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EFFECT OF SELF-EFFICACY ON STUDENTS' ACHIEVEMENT IN SCIENCE: A CASE OF SECONDARY SCHOOL STUDENTS IN PAKISTAN

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Abstract:
The current study aimed to investigate the effect of self-efficacy on students' achievement in science. The case of secondary school science students' is examined to achieve this task. The study is based on Bandura's Theory of Self-Efficacy, which divides Academic, Social and Emotional self-efficacy in three categories. The *Questionnaire 'Self-efficacy* Questionnaire for Children (SEQ-C) developed by (Muris, 2001) was adapted in the present study to quantify secondary school students' and was administered to 811 students. The achievements of students in science subjects governed by their academic, social and emotional self-efficacy were statistically examined to meet the research objectives. Findings revealed that secondary school students have a stronger academic and social self-efficacy. The need to assimilate content for developing emotional self-efficacy among students is highlighted. The study also discovered the significant impacts of parents' job status and the qualifications on children's self-efficacy.

Keywords: self-efficacy, achievement, SEQ-C, science

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1. Introduction

Science is an acquaintance apparent by the man through his ambiance. Man acquires the information of atmosphere through his sense of touch, hearing, sight and taste. He urbanized his views and approach by that knowledge of surroundings. This knowledge has developed his ways of thinking, doing and acting. He became more civilized and developed by performing in a certain conduct. So role of science for modern era is an essential component of human growth.

So, science has become the fundamental part of our syllabus at diverse levels. Science is very important part of learning at secondary school stage. Various structured activities and scientific methods provided to students during their schooling in their curriculum. These actions planned in such a way as to give them some appreciation of scientific concept and they will behave in a certain manner.

Good (1973) expressed that science learning is a field of specialized learning to which amenities, syllabus, and educator learning are related. In (1994) Simpson, Koballa, Oliver and Crawely discussed the relationship among apprentice, science and people. They acknowledged that science learning brings up the all three domains i.e. cognitive, psychomotor and affective by bringing together learns science and society. The cognitive domain deals with the attainment of essentials and notions as well as the maturity of quandary resolving abilities. The psychomotor realm concerns with the maturity of physical abilities and affective realm deals with morals, ideas, benefits and enthusiasm.

Various researches on the interaction between male and female students' achievement in science have conducted by different researchers. According to Bong & Shaalvik (2003) and Pajares (1996), that students' attitude and achievement in scientific discipline usually are favorably and also substantially related. Walberg's theory on educative productiveness identifies seven elements that will promote your variance throughout students' cognitive and also affective results. For example, students' potential, maturation, the caliber of training in addition to quantity of training, their emotional atmosphere in their house, their fellow party beyond the school room along with the time period associated with video/television mass media (Rana, 2002).

Many factors effect students' achievement in science, self-efficacy is one of important factor (Bandura 1997). Self-efficacy indicates someone's' belief about his competency to manage and achieve the concrete plan needed to make specified achievements.

Strong self-efficacy believers don't keep away from the complicated errands. They acknowledge tricky errands as confronts and try hard to master them.

In the case of failure, they consistently try hard to overcome failure, because they believe that their failure brought a new bolstering, in second attempt they put all energy and information to attain the job. They believe that they can overcome the threatening situations by their efforts. Bandura's (1977) Self-efficacy is one of the individual factors and is cleared as "*the conviction that one can successfully execute the behavior required to produce the outcomes*" (p. 79).

According to (Bandura, 1997, 1986; Multon, Brown and Lent, 1991) Self-efficacy plays a vital role in persons' performances, it influences memory indirectly. Self-efficacy was found a basic factor to determine individual choices, the exerted efforts, and the persistence of effort in case of difficulties, the thought patterns and emotional responses. Self-efficacy beliefs are strongly related to major motivation patterns like self-regulation (Zimmerman, 2000, Zimmerman & Bandura, 1994). Most of students have belief that if they have good self-efficacy then their ability to succeed in science tasks, courses will be higher. (Britner & Pajares, 2001; Zeldin & Pajares, 2000).

