EFFECT OF UTILIZING SYSTEMS INSTRUCTIONAL APPROACH MODEL IN DEVELOPING PSYCHOMOTOR SKILLS AMONG STUDENTS OF BUILDING TRADE IN TECHNICAL COLLEGES IN IMO STATE.

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Abstract

The poor performance of building trade students in practical work (psychomotor skill) in the National technical Certificate Examination (NTC) conducted by National Business and Technical Education Board (NABTEB) in recent times prompted this research work. The study is an attempt to find solution to the poor academic performance of students of building trade in their practical paper II of the National Technical Certificate Examinations being conducted by NABTEB. The study was to find out the effect of using systems instructional approach (Dick & Carey) model in developing psychomotor skills among students of building trade in technical colleges in Imo State. The design employed was the quasi-experimental research, non-equivalent control group design to ascertain the effectiveness of the systems instructional approach model. The population was 150 National Technical Certificate II students of the four technical colleges in Imo State. The instrument for data collection was the Psychomotor Skills Achievement Test in Building Trade (PSATBT) developed by the researchers. Three research questions were analyzed using the pre-test, post-test mean values, while analysis of Covariance (ANCOVA) and paired sample t-test statistic were used to test the four hypotheses at 0.05 level of significance. Results of the study among others showed that there was significant difference between the academic achievement of the experimental and control groups in the post-test (PSATBT) as revealed by their mean scores in favour of the experimental group. Based on the findings it was recommended that the systems instructional approach model should be used in the teaching and learning of technical courses in order to develop psychomotor skills in learners.

Keywords: instructional design models, psychomotor skills, vocational- technical education, psychomotor domain, instructional guide.

Introduction

Through research in education, numerous learning theories and instructional design (ID) models have been established, one well-known instructional design model is "the Dick and Carey Systems Approach Model". The model was originally published in 1978 by Walter Dick and Lou Carey in their book entitled "The Systematic Design of instruction" (Dick & Carey 2001). The model is in the form of Analyzing Learner Characteristics, Designing and Developing Learning Objectives, Developing Instructional Materials, Implementing the instruction, evaluating the desired goals (Bello & Aliyu, 2012), "ADDIE" the acronym stands for the 5 phases contained in the

model and is the most commonly used model for creating instructional materials. Dick and Carey made a significant contribution to the instructional design field by championing a system view of instruction as opposed to viewing instruction as a sum of isolated parts. The model addressed instruction as an entire system, focusing on the interrelationship between context, content, learning and instruction. According to Dick and Carey, (2001), "components" such as the instructor, learner, materials, instructional activities, delivery system and learning environments interact with each other and work together to bring about the desired student learning outcomes.

Dick and Carey (systems instructional approach) is based on an instructional theory that says "there is a predictable and reliable link between a stimulus (instructional materials) and the response that it produces in a learner (Learning of the materials) (McGriff, 2001).

The model also insists that the designer of instruction needs to identify the sub-skills that the students must master to permit the intended behaviour to be learned and then select the stimulus and strategy for its presentation that builds each sub-skills (Bello & Aliyu, 2012).

According to Bello and Aliyu, this theory was borrowed from the behaviourist, cognitivist, and constructivist schools of thought.

The model views instruction as:

> a systematic process in which every component (i.e teacher, students, materials and learning environment) is crucial to successful learning. A system is technically a set of interrelated parts, all of which work together towards a defined goal. The parts

of the system depend on each other for input and output and the entire system uses feedback to determine if its desired goals has been reached (Dick & Carey, 2005: 365).

The model includes nine steps or procedures that are used to design instruction. This set of procedures is referred to as "a systems approach" because it is made up of interacting components each having its own input and output which together produce pre-determined products. A system also collects information about its own effectiveness so that the final product can be modified until it reaches the desired quality level.

As such, Dick and Carey advocated the following reasons for systems approach.
1. The focus is on what the learners are required to do by the end of the course.
2. Each component in the system is linked carefully to the other.
3. The process is empirical and replicable (Dick & Carey, 1997).

