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Improvisation and Usefulness of a Scaling Board In Inverse Proportion Problem Solving

F. C. Y. Aprebo
Uranta Soba

ABSTRACT

This study on improvisation of a Scaled-Board and its usefulness in inverse proportion problem, is basically concerned with how a model is improvised to teach an inverse proportion topic in Mathematics which portrays the practical bit of the mathematics. A simple pretest-posttest experimental design and control groups design are used. The model is tested on a randomised sample of 50 students randomly selected from 200 students, out of which 25 of them were taken for the experimental group while the other 25 were taken for the control group. Mathematics Achievement Test of 3 questions was given to the sampled groups before and after treatment.It explores the stages of the Scaled-Board preparation and how the model is used in solving the inverse proportion topics in Mathematics. The finding shows that the scaled-Board is more effective than the calculation method.

Keywords: *Scaled-Board, inverse proportion, Mathematics*

INTRODUCTION

It is a known fact that understanding is of various levels. If it comes through a verbal expression only, it will last within the classroom for most learners. If it comes through both verbal and seeing, it will last longer in the memory of the learner than the classroom hours. And if it involves verbal, seeing and doing, it will last much longer in the memory of the learner (Malamed, Nd). In support of the above statement, Bernadette (1999) states that chemistry students should be taught with their hands on different materials in order to arouse their interest and enable them acquire the cognitive competence and process skills. The U.S. National Science Education Standards (1995) also

Aprebo, F. C. Y., Ph.D and Uranta Soba are Lecturers in the Mathematics Department, School of Secondary Science Education, Federal College of Education (Technical), Omoku, Rivers State, Nigeria

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posits that critical issues providing hand-on and mind-on activities gave rise to authentic learning experience with students in Science. And that this could only be achieved through the use of the standard models, graphs and improvised materials (Marvin 1995). Again, the understanding will come,when the child or the student must be willing to learn. Like Brunner (1967) stated to arouse the willingness of the students' ability to learn, teachers should design discrepant-event activities in order to pique the curiosity of their students.

However, it is sad to note in this millennium that some teachers (in both primary and post primary schools) have not still known the usefulness of improvisation in Science and Mathematics teaching in the classroom (Olebukola, 2002). Eguabor (2000), Betiku (2000) and Olugunju (2000) attest to the above fact thatthe dream of Education Task Fund (ETF) in collaboration with the National Commission for Colleges of Education (NCCE) giving training to teachers through the train the trainer programme is a welcome development in the educational sector. But we pray it should come and stay with us, so that it will actualize the lecturers` capacity building in our Colleges of Education, who will later impact this to would be primary and post-primary schools` teachers.

Inverse proportion problem solving is always difficulty on the part of the learner. Any time this topic is introduced to new set of students their imaginations appears abstract, if not taking their minds to the idea of direct proportion problem solving. This happens because its computation looks different from the conventional formula for direct proportion problem solving.

For example, to find the cost of 15 eggs at the price of N5.00 per egg, the calculation will go thus:

1 egg costs N5.00

Therefore, 15 eggs cost 15 X N5.00 = N75.00

On the other hand, to find the number of days for 5 men to complete a work done by 15 men for 3 days, the approach is not the same with that of direct proportion problem solving. If 15 men did a work for 3 days, 1 man will do that work for 15 x 3 days i.e 45 days.

And 5 men will do it in 15 x 3 divided by 5 days i.e 9days.

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But if this problem is given to many students a good number of them will still end up solving it with the direct proportion method, because the inverse proportion method is confusing.In the light of this problem observed from the students, the researchers came up with the improvisation and usefulness of scaled-board in inverse proportion problem solving". Based on the foregoing, it tentatively assumed that there is no statistical significant difference between the means of calculation method and that of Scaled-Board method in the teaching of inverse proportion problem. This is represented as: $\mu_1 - \mu_2 = 0$ at 0.05 significant level.

The purpose of the design of the Scaled-Board is to remove the fear of the subject Mathematics from the mind of the learner. Making Mathematics practical and to refocus the learners mind to the link Mathematics has with the daily activities the learner engage himself with.

