



RESEARCH PAPER

Effect of Students Attitude towards Technology on their Academic Achievement

Dr. Tariq Hussain¹ Khalid Mahmood² Dr. Abida Nasreen³

1. Assistant Professor, Department of Technology Education, IER, University of the Punjab Lahore, Punjab, Pakistan
2. Visiting Faculty, Department of Technology Education, IER, University of the Punjab Lahore, Punjab, Pakistan
3. Associate Professor, IER, University of the Punjab, Lahore, Punjab, Pakistan

PAPER INFO

Received:
February 14, 2017
Accepted:
June 24, 2017
Online:
June 30, 2017

Keywords:
Attitude
towards
technology,
Academic
Achievement,
and Technical
Education

**Corresponding
Author:**

tariqedu71@yah
oo.com

ABSTRACT

The purpose of the study was to investigate effect of students' attitude towards technology on their academic achievement in technical education. Data was collected from 3338 respondents of final year students of Civil, Electrical and Mechanical technologies. To measure attitude towards technology Pupils' Attitudes towards Technology (PATT) USA instrument was adapted. Validity and reliability were re-established on the revised instrument. The achievement scores of students were obtained from the annual examination results of the Punjab Board of Technical Education. Data were analyzed with the help of Statistical Package of Social Sciences (SPSS-15). Regression analysis was also used to investigate the effect of students' attitude towards technology on their academic achievement. Results showed that students with higher level of attitude towards technology reflected higher academic achievement in technical education while students with lower level of attitude towards technology scored lower marks in technical education. The present study established that respondents' overall attitude towards technology significantly affect their academic achievement. It is recommended that all the stakeholders should considered the students' attitude towards technology while planning and implementing the technology education programs

Introduction

Technical education is a wide-ranging term referring to those facets of educational processes involving, in addition to general education, the study of technologies and associated sciences and acquisition of practical skills, attitudes,

understanding and knowledge, relating to occupations in numerous sectors of economic and social life (Ali, 2003). In Pakistan, the skilled manpower is trained at three levels: vocational education to train skilled manpower at first basic level; middle/second ladder technical education prepares its graduates for supervisory roles and higher level technical and professional education prepares the technologist and leadership (Mirza & Khan, 2000). The government established Polytechnic Institutes (GPIs) and Colleges of Technology (GCTs) in all provinces of Pakistan to offer Diploma of Associate Engineer (DAE) providing three-year training after 10 years of schooling in various technologies (Mirza & Khan, 2000). Hence, technical Education is an important area of education at DAE level in Pakistan and is the most crucial stage for technical education students because their career depends on achievement in technical subjects at this stage. In Pakistan, the age of DAE students is approximately between 15-20 years. Aslan and Aslan (2009) point out that students cognitive and affective developments are very rapid in this period.

According to many studies (e.g., Ma & Kishor, 1997; Meece, Parsons, Kaczala, & Goff, 1982), the variable 'attitude' is one of the potent factors that relate to achievement. Attitudinal concepts account for and assume patterns of thinking, feeling and act. Attitude is a learned disposition in a reliably favorable or unfavorable mode towards to answer an object (Koballa & Glynn, 2007). Moreover, Osman, Halim, and Ikhsan (2003) have indicated the importance of students positive' attitudes which form a basis for better understanding. The varying attitude towards technology was conceptualized to determine primarily whether the students of Polytechnic Institutes (PIs) and Colleges of Technology (CTs) in Pakistan have a favorable attitude towards technology. Determining the students' attitudes toward technology is the primary step to improve and implement a comprehensive technical education programme.

Ausubel et al., (1978) believed that attitudes towards technology might be helpful in planning and tuning the curricular components to the cognitive levels of pupils to attain significant learning. So, it is clear from the above discussion that to achieve a comprehensive student success, it is required to know the students' attitude towards technology. Different researchers have also conducted the research on relationship between attitude and achievement. These studies revealed that students' attitudes and achievement are positively and significantly correlated (Adesoji, 2008; Akpinar et al., 2009; Kan & Akbas, 2006; Neathery, 1997; Prokop, Tuncer, & Chuda, 2007; Serin, 2008). Despite these studies, the researcher believes that there is still a need to study attitude towards technology. No effort has been made to investigate students' attitudes towards technology and its effect on their academic attainment in technical education. So, to investigate the effect of attitudes towards technology on academic achievement in technical education in Pakistani context is the need of the hour. The proposed study is an attempt to address this need.