High school students mostly depend on their self-efficacy in science to achieve the targets inside and outside classroom (Kupermintz, Lau & Roeser (2002). Smist, Archambiautt and Owen (1997) described that aptitude, attitudes and attributions are the factors that determine science self-efficacy. General self-efficacy is determined by the four factors; "*inactive mastery experience, vicarious experience, verbal persuasion and psychological and emotional states''*. Children's self-efficacy beliefs become more accurate and persistence along with time and it is difficult to alter them (Bandura 1997).

Effect of Confidence on the students' self-efficacy in science is vital (Andre, Whigham, Henbrickson & Chambers, 1999; Britner & Pajares 2001; Kupermintz, 2002; Lau & Roeser, 2002). According to Ryckman & Peckman (1987), among students from elementary schools gender is a major factor for the success and the failure. Females mostly attained their successes by effort, while males gained successes by ability.

Hill (1990) found that middle and high school girls lack interest in science carriers and in science related activities outside of school. In 1986 and 1997, Bandura described four factors to determine self-efficacy; "*enactive mastery experience, vicarious experience, verbal persuasion and psychological and emotional states''*. Pintrich (1999) described that self-efficacy beliefs add a considerable part in accomplishment persuade transmit with self-regulated learning processes and intercede academic achievement. Learners brought up a sagacity of self-efficacy for doing well as they work on tasks and made more skillful (Schunk, 1991).

Students' previous success is indicated a direct positive influence on students self-efficacy and their English achievement outcomes (Eccles 1983, Bandura 1997). In meta-analysis of 39 studies from 1977 to 1988 reveals, significant relationships were

present between self-efficacy and performance of high schools and college students than younger students, relatively weak relationships were founded between self-efficacy and performance of younger students than high schools and college students (Multon, Brown and Lent, 1991).

Muris (2001) conducted a study which showed that self-efficacy and certain academic and emotional self-efficacy were significantly negatively related to depression. In short, children with low self-efficacy show high level of depression. Girls were affected more than boys.

Liem, Lau and Nie (2008) carried out a work in 1475 individuals to discover the particular position of self-efficacy throughout good results and in addition, they located self-efficacy favorably linked using good results.

Among students from elementary schools, gender is a major factor for the success and the failure. Females mostly attained their successes by effort, while males gained successes by ability (Ryckman & Peckman, 1987). Betz & Hackett (1981) and Post-Kammer & Smith (1991) expressed that various studies shown that for typical female occupations females had greater self-efficacy to complete educational requirements and job duties. Many researchers have found that negative attitudes and low level of self-efficacy are the aspects that partly result persistent under account of woman and minorities in professional occupation (Lent, Brown & Larkin 1986 and Post, Stewart & Smith, 1991).

1.1 Research Questions

Q1: How cognitively do secondary school students of public schools covenant with their learning program?

Q2: How do secondary school program compassionate in budding self-efficacy among students?

Q3: What are the impacts of students' parents' education and job status on their self-efficacy?

2. Methodology

This study concerned quantitative statistics investigation and was explanatory in character. Survey method was used to collect information and associations among variable such as self-efficacy which affected the achievement of science students.

2.1. Population of the Study

The population of the study consisted of all secondary school male and female in district Okara of Punjab province. These students were studying Physics, Chemistry, Biology/ Computer science and Mathematics as science subjects at secondary level. Secondary level is the mainly vital period during the studious period of students as this phase escorts them towards their prospect studious as well as certified profession (Govt. of Pakistan, 1998).Further, learners at secondary school are fully developed and they have new connections with the discipline of science than scholars at middle stage (Govt. of Pakistan, 1998). It was assumed that secondary school science students have urbanized more self-efficacy in science than students at middle stage. So they were in superior situation to answer to the tool of self-efficacy and its effect on student's achievement in science.

