

Improving Problem-Solving Skills of Seven A-18 Section Female Trainees of KCTE in Electrostatics Content of BNCS102 In 2016

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Abstract

My concern was Improving Kamise College of teachers' education A-18 seven female Trainees' electrostatics problem solving skills in 2016. Identifying and seeking the solutions to problems that influence the problem solving skills of these trainees initiated me conduct this study. Of 39 A-18 section's trainees 14 males and 25 females, seven female's trainees were selected using purposively sampling methods. Questionnaire, observation and document analysis tools were employed to gather the data. Hence, qualitative data was analysis using quotations followed by summarization. And, quantitative data was analysis using, percentage and portrayed would used to analyze the. From data analysis, unoriginal back ground that these trainees have about physics subject , knowledge gap of problem solving techniques, difficulty in scientific words , power numbers multiplication and division and trigonometry functions were the findings. Hence, the first strategy was Original zing physics the back ground through description and counseling, then qualitative problem before quantitative problem of electrostatics were practiced. Equally; both cooperative problem solving of P.Heller and metacognitive strategy of Oladunni (1998) were implemented simultaneously. Based on the results, the researcher change the technique of the problem solving strategy used before. In such away, given the steps of problem solving techniques and using the methods a self criticism strategy was implemented. Conceptual words translated from Amharic to English, give selected problems from standard reference books to practice and feedback at each step of the activities. In practicing this for a month, six (86%) trainees start solving of quantitative electrostatics problem accordingly and improve their problem solving skills. But, the researcher would plan for one (14%) trainee who was not in position of solving the problem accordingly for the next if I would assign to the trainee class as well as a trainee joined integrated natural science steam science . Psychology educator, laboratory technical, TDS help the researcher in this study. My work was evaluated through carefully observations. This research help researcher in improving trainee's learning of electrostatics, patience and strength to achieve instructional objective. Additionally; the

researcher was initiated to solve other related problems that affect his instruction.

I. INTRODUCTION

Problem based learning is contemporary teaching approach which helps students to achieve lifelong learning skills, and essential to physics. Hence, it is a teaching-learning strategy which simultaneously develops higher order thinking, disciplinary knowledge bases and practical skills by placing students in the active role of practitioners. Therefore, problem solving is a process, in which an individual or a team applies knowledge, skills, and understanding to achieve a desired outcome in an unfamiliar situation. Problem-solving skills arise from innate talent, from training, and, most importantly, from long practice (ABET; 1986). Thus, students enhanced the skills from inborn and repeated practice of long time. Whatever, problem solving requires an appropriate mental representation of the problem and the subsequent application of certain strategies in order to move from an initial state to a desired goal state (Metalloid, 2009). So, problem solving is viewed as a fundamental part of science education in regular schools (Loucks, 2007). Additionally; problem solving is the most important learning outcome of educational endeavors (Gagne, 1980). Accordingly; developing power full problem solving skills and deep conceptual understanding of students are the goal of physics instructions (Mestre, et.al; 1993). Further, knowledge and cognitive process are among the group of these skills (Mayer and Whitrock; 2006). So; the problems designed for classroom use is in line of trainees to connect new knowledge to old; understand concepts enough; and be able to teach them to their peers. As a result, new knowledge is one of the skills which help them become lifelong learners and problem solvers (King, 2005). Thus, the electrostatics content of basic natural science two problems were to improve trainees understanding and problem solving skills in physics. In new modality training system of the college, electricity and magnetism part of physics is the emphasized area that the trainees take it in BNCS102 as ordinary course. Thus, electrostatics is one focuses area of electricity and magnetism. Thus, the trainees learnt the concepts

of this content through demonstration and problem solving. In this way that the learners` develop problem solving skills and gain knowledge of the physical science. Hence, to understand the concept electrostatics, trainees have to give attention on understanding the science of electrostatics, and reasoning and interpreting it scientifically. Consequently, developing conceptual knowledge of electrostatics and its` science, the trainees expected to develop problem solving skills in it. Hence,

the strategies put into practice of teaching-learning and originality in solving problem should be seen seriously. Equally, trainees first write a qualitative description, then identify relevant concept and principle, and lastly apply these in quantitative part to finding solution. Hence, they involve in the following procedure and steps as follows.

