

Effect of a Proposal Teaching Strategy on the Students Common Errors

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Abstract: The study examines the efficacy of a proposed strategy for diagnostic teaching in remedying the student's common errors in learning mathematics through the present model of teaching, which depends on diagnosis and treatment of the educational problems that face the students and improve students' instructional level and eliminate the educational problems that may hinder student learning. The study identified the most important steps to build a model of teaching which are summarized in preparation of the strategy and the concept of mastery and the style of measured concept, then preparation of teaching diagnostics and treatment through dividing and arrangement of content, teaching planning and preparation for the diagnostic tests and final preparation of treatment methods. Also, the study defined the procedures for effective application of the diagnostic teaching that may help in managing the educational problems which face students, especially those who suffer from low level of achievement.

Key words: Proposal teaching strategy, common errors, students, mathematics, educational problems

INTRODUCTION

Diagnostic teaching/conflict teaching: Diagnostic teaching or conflict teaching as it is sometimes called was researched and developed by the Shell Centre for Mathematics Education in the 1980's. It is a process of teaching which identifies pupils' misconceptions and then uses different teaching methods and ideas to try to help pupils' to overcome their misconceptions (Bell and Purdy, 1985). This is done by giving a class a problem to work on in pairs or individually. Then the teacher would lead a classroom discussion airing any misconceptions the pupils might have, by asking questions and creating conflict, the teacher would try to make the class discuss and debate to finally decide that the misconception was incorrect. Finally, the teacher would give another question to provoke the pupils understanding of the concept (Mason and Tooley, 1992). Diagnostic teaching is the process of diagnosing student abilities, needs and objectives and prescribing requisite learning activities. Through diagnostic teaching, the teacher monitors the understanding and performance of students before teaching the lesson, while teaching and after teaching the lesson (Erinosho, 1990). Diagnostic teaching can inform teachers of the effectiveness of their lessons with individuals, small groups of students, or whole classes, depending on the instruments used. Within a diagnostic teaching perspective, assessment and instruction are interacting in a continuous process, with assessment

providing feedback to the teacher on the efficacy of prior instruction and new instruction building on the learning that students demonstrate (Guskey, 2003).

Remedially teaching: While diagnosis is the process of investigating the learners' difficulties and the reasons for this, its follow up leads to actions that may help children make up their deficiencies. This step is generally termed Remedial Teaching. So, you have to be skilled in preparing or arranging for such materials which may be used to undertake corrective instruction and thus enhancing the quality of learning.

Selection of materials: The following points should be kept in mind while selecting appropriate instructional material:

- The corrective material should be designed to correct the students' individual difficulties.
- You have to analyze the work of slow learners by means of observation, interview and Diagnostic Testing. A careful consideration of the three may help decide what kind of corrective material is to be designed and whether material will be adequate to correct the specific difficulties of learners.
- The corrective material should be graded, self-directive and should permit students to work independently. Written directions, which accompany the material, should be easily readable and comprehensible by the students.

- The corrective material must permit individuals to progress according to their pace.
- The material should encourage systematic recording of evidence of pupils' progress.

Diagnostic assessment is an evaluation of a learner's skills, strengths and weaknesses. This is carried out with the tutor in either an individual or group setting. It gives a thorough indication of not only which level an individual needs to be placed within for each subject but also which specific areas of work they need to improve on. Each diagnostic assessment pack contains:

- Paper-based task books for the relevant subject.
- A tutor administration manual for each subject, including pre-entry materials.
- For the ESOL pack, an audio tape of ESOL listening tasks (Block, 1977).
- A CD-ROM with the full version of all the paper-based tasks.
- Flash cards are cards imply short and simple information such as answering a specific question.

Re-teaching is a method which is some times adopted by the teacher to remedy and correct the common errors among students by using methods that is different from his first method of teaching when he taught the topic at first.