Literature Review

Attitude can be defined as reflection of individual towards any phenomena. Oppenheim (2000) has defined attitude as, "a state of readiness or predisposition to respond in a certain manner". These judgments are not groundless and typically formed on the information received from surroundings (Barden, 2004).

Nemours studies have concentrated on the relationship of attitude and achievement. The research literature concerning this relationship does not state us steady findings. Simpson and Oliver (1990) presented a little support for any strong relationship between attitude and achievement. Some other research also indicated low positive correlation between attitude and achievement (Neathery, 1997; Schibeci & Riley, 1986). Likewise, Schibeci (1984) quoted a strong correlation of 0.3-0.5 between attitude and achievement, similar findings were reported by Oliver and Simpson (1988). However, a moderate correlation between attitude and achievement was reported by Shrigley (1990), Simpson and Oliver (1990), Simpson et al., (1994), Weinburgh (2006). The relationship between attitude and achievement was widely studied (Akpinar et al., 2009; Freedman, 1998; Neathery, 1997; Simpson & Oliver, 1990; Singh, Granville, & Dika, 2002; Weinburgh, 2006). These researchers revealed insight regarding existence of any relationship between attitude and achievement and majority of them have described positive and significant correlation.

Cannon and Simpson (1985) investigated the correlation between attitude, and achievement of ability group pupils of class seven. They concluded that attitude influenced achievement. Although the correlation was low however, results indicated that attitude was a good predictor of achievement. Similar findings were reported by Talton and Simpson (1987) who used the same questionnaire to investigate the relationships of attitude and achievement among tenth-grade biology students. In addition, Rennie and Punch (1991) investigated the relationship between attitude and achievement.

Magno (2003) conducted a study to determine the relationship between students' attitude towards technical education and achievement of Caritas Don Bosco School students. The results indicated the significant relationship between general attitude towards technical education and academic achievement. Akpinar et al., (2009) examined the 6, 7 and 8 class pupils' (n= 658) attitudes toward science and technology and its relationship with academic achievement. They found significant positive correlations between students' attitudes toward science and technology and academic achievement. The relationship between attitude and achievement was studied by Keawpradit in 2002. He investigated and measure the relationship between learning attitude and behavior of students with high learning achievement who were studying the Certificate in Vocational Education in Industrial Trade at Chiang Mai Technical, College. The result of the study indicated that there is significant relationship between attitude, opinion and

feeling towards technical and vocational education in Industrial trade and learning achievement.

Serin (2008) examined the relationship between primary school student's attitudes towards science and their science achievement. The results of the study indicated that student's gender, socio-economic status of their families, perceptions of their parents' attitudes and their perceptions of science achievements have a significant effect on their attitudes towards science. The results of the study also depicted a meaningful relationship between the primary school student's attitudes towards science and their science achievement.

Material and Methods

The major approach adopted to conduct the study was quantitative while casual comparative research design was used to investigate the effect of students' attitude towards technology on their academic achievement in technical education. All the DAE students at Polytechnic Institutes (PIs) and Colleges of Technology (CTs) in Punjab were the population. Multistage sampling technique was applied to draw the sample from the population in the jurisdiction of Punjab province of Pakistan. As this study was delimited to three technologies (Civil, Electrical and Mechanical) and these three technologies were being offered in 11 public and 33 private Polytechnic Institutes and Colleges of Technology in the Punjab. The researchers selected these three technologies because these are the major and conventional technologies in Pakistan.

