The personality and academic achievement

ASSIGN BUSTER

ABSTRACT

Chemistry achievement is one of the major interests of educators. Educational psychologists have been always concerned to identify the factors that affect students' achievement. The emphasis continued to change and shift from one aspect to the other from time to time. The purpose of this study is to determine the effect of student's personality and attitude on Chemistry achievement. Data were collected by self-prepared survey instrument. The opinions of personally approached 780 secondary school students of government, semi-government and private school sectors were surveyed through stratified random sampling. Data was analyzed by calculating mean, and by applying one way ANOVA. The results revealed that Gender, Family Type, School sectors, Parents Education, and Choice of Course have significant effect on chemistry achievement. Findings of study also revealed that out of five sub-factors of personality, the two sub-factors (Conscientiousness and Openness to Experience) effect significantly on students having 50-80% marks achievement in chemistry. From 81-90% the significant determinant of chemistry achievement is the sub-factor Achievement Motivation and above 90% marks the significant predictor of Chemistry Achievement is sub-factor Motivation. The research will benefit Educators, Curriculum developers, Teacher, Parents and students. Findings of the factors influencing academic achievement will help educators to develop fair academic curricula that can compensate for known weaknesses a student might carry in the classroom, and those that can nurture a student's strengths.

Keywords: Attitude towards chemistry; Personality traits; Chemistry Achievement; Openness to experience; Conscientiousness; Motivation; Achievement Motivation.

Introduction

Academic achievement represents the understanding of the student about different concepts and skills developed in different subjects. In most of the countries, parents usually desire that their children show high level of academic achievement which sets a lot of burden on children, teachers, schools and in general the whole education system. Thus the whole education system revolves round the academic achievement of students so, the schools set a lot of time for helping students to achieve high grades. Academic achievement may be influenced by different factors like intelligence, study habits, and attitudes of students, socio economic status, motivation, opportunities, and different characteristics of their personality. Academic achievement is considered as a core standard to measure students' total potential and capabilities of learning. Hence academic achievement occupies a very vital place in our education as well as in the learning process.

Achievement is the major outcome of education, the level to which a student, teacher has accomplished their educational goals. According to Crow and Crow (1964) academic achievement is reflected by the extent to which a skill or knowledge has been acquired by a person from the training imparted to him. Previous studies in science education revealed that students at all levels struggle to learn chemistry, but most of them remain unsuccessful (Herron, 1975; Nakhleh, 1992; Sawrey, 1990). Knowledge of

the factors that influence academic success has important implications for learning and education. Academic success is strongly influenced by individual differences in personality and attitude.

Literature Review

Personality and Academic Achievement:

Personality is the basic area of study for psychologists. Hall and Lindzey (1991) state that personality may be defined in terms of characteristics or abilities, that are highly representative of an individual and is an important part of the overall impression created on others. According to Pervin, and John (2005) Personality comprises of unique set of characteristics that define an individual feelings, way of thinking, and behavior. Personality is a person set of relatively stable characteristics that account patterns of behavior, in various situations each individual in some ways is different and in some ways is unique. There is much concern about the science achievement of the students in high schools recently. Accordingly a strong emphasis is currently placed on improving the quality of science education (Morrel & Lederman, 1998).

A widely used personality model, McCrae and Costa's NEO Five Factor Model, or " Big Five Model" (1990), comprises of Extraversion, Neuroticism, Conscientiousness, Openness to Experience and Agreeableness.

Recent studies show that Big Five traits measurement is powerful enough to explain a moderate percentage of the variance in academic achievement (Blickle, 1996; Rolfhus & Ackerman, 1999). The relationship between Extraversion and academic achievement shows that Extravert students

perform better in primary schools where as introverts perform well in secondary schools and university (Eysenck & Cookson, 1969). Introverts are benefited in written exams, while extraverts have an advantage in oral exams (Chamorro- Premuzic & Furnham, 2003a; Furnham & Medhurst, 1995).

Table 2. 1: Characteristics of Big Five Personality Traits

Big five traits

Characteristics

Sample Items

Extraversion

Impulsive, Ambitious, Social,

Caring, optimistic, Confident

I learn more through cooperating and discussing with my classmates.

Agreeableness

Friendly, helping, trusting,

Kind, Cooperative

Kindhearted, Supportive.