Literature
In any educational environment the curriculum worker must bring to analysis the needs of the learner, what has been learned, about the growth and development characteristics of learners in general. According to Nwachukwu (2006), knowledge of the pattern of human development makes it possible for the technology teacher to know what to expect of a learner and what the learner is able to do, either physically or intellectually at a given stage. The concept of developmental tasks is useful to the technical teacher because it will help in identifying, discovering and stating educational objectives and in assisting students achieve mastery of

educational tasks. In this regard the curriculum should incorporate the learning experiences that can shed light and give guidance to the achievement of the developmental tasks: The relevance of what is learnt in school and its application in the world of work have been the main concern of education. In its effort towards a qualitative and functional education, the national policy on education (Federal Republic of Nigeria, 2004), stated that one of the main objectives of the education system in Nigeria is to help the child acquired appropriate skills, abilities and competences, both mental and physical as necessary for the individual to live and contribute to the development of the society. However, expressing lack of satisfaction on achievement of these objectives on the students performance in technical education, Oranu, (2005), expressed concern over the performance of the students in technical subjects. Oranu observed that students' performance in technical subjects over the years has not been quite impressive and because technical education cannot be relegated to the background in the technological development of any nation and this development should give concern to all who are interested in technological development of the nation. Technology education imparts skills, knowledge and practical competences to its recipients with a view of preparing them for employment opportunities or become self-employed in their chosen profession or occupation (Eze, 2009). The noble objectives of technology/ technical education are achievable by improving students performance in learning. Performance itself, may be improved either through creation of appropriate awareness that can increase students' interest or through the application of appropriate modern instructional approach in imparting the desired skill.

One possible approach to attain this desired goal in building trade subjects may be through the appropriate application of the Dick and Carey systems instructional model, which itself involves the application of the nine procedural steps (a set of procedures and techniques) which an instructional or lesson designer should employ to design, develop, evaluate and revise instruction. The nine basic steps in an iterative cycle and a culminating evaluation of the effectiveness of the instruction are as follows:

1. Determine instructional goal-what do you want the learners to be able to do after the instruction is completed?

2. Analyze the instructional goal – a step- by step determination of what learners are doing when they perform the goal and what entry behavior's are needed.

3. Analyze learners and contexts- context in which the skills will be learned and the context in which the skills will be used.

4. Write performance objectives – specific behavior skills to be learned, the conditions under which they must be performed and the criteria for successful performance.

5. Develop assessment instruments – based on the stated objectives.

6. Develop instructional strategy – identify strategy to achieve the terminal objectives; emphasis on presentation of information, practice and feedback, testing.

7. Develop and select instruction using the stated strategy, produce instructional materials.

8. Design and conduct formative evaluation so that the materials can be evaluated with learners and revised prior to distribution.

9. Revise instruction – data from formative evaluation are summarized and interpreted to attempt to identify difficulties experienced by learners in achieving the objectives and to relate these difficulties to specific deficiencies in the materials.

Summative Evaluation Independent evaluation to judge the worth of the instruction. The model according to Bello and Aliyu (2012) was mainly designed for a classroom / Laboratory instructional setting in educational institutions. As such, Dick and Carey (2001) pointed out the systematic characteristic of their model as being goal – directed, interdependencies of all the components in the system, feedback mechanism to determine whether stated goals is met and self-regulating, i.e modifying goals until the desired goals is reached. The systems approach model as it is also called focuses the instructor or lesson designer on the goal of the instruction by requiring a need assessment and the documentation of clear and measurable learning objectives (Gustafson & Branch, 2002). This method provides a solid ground in instructor's choice of approach, which can enhance achievement of the desired goals of instruction in record time which appears to be one of the deficiencies leveled against lecture (chalk & talk) method of instruction. For instance, the "chalk and talk" methods of instruction do not give students the opportunity to acquire the practical (psychomotor) skills in classroom or laboratory instructional activities because it is theoretical in approach. Okebukola (1997) supported this view when he stated that the lecture

or traditional method of instruction which is referred to as "chalk and talk" method cannot lead to the needed scientific and technological development of a nation like Nigeria, if such method is the most widely used teaching method in post-primary schools. The inadequacy of the method is partly responsible for the inability of the students to secure employment in industries or be self-employed after leaving school. As a result, many of the students are found roaming the streets without jobs probably because their training was inadequate to face the challenges in the world of work. Building trade is one of the technology courses that equip students with relevant vocational skills to earn a living after leaving school or become self-employed, and it is offered in the National Technical Certificate (NTC) being conducted by the National Business and Technical Examination Board (NABTEB). The technical Colleges Offering National Technical Certificate in building trade options are within the scope of this study and are established by the state government.