2.2. Sample of the Study

Multistage procedure was used (Tashakkori and Teddlie 2003) since it involves "*selecting a relatively large number of units from a population, or from specific subgroups (strata) of a population, in a random manner where the probability of inclusion of every member of the population is determinable*" (p. 713).Three tehsil were divided into two stratum on the basis of locality i.e., urban and rural schools. Each echelon was further subdivided into two substrata on the basis of gender i.e., male and female schools. Two schools were selected arbitrarily from each substratum in the tehsils Total numbers of schools selected for the sample of the study was 24 schools, 08 schools from each tehsil.

One science class was selected randomly from each school. The students integrated in illustration were appearing in Secondary School Certificate Examination 2016 of Board of Intermediate & Secondary Education Sahiwal in Punjab province. The *Self-Efficacy Questionnaire for Children (SEQ-C)* along with Demographic Information Proforma were administered on 811 students selected from 24 schools of three tehsils (Okara, Renal Khurd, and Depalpur). Achievement refers to students' achievement scores obtained in 9th class Board examinations in the subjects of Physics, Chemistry, Biology/Computer Science and Mathematics.

2.3. Data Collection and Analysis

Quantitative data was collected by administering a questionnaire Self-Efficacy Questionnaire for Children (SEQ-C) (Muris, 2001). It was adapted in the present study to quantify secondary school students' self-efficacy. *Self-Efficacy Questionnaire for Children* (SEQ-C was translated into Urdu language by three language and content experts. These translations were measured up to each other. After obtaining the

authorization of experts, the Urdu translated version was used for pilot study on 150 secondary school science students of public secondary schools in district Okara. *Questionnaire for Children (SEQ-C)* was determined by calculating Cronbach Alpha Reliability Coefficient. This value was found α =.831. The reliability coefficients were also calculated for each subscale of *Self-Efficacy Questionnaire for Children (SEQ-C).* SEQ-C –Emotional, SEQ-C –Social, SEQ-C –Academic, 0.559, 0.799, 0.618. The Alpha reliability value for the final *Self-Efficacy Questionnaire for Children (SEQ-C)* was α = 0.91.After the entry of data; it was analyzed by Statistical Package for Social Sciences (SPSS) version 21

3. Results

3.1. Descriptive statistics

Table1: Demographic Characteristics

Variable	N	Percentage
Gender		
Male	403	49.3
Female	408	50.7
Age		
13-15	703	86.7
16 & above	108	13.3
Locality		
Okara	263	32.4
Renala	257	31.7
Depalpur	291	35.9

Findings reveal that female students are 50.7% in the present study. Most of the students (86.7%) are between 13 years to 15 years of age, and tehsil Depalpur represents 35.9 % of sample.

Table 2: Students' Academic Self-Efficacy

Sr	Statement	Mean
	Academic self-efficacy	
1	How well can you get teachers to help you when you get stuck on schoolwork?	3
2	How well can you study when there are other	2.78
3	How well can you study a chapter for a test?	2.1
4	How well do you succeed in finishing all your work?	1.9
5	How well can you pay attention during every lecture?	1.7
6	How well do you succeed in understanding all?	2
7	How well do you succeed in satisfying your parents?	1.9
8	How well do you succeed in passing a test?	2.5
	Academic Self-efficacy	3.576

Findings reveal that students support the idea that they follow the teachers and ask for help in case of problem, they do not have to think too much. In contrast, the learners oppose the statements that they can study a chapter for test. Even students do not show much attention during lecture with mean score 1.7. The mean score of 3.576 for the academic self-efficacy demonstrates that, accumulatively, the students have good academic self-efficacy (Table 2).