I realize that helping my classmates in chemistry benefits me.

Conscientiousness

Hardworking, Motivated,

well organized, dutiful,

achievement-oriented

I strive to achieve excellence in everything I do.

Neuroticism

Nervous, Sensitive,

disturbed, confuse, distract

I cannot understand the imaginary concept of Chemistry.

Openness to Experience

Open-minded, Inventive,

Curious, Imaginative, Innovative

I am always willing to accept the new experiences of Chemistry.

Neuroticism is the condition of fear, nervousness in stressful conditions i. e., exams (Hembree, 1988; Siepp, 1991). Neuroticism leads to poor self-concept (Wells & Matthews, 1994) and low self-estimated intelligence (Furnham, Chamorro-Premuzic, and Moutafi, under review). Chamorro-Premuzie and Furnham (2003) found that Neuroticism may impair academic achievement or has no significant associations with academic achievement (Puklek Levpu[scaron] [caron] ek & Zupan[caron] i[caron] 2009a). Openness to experience is significant predictor of academic achievement(Bratko et al.,

2006; Laidra et al., 2007). Openness to experience and agreeableness are positively related to academic achievement (Lounsbury et al., 2003; Farsides & Woodfield, 2003). Researchers have shown significant associations between Conscientiousness and academic achievement in school (Noftle & Robins, 2007) because careful, organized, hardworking, and achievement-oriented students may expect to succeed in academic settings.

Attitude and Academic Achievement

Osborne et al. (2003) state that attitudes are the feelings, beliefs, and values held about an object, in terms of chemistry may be enthusiasm about chemistry, perceptions of chemistry, and the contribution of chemistry to society or scientists. Thus attitude play a vital role in fostering long-lasting learning and to determine students' academic achievement. Affective characteristics are considered as an important domain of attitude so in this study we select seven affective characteristics that are motivation, interest, confidence, enjoyment, importance, anxiety and achievement motivation.

Table. 2. 2: Characteristics of Affective Domain of Attitude

Scale

Description

Sample Item

Enjoyment

Fascinating, Exciting, Fun, Interesting, Attractive, Captivating

Chemistry lessons are interesting and fun to study.

Anxiety

Worry, Nervous, Fear, Confuse, Uncomfortable

Chemistry usually makes me feel uncomfortable, nervous and confused.

Importance

Useful, beneficial, Advantageous, Helpful, Aware

Chemistry is useful if the topics are connected with our daily life.

Interest

Aware, Curious, Like,

I am interested to know about the new researches in chemistry.

Motivation

Inspiration, Reinforcement, Stimulation, Encouragement

When I fail in Chemistry course, it encourages me to try much harder to do well in Chemistry.

Confidence

Success, Sureness, Sef-reliance

I am sure I can learn and can do advance work in Chemistry

Achievement Motivation

Extent to which students are motivated to achieve their goals.

I get good grades in Chemistry than any other subject.

An examination of literature on attitude and chemistry achievement reveals conflicting results (Shibley et al., 2003; Turner and Lindsay, 2003). While some claim a low correlation between attitude and achievement, others claim the two are strongly positively correlated. Wei-nburgh's (1995) meta-analysis of the research suggests that there is only a moderate relation between attitude and achievement.

Previous researches show the effect of affective characteristics of attitude on academic achievement. Skaalvik and Rankin (1995), Egitimidergisi, (2007) found that motivation is correlated with academic achievement. Academic achievement is most likely to occur when learning is self-directed and students are motivated (Ryan, Connell, & Deci, 1985). Furthermore, researchers have found that motivation leads to engagement in academic tasks, which is related to achievement (DeCharms, 1984; Dweck, 1986). Interest is an individual predisposition and a psychological state of mind, which is important for cognitive engagement, learning, and achievement (Ainley, Hidi, & Berndorff, 2002; Pintrich & Schunk, 2002). Krapp approach interest in two different point of views, Personal and situational interest. Personal interest is topic-specific, persists over time (Schiefele 1991). However, situational interest is aroused as a function of the interestingness of the event or object and it is also changeable and partially under the control of teachers (Schraw, Flowerday, & Lehman 2001). Interest is related to students' devotion, goals, and depth of learning (Hidi & Renninger, 2006). Interests increase when students feel competent, so even if students are not initially interested in a subject or activity, they may develop interests as they

experience success. (Stipek, 2002). Whitfield (1979) reported chemistry and physics as the least enjoyable subject. Analysis indicates that there is significant mean difference between Grade 9 and Grade 10 students' attitudes toward chemistry as a school subject on " enjoyment" and " importance" dimensions (Can & Boz, 2012). Achievement motivation is correlated with academic achievement (Camara, 1986). Individuals' academic achievement depends not only on their motivation to achieve but also on whether they expect to achieve and whether they fear failure. Students' work hard when they perceive a reasonable chance to succeed than when they perceive a goal to be out of reach (Atkinson, 1964).