In the course content of building trade at the technical college level, psychomotor skills acquisition is one of the major emphases in the National Technical Certificate (NTC) examinations conducted by the National Business and Technical Examinations Board (NABTEB), and it appears to be difficult for the students to acquire. The problem of skills acquisition in a subject sometimes is not limited to the students alone, but also to some teachers that handle the subject. However, in their studies, Mishra, Barran and Pislaru, (2009) stated that in engineering or technology education, psychomotor skills form a very important set of skills that need to be acquired by students to satisfy overall employability skill requirements;

and that Nigeria cannot achieve its objectives of education if technology teachers continue to rely heavily only on the conventional methods of instruction (Nwachukwu 2001). Okoro (2003) stated that in lecture method ("Chalk & Talk") the teacher supplies information to the students. The teacher is regarded as the custodian of knowledge and dishes it out in form of ideas, opinions and information. Available records from the National Business and Technical Examinations Board (NABTEB) which is the major external examination body responsible for the National Technical Certificate Examinations (NTC) and the Advance National Technical Certificate (ANTC), at the post-primary school level in Nigeria show that the number of candidates that pass in their psychomotor examinations is very small. Evidently, the small percentage passes as shown in Appendices 1, 2, 3 and 4, Pp. 30 - 37 (Researchers' 2012, field survey) prompted this research work as to proffer solution to this problem. In this regard, the study was accomplished with achievable objectives in specific terms.

Specifically, the study determined the effect of utilizing systems instructional approach model and lecture ("Chalk & Talk") method in ascertaining;

- the academic achievement in psychomotor skills performance of students taught building trade lesson using systems instructional approach model and those taught using lecture ("Chalk & Talk") method as determined by mean scores.

- the difference in pre-test and post-test academic achievement in psychomotor skill performance of building trade students exposed to the systems instructional approach model as determined by mean scores.

- the difference in the pre-test and post-test academic achievement in psychomotor skill performance of building trade students expose to ("Chalk & Talk") lecture method as determined by mean scores. Based on these purposes, four null hypotheses were tested at 0.05 level of significance.

Method

The study adopted a quasi-experimental pre-test, post-test research design in which Akuezuilo and Agu (2003), explained as involving periodic measurement on one or more group(s) before and after treatment. The design was pretest, post-test, non-equivalent (subjects differ in background, ability, I. Q and number) control group research design involving four schools but no randomization (intact or pre-existing classes were used).

Table 1: Non Randomization pre-test, post-test control group design.

Groups	Assign	Pre-test	Treatment	Post-test
Treatment G_1	NR	X_{11}	T_1	Y_{12}
Control G_2	NR	X_{21}	T_2	Y_{22}

Table 1 shows symbolically the non-randomization pre-test, post-test control group design. This design is deemed appropriate as it is not possible to place subjects in groups by random assignment without disrupting the programme and timetable of the schools used in this study. The design comprises an experimental group (G_1) and control group (G_2) both were given pre-test earlier before the treatment and post-test at the end of treatment (X_{11} and X_{21}) and (Y_{12} and Y_{22}) respectively, in which the control group and experimental group do not have pre-experimental sampling equivalence (Sambo, 2005). The independent variable was the systems instructional approach model, while the dependent variable was the students' performance (psychomotor skills) in the post-test. The experimental groups were exposed to the influence of the model (T_1); the control groups were exposed to the influence of (T_2) lecture ("Chalk & Talk") method. At the end of the treatment, observations were made in respect of the post-test (Y_{12} and Y_{22}) to determine the differences that occur in the experiment as contrasted with the psychomotor skills achievement in both groups. The area of this study was Imo State, South-East Nigeria. The population for the study comprised 150 National Technical Certificate Building Students in year II (i.e. NTC II) Students) in four Technical Colleges in Imo State. There was no sampling, the entire population of 150 students were used in this study. Rather the researchers used purposive sampling technique to place the technical colleges into experimental and control group. A total number of 85 students in two different schools were used as the experimental group (G_1), while 65 students in another two different schools constituted the control group (G_2). After the conduct of the experimental treatment, the pre-test and post-test scores obtained from the two experimental schools were put together and treated as one group (G_1). Also the scores of the two control group schools obtained were put together and treated as one group (G_2).