Table 3: Students' Social Self-Efficacy

Sr#	Statement	Mean
	Social Self-Efficacy	
1	How well can you express your opinions when other classmates disagree with you?	3
2	How well can you become friends with other?	2.77
3	How well can you have a chat with an unfamiliar person?	2
4	How well can you work in harmony with your classmates?	3
5	How well can you tell other children that they are doing something that you don't like?	1.77
6	How well can you tell a funny event to a group of children?	1.55
7	How well do you succeed in staying friends with other children?	3
8	How well do you succeed in preventing quarrels with other children?	2
	Social Self-Efficacy	3.818

Data further shows that the students support the idea of promoting students' social self-efficacy through their studies. Mean scores of 3, 2.77, 3,3 and 2 for the five statements of the social self-efficacy reveal the respondents' strong agreement in this regard (Table 3). Only two statements have mean less than 2.The five statements demonstrate that the secondary school students support the idea of social self-efficacy. Social self-efficacy is also considered necessary for success in examinations. The mean score representing the students' responses on the entire construct "Social self-efficacy" is 3.81. It supports the notion that social self-efficacy is an important part of students' achievements.

Table 4: Students' Emotional Self-Efficacy

Sr#	Statement	Mean
	Emotional Self-Efficacy	
1	How well do you succeed in cheering yourself up when an unpleasant event has happened?	1.33
2	How well do you succeed in becoming calm?	3.67
3	How well can you prevent to become nervous?	2.23
4	How well can you control your feelings?	1.77
5	How well can you give yourself a pep-talk when you feel low?	1.77
6	How well can you tell a friend that you don't feel well?	2
7	How well do you succeed in suppressing unpleasant thoughts?	2
8	How well do you succeed in not worrying about things that might happen?	1.33
	Emotional Self-Efficacy	2.021

Findings demonstrate that the mean scores of students' responses on the four statements of the construct "emotional self-efficacy" are 3.67, 2.23, 2, and 2, other four statements mean score less than 2 (Table 4). It shows that secondary school students have less emotional self-efficacy. The mean score revealing the respondents' emotional self-efficacy is 2.021. It shows a normal emotional self-efficacy among the secondary school students.

Table 5: Three Levels of self-efficacy in secondary school students

	Academic	Social	Emotional
Mean score	3.57	3.81	2.02

Comparison among the student' responses in the subscales demonstrate that the majority of them have good academic self-efficacy. Data reveal that the social self-efficacy in curricular designs of 1oth grade programs is stronger than promoting academic and emotional self-efficacy (Table 5). The students avoid making decisions on the basis of emotional self-efficacy. The presence of emotional self-efficacy among the learners is lower than academic and social self-efficacy.

Table 6: Impact of parents' Employment Status on students' self-efficacy

Subscale	Status	N	Mean	T	M.D
Academic	Govt. Employed	203	2.32	-3.248*	-0.167
	Private Employed	608	2.48		
Social	Govt. Employed	203	3.30	-3.320*	-0.144
	Private Employed	608	3.44		
Emotional	Govt. Employed	203	3.37	-0.447*	-0.021
	Private Employed	608	3.39		

Note: *N* = sample size, *t* = *t* value, M. D. = mean difference,*the value is significant at the level of 0.001

The secondary school students studying in schools their parents had government employment and private as well. To find out the impacts of students parents' employment status on their self-efficacy, *t* test was applied. Findings demonstrate that the *t* values of -3.248, -3.320 for academic self-efficacy and social self-efficacy respectively are significant at the level of 0.001 (Table 6). However, the *t* value for the emotional self-efficacy is insignificant.

Table 7: Impact of parents' Education Status on students' self-efficacy

Subscale	education	N	Mean	T	M.D
Academic	Matric/Inter	233	3.46	4.109*	0.176
	Bachelor/Master	578	3.28		
Social	Matric/Inter	233	3.27	-3.698*	-0.150
	Bachelor/Master	578	3.42		
Emotional	Matric/Inter	233	2.39	-0.116*	-0.004
	Bachelor/Master	578	2.34		

Note: N = sample size, t = t value, M. D. = mean difference, *the value is significant at the level of 0.001

Findings reveal (table7) that the *t* value showing the effect of students' parents' previous education on their emotional self-efficacy is insignificant. However, the *t* values to demonstrate the impacts of previous education of students on their academic and social are 4.109, -3.698. These values are significant at the level of 0.001. The *t* values and mean differences show that the impact of students 'parents' previous education is positive on the subscales of academic and social self-efficacy, whereas it is negative on the scale emotional self-efficacy.