PARTICIPANTS AND PROCEDURE

The simple experimental design was used for the study; which involved the control and experimental groups, using the pre-test and post-test scores. The Population of the study comprised all Senior Secondary School Three Students in Rivers State. Multistage sampling technique was used to select four Senior Secondary Schools in Rivers State. A sample of 50 students was randomly selected out of 200 students from the four secondary schools. They are Government Comprehensive Secondary School, Borikiri, Community Secondary School, Oroworokwo, Government Secondary School, Oromineke and Holy Rosary Secondary School, Port Harcourt. The sample was divided into two groups; 25 students for the experimental group and another 25 students for the control group. Mathematics Achievement Test of 3 questions was given to the sampled groups before and after treatment. The questions were drawn from the Senior Secondary School Mathematics scheme of work, validated by one Senior Lecturer and one Chief Lecturer from School of Secondary Science Education, Federal College of Education (Technical), Omoku, Rivers State. The materials used for the preparation of the Scaled-Board include plywood, nails, ruler, 6B pencil, hammer, thread and dolls (plastic human beings). There are three stages to be taken to end up the Scaled-Board preparation.

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RESULTS AND DISCUSSION

The three stages to be taken to end up the Scaled-Board preparation are as follows:

Stage I: On the plywood which is taken as the grass lawn, with the help of the ruler and the 6B pencil the wood is ruled into equal portions using both horizontal and vertical lines.
Equal portions of shared supposed-grass lawn

Fig 1: The draft of stage of the Board

Stage II: Nails are driven into all points where two lines are intersecting on the board.

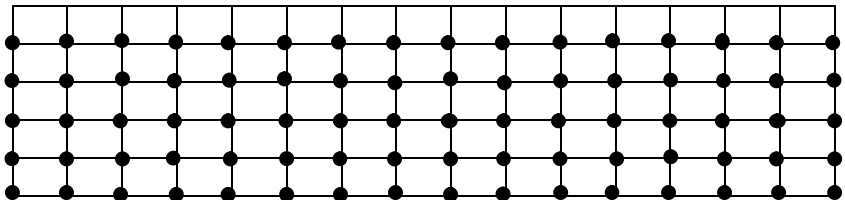

Fig 2: Nails in Scaled-Board

Stage III: The thread is tied to the first nail at the top-left. The use of the thread is to indicate portions per day on the Scaled-Board.

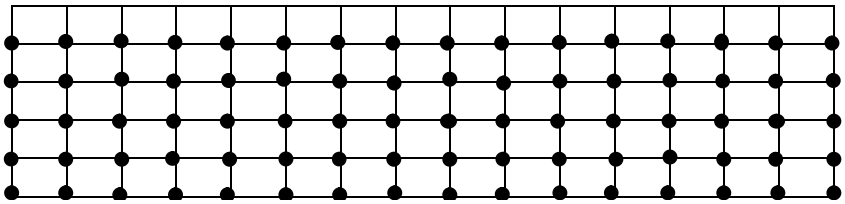

Fig 3: Thread tied on nails on the Scaled-Board.

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Test Running:

Problem: 15 men can cut a lawn for 3 days. How many days can 5 men use in cutting that same lawn, if they are working at the same rate?