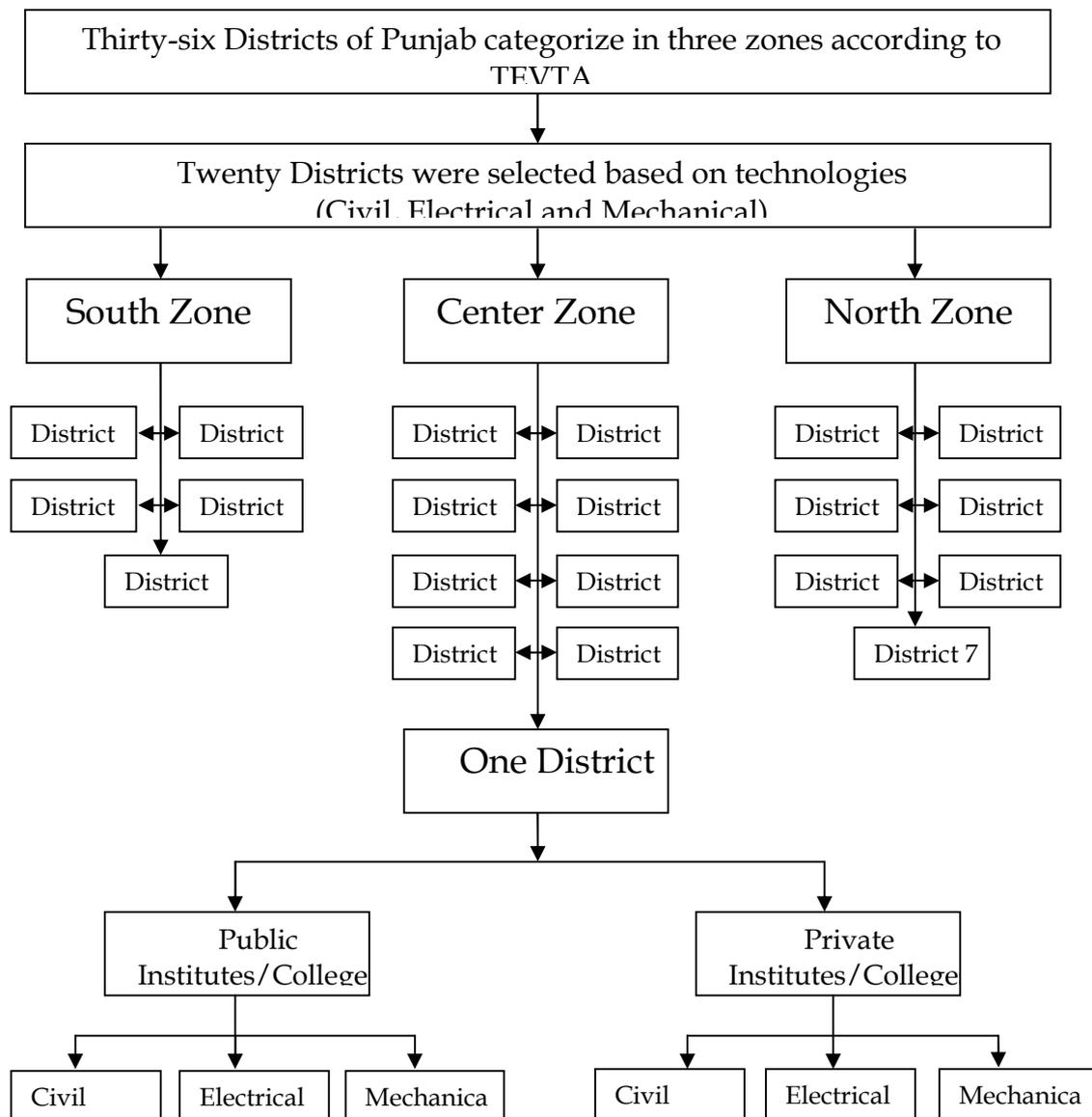


Figure 1: Three zones of TEVTA in Punjab on Geographical and Administrative bases

Instrumentation

Pupils' Attitudes towards Technology (PATT USA) instrument was used in this study by the researchers to measure attitude towards technology. The researcher adapted this instrument with the kind permission of its developer. The PATT USA instrument was developed in 1988 by Dr. Marc de Vries, Professor at Eindhoven University, The Netherlands; Dr. Allen Bame, Associate Professor of Technology Education at Virginia Tech; and Dr. William E. Dugger, Jr., Professor of Technology Education at Virginia Tech. Validity and reliability were re-established on the revised instrument. The translated version of PATT USA in