PROGRAMMED INSTRUCTION

The teacher can use all or some of those remedy procedures and means, he could also design other remedy methods that he thinks they will give him more opportunity to solve his environment conditions (Hutchison, 1997). Bloom (1971) thinks that the low achievement by weak students is ascribed to a numbers of factors; As a result of the students lack of basic pre-learning ability and as a result of their low educational academic achievement in most cases, therefore, they are generally slow learners, opposite to their colleagues who are highly educated which are generally fast learners to comprehend the same topic well and they will need longer time to learn that topic in an excellent degree. The non-availability of the minimum limit of pre-education: or what is called the prerequisites for further education that might hinder the full achievement of the further education. Those low educated and poor in academic achievement lack in general, the motive to learn and feeling of hate to the scholastic subject will grow which their level is low in it and generally their bad result may constitute frequent frustrations that could hinder their future aims. And the dreams of the stage which they live, consequently such students are less participant in such learning process.

And they need to be helped in increasing the motive to learn and to giving them the confidence in accomplishing better results and to stress on the fact that they are not less than their colleagues, but they only need to exert more efforts and spend longer time in learning and to exploit the time in a better way and benefiting from whatever method of learning that could be provided by the qualified teacher. In view of the teacher's unfamiliarity- often- of the scientific background of each student due to the shortage of personal tests and the records that give the teacher a knowledge of the student scientific background, then such teacher will start from a starting point that are lower than the level of other students and sometimes higher than the level of the others, especially students who are low in their willingness and educational achievements who encounter some difficulty in learning what is given to them, or they can't comprehend the teacher's technique, some times it seems that the teacher is giving them some jargons without any meaning. If they find out that some of their colleagues have learnt what has been said, then their frustration will be even worse and if they find any who shares their opinion, then they usually think that the defect is the teacher and by that, the problem will be even more complicated. Some teacher's negligence of using the continuous formative evaluation which uses the personal tests to benefit from its results in rectifying the learning track by using the corrective feedback contributes to such educational draw-back. Not applying diverse instructional methods particularly in the review periods to suit the different abilities of the students, in spite that the purpose of such periods is to rectify the teaching track in remedy of the educational problems that might encounter some students (Bloom, 1971).

To raise the level of medium and low qualification students, adopting the diagnostic prescriptive procedures continuously in the learning process (Erinosho, 1990), which depends on diagnosis and treatment of the educational problems.

Aim of the study: The present study has the objective to propose an educational pattern that could lead to an improved teaching performance which would in turn improve student level.

Importance of the study: To identify the child's weaknesses and strengths;

- Hypothesize possible reasons for these weaknesses and strengths.
- Formulate behavioral objectives to serve as a structure for the remediation of weaknesses or the enrichment of strengths.

- Providing material for supporting teacher in developing diagnostic teaching skills.
- To equip teachers to use supporting teachers in developing diagnostic teaching skills.
- The attempt to provide the field with a main pattern that could be used easily in teaching.
- The attempt to find a solution to a key problem that upset the people in charge of the educational process and the students' guardians which are the problem of the low achievement of some students in some academic subjects and their reluctance to study them sometimes and the shortage of motivation to learn them.

The study problem: The present study tries to answer the following questions:

- Is it possible to give an integrated educational pattern that could improve teacher teaching skills and remedy the weaknesses points in the students learning?
- What is the effect of this strategy on the students' common errors in geometric subjects at the seventh grade of middle school?

THE STUDY PROCEDURES

The study has some material that used such diagnostic teaching sample of students teaching materials, guidance for scoring and interpreting responses.

This step means planning the diagnostic prescriptive procedures strategy before the actual teaching inside the classrooms, through:

First: Clearly state the objectives representing the purposes of the course and how to measure it: When a certain student master use a certain scholastic content then this means that this student is able to accomplish the educational aims of this content and to endure that it is necessary to find a test that measure such educational aims and this is often called summative mastery test .also it requires the existence of a performance level to such test that represent the minimum of performance which is called the mastery level and whoever reaches such level, is considered a versed student and whoever fails to, is considered not versed and need some remedy (George, Boyd, 2003). Hence, to define the mastery degree and to measure it, we should therefore, follow the following steps:

Concluding the educational goals of the proposed subject

content: This could be done by analyzing the content to be familiarity with the main components correlated to the learning aspects from the facts, data, concepts, symbols, principles, rules, law and theoretical assumptions, theories with some components that are linked to the learning aspects, then the aims could be formed in light of the general goals of the subject, also the goals should be formed in behavioral form to facilitate it where the behavioral goal is distinguished in defining the action required to be performed and the extent of that performance and the doer who will perform that act (Long *et al.*, 1981). Also such goals should imply different knowledge levels such as remembering, understanding, application, analysis and synthesis if possible (Bloom, 1976).

