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CONCEPT FORMATION TEACHING MODEL: A CORRELATIONAL STUDY OF CONCEPT DEVELOPMENT

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ABSTRACT

A concept is an idea. It helps to classify things in mind. Concepts are one of the key parts of the teaching-learning process. These are always related to learner academic success. Academic success always depends on a student's clear concept. The study objective was to find the relationship between the concept formation teaching model and students' academic success. An experimental study was conducted for a period of two months to determine the effect of this model on the academic success of the students. The study was concluded that students who instructed by this model scored significantly high than the students who instructed by a conventional way of teaching. A retention test was also taken for the purpose of knowing the students' retention levels. The study results of retention test showed that students retain their concepts for a longer period of time with accuracy. Removal of misconception and strengthening of precise and accurate concepts is only possible when teaching is based on conceptual learning. To substitute the procedural learning from conceptual learning, this model is helpful and proved to be significant in teaching-learning process. It is recommended to use this model to form and develop concepts.

Keywords: Concept; Teaching; Concept formation; Teaching model.
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INTRODUCTION

By definition concepts are abstract ideas. They are considered as a fundamental stone for the concept behind beliefs, values and opinions. The role of concept in cognition building is vital. Different fields and subjects like Philosophy, Linguistics Psychology and Educations are studying it and working to find out structure of concepts and how they can be put together to form thoughts and its building. Cognitive sciences studied concepts and consider it very important (Goguen, 2005; Margolis & Laurence, 1999; Carey, 1991). How to make the teaching and learning environment more effective is always researchable. Research is always conducting for the purpose to make deep understanding of the phenomena. It is to study to find out ways to enhance the teaching learning process. Research shows that good teaching is that in which students are involved actively with positive participation in course relevant material. Research shows that class room environment also matters for better learning. Good teacher always cares about their students. They also plan, prepare, instruct in a good way to help the student's in their learning. Good teaching not only prepare the students for academic year but also help them towards their academic success in their practical life (Ruzgar, 2021).

The teacher has qualities like enthusiasm that will help him in overcoming the difficulties. They will teach in a better way instead of rote learning. It is also observed that students have more respect for the teacher who have more enthusiasm for their course material. It is true that some time to cover the curriculum make

the process of teaching learning boring (Barkley & Bianco, 2006). Recent researches show correlation between enthusiasm of that teacher and that the learning motivation of the students. It shows that enthusiasm of the teacher leads the students towards more interest, engagement and curiosity (Patrick et al., 2000). Another quality which is necessary for teaching is interaction with the learner. The interaction of the teacher with the students develop a good and positive atmosphere for learning. The teaching learning process depends on the relationship of the students with their teachers (Patrick et al., 2000).

To develop a balanced students' personality is the main focus of educational policy 2017. Due to rapid global development quality education is the need of the country. Education which not only help to solve basic problems but to cater the main stream challenges in this field (Government of Pakistan, 2018). This is also focused by Khan (2011) and Nisa (2018). In 2011, Khan addressed the problem of forming the concepts especially in science subject. The questions that are raised by education stake holder were that normally students put effort to get only good grades in examination or just to memorize the concepts that will go in their short term memory. So they neither able to retain them in long term memory nor use learnt concepts in life. Ultimately they learn concepts but after very short time, they forget it. For pointing out this crucial area of teaching, Khan (2011) investigated the existing level of concepts to check whether the questions raised by education stake holders have any validity or this is just a claim.

After getting statistical results about students existing level of concepts, Khan (2011) developed a teaching model named as concept formation teaching model in which application and generalization was given due importance. The same study was re-conducted by Nisa (2018) who experimentally proved that when students taught through this model, they learn them in better way and retain them for a longer period of time. Pujani et al. (2019) performed an experimental study to know the effectiveness of activity-based conceptual change modules in increasing student scientific knowledge and reducing students' misconception on electromagnets. Study was conducted to investigate the effectiveness of activity based conceptual change method over the conventional method. The study results revealed that the participants of experimental group who receive treatment performed better than the participants of the control group. Activity-based conceptual change module was effective to increase the level of scientific knowledge and reduce the level of student misconception.

Perdana et al. (2018) focused on the effect of conceptual change text structure on concept understanding and misconception reduction of dynamic electricity. The study results showed that the student of experimental group displayed significantly higher understanding and misconceptions reduction as compared to the control group students. Both groups showed increase in the understanding of concept and reduction of misconceptions, however, the experimental group's students have higher mean value than control group. This is clear from the results that concept based teaching method is more effective than traditional method.