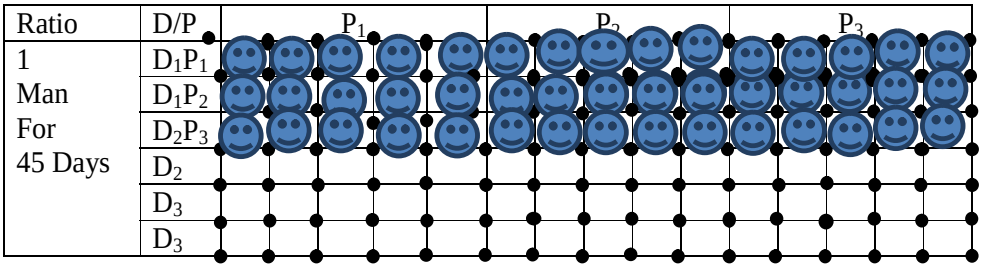
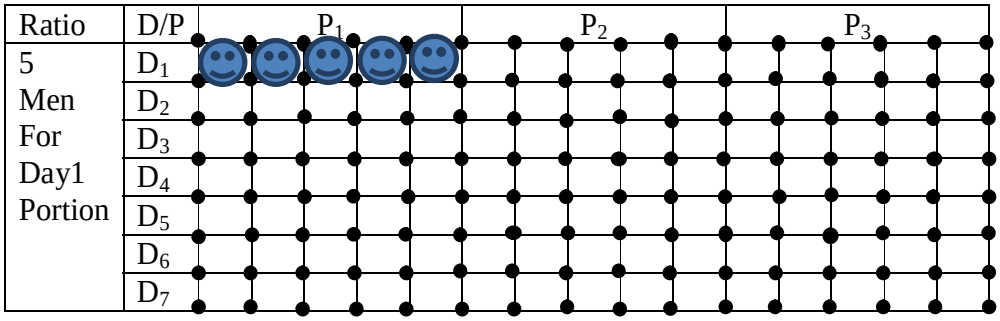


Fig. 4: One man for 45 days



Sx̄₁ x̄₂=

Ratio	D/P	D_1	D_2	D_3
15 Men For P_1D_1 to P_3D_7	P_1	P_1D_1	P_2D_1	P_3D_1
	P_2	P_1D_2	P_2D_2	P_3D_2
	P_3	P_1D_3	P_2D_3	P_3D_3
	P_4	P_1D_4	P_2D_4	P_3D_4
	P_5	P_1D_5	P_2D_5	P_3D_5
	P_6	P_1D_6	P_2D_6	P_3D_6
	P_7	P_1D_7	P_2D_7	P_3D_7

Fig 5: This indicates the days taken by the 15 men to do the work

The Statistical Test Computation is as given below:

$\mu_1 - \mu_2 = 0.$

$= 9.25 - 5.36$

$= 3.89$

0.341467

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Inference

Tval = 2.021

Calval = 12.3662

The $H_{0:}\ \mu_1 - \mu_2 = 0$ is tested at 0.05 significant level and has been observed that the calculated value is greater than the critical value; therefore the null hypotheses that there is no statistical significant difference between the means of calculation method and that of Scaled-Board method in the teaching of inverse proportion problem is rejected. This gives the impression that the Scaled-Board used is more effective in the inverse proportion than the normal calculation method.

CONCLUSION AND RECOMMENDATIONS

God has giving us everything. It is left for man to think on how he could make himself comfortable with those things. Therefore there should be this encouragement go beyond the chalk board, so that our children may not see mathematics as a threat, and the teachers too will see the need in improving for all mathematical topics. As Tunde (2001) points out that the teachers of science should be encouraged by various educational authorities to initiate improvisation of scarce and very costly imported apparatus. Thanks to nature, the materials needed to improvise are within our locality as rightly stated by Akinotohum (2000). As a result of the practical method discovered and proved statistically as better than the conventional method of teaching Inverse proportion in the Secondary Schools, the following recommendations are made:

1. The Scaled-Board should be used whenever and wherever the inverse proportion topic is taught to students.
2. Mathematics Teachers should make it a policy to use instructional materials whenever necessary.

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3. Mathematics Teachers are encouraged to improvise teachingaids where there are none.
4. Teaching aids that have been improvised and tested effective should be mass produced and made available in our classrooms.
5. Government shoulddiscourage the idea of leaving approved Mathematics practical tools on papers alone.
6. Those that have been able to mass produce the teaching aids should not think of making hundred percent gain at the beginning of their production. Owing to the level of poverty in Africa, if this done, it will certainly discourage our students from buying and using these teaching aids, thereby not achieving the aim of the production.
7. Teachers should think of encouraging Mathematics learning in African classrooms, for we have tapped enough ideas from the foreign Mathematics curriculum.

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