- Prepare course table specifications via following step:
 - Putting the content components on the right of the table and arranged vertically in a list from up downward.
 - Recording the intellectual processes (knowledge) that are likely to be carried out by the student when he studies each component of the content components at the upper side of the table horizontally.
 - Putting an X mark before each component of the content components and under the intellectual process that is correlated to the learning of this component.
- Review of the specification table to ensure the non repetition or the dualism of the information in more than one table of such tables (Fig. 1).
- Construction of the mastery test:

The mastery test could be constructed from the information of the specifications tables' content that have been previously prepared where this test should cover all the goals included in the specifications table and the relevant intellectual processes.

- Defining the performance level of this final test:

We could adopt the performance level as an evidence of the student attainment of the mastery degree in learning the proposed content and this level should be high and the students need to exert a great effort to attain such level in order to make the strategy adopter to say confidently that his students have really reached that

Content component	Knowledge intellectual processes correlated to the process of learning the content components		
	Knowledge comprehension application analysis synthesis assessment		
Facts	-	-	
Concepts		-	-
Principles		-	-
Rules	-		-
Theories			-

Fig. 1: Explains how to prepare the specification table

level after applying the diagnostic prescriptive procedures and their level actually upgrades their qualifications level and they really mastered what they have learned (Thorndike and Hagen, 1986).

Second: Preparation for the diagnostic prescriptive procedures in teaching: The preparation for the diagnostic prescriptive procedures for the content could be achieved through the following three steps:

- Scholastic content organization and dividing it in to a group of secondary units, then each secondary unit could be divided in to smaller units that each one could be taught in one period called educational units.
- Preparing the table of specification for each educational unit (educational chapter or section), also for each educational unit (class period) that could be done by dividing the specifications table that has been prepared earlier, which has been used in building the collective final mastery test, also in each table the educational goals should be defined.
- Planning the teaching technique that will be followed in each secondary unit and for each educational unit (class period) to accomplish the unit goals through:
- Preparing the teaching method that will be followed in the beginning of the class period for all the students to teach the content and that could be done as follows:
 - Defining the behavioral goals that should be achieved by the student during the instruction unit or the class period.
 - Preparing the boards that imply the objectives for each Instruction unit, where such boards should do to all students during the period time.
 - Preparing the progress method in each educational unit which could realize the entire lesson objectives one after the other.
 - Preparing the assessment questions for each instruction unit.

- Preparation of the diagnostic tests for each secondary unit that could be done through preparing an identical copy of final summative mastery test with a slight amendment, by including more than one question on each objective to guarantee it accomplishment and make sure the purpose of the diagnostic test is clearly defined (Bowser, 2003).
- Preparation of remedy methods “ correctives” in terms of remedying the initially adopted method of teaching (when a great no. of students seem to have not comprehend a certain part of the content, consequently a certain goal has not been accomplished) or to give a hand to those students who are encountering some difficulty during learning the content, or they haven’t secured certain goals, their mistakes are not common, but on an individual, such help will be furnished in the form of information that must be given in a different way, in the form of small cards that include the name of the student, the question that was answered by the student wrongly in the diagnostic test with underlining or specifying the wrong answer given by the student and the type of mistake and the behavioral goal that was not accomplished and the scholastic content that is able to cover that goal with the educational activities that will be assigned to the student in order to remedy the mistake in such item particularly. A tape cassettes could also be prepared or video cassettes to accomplish such goals in turn.
- Defining the remedy applying methods or correctives to the students and that could be done as follows:
 - If the mistake is common among the majority of students then the teacher should re-teach the content part that was missed by the majority of students in answering the question that measure the extent of the behavioral goal accomplishment which covered by the part of the content.
 - Dividing the students into small groups, each group consisting 3-4 students, observing that each group shall have some common mistake and each group should be provided with the remedy means for such common mistakes such as giving them remedy cards similar to the one previously mentioned in step (c) or by giving them certain assignments such as asking them to read certain pages in the text book or by applying some training or exercises that must be carried out under the teacher supervision.
 - Separating the student that has individual mistakes, or those with their own mistakes, that no body has their mistakes and to deal with them