Demographics (Gender, School Sector, Parents Qualification, Choice of Course) and Academic Achievement:

Previous studies demonstrate that achievement in science is gender dependent. Male and female students' achievement in science is significantly correlated (Schibeci and Riley 1986, Weinburgh 1995). Previous research revealed that boys outperform girls in science in most countries (Pinchas 1988, Wang & Staver 1995). Gender differences in science achievement test scores have not typically been large when compared. However, recent studies on gender differences in science achievement reported a change in pattern, thus reporting either no gender differences (Ventura 1992, Calsambis 1995) or girls outperforming boys in science (Young and Fraser 1990, Soyibo 1999). Fraser-Abder (1990) investigated the effects of gender, school-type (single-sex or coeducational schools, private denominational or government schools), parental occupation, and socioeconomic status on science achievement in Trinidad. Fraser-Abder found that girls scored

significantly higher than boys on the science test. Zappala (2002) argue that the type of school a child attends influences academic achievement. Schools according to Sentamu (2003) are social institutions in which groups of individuals are brought together to share educational experiences and such interactions may breed positive or negative influences on learners. Parents' education is positively related to students' academic achievement. This is supported by Dills (2006) and Owens (1999). Considine and Zappala (2002) Kwesiga (2002) reveal that School sector (public or private) is linked to academic performance of students.

Parents who scaffold learning experiences and provide support to their children when needed early in children's lives may prepare their children for school entry and provide basis for them to benefit from educational activities (Pianta & Egeland, 1994; Pianta et al., 1990; Pianta et al., 1997). Parents own behavior as well as joint family activities have been shown to influence children's academic motivation and behavior (Chen, Lee & Stevenson, 1996; De Garmo, Forgatch & Martinez, 1999; Grolnick & Slowiaczek, 1994; Heiss, 1996). Authoritative parenting, has positive effects on how students approach the demands they face in school (Bradley et al., 2000; Gutman & Eccles, 1999).

Interest and attitude of learners towards the subject plays a decisive role for the success of the learner. Students choose course by their interest are believed to be highly motivated to learn than students placed in a department without their interest. High motivation is a factor which can lead students to a better achievement. Studies done by different authors disclosed that motivated students perform better academically than

unmotivated ones (Bank and Finlapson, 1980; Broussard and Garrison, 2004; Sandra, 2002).

Significance of the Study

Attitude towards Chemistry and personality traits vary over time and effect academic achievement of students in different ways. Previous studies show that attitudes and personality towards Chemistry achievement are cultural dependent. Culture varies between and within countries. Therefore, it is reasonable to assume large number of variations in students achievement in chemistry reported from different parts of the world. Gender role varies in different cultures; it is therefore likely that chemistry achievement is gender dependent. Chemistry achievement is one of the major interests of educators. Although being not very frequent affective characteristics are studied together with personality and achievement in chemistry education. However studies based on Affective Characteristics and Achievement or on Personality and Achievement is found separately but combine study of all these three factors is not found in chemistry education. Prior research has established that both personality traits and attitude are associated with academic achievement. However, not much is known about the joint influence of personality traits and attitude on learners' Chemistry academic achievement. In the current study, researcher sought to fill in this gap in the literature by directly examining the relationship between personality, attitude and academic achievement.

Three major research questions were investigated: (1) what is the relationship between secondary school science students ' Big 5 personality traits and affective characteristics of attitude on their Chemistry academic

achievement? (2) How demographic factors (age, gender, family type, school sector, choice of course and educational levels of parents) influence Chemistry academic achievement of secondary school science students. (3) Are the Affective Characteristics of Attitude depends on each other?

