform and were clustering around the mean, as well as portraying enhanced uniformity of performance. Skewness changed from negative to positive or became less negative in the majority of instances, portraying a redistribution where more students started scoring lower, though in one instance, the skew was still negative with a more constricted distribution—showing enhanced performance. Lastly, kurtosis measures reduced in all instances, towards or below zero, implying fewer extreme scores and more even distributions during the post-tests. Generally speaking, average scores remained unchanged, yet the post-test findings demonstrate a pattern towards increased consistency, with either better or slightly reduced central performance, depending on the dataset—especially emphasizing the subtle characteristics of post-intervention performance.

b. Descriptive Statistics of Experimental Group

Table 4

Planning as one of the meta cognitive skills for Experimental group

	Mean	Median	SD	sk	Ku
Pre test	42.90	43	4.20	-0.08	0.09
Post test	47.93	49	4.76	-0.54	0.38

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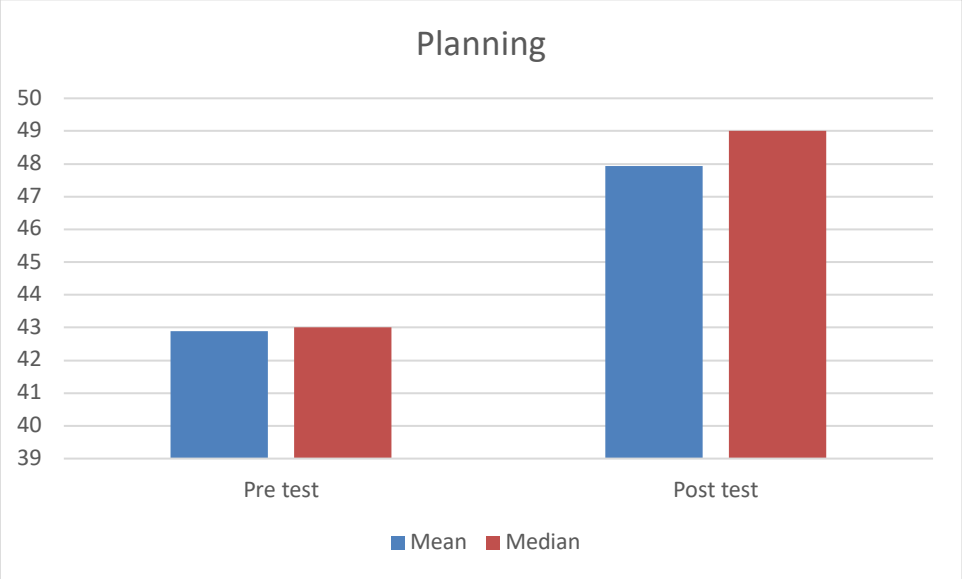
Figure 4

Graphical presentation of pre and post test scores of Planning as one of the Metacognitive skills for Experimental group



Interpretation

Average score went up by roughly 5 points — that indicates general performance improvement. The middle score went up too, affirming more than half of the students achieved a higher post-test score. Variability is slightly increased in post-test scores, but both SDs remain low, which indicates scores still tend to clump tightly around the mean. Pre-test scores were almost symmetric. Post-test scores have a mild left skew, which is to say more students got high marks and some lower scores drew the tail left. Both are platykurtic (flatter than typical), though the post-test is ever so slightly more peaked, or in other words, scores are still distributed but more densely concentrated about the mean than on the pre-test.

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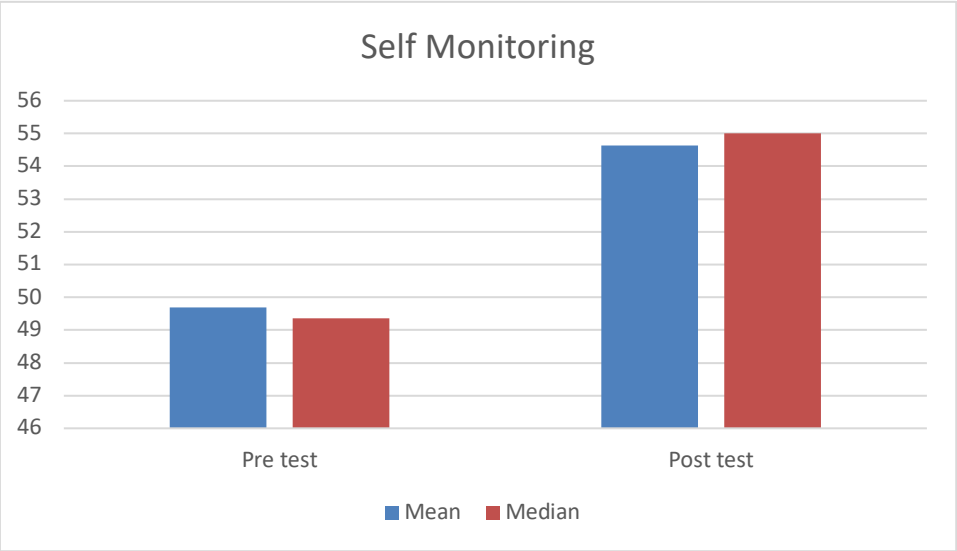
Table 5