individually to remedy their problems inside the classroom with training them on questions and exercises similar to that which they made mistakes in.

Third: Actual application for the diagnostic prescriptive procedures by applying what has been prepared earlier:

This could be applied through adopting the following 5 steps:

- Guiding students and demonstrating the learning strategy of diagnostic prescriptive procedures.
- Teaching each secondary unit by using what has been previously prepared.
- Applying the final test that covers the whole of the proposed content on the students after finishing teaching the whole.
- Recording the marks of each student whether he reached the mastery level or not to know the knowledge level of the student and prepare a report for each student explaining in details the goals accomplished by the student and those which have not been accomplished to form a clear image about the scientific product of the adopted program or the strategy for each student and in order to realize the benefit of the student and the teacher.
- Finding the extent of the adopted program or the strategy.

Each step of the aforesaid could be clarified in detail as follows:

Guiding the students: At the beginning, a pre-test should be applied on the students implying the earlier know ledge and information relevant to what would be taught and learned during the scholastic year. This diagnostic test aims at diagnosing the weaknesses and strength points in the earlier education of the student in order to remedy the points of weaknesses and strength after the remedy procedures and then the diagnostic test shall be repeated to the students to guarantee remedying the weakness points. If the remedy was not good enough, then such students will be ordered according to their level of knowledge, so as to specify the different starting point of learning for each student. After that the teaching means will be explained to the students:

- All students will practically practice learning employing a new methods and technique which had been prepared specifically for each student so as to learn better.
- Each student will acquire a mark that is specified for him based on his performance in the final examination.

- Each mark is specified for each student in accordance to his specified performance.
- Any student that gets excellence or above it shall be regarded efficient in learning the content.
- Each student will get every sort of help that he requires until he learns well. According to this, any student who is incapable of learning by any method or technique (or any other educational means) he can use another different means that the teacher provides for him or that he can manage for himself.
- During the suggested period of the content (unit to other) each student shall undergo many diagnosis examinations which have no marks as to encourage and push forward the learning processes. The student can use the outcomes of these diagnosis examinations to correct his educational mistakes or correct some of the goals and concepts.
- It is to provide each student with a number of corrections that may help him to overcome his troubles and educational complications in which he can correct his mistakes and the conceptual mistakes, each student can select what is appropriate of the corrections owing to his need.

Teaching the branch units: To teach unit as per the strategy of diagnosis perspective procedures, follows the course as for each unit:

- Presentation of the goals for the students.
- Presentation of the teaching plan for the students with explanation.
- Teaching the content that covers the goals for all students within a unified method.
- Application of the diagnosis perspective procedures after teaching the unit.
- Specifying the students who are advanced in learning and achieved a degree of perfection in learning and those who have not achieved a degree of perfection in learning.
- The students who have achieved perfection in learning and got excellent shall get assessment and encouragement so as to persist in learning the following units.
- Correction and tackling the learning mistakes for the students who have not achieved the level of perfection in their performance.
- The processes of diagnostic perspective procedures shall be encouraged and activated so as to make it effective and substantial.
- It is to re-diagnose the processes for the students who received such diagnosis for their educational problem to assess such feasibility of the diagnosis. Thus, assessment of these students who achieved

perfection shall be conducted after the processes of diagnostic perspective procedures. Then a course of diagnostic perspective procedures shall be given once again for those who have not achieved perfection yet.