Methods

Development and Validation of Instrument

To investigate the aim of this study, the first step was to develop a valid and reliable questionnaire for measuring students' personality trait and attitudes toward chemistry achievement. Rather than translating an attitude and personality questionnaire among those available in literature, we constructed a new questionnaire, in order to be more relevant to the curriculum and conditions applied in the Pakistan schools. The questionnaire was prepared on the basis of Likert scale type. It was prepared by keeping in view different aspects of the problem.

All participants completed a 37-statement investigator-developed questionnaire. The Questionnaire includes six demographic variables as well as two factors (Personality & Attitude). Six demographic variables are included that elicits respondents' background information.

All participants were asked to rate each item using a five-point scale where a ' 5' represented ' strongly agree' and a ' 1' represented ' strongly disagree.' The ratings for all statement on each scale are summed, and a higher score indicates more obvious trait characteristics. All items were written in a ' structured alternative format' design to reduce the tendency to give socially desirable responses (Harter, 1982). The pilot testing was done on a sample

of 50 students. The reliability of the research instrument was 0. 84 and level of difficulty of questionnaire was moderate.

Procedures

The authors obtained authorization from school administrators to conduct the study. Through individual meeting communications were provided to the school counselors (or classroom teachers) to explain the purpose of this study and the research instrument. Students were recruited through voluntary participation. There were 780 students who participate in this study. The investigators administered the Questionnaire to consenting students either during classes. Before administering the survey, the purpose of the study and the procedures to complete the Questionnaire were explained to the students. Students' understanding of the survey was verified and questions about the survey were answered.

Data Analyses

Quantitative analysis was performed with the help of SPSS (Statistical Package for Social Sciences). Mean and one way ANOVA was applied on the data to investigate questionnaire

in terms of personality traits and attitudes toward chemistry.

Effect of Gender and Family Type on Students' Chemistry Achievement

Figure 1 illustrates a significant effect of Gender and Family Type on students Chemistry Achievement. Figure indicates that Male students have the mean value 3. 66 and are high achievers in chemistry as compare to

female students having mean value 3. 60, while students belongs to “ Nuclear Family” have the mean value 3. 65 and are high achievers in chemistry as compare to students who belongs to “ Joint family” system having mean value 3. 62.

Figure 1: Mean values of “ Class”, “ Gender” and “ Family Type” on the basis of secondary school students “ Chemistry Achievement”.

Effect of School Sector on Students’ Chemistry Achievement

Figure 2 shows a significant effect of School Sector on students Chemistry Achievement. Figure indicates that the “ Private school” show highest mean value 4. 14 of “ Chemistry Achievement” while the “ Government School” show lowest mean value 2. 78 of Chemistry Achievement and “ Semi-Government School” show moderate mean value 3. 98 of Chemistry Achievement.

Figure 2 shows Mean values of “ School Sector” on the basis secondary school students “ Chemistry Achievement”.

Effect of Father Qualification on students’ Chemistry Achievement

Figure 3 indicates that the students whose “ Father qualification” is “ Masters” show highest mean value 4. 17 of “ Chemistry Achievement” and the students whose fathers are ” Uneducated” show lowest mean value 2. 34 of Chemistry Achievement as compare to the students whose father qualifications is “ Matric”, “ Intermediate”, “ Graduation” and “ Masters”. Figure 3 illustrates a positive significant effect of Father Qualification on secondary school students Chemistry Achievement.

Figure 3 shows Mean values “ Father Qualification” based on secondary school students “ Chemistry Achievement”.

Effect of Mother Qualification on Students’ Chemistry Achievement

Figure 4 indicates that the students whose mother qualification is “ Masters” show highest mean value 4. 21 of “ Chemistry Achievement” and the students whose mothers are ” Uneducated” show lowest mean value 2. 37 of Chemistry Achievement as compare to the students whose mother qualifications are “ Matric”, “ Intermediate”, “ Graduation” and “ Masters”. Figure 4 illustrates a positive significant effect of Mother Qualification on secondary school students Chemistry Achievement.

Figure 4 shows Mean values of “ Mother Qualification” on the basis of Secondary School students “ Chemistry Achievement”.