Self-Monitoring as one of the meta cognitive skills for Experimental Group

	Mean	Median	SD	sk	Ku
Pre test	49.69	49.5	4.70	0.14	-0.03
Post test	54.64	55	4.85	-0.23	0.23

Figure 5

Graphical presentation of pre and post test scores of Self-Monitoring as one of the Metacognitive skills for Experimental group



Interpretation

The mean score rose, reflecting general improvement in performance. The median score also rose, affirming that over half of the students performed better on the post-test. Very slight increase in variability, but scores on both tests are equally bunched around the mean. Pre-test had an extremely slight right tail (a few higher scores). Post-test moved to a very slight left tail, i.e., more students scored above the mean, with fewer lower scores tugging the tail leftwards. Both distributions are near normal (mesokurtic). Post-test is somewhat more peaked but nothing

drastic — so no real change in the extremity of scores.

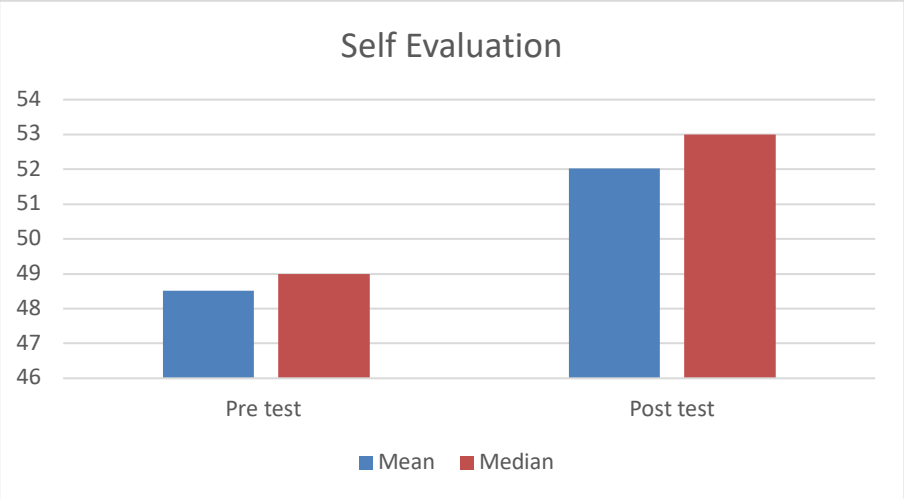
Table 6

Self-Evaluation as one of the meta cognitive skills for Experimental group

	Mean	Median	SD	sk	Ku
Pre test	48.52	49	4.26	-0.53	0.32
Post test	52.02	53	4.43	-0.44	0.09

Figure 6

Graphical presentation of pre and post test scores of Self-Evaluation as one of the Metacognitive skills for Experimental group



Interpretation

The mean increased, indicating an overall improvement in performance. The median increased, indicating that over half the students did better. There is a slight increase in variability, but scores are tightly bunched around the mean in both tests. Both distributions are skewed to the left, indicating more students scored on the higher side. The skew reduced slightly in the post-test. Both distributions approximate normal (being slightly platykurtic), with the post-test being closer to a normal distribution.

Conclusion

In all three data sets, the post-test scores indicate definite gains in performance, as evidenced by increases in both mean and median scores. The mean scores rose in all cases, indicating that students, on average, performed better in the post-test. Likewise, the median scores also increased in each data set, indicating that more than half of the students scored higher following the intervention. The standard deviation (SD) rose slightly in two datasets and stayed unchanged in one, which means the spread of scores became greater in the post-test in some, but the spread was comparatively consistent as a whole. Skewness moved in the direction of being more negative across all datasets, indicating that the distribution shifted to left-i.e., more pupil scored better in the post-test, with fewer scores dragging the tail towards the left. The Kurtosis measures of the distribution were slightly lower in the post-tests, indicating a more symmetrical distribution with fewer extreme values. Overall, the central tendency (median and mean) increased but the post-test distributions were more even and with fewer extreme scores, an indication that the interventions could have made the performance of the students more standard. Overall, the results tend to indicate a desirable outcome, where the post-test performances not only increased but also became more stable and standard.

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