The instruments used for data collection was the psychomotor skill Achievement test in Building Trade (PSATBT) developed by the researchers based on the seven topics in the content area of NTC II course in building trade NABTEB 2011 syllabus. The psychomotor skill achievement test instrument has two sections. Section one consists of one practical question on setting out building using the builders' square method, while section two consists of 40-multiple choice objective test items with four options lettered (A – D) and students were asked to choose the correct options. The same test instrument served as pre-test and post-test. Pilot study was also carried out to ascertain the construct validity and reliability of the instrument.

For this purpose, intact classes of 20 NTC II students in building department were used at Boys Technical College Aba, in Abia State. Ten NTC II (10) students were purposively assigned to the experimental group, while the remaining 10 NTC II students was assigned to the control group. The pre-test instrument were administered to both groups before commencement of the experimental treatment. The regular building teacher taught the control group using the ("Chalk and talk") lecture method lesson plans written by the researchers, while the experimental group was taught with the lesson plans prepared in line with the systems instructional approach model using also the skills-check-list and followed the task specifications proffered in the model. And also whole-part-whole techniques imbedded the systems instructional approach model.

Post-test was administered at the end of the exercise and the result of the pilot study guided this research work. After two weeks of the pilot study another test was given as a follow-up and the scores in the post-test in the pilot study and scores obtained after two weeks of the post-test were analyzed using the Pearson product correlation coefficient to determine the consistency/reliability of the instrument which yielded a reliability coefficient of 0.93.

The data for this study were collected by administering the PSATBT at the pre-test and post-test stages. Both the pre-test and post-test instruments were made up of one practical question on setting out building using the builders' square method and a copy of building drawing was attached in addition to the forty (40) multiple choice objective test items with options (A – D) printed in different alphabet characters and rearranged serially' to differentiate pretest from post-test. The researchers administered the pre-test instrument before the experimental treatment was given to the control and experimental groups. When all the teaching had ended, the researchers administered the post-test psychomotor skills achievement test in building trade to the subjects (students) with the assistance of the subject teachers.

The performance (scores) in both tests were computed to find the academic achievement in psychomotor skills acquisition in building trade. The psychomotor skill achievement test was scored using the marking scheme check-list and schedule of answers respectively for the practical test and multiple choice objective test prepared by the researchers.

At the end of the skills sessions, students were given assignments to carry out as a way of providing feedback to the researchers. For the Data Analysis, the data collected from the pre-test and post-test administered were analyzed statistically. In answering the research questions, the comparative mean scores were used to answer the research questions, standard deviation of students' mean performance was also determined to find the harmony in students' performance standard. The analysis of covariance (ANCOVA) and paired sample t-test were used for testing the null hypotheses based on the decision that if F-cal is less than or equal to the F-Critical value, the null hypothesis is accepted. Also if F-calculated is greater than F-critical value, then the null hypothesis (Ho) is not accepted. The same rule were applied to the dependent t-test or paired sample t-test.

Results
Research Question 1
What is the academic achievement in psychomotor skill performance of students taught setting out building with the builders' square method, using systems instructional approach model and lecture ("Chalk & Talk") method as determined by mean scores?

Answer to this research question is presented in Table 2.

Table 2: (Comparison of the mean scores of the experimental and control group in the pre-test post-test.

	Pre-test			Post-test			Mean
Group	Mean	SD	N	Mean	SD	N	difference
Exp.	29.46	5.6	85	69.46	6.14	85	23,28
Control	32.85	5.53	65	46.18	5.42	65	

From Table 2, the mean score in psychomotor skill performance of the experimental group (systems instructional approach model) is 69.46 and the standard deviation is 6.14, while the mean score in psychomotor skill performance of the control group (lecture method) was 46.18 and the standard deviation is 5.42. The mean score difference of 23.28 in favour of the experimental group is shown also in the Table 2. The result shows that students taught using systems instructional model method performed better than the students taught with lecture ("Chalk & Talk") method.

Research Question 2
What is the difference in the pre-test and post-test academic achievement scores in psychomotor skill performance of students taught setting out building with the builders' square method using systems instructional approach model?

Answer to this research Question is presented in table 3;

Table 3: The mean scores of the experimental group in the pre-test/post-test and mean difference in Academic Achievement of students.