Research Problem

Teaching and learning in the subject of computer science required clarification of concepts. Students studying subject of computer science not only required to learn but also have to apply their knowledge.

Research Importance

1. This research was important to know about the shortcoming in student's concept and how to deal with this.
2. This research will help both the teacher and the learner in the subject of computer science.
3. Results of the research to contribute for applying concept formation teaching model

METHODOLOGY

The study was conducted to find the relationship between concept formation teaching model and students' academic success of XII Grade Computer Science students. Pilot testing was performed on 2% of the

population by taking permission from school principal. An achievement test of 85 items after deleting items was applied on 32 students of control and experimental group for checking their existing level.

The selected design for the study was "Pretest-Posttest Control Group Design" was applied with additional posttest which is considered as retention test i.e.

R O T O O

R O - O O (Gay et al., 2005)

Experience and qualification of both group teacher was same i.e. M.Sc. and B.Ed.; Both the teachers taught the same course having same time duration (40 minutes) allowing by the school.

The study was conducted for two months. Concept formation teaching model was applied to teach the experimental group. Prior permission from author of the model was taken. Lesson plan based on concept formation teaching model was prepared for Computer Science subject. Students of controlled group were taught by scripted lesson plan recommended by Directorate of Professional Development. A posttest was administered to check the effect of the concept formation teaching model with students' academic success. Retention test was also taken to check the students' retention level.

Code of ethics i.e. prior consent, anonymity, freedom to withdrawal, confidentiality and privacy were considered. Approval from Advanced Studies and Research Board was taken. This model was developed in 2011 and in 2018 this model was applied again to verify its effectiveness on students' academic success.

Applied concept formation teaching model was based on instructional objectives, previous knowledge, presentation (motivational set and body of the lesson), conclusion, generalization, evaluation and home task.

Data Collection Tools

To check the understanding of the students in Computer Science subject, an achievement test from Textbook of Computer Science for Grade XII published by Khyber Pakhtunkhwa Textbook Board, Peshawar was developed by considering the test preparation guidelines and was based on Taxonomy of Educational Objectives. Reliability of the test was checked using rationale-equivalence reliability. This is considered to be the most suited for reliability (Gay et al., 2005)

Validity of the Instrument

α coefficient after applying rational equivalence reliability was .96.

Data Analysis

For data analysis purpose SPSS(XII) was used. Product-moment coefficient of correlation was applied to check concept formation teaching model's effect on concept development and to find out relationship of concept formation teaching model on students' academic success. To know how much concepts remained in students' mind even after some time, relationship between posttest and retention level was also found.

Delimitation of the study

Study was delimited to:

1. Grade XII students of Government Higher Secondary School of District Nowshera,
2. Computer Science subject,
3. Book of computer science for Grade XII published by The Khyber Pakhtunkhwa Textbook Board, Peshawar, and
4. Concept Formation Teaching Model.

RESULTS AND DISCUSSION

Table 1 indicates the significance among experimental group's mean achievement scores on pretest and posttest (.82) was greater than r value (.32) at .05 level so null hypothesis was rejected. It shows that students' academic success was related with the treatment (Concept Formation Teaching Model). Relation between variables between +0.35 is considered as weak/none; between +0.35 and +0.65 as moderate and between +0.65 and +1.00 as strong (Gay et al., 2005), therefore, the null hypothesis was rejected.

Table 1. Relationship of mean achievement scores on pretest and posttest of experimental group.

Groups	N	r
Pretest and Posttest	32	.82

Table 2. Relationship of mean achievement scores on pretest and posttest of controlled group.

Groups	N	r
Pretest and Posttest	31	.67

Table 2 indicates significance among controlled group's mean achievement scores on pretest and posttest (.67) was bigger than r value (.32) at .05 level so null hypothesis was rejected. It indicates that students' academic success was related with treatment given to the controlled group (Scripted lesson plans). Relation between variables between +0.35 is considered as weak/none; between +0.35 and +0.65 as moderate and between +0.65 and +1.00 as strong (Gay et al., 2005), therefore, the null hypothesis was rejected.

Table 3. Relationship of mean achievement scores on posttest and retention test of experimental group.

Groups	N	r
Pretest and Posttest	32	.73

Table 3 indicates significance among experimental group's mean achievement scores on posttest and retention test (.73) was greater than r value (.32) at .05 level so null hypothesis was rejected. It specifies that achievement of students in posttest after teaching through concept formation teaching model was retained in retention test being applied after time interval. Relation between variables between +0.35 is considered as weak/none; between +0.35 and +0.65 as moderate and between +0.65 and +1.00 as strong (Gay et al., 2005), therefore, the null hypothesis was rejected.