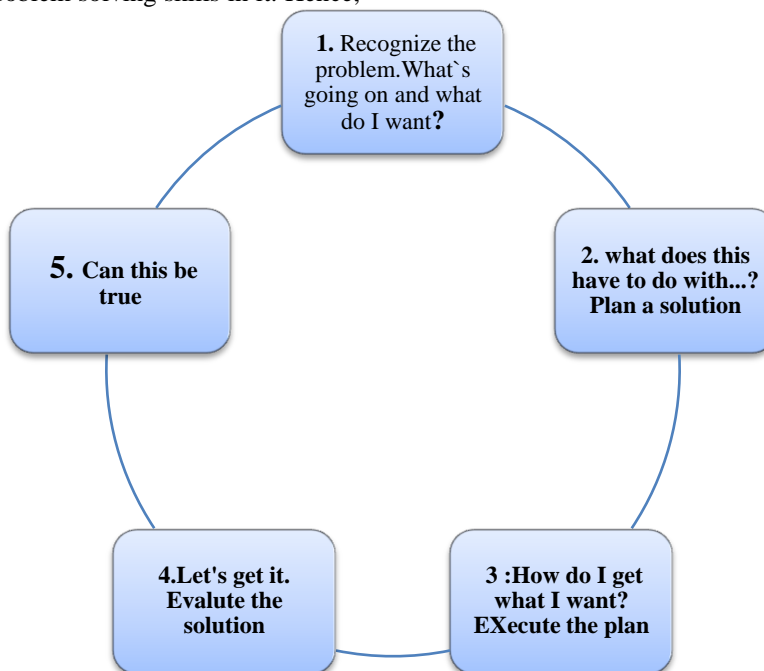


Figure 1.1: Problem-Solving Framework Used by Experts in all Fields G. Polya, 1945

Accordingly, from my observations seven A-18 section female trainees our college, most of the time in firm for straight forward utilization of coulombs law in finding the electric force ,field, and potential difference of quantitative static charges problems in my instructions . As a result, they simply operating numbers in their mobile without tackling the problems then see their exercise book by turning a leaf; pretend practicing, depression, and poor practices were observed. In general; they have poor performance in quantitative electrostatics problems. So, improving these trainees' skills gap is found to be important.

Purpose, Research question and methodology of the study

This study was conducted to minimize the skill gap that seven A-18 section female trainees of KCTE have in solving electrostatics problems in Bnsc102 course. In

this direction, this study was aimed at answering the following basic questions:

1. What make these trainees hard to solve electrostatics problems in Bnsc102?
2. How to fill the skill gap that these trainees have in solving electrostatics problems of Bnsc102 course?

This study was descriptive research design where mixed research methods were employed. The target Population of this study was A-18 section female trainees of 2016 entry of KCTE. Questionnaire, observation and document analysis were employed to gather relevant data for this study. Data were analyzed using both quantitative and qualitative. Hence; quantitative data was analyzed using percentage, pie chart and different portrayed figures. Similarly; the qualitative data was analyzed using quotations followed by summarization.