Effect of Choice of Course on Students’ Chemistry Achievement

Figure 5 illustrates a significant effect of Choice of Course on Students Chemistry Achievement. Figure indicates that the students who choose chemistry for “ Better Academic Accomplishment” show highest mean value 3. 93 of “ Chemistry Achievement” and the students who choose chemistry “ Out of Interest” show lowest mean value 3. 36 of “ Chemistry Achievement”.

Figure 5 shows Mean values of “ Choice of Course” based on secondary school students “ Chemistry Achievement”.

Sum of Squares

(df)

Mean Square

F-values

(p-values)

Post hoc

(p-values)

51%-60%Vs. 61%-70%

51%-60%Vs. 71%-80%

91%-100%Vs. 50% & below 50%

91%-100% Vs. 51%-60%

91%-100% Vs. 61%-70%

91%-100% Vs. 71%-80%

Extraversion

Between group

2. 445

(5)

0. 489

1. 136

(0. 340)

Within group

333. 101

(774)

0. 430

Agreeableness

Between group

5. 249

(5)

1. 050

2. 196

(0. 053)

Within group

369. 982

(774)

0. 478

Conscientiousness

Between group

8. 395

5

1. 679

4. 180

(0. 001)

-0. 2453

(0. 015)

-0. 2992

(0. 001)

Within group

310. 866

(774)

0. 402

Neuroticism

Between group

4. 343

(5)

0. 869

1. 485

(0. 192)

Within group

452. 680

(774)

0. 585

Openness to Experience

Between group

10. 273

(5)

2. 055

3. 661

(0. 003)

-0. 55686

(0. 009)

-0. 34645

(0. 048)

-0. 31730

(0. 042)

-0. 38241

(0. 005)

Within group

434. 327

(774)

0. 561

-0. 15460

(0. 017)

Personality

Between group

2. 616

(5)

0. 523

3. 044

(0. 010)

Within group

133. 024

(774)

0. 172

Table 3: One way ANOVA and Tukey post hoc for multiple comparisons of " Chemistry Achievement" on secondary school students' " Personality trait"

Effect of Personality Traits on Students' Chemistry Achievement

Table 3 indicates that there is no significant effect of secondary school student's Personality trait " Extraversion", " Agreeableness", " Neuroticism" on " Chemistry Achievement".

Table 3 also reveals that there is significant effect of secondary school student's Personality trait " Conscientiousness" on " Chemistry Achievement". From the Tukey Post Hoc Test of Multiple Comparisons reveals that the students who got marks 61%-70% and 71%-80% show more " Conscientiousness" that the students who got 51%-60% marks.

Table 3 also specifies that there is significant effect of secondary school student's Personality trait " Openness to Experience" on " Chemistry Achievement". Tukey Post Hoc Test of Multiple Comparisons reveals that the students who got marks 50% & below 50%, 51%-60%, 61%-70% and 71%-

80% show more “ Openness to Experience” than the students who got 91%-100% marks.

Table 3 also illustrates that there is significant effect of secondary school student’s “ Personality” on “ Chemistry Achievement”. Tukey Post Hoc Test of Multiple Comparisons reveals that the students who got marks 71%-80% show more “ Personality” than the students who got marks 51%-60%.

Sum of Squares

(df)

Mean Square

F-values

(p-values)

Post hoc

(p-values)

81%-90% Vs. 51%-60%

81%-90%Vs. 61%-70%

91%-100%Vs. 50% & below 50%

91%-100% Vs. 61%-70%

91%-100% Vs. 71%-80%

Interest

Between group

3. 199

(5)

0. 640

0. 857 (0. 510)

Within group

577. 815 (774)

0. 747

Motivation

Between group

12. 250 (5)

2. 450

3. 923 (0. 002)

-0. 61783

(0. 005)

-0. 33498

(0. 042)

-0. 36734

(0. 015)

Within group

483. 388 (774)

0. 625

Enjoyment

Between group

5. 923

(5)

1. 185

1. 197 (0. 309)

—

Within group

766. 010 (774)

0. 990

Confidence

Between group

4. 141 (5)

0. 828

1. 790 (0. 112)

Within group

358. 069 (774)

0. 463

Importance

Between group

2. 379 (5)

0. 476

0. 832 (0. 527)

—

)

Within group

442. 382 (774)

0. 572

Anxiety

Between group

5. 907 (5)

1. 181

1. 419

(0. 215)

Within group

644. 330 (774)

0. 832

Achievement Motivation

Between group

12. 150 (5)