- These procedures shall be repeated for each unit until finalizing teaching the contents as a whole.
- **Application of the final examination:** After completion of the content of teaching material as a whole and ended up the diagnostic perspective procedures for each student, the students shall have final examination to differentiate those students who achieved perfection from learning than those who have not achieved perfection from learning.
- **Recording the mark of each student and preparing a report about it:** This step is conducted to give a clear image for each student regarding the educational goals which he/she achieve them and mental knowledge processes which the student conduct so as to make it clear in his mind, the parts that he understood and those which he failed in understanding.

As well, this step will give the teacher or the one who applies the strategy a clear image about the efficiency of teaching methods followed in teaching each educational goal.

- **Specifying the extent of substantiality or effectiveness of the program or the strategy used:** The percentage of the number of students who achieved perfection (excellent) are specified from the total number of the students who studied using this strategy. As well those students who got (very good), if this percentage was big, it would mean that the strategy was successful in its goal (Frederiksen, 1990).

Using these procedures means that the strategy of diagnostic perspective procedures of teaching can be applied in classrooms teaching easily. It is believed that applying it continuously and well in the classrooms shall result in a clear improvement in the acquisition of the students.

THE APPLICATION OF THE STRATEGY

This strategy has been applied to the seventh class in the basic schools. The researcher chose the area and the perimeter of the polygon as subject. The researcher and the teacher of mathematics for the mentioned class

Table 1: The common errors occurred among the groups areas

The error type	A	B
Errors pertaining to the geometric laws	27%	46%
Errors pertaining to geometric figures	30%	51
Errors pertaining to geometric concepts	35%	59
Errors pertaining to verbal geometric issues	26%	38%

have arranged the contents of the subject according to the proposed steps. Two equivalent groups of students (A,B) have been selected, the group A has been taught using the above mentioned teaching strategy, while group B has been taught using ordinary teaching method. Teaching process duration was two weeks. After that a diagnostic examination which was already prepared by the researcher before the application of the low teaching methods, has been given to the two groups (A and B). The error which occurred among 25% and more of the students was identified as a common error. Then the researcher checked the students work books and analyzed the results, which shows in the Table 1.

From the above results we can see that group A has less common errors than that for group B, which indicates that, the proposed strategy of teaching is more useful and effective.

According to, these results, it is clear that the proposed strategy of teaching affected the success and achievement of the students positively.

RECOMMENDATIONS

The researcher recommends the following:

- Re-drafting the textbooks to be in line with the possibility of employing the suggested pattern with the diagnostic perspective procedures so as to build up its content to suit the information and knowledge arranged.
- Training the students of the faculties of education and training the male and female teachers who are experienced in service on the methods of employing the diagnostic perspective procedures in teaching whether inside the labs of teaching at the faculties of education and the intermediate faculties or inside the classroom as for the male and female in teaching service or the experienced teachers in service so as to transfer skills about that strategy from its theoretical form to its functional and practical form in order to benefit from it in the educational field.
- Re-consideration in the technique of the assessment used today in our schools to benefit from its outcomes in talking the weak points of teaching and the defects of the ongoing teaching and working on its adjustment persistently, this means the assessment should be diagnosed in order to know the weak points to tackle them and to know the strong points to assess them.

- Introducing the students with the educational goals, facts, data, codes, principles, rules, regulation, theories, skills and conduct elements that they should acquire before the process of teaching, because the desire to achieve a high educational outcome and perfection in learning necessarily follows informing the students of what to learn and acquire within words and phrases and terms that they can understand and accept so as to make the process of learning meaningful with a defined function.
- Specifying, the level of performance for all students and helping them to reach perfection, taking into consideration that each student who reached this level of performance has substantially reached the level of perfection.
- When designing the examination used in the processes of learning particularly, the diagnostic perspective procedures or the formational, the examinations must be of criterion-referenced tests that compares the level of individual student's performance with the specified performance of perfection. It is not recommended to take the type of norm-referenced tests only in its narrowest limitations such as the final tests for example.

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