II. RESULTS AND DISCUSSION

A. Trainee's Closed Questionnaire

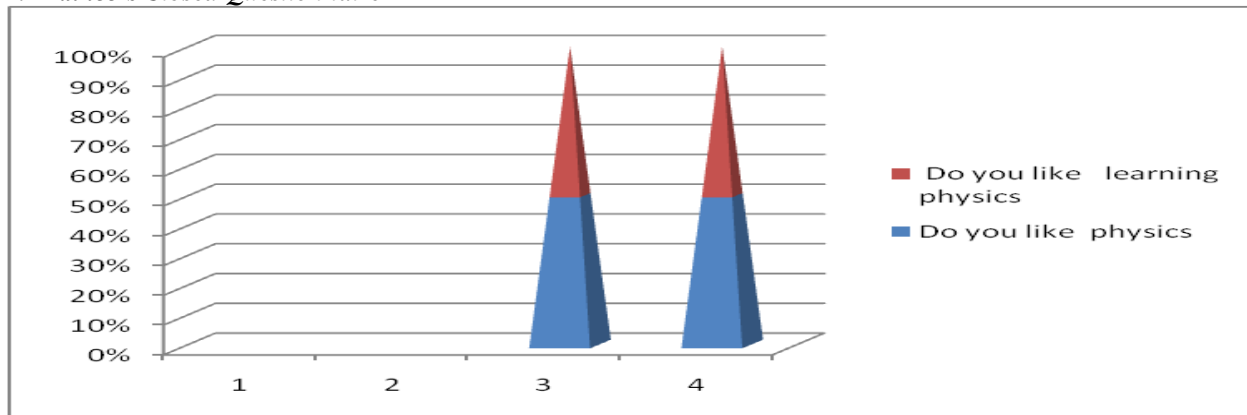


Figure 4:1 Perception of Trainees Toward Physics Problem

From figure 1:4, 57 % (4) trainees dislike both physics subject but 47 % (3) of them like physics. Similarly, 57 % (4) trainees dislike learning but 47 % (3) of them like physics learning it. So, they hit the subject its self and dislike it's learning.

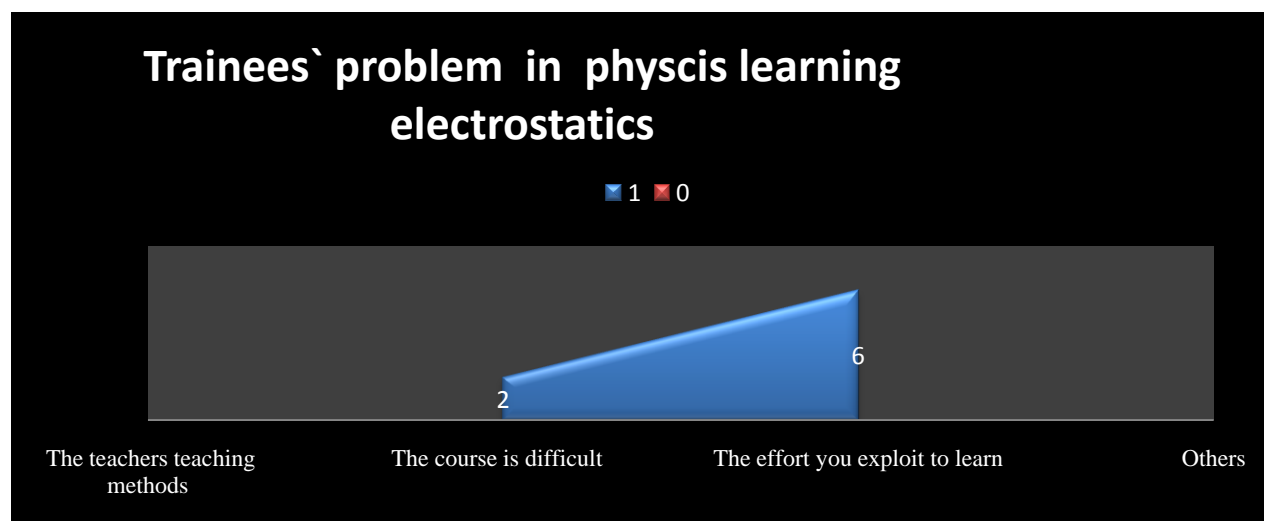


Figure 4:2 Female Trainees' Hard Of Learning Electrostatics In Problem Solving Approach.

From figure 4:2; most (5) trainees have their own personal problem in learning electrostatics. Hence, they didn't exploit their effort to solve the qualitative electrostatic problem. Whereas; a few (1) trainee didn't exploit her efforts to learn electrostatics in problem solving approach was due to difficulty of the content. So, this makes electrostatics quantitative problem hard to solve it during instruction. Hence, the difficulties of most trainees' to solve electrostatics in physics learning were raise on exploiting efforts to learn. But, there is no comment on teachers teaching methods and if others.