	Pre-test			Post-test			Mean
Group	Mean	SD	N	Mean	SD	N	difference
Exp.	29.46	5.63	85	69.46	6.14	85	40

Referring to table 3, the pre-test mean scores in psychomotor skill performance of the experimental group using systems instructional approach model is 29.46, while the standard deviation is 5.63 and the post-test mean score is 69.46 and standard is 6.14. The above result indicates a mean difference of 40 in Research Question 3:

favour of students in experimental group. This also goes to portray that the treatment given to the experimental group (systems instructional Approach model) equipped them better in psychomotor skills acquisition, than those in control group.

What is the difference in the pre-test and post-test mean achievement scores of students taught setting out building with the builders' square method, using lecture ("chalk& talk") method?

Answer to this research question is presented in Table 4

Table 4: The mean scores of the control group in the pre-test / post-test and mean difference in Academic Achievement of Students.

	Pre-test			Post-test			Mean
Group	Mean	SD	N	Mean	SD	N	difference
Control	32.85	5.53	65	46.18	5.42	65	13.33

From Table 4, the pre-test mean score and post-test mean score in psychomotor skill performance of students taught setting out building with the builders' square method, using lecture ('chalk & talk") method is 32.85 and 46.18 respectively. The difference in the pre- test and post- test mean score is 13.33. This indicates that those taught with the lecture method also had mean achievement gain score of 13.33 in psychomotor skill acquisition.

Hypothesis 1
There is no significant difference in the psychomotor skill achievement of students taught setting out building with the builders' square method using systems instructional approach model and lecture ("chalk/ talk") method.

Test to Hypothesis 1 is presented in Table 5.

Table 5: Summary of Analysis of Covariance (ANCOVA) of students mean scores in psychomotor skill Achievement by teaching method.

Source	Type III sum of squares	df	Mean square	F	Sig.
Corrected model	20310.055	4	5077.514	157.080	.000
Intercept	9441.634	1	9441.634	292.090	.000
Pre-test	94.792	1	94.792	2.933	.089
Group	18185.766	1	18185.766	562.602	.000*
Location	15.018	1	15.018	.465	.497*
Group & Location	243.757	1	243.757	7.541	.007*
Error	4687.038	145	32.324		
Total	553776.000	150			
Corrected Total	24997.093	149			

From Table 5, the calculated f-ratio value is (562.602) while the critical or table value is (3.90). The calculated f-ratio exceeds the critical f- ratio, the null hypothesis was therefore rejected in favour of the alternative hypothesis.

Significant difference was found in favour of those taught using the systems instructional Approach model. This implies that the use of the systems instructional Approach model (Dick & Carey) has proved to be more effective in

facilitating the acquisition of psychomotor skills among building trade students than the use of lecture ('chalk& Talk') method.

Hypothesis 2
There is no significant difference in the pre-test mean score in psychomotor skill performance of students taught setting out building with the builders' square method, using systems instructional approach model.

Table 6: Paired sample – t-test comparing pre-test and post-test mean scores of subjects in experimental group.

	Mean difference	df	t-cal	t-critical	Decision
Pair / pre-test – post-test	40	84	43.90	1.99	Reject

From table 6, the calculated t-value, df (84) is 43.90, while the t-critical value was 1.99, this shows that the pre-test mean score of 29.46 was significantly less than the post-test mean score of 69.46. Based on this, the null hypothesis of no significant difference was rejected, while the alternative hypothesis that, there is a significant difference in the pre-test and post-test mean achievement scores was accepted.

Hypothesis 3
There is no significant difference in the pre-test and post-test mean achievement scores in psychomotor skills performance of students in the control group.
The test of this hypothesis is presented in Table 7.

Table 7: paired sample – t-test comparing pre-test and post-test mean scores of subjects in control group.

	Mean difference	df	t-cal	t-critical	Decision
Pair / pre-test – post-test	13.33	64	17.04	1.96	Reject

In Table 7, the calculated t-value is (17.04) more than the t-critical value (1.96), the null hypothesis was therefore rejected in favour of the alternative hypothesis. Significant difference was found between the pre-test and post-test mean achievement scores in psychomotor skills performance of students in the control group. This implied that the subjects in the control group also gained in psychomotor skills acquisition despite that they were taught with the lecture ('Chalk &Talk') method. This gain was attributed to learning that took place by chance.

Hypothesis 4
There is no significant interactive effect between treatment (systems instructional model) and school location (Urban & Rural) on students' psychomotor skill performance.