Table 4. Relationship of mean achievement scores on posttest and retention test of controlled group.

Groups	N	r
Pretest and Posttest	31	.55

Table 4 indicates significance among controlled group's mean achievement scores group on posttest and retention test (.55) was bigger than r value (.27) at .05 level so null hypothesis was rejected. It shows that relationship exist but weak in nature. It indicates that students' achievement in posttest after teaching through scripted lesson plans was retained in retention test being applied after time interval. Relation between variables between +0.35 is considered as weak/none; between +0.35 and +0.65 as moderate and between +0.65 and +1.00 as strong (Gay et al., 2005), therefore, the null hypothesis was rejected.

The study was executed to find the relationship between students' academic success and concept formation teaching model of Grade XII computer science class. In this study retention level of the students was also checked to know about their retention level.

The study concluded that the coefficient of correlation among experimental group's mean achievement score on pretest and posttest (.82) was significant. This value is greater than the critical r value (.32) means null hypothesis is rejected. It shows that students performed better in their posttest.

The correlation coefficient calculated between mean achievement score of control group (.67) was significant than critical table value (.32). In this case null hypothesis was rejected. But lesser than experimental group.

The relationship among the experimental group's mean achievement scores on posttest and retention test was find out with the help of Product-Moment Coefficient of Correlation. It was observed that correlation coefficient of Computer Science students studying in Grade XII (.73) was bigger than r value (.32) at .05 level of significance. So H0 was rejected. A significant strong correlation was found between experimental group's mean achievement scores on posttest and retention test. The relationship is strong which support that concept formation teaching method is better for retention learning.

The correlation among the controlled group's mean achievement scores on posttest and retention test was find out with the help of Product-Moment Correlation Coefficient. It was observed that correlation coefficient of Computer Science students studying in Grade XII (.55) was higher than the r value (.32) at .05 level. So H0 was rejected. A moderate correlation was found between mean achievement scores on posttest and retention test of controlled group.

This study has the same findings with that of Shah et al. (2020) who experimentally prove that the students who taught through the concept formation outscored in their achievement test now and then as compared to controlled group students. The present study results also showed the statistical significant difference between the success scores of experimental and controlled groups in posttest and retention test.

The findings of this study are supported by Nisa (2018) who argued that for affective learning experiences, it is better to use concept formation teaching model. The present study depicted that due to holistic and balanced development of personality of students it is easy to enable them to use learnt subject matter into their practical life. This is only possible when students have deep insight into the inter relationship and relevance between the concepts.

This study is aligned with National Educational Policy of Pakistan (2009 and 2017) that also give importance to the quality education and to develop the overall personality of the students. It emphasized on that type of education which enable the learner to gain knowledge and skills which are according to the need of market and society. Further the policies not only emphasis on the quality of education but even to enhance it.

Results of the study are aligned with Aydin (2012) who conduct a research on remediation of misconceptions about geometric optics using conceptual change texts. The study showed that the conceptual change texts are more effective than traditional method for teaching to eradicate students' misconceptions. Statistically significant relationship between pretest and posttest of the students in the experiment group was found that predicts the experimental group's students' academic success was associated with the teaching applying conceptual change texts.

The present study supported the findings of Khan (2011) who said that conceptual change through teaching is important otherwise rote memorization does not contribute to the learning of the students. The research recommended that teaching must follow some systematic way which build the concepts of the students in such a manner that help them to overcome the challenges of the modern and challenging era. The conduction of seminars and expert speeches to address the required area in right way is necessary.

CONCLUSIONS

On the basis of conducted study, it is clear that this model plays a vital role in students' academic success. Considering in mind the factors which help the students to improve their academic success enhance their

attainment and achievements. It is concluded that student's academic success was related with concept formation teaching model. As students memorized their concepts with accuracy, so the retention level of their learning was stronger. It means that concept formation teaching model makes the concept of students more clear and accurate. As a result, this model was proved to be helpful in conceptual learning.

A way forward

Instructional quality and delivery style is an important part in teaching-learning process. If the body of the lesson delivered in proper way to achieve pre-determined classroom objectives, concepts will be clearer and misunderstanding will be remove by proper and timely feedback. Teacher may instruct qualitatively by addressing peculiar steps of teaching. So in-service training may be provided to the teachers.

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