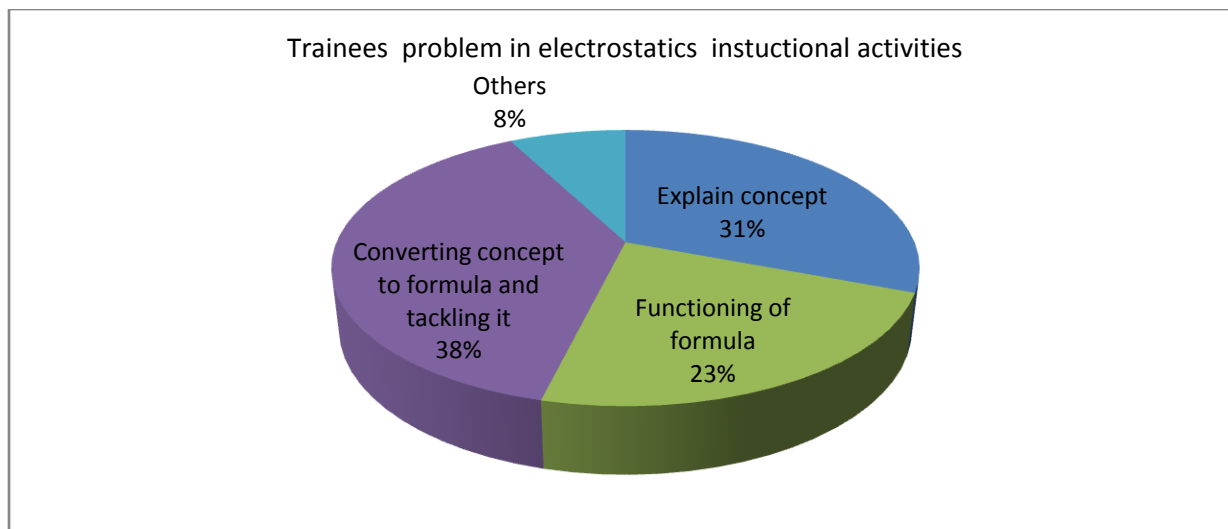


Figure 4:3 Trainees Problem in Electrostatics Instructional Activities.

From figure 4:3, 38% of the trainees have a problem of converting concept to formula and tackling it, 31% of them have difficulty of understanding electrostatics concepts, 23% of them have a problem of functioning the formula, and 8% of them respond that the contents were hard. Hence, the majority trainees face difficulty of explaining the concepts, converting these concepts to quantitative problem then tackling it.

B. Trainees Open Questionnaires.

From the above respond the seven female trainees were in problem in whatever degree. One trainee dislikes the quantitative problem solving and the other trainee has gap of the problem solving technique. Whereas; two female trainees develop the perception of that they can't solve quantitative electrostatics problem because that it was hard for them to solve it any ways. And; one female trainee has lack of clarity in electrostatics and the other lacks of special support in electrostatics problem solving. Hence, the researcher conclude that most female trainees didn't understand the concepts and knew formula of electrostatics during instruction.

In general from the above it was summarized as the trainee's challenging in learning electrostatics were; a trainee dislike calculation of electrostatics problem activities, lack of back ground knowledge of electrostatics. Likely; perceiving it was difficult to learn. Then focusing on none- problem based study was their option. Science words used in problem solving were new and it becomes obstacle to solve the electrostatics problem. Additionally; lack of enough electrostatics practice problems were challenges for three female trainees. Accordingly, the trainee's possible solution were; not join the steam in the future, the assessment should focused on the theory, choose, and matching,

deep explanation during instructions, reference materials, tutorials and practice the activities repeatedly were the possible solution set by trainees. Hence, from their responses I concluded that it is impossible to learn the quantitative parts of the electrostatics rather than the theoretical one.

C. Observations

What are trainee's challenges observed in solving electrostatics problems in instructional activities?

1. Difficulty of converting the concept of electrostatics in graphical representation form to the numerical form and the knowledge gap of geometry in mathematics.
2. Difficulty of understanding what to be solved in the problem, identification the given representation, selecting the important variables from the given in and set to solve.
3. Difficulty of trainees in the problems electric force, electric field, electric energy and potential difference equation from x-y coordinate graph. Tackling the multiplication of the number whose have power.
4. Difficulty in solving equation due to the gap they have in basic mathematical operation to solve the equations. The gap they have the relation of different units in physical quantities. Difficulty in decomposing of vectors from x-y coordinates in to each component. Difficulty of trainees in solving equation gives in the form trigonometric function.

D. Document analysis

-Five female trainees didn't identify the required but one identified what was asked. Hence this agrees with the observation and female trainees and the literature (Savelsbergh et al., 2002). All female didn't operate the trigonometric function, similarly except one, no female trainee derive power number multiplication and division accordingly. Hence these

agree with the observation and trainees response. There is no clear step in solving the given problem in most (six) trainees simply try and error, erasing and simply operate the four basic operation with the given number randomly. More over the observation and trainees response agree with it.

