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RESEARCH ARTICLE

AN INVESTIGATION INTO NUMBER CONSERVATION ABILITY AMONG GIRLS OF COED AND SINGLE-SEX PRIMARYSCHOOLS IN KHYBER PAKHTUNKHWA.

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Abstract

The aim of this study was to investigate number conservation ability among girls of co-educational (Coed) and single-sex primary schools. Two major objectives of the study were: 1) To investigate number conservation ability of girls belongs to Coed and single-sex primary schools; 2) To compare girls of Coed and single-sex primary schools on number conservation ability. The study was based on three null hypotheses: 1) Girls (age group of 3 to 5) of Coed and single-sex primary schools are not number conservers; 2) Girls (age group of 6 to 8) of Coed and single-sex primary schools are not number conservers; 3) There is no significance of difference in the frequency of Coed and single-sex primary schools' girls. All the government primary schools (Coed & single-sex) of Khyber Pakhtunkhwa were the population of the study. A total of 240 girls students from Coed & single-sex primary schools were taken as a sample of the study. Empirical research design was taken as research design. Observation sheets were developed for data collection. Statistical tools such as percentage and t-test were applied for the analysis of data. Girls (age group 3 to 5) were not found to be number conservers. It was found from the results that girls (age group 6 to 8) were number conservers. It was also found that girls from Coed schools performed better (found to be number conservers at the age of 6) than those of single-sex schools (found to be number conservers at the age of 7). Hence it is recommended that girls are to be allowed and encouraged to study in Coed (boys' primary schools), government and other agencies should take serious steps in this regard.

Introduction:-

We can never be underestimating this fact that education play pivotal role in the development of a nation. To gain knowledge from start to end is the basic and fundamental teaching of Islam. "Read in the name of Allah, who created you", was the first revelation on the Prophet (S.A.W) which explores the importance of education in Islam. Education is the key which can enable us in understanding and resolving our daily life problems (Ahmad, 2017).

Primary education is the foundation stone in the education system. In Pakistan primary education comprises Early Childhood Education (ECE) for age group of 3 to 5 and Grades I-V. So we can say that primary schools comprise seven classes (including Nursery, Prep and grades I-V). Three R's (Read, Write and Arithmetic) are the main objectives of primary schools' children (Ahmad, A., Tabassum, R., & Farooq, R. A., 2017).

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In Pakistan there are separate primary schools for girls and boys. It has also been observed that parents are willing to allow their daughters to study in boys schools up to primary level. Gender composition of schools as coeducational and single-sex is an influential factor for the students; as both schools have different environment. The combinations and sequences of both schools remain the topic of interest all over the world (Malik, R., & Mirza, M. S., 2014).

There have been great debates around the world on the merits and demerits of coeducational and single-sex schools at all levels. In United States of America and other western countries for earlier grades coeducation is accepted, however in Asian countries especially in Pakistan separate schools have been established and practiced at different levels of education in public sector. In the province of Sindh (Pakistan) coeducational schools are in practice at primary level (Malik, 2013).

In Khyber Pakhtunkhwa (Pakistan), there is hardly little work have been done to identify difference between the girls achievements of coeducational (girls in boys schools) and single-sex primary schools, so the present study is aimed to investigate the number conservation ability among girls of coeducational and single-sex primary schools in Khyber Pakhtunkhwa.

Objectives of the Study:-

The study was based on the following two major objectives:

1. To investigate number conservation ability of girls belongs to Coed and single-sex primary schools.
2. To compare girls of Coed and single-sex primary schools on number conservation ability.

Hypotheses of the Study:-

Following null hypotheses were tested:

1. Girls (age group of 3 to 5) of Coed and single-sex primary schools are not number conservers
2. Girls (age group of 6 to 8) of Coed and single-sex primary schools are not number conservers
3. There is no significance of difference in the frequency of Coed and single-sex primary schools' girls

Delimitation of the Study:-

The study was delimited to:

1. Girls of single-sex primary schools (girls primary schools)
2. Girls of coeducational primary schools (boys primary schools)
3. Girls of age group of 3 to 8 only

Literature Review:-

Cognition is the ability of mental processes through which a child recognize the world around him, compute data get from environment, judge it and then disseminate his perception to others. Like a scientist, children construct their own knowledge (Rahman, 2011) and (Ahmad, A., Tabassum, R., & Farooq, R. A., 2017). For the first time Piaget, proposed his four staged theory after studying his own and other school children for forty years (Mooney, 2000).