Urdu language was administered to 300 DAE students of 3rd year from the programmes of Civil, Electrical and Mechanical technologies. The reliability coefficient of the scale was found as 0.71. During data collection, for try out, the researcher felt that respondents are facing problems in understanding some of the statements. So, some changes were made in the translation with the help of bilingual experts in accordance with the understanding level of the students and local culture. The instrument with the rephrased items was again administered to 312 students. Cronbach Alpha reliability value of the scale was increased from 0.71 to 0.89 because of rephrasing the items. The final version of Pupils' Attitude towards Technology (PATT USA) scale used in the present study consisted of four sub-scales and 44 items. Cronbach Alpha reliability coefficient of the final scale was 0.89. The reliability co-efficient of the scale and sub-scales are as given:

Table 1
Mean, Standard Deviation and Reliability Coefficient for PATT USA

Respondents	M	SD	Cronbach Alpha Reliability
312	175.20	20.061	0.89

Table 2
Reliability Level Value for PATT USA Sub-Scales

PATT sub-scales	N	Alpha Cronbach Reliability
General interest in technology	13	0.700
Attitudes towards technology	11	0.708
Consequences of technology	05	0.564
The concept of technology	15	0.773

Achievement Score

The achievement scores of students were obtained from the results of the examination conducted by Punjab Board of Technical Education.

Results and Discussion

Data was analyzed with the help of Statistical Package for Social Sciences (SPSS-15). Mean scores of the respondents on PATT USA scale and sub-scales were calculated. Regression Analysis was applied to investigate which of the independent variables (students' attitude towards technology) has effect on the dependent variable (academic achievement).

Research Question 1: Does the attitude of students towards technology affect their academic achievement?

Table 3
Summary of Regression Analysis: Effect of Respondents' Overall Attitude towards Technology on their Academic Achievement

Variables	B	SE	β	t-value	p-value
Overall attitude	.633	.112	.098	5.662	.000***

***P<0.001

The results presented in table 3 shows that overall attitude of the respondents affect their academic achievement. Regression coefficient is B=.633, p=0.000 which is significant at $\alpha=0.001$. Hence, it is obvious that respondents' overall attitude towards technology significantly affect their academic achievement.

Table 4
Summary of Regression Analysis: Effect of public sector respondents' overall attitude on their academic achievement

Variables	B	SE	B	t-value	p-value
Public	.526	.207	.084	2.542	.011

***p<0.001

The results given in table 4 illustrate that overall attitude of the public sector respondents affect their academic achievement (B=.526, p=.011 at $\alpha=0.001$). The analysis shows that public sector respondents' overall attitude affection their academic achievement.

Table 5
Summary of Regression Analysis: Effect of Private Sector Respondents' Overall Attitude on their Academic Achievement

Variables	B	SE	β	t-value	p-value
Private	.695	.132	.106	5.282	.000***

***P<0.001

The results presented in table 5 demonstrate the effect of private sector respondents' overall attitude on their academic achievement (B=.695, p=.000 which is significant at $\alpha=0.001$). Analysis also shows that private sector respondents' overall attitude has significant effect on their academic achievement.

Table 6
Summary of Regression Analysis: Effect of Sub-scales of Attitude on Respondents' Academic Achievement

Variables	B	SE	β	t-value	p-value
General interest in technology	1.768	.401	.094	4.408	.000***
Attitude towards technology	.040	.483	.002	.083	.934
Consequences of technology	2.391	.651	.076	3.674	.000***
The concept of technology	-.446	.273	-.032	-1.631	.103

***P<0.001

The results given in table 6 illustrate that sub-scales, "General interest in technology" and "Consequences of technology" affect the students' academic achievement. Regression coefficient for sub-scale, "General interest in technology" is $B=1.768$, $p=0.000$ which is significant at $\alpha=0.001$. Similarly, regression coefficient for sub-scale, "Consequences of technology" is $B=2.391$, $p=0.000$ which is significant at $\alpha=0.001$. It is evident that the respondents who have attitude towards General interest in technology and Consequences of technology have significant effect on academic achievement in technical education.

Table 7
Summary of Regression Analysis: Effect of Civil Technology Respondents' Overall Attitude on their Academic Achievement

Variables	B	SE	β	t-value	p-value
Attitude	.554	.176	.094	3.147	.002

*** $p < 0.001$

The results presented in table 7 show the effect of civil technology respondents' overall attitude on their academic achievement ($B=.554$, $p=.002$ at $\alpha=0.001$). The analysis shows that Civil technology respondents' overall attitude affect their academic achievement.