E. Finding

The Analysis of the data obtained from female trainees' questionnaire, observation and document analysis reveal that;

Unoriginal back ground history that these trainees have about qualitative problem physics subject. I.e. it is

difficult to tackle and hard to study hard, so that it is impossible to learn for them. Difficulty of physics science language, gap of knowledge in problem solving science techniques, understanding the concept of the contents and transforming it in to mathematical formula and graphical representations, and solving it, giving meaning of the quantitative obtained results i.e. understanding of physics' concepts and its mathematical science, and rule of mathematics and science of mathematics and lack extra problems to practice and supports in solving different solved problems were the finding.

Action Plan, Implementations, Evaluation and Reflections, and Next Steps

Action Plan

Action of possible solution	Time	Implementers	Material need/Resource used	Methods evaluation the change	Observer
Original zing the back ground that these trainees have about physics subject	up to march,30 (3hrs)	Researcher and psychology educator	Use literature of physics scholars experience and study skill	Polite test	TDS focal person
Improving the understanding of female trainee's electrostatics concepts both theoretically and practically through experiment in laboratory.	up to April, 5 (4hrs)	Researcher, laboratory technician and trainees	Physics for scientist and engineering text book, diagram	Observation cheek list	TDS focal person
Improving trainee's understanding of mathematics science and rule(basic operation, exponents, trigonometry)	up to April, 15 (3hrs)	Researcher	figure, diagram	Observation checklist	TDS focal person
Improving the procedure of problems solving	up to April, 25 (2hrs)	Researcher	Videos, figure	Observation checklist	TDS focal person
Solving different example concerning electric force, field, potential energy, and electric circuits)	Up to April,30 3hrs	Researcher	Work sheet	observation through scoring	
Give close support in mid of exercising problem solving practices during tutorials	Up to May,24 3hrs	Researcher	Work sheets, figure	Observation s checklist	TDS focal person

Table 5:1 Table of Proposed Action

F. Implementation

As observed from the evidence above, there is a need to use various strategies which are pertinent to improve the problem solving skills of electrostatics. Accordingly, the researcher employed the following strategies: Thus, the first strategy was Original zing the back ground that these trainees have about physics

subject through description and counseling, qualitative problem before quantitative problem of electrostatics were practiced then use mixed problem solving strategies i.e. cooperative problem solving of P.Heller and metacognitive strategy of Oladunni (1998) were implemented simultaneously,. Additional tutorials on electrostatics in line of the science of mathematics and

its rules which used by trainees` in solving these problem were given. In doing so, I was got improvement because of the trainees got the reality of physics subject, show interest, the concepts and science of electrostatics that most of these trainees have were improved, know the science of mathematics and rule, which would be used to solve the problem of electrostatics. Based on the results, I change the technique of the problem solving mechanism used before. In such away, given the steps of problem solving technique and using the method a self criticism strategy was implemented. I.e. giving the correct answer and they search the way to reach on the results and give the physical meaning of the results. Conceptual words translated from Amharic to English, give selected problems from standard reference books in addition to their module to practice, and feedback at each step of the activities. Check with equal value both the procedure and results obtained, and the physical meaning of the results.

III. EVALUATION AND REFLECTION

The root cause of the problem was observed carefully. Original zing physics the back ground help these trainees` through learning by doing and gaining of deep knowledge. Understanding the of trainees problem at each learning corners and tackling on the problem improve trainees learning in different strategies and leads to the success of set goal. The research practices this process for a month and found that the majority of the trainees start working the problem accordingly and improve their problem solving skills. Thus, the researcher found that six of the trainees start working the problem effectively and improve their problem solving skills. Psychology educator, physics laboratory technician, TDS help me in the study. The researcher evaluated these works through observations. This research helps me in improving female's trainees` electrostatics learning, developing patience and strength in order to achieve instructional objective. Additionally; I was initiated to solve other related problems that affect my instructional process.

Next steps

Even though, six (86%) trainees start solving of quantitative electrostatics problem accordingly and improve their problem solving skills. However; still there was one (14%) trainee who was not in position of start working the electrostatics problem accordingly. So, I would plan for next time if I would assign to the trainee class as well as a trainee joined integrated natural science steam science.

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