Jean Piaget after studying his own children and other school children for 40 years proposed a four stage theory which is cognitive development theory. These stages can be classified as sensorimotor, pre-operational, concrete operational and formal operational stage. In first stage which starts from birth and last for 2 years children uses their own senses to comprehend the world. In this stage object permanence ability is developed in the children (Piaget, 1977). This stage is considered to be time of very fast growth and change and they acquire a sufficient amount of cognitive growth in short span of time.

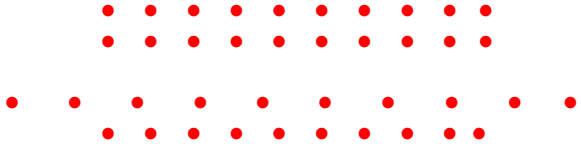
Second stage of Piaget theory usually starts from 2 years and last up to early childhood (6/7 years). Language use and development is one of the major characteristic of this phase. Children of this group can understand and make a link between past and future events, however children fails to develop the cause and effect relationship. There intelligence is based on egocentrism and there is lack of logical thinking (Ahmad, 2017).

Third stage, called concrete operational stage starts from early childhood (6/7) and last up to adolescence (11 years). Children are able to think logically so that their egocentrism become less, and develop the conservation ability at this phase (Ahmad, A., Tabassum, R., & Farooq, R. A., 2017).

The formal operational stage which is the last stage of Piaget theory starts from the age 11 and last up to 17 years. Hypothetical and abstract thinking is developed at this stage. The children can make hypotheses and can think about abstract concepts (Piaget, 1977).

Conservation:-
One of the major and important characteristics of concrete operational stage is the conservation of quantity. According to the dictionary "conservation is the principle by which the total value of a physical quantity (such as mass, weight, or number) remains constant in a system which is not subject to external influence"

Number Conservation:-
It is the most important and famous task of Jean Piaget's conservation tasks. Number conservation is the ability of a child that the physical shape or rearrangement of objects does not relate with the quantity.



The debate on the advantages and disadvantages of coeducation and single-sex started in 19th century. In 1920 it was organized that we can control sex hostility and can revamp the quality of marriage. In another study conducted in 1960s. It was affirmed that students were more pleased in coeducational environment (Malik, R., & Mirza, M. S., 2014).

Single-sex schools were found to be better for girls in a study conducted by feminists in 1970s and 80s. Same type of studies and debates continued in 1990, and the results showed that single-sex schools could be helpful for students (Malik, 2013).

(Yates, 2004) states that, almost past three decades a lot of debates have been held on the merits and demerits of coeducation and single-sex education. In a study conducted by (Datnow, A., Hubbard, L., 2002) it was found that single-sex education have more benefits both for girls and boys, however there are some claims from researchers that single-sex schools are more favorable for boys (Hawley, 1993) & (Reisman, 1991).

In a study conducted by (Hudley, 1995) and (Riordan, 1994) it was concluded that boys performed better in single-sex education as compared to coeducation. A study conducted by the National Association for Single Sex Public Education declared that single-sex education is in the favor of boys (Malik, R., & Mirza, M. S., 2014).

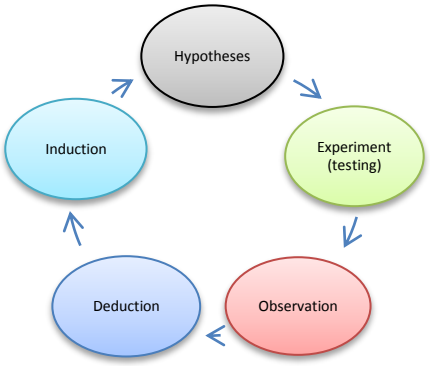
Opposing to single-sex education, (Robinson, P., & Smithers, A., 1999) in their study concluded that it is better to educate both sexes together for real life. Other supporters of coeducation put forward that it can reduce the classes, building and teachers. It nourishes the understanding level and mutual respect for each other (Marsh, 1989 & 1991) and (Goldstein, 1987).