The test of this hypothesis in presented in Table 7

Table 8: Summary of Analysis of covariance (ANCOVA) of students interactive effect by teaching method (Systems Instructional Approach Model) and school location (Urban & Rural) on dependent variable: post – test.

Source	Type III sum of squares	df	Mean square	F	Sig.
Corrected Model	20310.055	4	5077.514	157.080	.000
Intercept	9441.634	1	9441.634	292.090	.000
Pre-test	94.792	1	94.792	2.933	.089
Group	18185.766	1	18185.766	562.602	.000*
Location	15.018	1	15.018	.465	.497*
Group & Location	243.757	1	243.757	7.541	.007*
Error	4687.038	145	32.324		
Total	553776.000	150			
Corrected Total	24997.093	149			

*significant.

From Table 8, the calculate f-ratio value (0.465) is less than the table f- table f-ratio (3.90), the null hypothesis is therefore accepted that school location had no significant effect on students psychomotor skills performance, however there was a significant interactive effect of teaching model (systems instructional Approach model) and school location on student's psychomotor skill performance as calculated f- ratio (7.54) is greater than the table f- ratio (3.90). In this case, the null hypothesis was rejected, while the alternative hypothesis, that's there was significant interactive effect of the teaching model and school location on students' psychomotor skill performance was accepted.

Findings of the study

1. The mean achievement score of the experimental group was 69.46 while that of the control group was 46.18.
2. The pre-test and post- test mean scores of the experimental group was 29.46 and 69.46 respectively.
3. The pre-test and post-test mean scores of the control group was 32.85 and 46.18 respectively.
4. Significant difference in the mean achievement score was found in favour of the experimental group (i.e. those taught using the systems instructional approach model).
5. There was significant difference in the pre-test and post-test mean achievement scores of the experimental group (i.e. those taught using the systems instructional approach model)
6. There was significant difference in the pre-test and post-test mean achievement scores of the control

group (i.e. those taught using the lecture ("Chalk &Talk") method.

7. Psychomotor skills acquisition /performance by subjects were not influenced by school location (learning environment). There was significant interaction of the teaching model and school location on students' psychomotor skill performance. This implied that the treatment (systems instructional model) given to the students in various schools were found interesting and motivating to the extent of creating a positive effect, that was better psychomotor skills acquisition.

Discussion of Findings

The result of the analysis of the null hypothesis which stated that there would be no significant difference in the mean achievement scores of both the experimental group and control group in the post- test revealed that the experimental group performed significantly better than the control group. This significant difference in the mean achievement scores between the experimental and control groups may be attributed to the treatment (systems instructional approach model) that existed between the two different groups leading to better psychomotor skills acquisition among the subjects in the experimental group. This findings may be an indication that the sequential steps of proper instructional planning, designing and presentation (whole-part-whole techniques) proffered in the Dick and Carey systems instructional approach model have offered a better understanding of psychomotor skills acquisition among students. Also the better performance of the experimental group over the control group was enhanced by the task analysis of the

skills involved and utilization of the skills-sheet in designing the lessons and in stating the instructional objectives. This findings was in agreement with the findings of Bello and Aliyu (2012), who found significant difference in the mean achievement score of the experimental group that's those taught using the Dick and Carey instructional model in teaching Electrical/Electronic technology education in understanding difficult concepts and abstracts.

The result of the analysis of the second null hypothesis which stated that "There would be no significant difference in the pre-test and post-test achievement scores in psychomotor skill performance of the experimental group showed that the pre-test mean score of 29.46 was significantly less than the post-test mean score of 69.46. The null hypothesis of no significant difference was rejected, while the alternative hypothesis of there was a significant difference in the pre-test and post-test mean achievement scores was accepted. This findings derived support from the work of Bello and Aliyu also, who found that the treatment given to the experimental group led to the retention of the facts among the subjects. Also, the work of Bruner (undated) in Bello and Aliyu stated that "concepts are better learnt through learner's participations in problem solving". Further support was derived from the work of Njoku (2012) who found that practical skills require a better instructional approach for better achievement. And that this could enhance clearer understanding of the fundamental guiding principles and minimized poor mastery of the practical skills, which can be hazardous to both the professional, equipment and the environment.