Table 8
Summary of Regression Analysis: Effect of Electrical Technology Respondents' Overall Attitude on their Academic Achievement

Variables	B	SE	B	t-value	p-value
Attitude	.835	.208	.118	4.021	.000***

*** $p < 0.001$

The results given in table 8 illustrate the effect of Electrical technology respondents' overall attitude on their academic achievement ($B=.835$, $p=.000$ which is significant at $\alpha=0.001$). The analysis shows that electrical technology respondents' overall attitude significantly affects their academic achievement.

Table 9
Summary of Regression Analysis: Effect of Mechanical Technology Respondents' Overall Attitude on their Academic Achievement

Variables	B	SE	β	t-value	p-value
Attitude	.589	.194	.092	3.032	.002

*** $p < 0.001$

The results presented in table 9 illustrate the effect of mechanical technology respondents' overall attitude on their academic achievement ($B=.589$, $p=.002$) which is significant at $\alpha=0.001$. The analysis shows that Mechanical technology respondents' overall attitude affect their academic achievement.

Discussion

The present study investigated the effect of students' attitude towards technology on their academic achievement in technical education that will serve as a milestone in Pakistani scenario. The educational potential of technology is examined in a diversity of ways (Becker, 2000; Cooper & Brna, 2002; Godfrey, 2001). For example, Godfrey (2001) stresses the latent potential of technology to present ironic learning environments, allowing learners to espouse multiple perspectives on multipart phenomena, to substitute flexible knowledge construction in intricate learning domains, and to accommodate for individual differences. Literature reflects the evidence of students' positive attitude towards technology as quoted by researcher (e.g., Krueger, Hansen, & Smaldino, 2000). The related review of Kay (2006) recapitulates key strategies to familiarize pre-service teachers with technology which can be more supportive for solidification of the attitude of students. The present initiative empowers the conceptual framework which is already evident from the literature. Literature points out the effect of students' attitude towards technology on their academic achievement (Oliver, 1993). It also argues that trainee teachers who received prescribed training in the usage of technology did not differ in their future use of technology for teaching from teachers who did not receive such training. Same is documented by Ertmer (2005) who places responsibility of technologies for instruction on the shoulders of teachers even with the increased availability of technology wares (e.g., Ertmer, 1999), school related support for technology integration (e.g., Baylor & Ritchie, 2002), and a larger mindfulness of teachers about the prominence of technology use (e.g., Khine, 2001). This assumption is also seconded by studies (e.g., Becker, 2000, Hermans et al., 2008 and Wang et al., 2004). Other factors, besides technical knowledge and skills appear to interfere with teachers' successful technology incorporation. For example, knowledge, beliefs, and attitudes of students were examined (Cuban, 1993), since they figure out what teachers do in their classrooms and describe the staple of instructional practices that have suffered over time. Compared to teachers, less attention was paid to exploring students' perceptions of the technology used in classrooms. Several studies e.g., (Ng & Gunstone, 2002; Nugent, Soh, & Samal, 2006; Shyu, 2000;) explored the influence of technology and concluded that technology could motivate students for learning.

Conclusion

Based on the findings of the study, it is obvious that respondents' overall attitude towards technology significantly affects their academic achievement. It is concluded that public sector respondents' overall attitude towards technology affects their academic achievement. Moreover, private sector respondents' overall attitude towards technology has significant effect on their academic achievement. It is evident that respondents' attitude towards general interest in technology and consequences of technology scales have significant effect on their academic achievement in technical education. It is also concluded that Electrical technology

respondents' attitude has higher effect on their achievement than that of the Mechanical and Civil technologies' respondents.

Recommendations

1. The curriculum planners may consider the findings of the study while developing technology related curriculum as it will provide comprehension into teaching learning process.
2. The administration of technical institutions may utilize the results for determining attitude of the students taking technical education which in turn will improve performance of students.
3. This study may be helpful for the administrators of Polytechnic Institutes and Colleges of Technology for identifying the kind of students who take technical education because taking into consideration the students' attitude towards technology might provide information about their learning such as academic achievement.
4. Similar research should be conducted in other provinces to improve technology related attitudes and achievement in technical education and to facilitate better decision making for the development of technical education in Pakistan.