A study conducted on 322 students (comprised single-sex and coeducational students) in America by (Sax, 2005), it was found that in coeducational classrooms 37% boys and 59% girls secured 3.5 or higher grades on the writing test. In another study conducted by (Price, E., & Rosemier, R., 1972) it was concluded that girls in coeducational schools performed better than boys in arithmetic's.

Different researchers support for the two types of schooling, but there is no consensus which one is better than other. (Bastick, 2000) argues that this matter needs further research. So the researcher conducted this study in order to find which type of schooling is good/suit for the girls of age group 3 to 8.

Method and Procedure:-

Research Design:-
Since the nature of the study was empirical, so an empirical research design was used for the conduction of study.



Source: (Ahmad, 2017)

Population:-
All the 1,355,963 girls' students of primary schools in public sector in Khyber Pakhtunkhwa were the population of the study (Pakhtoonkhwa, 2014).

Sample:-
A total of 240 girls were conveniently selected form 4 primary schools (2 each from Coed and single-sex primary schools). From each school 60 girls were selected. The sample were tested and observed on number conservation task.

"Sampled Single Sex Schools (Girls Primary Schools) in District Swabi

i. Government Girls Primary School No. 4 Jalsai
ii. Government Girls Primary School Saifur Banda Tordher

Sampled Coed Schools (Boys Primary Schools) in District Swabi

i. Government Primary School No.1 Jalsai
ii. Government Primary School Nabi"

Research Instrument:-
Twenty red colored plastic buttons were used for the experiment (Ahmad, 2017).

Procedure of the Study:-
The sample girls were tested on number conservation tasks of Jean Piaget. The experiment was conducted in two tasks:
Task 1: The sample girls were presented two equal rows in length comprising equal number of buttons as shown below:

Following questions were asked from each student in turn:
1. Are these two rows are identical/same (Ahmad, 2017).
2. If Yes/No, then why/how much (Ahmad, 2017).

Task 2: Now one of the rows was spread apart so that one row looks longer than the other, as shown below:

The same questions were asked again for this task.

Scoring Data:-
"Scores were assign in such manner that for each correct answer '1' mark and for incorrect answer '0'mark was assigned. The score ranged from '0' to '4'. The girls' secured 4 marks were declared as number conservers, while girls having less than 4 marks were considered as non-conservers" (Ahmad, 2017).

Collection of Data:-
Data were collected by using observation sheets.

Analysis of Data:-

"After collecting data through observation sheets it was analyzed by using statistical tools such as percentage and t-test. The 50 percent criteria were adopted in order to determine the attainment age of number conservation" (Ahmad, A., Tabassum, R., & Farooq, R. A., 2017)

Results:-

It is clear form table 1 that the percentage values (0, 0; 10, 0; 40, 20) are less than 50 percent which shows that girls (age group 3 to 5) of Coed and single-sex were not found to be number conservers and hence both performed same on the number conservation task.

From table 2 we can see that all the percentage values (60, 45; 85, 70; and 95, 80) are larger than 50 percent except the percentage value (45) those of single-sex girls (age group of 6). It shows that girls (age group 7 to 8) of Coed and single-sex were found to be number conservers and performed same on number conservation task, similarly girls of age group of 6 of Coed were found number conservers, however the same group of single-sex girls were not found to be number conservers.

Table 3 gives us the detail of significance of difference between the frequency of 3 to 8 years old Coed and single-sex girls of primary schools. It is clear from the table that the t-values (0, 1.785, 1.360, 1.125, and 1.435) of age group (3, 4, 5, 7 and 8) there is no significant difference was found in the frequency of this group however the t-value (2.551) of age group of 6 clearly shows the significance of difference between the frequency of Coed and single-sex primary school girls.