2. 430

3. 637

(0. 003)

0. 36081

(0. 015)

0. 28473

(0. 033)

Within group

517. 194 (774)

0. 668

Attitude

Between group

1. 168 (5)

0. 234

0. 671

(0. 646)

Within group

269. 496 (774)

0. 348

Table 4: One way ANOVA and Tukey post hoc for multiple comparisons of “ Chemistry Achievement” on secondary school students’ “ Affective Characteristics of Attitude”

Effect of Attitude on Students’ Chemistry Achievement

Table 4 also indicates that there is no significant effect of secondary school student’s “ Interest”, “ Enjoyment”, “ Confidence”, “ Importance”, and “ Anxiety” of Chemistry lessons.

Table 4 indicates that there is significant effect of secondary school student’s “ Motivation” towards Chemistry on “ Chemistry Achievement”. Tukey Post Hoc Test of Multiple Comparisons it is evident that the students who got

marks 91-100% show more “ Motivation” as compare to students who got 50% & below 50%, 61%-70% and 71%-80% marks.

Table 4 illustrates that there is significant effect of secondary school student’s “ Achievement Motivation” towards Chemistry on “ Chemistry Achievement”. Tukey Post Hoc Test of Multiple Comparisons revealed that there is significant effect of secondary school student’s “ Achievement Motivation” on “ Chemistry Achievement”. The students who got marks 81%-90% show more “ Achievement Motivation” than the students who got 51%-60% and 61%-70% marks. Table indicates that there is no significant effect of secondary school student’s “ Attitude” towards Chemistry on “ Chemistry Achievement”.

Inter-relationship between different sub-factors of affective attitude

Variable

r- value

Sig.

Enjoyment and Interest

0. 765

0. 000

Interest and Motivation

0. 694

0. 000

Interest and Confidence

0. 623

0. 000

Interest and Importance

0. 574

0. 574

Interest and Anxiety

0. 031

0. 389

Interest and Achievement Motivation

0. 666

0. 000

Motivation and Enjoyment

0. 566

0. 000

Motivation and Confidence

0. 824

0. 000

Motivation and Importance

0. 476

0. 000

Motivation and Anxiety

0. 014

0. 687

Motivation and Achievement Motivation

0. 464

0. 000

Confidence and Importance

0. 500

0. 000

Confidence and Anxiety

0. 009

0. 793

Confidence and Achievement Motivation

0. 445

0. 000

Importance and Anxiety

0. 008

0. 834

Importance and Achievement Motivation

0. 407

0. 000

Anxiety and Achievement Motivation

0. 196

0. 000

Table 1 shows that r-ratio (0. 765) SO, there is strong positive relationship between secondary school student’s “ Interest” in chemistry and student’s “ Enjoyment” in learning chemistry lessons. r-ratio (0. 694) indicates strong positive relationship between secondary school student’s “ Interest” in chemistry and student’s “ Motivation” in learning chemistry lessons. r-ratio (0. 623) illustrate the strong positive relationship between secondary school student’s “ Interest” in chemistry and student’s “ Confidence” in learning chemistry lessons. r-ratio (0. 574) is not significant at pâ‰¤0. 05 level of

significance and there is no significant relationship between secondary school student’s “ Interest” in chemistry and they do not know the “ Importance” of chemistry lessons. r-ratio (0. 031) is not significant at pâ‰¤0. 05 level of significance so, there is no significant relationship between secondary school students “ Interest” in chemistry and their “ Anxiety” about chemistry lessons. r-ratio (0. 666) illustrate the strong positive relationship between secondary school student’s “ Interest” in chemistry and student’s “ Achievement Motivation” about chemistry lessons.

Table 1 also shows that r-ratio (0. 566) shows the moderate positive relationship between secondary school student’s “ Motivation” about chemistry and student’s “ Enjoyment” of chemistry lessons. r-ratio (0. 824) represents strong positive relationship between secondary school student’s “ Motivation” about chemistry and student’s and “ Confidence” about chemistry lessons. r-ratio (0. 476) shows the intermediate positive relationship between secondary school student’s “ Motivation” about chemistry and “ Importance” of chemistry lessons. r-ratio (0. 014) is not significant at pâ‰¤0. 05 level of significance So, it is evident that there is no significant relationship between secon