Table 8: Difference of total self-efficacy among male a and female respondents

Gender	N	Mean	SD	DF	T	Sig
M	403	1.98	1.222	185	2.039	0.043
F	408	1.64	1.064			

The result in Table 8 showed that there was significant differences in self-efficacy of male and female students of secondary school, males were upper (M = 1.98, SD = 1.222) and females were lower (M = 1.64, SD = 1.064), [t (185) = 2.039, P = 0.043, two tailed]. Male student had better self-efficacy than females.

4. Discussion

The research showed that educational self-efficacy has a brawny, straight association with educational accomplishment and tortuous association via negligence. As projected,

educational self-efficacy had a brawny connection with educational achievement. This is in line with earlier study that has confirmed that youthful people who trust in their competencies to work out manage over their learning achievement, attain good results academically than competitors who have low level effectual attitudes in their educational quests. (Bandura et al., 1996, 2001; Chemers et al., 2001; Greene et al., 2004; Multon et al., 1991; Robbins, Lauver, Le, Davis, Langley, & Carlstrom, 2004; Wood & Locke, 1987)

Present research work shows a brawny upbeat association between self-efficacy and academic achievement. It is very important for the schools to perk up their student's self – efficacy, they can advance the studious achievement of their learners.

Impacts of students' parents' employment status and their education on responses were examined to further explore the promotion of self-efficacy. The employment status of the parents has medium size effects on their children's self-efficacy. The impact of parents' employment status on their self-efficacy is insignificant. Viewpoints of government employed and private employed parents' children are significantly varied on the three subscales of SEQ. The private employed parents' children demonstrate stronger self-efficacy. It can be assumed that private employed parents can spend more time on their children studies than their government employed fellows.

This study calculated the levels of self-efficacy of the partaker appeared secondary school examination. Outcomes illustrated that there were sex variation in the heights of self-efficacy. Female students have lesser self-efficacy contrast to male students (Pintrich and De Groot (1990)), this study also showed that boys reported upper levels of self-efficacy than girls.

These results are in support with the self-efficacy hypothesis, which affirms that a character's effort tasks, in which he considers he is excellent at, are really very expected to become successful. The learners who confirm superior self-efficacy are more victorious with their educational achievement than the fewer doing well students who are unenthusiastic to believe tasks they consider as too hard due to lack of credence and capacities for achievement. Pajares (2000) in a meta-analysis of 39 studies from 1977 to 1988 reveals that self-efficacy; academic achievements were positively and statistically related to one another for numerous aspects/fields. (Multon, Brown and Lent 1991)

Overall, the results of this study show that the perception of school students have about their competencies powers their studious recital and their determination to maintain a good result that allows them to carry on in their selected course of study. This study supplementary supports other research that academic self-efficacy is definitely related with good academic results. (Bong, 2001; Pajares & Schunk, 2001;

Zimmerman, 2000). The research findings from the current study show that self-efficacy beliefs affect academic success as well as self-efficacy levels differ regarding gender, locality, mother tongue and tehsil. So, above discussion proved that self-efficacy is positively correlated with the achievement of students in science.

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5. Conclusions

The current study examined the effect of self-efficacy on students' achievement in science on the basis of Albert Bandura' theory of self-efficacy. It is concluded that the 1oth grade students are mature to respond their perceptions. It is important that there is evidence of support for less emotional self-efficacy in students.

It is also concluded those students 'parents' employment status and qualifications have significant impacts on their self-efficacy. The private employed parents' children are comparatively stronger in their self-efficacy than government employed parents' children

A major contribution of the current study is its evidence-based authentication that secondary school students have stronger academic and social self-efficacy than emotional self-efficacy.

6. Recommendations

The current study recommends assimilating content in secondary school curricular designs that is strongly supportive in developing emotional self-efficacy among the students. A study should be carried out on the effect of secondary school teachers' self-efficacy on students' self-efficacy.

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