$H_0$1: Girls (age group of 3 to 5) of Coed and single-sex primary schools are not number conservers

Table 1:-Percentage and frequency of Coed and Single-sex primary girls (age group 3 to 5)

Group	N	Age	Conservers	Percentage	Status (Criteria = 50%)
Coed	20	3 years	0	0	Non-Conservers
Single Sex	20		0	0	
Coed	20	4 years	2	10	Non-Conservers
Single Sex	20		0	0	
Coed	20	5 years	8	40	Non-Conservers
Single Sex	20		4	20	

$H_0$2: Girls (age group of 6 to 8) of Coed and single-sex primary schools are not number conservers

Table 2:-Percentage and frequency of Coed and Single-sex primary girls (age group6 to 8)

Group	N	Age	Conservers	Percentage	Status (Criteria = 50%)
Coed	20	6 years	12	60	Conservers
Single Sex	20		9	45	Non-Conservers
Coed	20	7 years	17	85	Conservers
Single Sex	20		14	70	
Coed	20	8 years	19	95	Conservers
Single Sex	20		16	80	

$H_0$3: There is no significance of difference in the frequency of Coed and single-sex primary schools' girls

Table 3:-Significance of difference in the frequency of Coed and Single-sex primary school girls (age group 3 to 8)

Group	N	Age	Conservers	*df*	t- value	*d*	Effect size Strength
Coed	20	3 years	0	38	0*	----	----
Single Sex	20		0				
Coed	20	4 years	2	38	1.785*	----	----

Single Sex	20		0				
Coed	20	5 years	8	38	1.360*	----	----
Single Sex	20		4				
Coed	20	6 years	13	38	2.551**	0.50	Medium
Single Sex	20		8				
Coed	20	7 years	17	38	1.125*	----	----
Single Sex	20		14				
Coed	20	8 years	19	38	1.435*	----	----
Single Sex	20		16				

***Non-significant **Significant $\alpha = 0.05$ Table Value = 2.021**

Discussion:-

It was generated from the data that girls of Coed and single-sex of age group (3 to 5 and 7 to 8) were found to be same on Piaget's number conservation task which is in contradiction to the studies conducted by (Malik, 2013), in which he concluded that single-sex schools could be helpful for students; (Datnow, A., Hubbard, L., 2002) concluded in their study that single-sex education have more benefits both for boys and girls; (Hawley, 1993) and (Reisman, 1991) concluded that single-sex schools are more favorable for boys; (Hudley, 1995) and (Riordan, 1994) have concluded in their studies that boys performed better in single-sex as compared to coeducation.

It was found from the data that 6 years old girls of coeducational schools were found better than single-sex girls. The supporting research studies to this finding are the study conducted by (Robinson, P., & Smithers, A., 1999) in which they concluded that it is better to educate both sexes together for real life; other supporters of coeducation put forward that it can reduce the classes, building and teachers. It nourishes the understanding level and mutual respect for each other (Marsh, 1989 & 1991) and (Goldstein, 1987). A study conducted on 322 students (composed of single-sex and coeducational students) by (Sax, 2005) in which he concluded that in coeducational classrooms 37 percent boys and 59 percent girls secured 3.5 or higher grades on the writing test; and a study conducted by (Price, E., & Rosemier, R., 1972) it was concluded that girls in coeducational schools performed better than boys in arithmetic's. It is clear from the tables that the percentage values (10, 40, 60, 85, and 95) coeducational primary school girls were found to be greater than those percentage values (0, 20, 45, 70 and 80) of single-sex primary schools girls.

Conclusions:-

Following were the major conclusions of the study:

1. Girls (age group 3 to 5) of coeducational and single-sex primary schools were not able to pass the number conservation task. Hence they were found to be same on this task.
2. Girls (age group 7 to 8) of coeducational and single-sex primary schools were passed in Piaget's number conservation task. Hence they were found to be same on this task.
3. Coeducational girls of age group of 6 were found to be number conservers as compared to single-sex girls of the same age. Hence it was found that girls of coeducational schools were found to be better than those of single-sex schools at the age group of 6.

Recommendations:-

Following recommendations were made:

1. As 6 years old coeducational girls were found to be better than single-sex girls on Piaget's number conservation task, so it is recommended that girls should be allowed to study in coeducational schools up to primary level. Parents, educational institutions, government and other allied agencies should be taken serious steps in this regard.
2. As it was found that girls of age group 3 to 5 were found to be failed on Piaget's simple task of conservation, so it is recommended that school going age of girls primary schools is to be 6 years. Parents, society, government and other allied agencies should tackle this issue seriously.

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