References

- Adesoji, F. (2008). Managing Students' Attitude towards Science through Problem Solving Instructional Strategy. *Anthropologist, 10*(1), 21-24.
- Ali, M. M. (2003). Quality Management of Engineering and Technology Education.
- Aslan, C., & Aslan, B. (2009). Differences in teacher candidates' attitudes toward science according to some psycho-social variables. *Procedia-Social and Behavioral Sciences, 1*(1), 1582-1585.
- Barden, N. (2004). Implication of the hypothalamic-pituitary-adrenal axis in the physiopathology of depression. *Journal of Psychiatry and Neuroscience, 29*(3), 185.
- Cannon Jr, R. K., & Simpson, R. D. (1985). Relationships among attitude, motivation, and achievement of ability grouped, seventh-grade, life science students. *Science Education, 69*(2), 121-138.
- Freedman, M. P. (1998). Relationship among laboratory instruction, attitude toward science, and achievement in science knowledge. *Journal of Research in Science Teaching, 34*(4), 343-357.
- Koballa, T., & Glynn, S. (2007). Attitudinal and motivational constructs. *Handbook of research on science education. Englewood cliffs, NJ: Erlbaum Publishers.*
- Ma, X., & Kishor, N. (1997). Assessing the relationship between attitude toward mathematics and achievement in mathematics: A meta-analysis. *Journal for research in mathematics education, 26*-47.
- Magno, C. (2003). Relationship between Attitude towards Technical Education and Academic Achievement in Mathematics and Science of the First and Second Year High School Students, Caritas Don Bosco School, SY 2002-2003. *Online Submission.*
- Meece, J. L., Parsons, J. E., Kaczala, C. M., & Goff, S. B. (1982). Sex differences in math achievement: Toward a model of academic choice. *Psychological Bulletin, 91*(2), 324.
- Neathery, M. F. (1997). Elementary and secondary students' perceptions toward science: Correlations with gender, ethnicity, ability, grade, and science achievement. *Electronic Journal of Science Education, 2*(1).
- Oliver, J. S., & Simpson, R. D. (1988). Influences of attitude toward science, achievement motivation, and science self concept on achievement in science: A longitudinal study. *Science Education, 72*(2), 143-155.

- Oppenheim, A. N. (2000). *Questionnaire design, interviewing and attitude measurement: Continuum*.
- Osman, K., Halim, L., & Ikhsan, Z. H. (2003). The Critical Thinking Attitudinal Profile of Some Malaysian Secondary Students: A Reflection of Scientific Attitudes. *Journal of Science and Mathematics Education in Southeast Asia*, 26(2), 143-166.
- Prokop, P., Tuncer, G., & Chudá, J. (2007). Slovakian students' attitudes toward biology. *Eurasia Journal of Mathematics, Science and Technology Education*, 3(4), 287-295.
- Rennie, L. J., & Punch, K. F. (1991). The relationship between affect and achievement in science. *Journal of Research in Science Teaching*, 28(2), 193-209.
- Schibeci, R. A., & Riley II, J. (1986). Influence of students' background and perceptions on science attitudes and achievement. *Journal of Research in Science Teaching*, 23(3), 177-187.
- Serin, O., Saracaloğlu, A. S., & Yavuz, G. (2010). The Relation among Candidate Teachers' Computer Self-Efficacies, Attitudes towards the Internet and Achievements in a Computer Course. *International Online Journal of Educational Sciences*, 2.
- Shrigley, R. L. (1990). Attitude and behavior are correlates. *Journal of Research in Science Teaching*, 27(2), 97-113.
- Simpson, R. D., & Oliver, J. (1990). A summary of major influences on attitude toward and achievement in science among adolescent students. *Science Education*, 74(1), 1-18.
- Singh, K., Granville, M., & Dika, S. (2002). Mathematics and science achievement: Effects of motivation, interest, and academic engagement. *The Journal of Educational Research*, 95(6), 323-332.
- Talton, E. L., & Simpson, R. D. (1987). Relationships of attitude toward classroom environment with attitude toward and achievement in science among tenth grade biology students. *Journal of Research in Science Teaching*, 24(6), 507-525.
- Weinburgh, M. (2006). Gender differences in student attitudes toward science: A meta-analysis of the literature from 1970 to 1991. *Journal of Research in Science Teaching*, 32(4), 387-398.