The transition in average scores between the experimental (systems Instructional Approach Model) and the control

Lecture, ("Chalk & Talk" method) groups in the pre-test and post-test were found to be from 29.46 to 69.46 and from 32.85 to 46.18 respectively. Also the mean difference between the pre-test and post-test achievement score of the subjects was 40 (experimental group), and 13.33 (control group). This further signified that the traditional method of instruction in classroom mostly used by teachers (Okebukola, 1997) (Nwachukwu, 2001) (Okoro, 2003) (Bello & Aliyu, 2012) in the control group did not offer significant change in the mean psychomotor achievement in skills acquisition of the subjects when compared to the experimental group. This could be as a result of setting improper/unclear instructional objectives, non-use of skills check-list, poor use of instructional strategies and biased assessment of students work piece, thereby resulting to poor academic achievement of students in psychomotor skills acquisition. The proper use of the sequential steps were clearly suggested by Bello and Aliyu, 2012 and 'Dick and Carey' model.

The result of the analysis of the second null hypothesis which stated that "there would be no significant difference in the pre-test and post-test mean achievement scores in psychomotor skill performance of subjects in the control group, showed that the pre-test mean score of 32.85 was significantly less than the post-test mean score of 46.18 of the same group.

The null hypothesis of no significant difference was rejected, while the alternative hypothesis that there was a significant difference in the pre-test and post-test mean scores in psychomotor skills performance of subjects in control group (lecture method) was accepted. The source of difference or variation was traced by the computation of the two means (pre-test and post-test-scores)

which showed that the treatment (lecture method) also helped the subjects to gain. This gain was attributed to learning that took place by chance, as it was insignificant when compared to that of the experimental (pre-test & post-test) group difference. This finding of the study regarding the academic performance of subjects in the control group (lecture ("chalk & talk") method) was in agreement with that of Bello and Aliyu (2013) who found that the transition in average scores between the experimental and the control groups in the pre-test and post-test were in favour of the experimental group more than the control group. And Bello and Aliyu attributed the poor performance of subjects in the control group to the traditional classroom instructional strategies readily practiced by teachers in the control group as it did not offer significant change in the mean performance of the subjects when compared to the experimental group.

The result of the analysis of the third hypothesis showed that school location had no significant effect on students psychomotor skills performance. The calculated F-ratio (0.465) was less than the table F – ratio (3.90). This implied that psychomotor skills acquisition/ performance by the subjects were not influenced by school location (learning environment), that is school location does not affect psychomotor skill performance. However, there was a statistical significant interaction of teaching method (systems instructional approach model) and school location (urban & rural) on students' psychomotor skill performance as calculated F-ratio (7.54) was greater than the table F-ratio (3.90). This implied that the treatment (Systems Instructional Model) given to the subjects in various school, locations were found interesting and motivating to

the extent of creating a positive effect, that was, better psychomotor skills acquisition/performance. This also was in agreement with Dick and Carey who stated that the systems instructional approach model views instruction as a systematic process in which every component (i.e. teacher, students, materials and learning environment) is crucial to the successful learning.

Conclusion

The problem of poor psychomotor skill performance in the National Technical certificate practical examinations in building trade by students conducted by National Business and Technical Examination Board (NABTEB) was an indication of the fact that the students were not properly taught with the predominant lecture ("Chalk & Talk") method.

This resulted to lack of relevant skills among students of building trade in technical colleges in Imo State. The study also revealed that the use of the Dick and Carey (systems Instructional Model) proved more effective and efficient than the lecture method.

Recommendations

Based on the findings of this study, the researchers made the following recommendations:

1   The systems instructional approach model should be used in the teaching and learning of technical courses in order to develop psychomotor skills in learners.

2   It should be introduced compulsorily in technical colleges to promote active participation of students in the teaching of important skills, concepts and enhance problem solving in real world situation.

3   Specialists in technical courses/disciplines should be trained to produce skills-check-lists or tasks analyses in their respective areas of specialization. This will facilitate the breaking of tasks, or skills into sub-ordinate skills to be accommodated in systems instructional approach model.
    Regular workshops, or seminars should be organized using subject-experts or specialists to retrain teachers on the effective use of this instructional model.

4   Adequate number of practical tools, equipment, materials and instructional aids should be provided in technical colleges in each class at a time for practical teaching or instruction.

5   Technology institutions producing teachers of technology should update their curricular to incorporate the use of systems instructional approach model as a necessary guide for psychomotor skills development in learners.

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