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Students' Attitude towards Technology: A Study from Pakistan

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Abstract

Since the emergence of Pakistan, technical education has been over ruled. In the early phase trade institutes, there after polytechnics and later on the colleges of technology emerged. The current endeavor is an effort to explore the students' attitude towards technology. About 3338 respondents served as sample from final year of Civil, Electrical and Mechanical technologies being offered in 11 public and 33 private Polytechnic Institutes and Colleges of Technology in Punjab province of Pakistan. In order to measure attitude towards technology Pupils' Attitudes towards Technology (PATT) USA instrument was adapted. The instrument was developed by Prof. Dr. Marc De Vries. The findings of the study depicted that significant and positive correlation existed between all factors of PATT USA scale. It was concluded that students attitude toward technology was positive. The public and private sector respondents reflected parallel attitude towards technology. In comparison among Civil, Electrical and Mechanical technology respondents, there was significant variation in their attitude towards technology.

Keywords: Attitude, technology, polytechnic institutions, public and private sector, (PATT) USA

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Introduction

The development of human resources is imperative as capital investment for the financial viability of a nation. Technical workforce is an essential condition to boost productivity. Training of skilled workers in professional and valuable way is a challenge faced by developed and developing countries alike in a world of swift technological change and increasing international contest. It has become obligatory for the countries like Pakistan to go forward in technical education.

Technical education is a wide-ranging term mentioning those facets of educational processes involving in accumulation to general education; the study of technologies and associated sciences and acquisition of practical skills, attitudes, understanding and knowledge, relating to occupation 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 technologists and leaders (Mirza& Khan, 2000).

The need for appropriate technical education at all levels has been sensed since independence. The importance of human resources for achieving self-sufficiency was explicitly emphasized by the founder of the nation, Quiad-e-Azam Muhammad Ali Jinnah in his message to the participants of the All Pakistan Educational Conference (1947) explained the need of technical education by endorsing the associated factors. He quoted education for acquiring scientific and technical education by people for building up future economic life.

The variable attitude towards technology was conceptualized to determine 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 program.

Determining the students' Attitude toward Technology facilitates teachers and curriculum planners to consider and appraise the technical education program and its appropriate structures. Since the variable "Attitude towards technology" is quite distinguishing in its structure and there is a need to deliver empirical data about it.

Statement of the Problem

Attitude is a vital aspect of Technical Education. It is need of the hour to have its thorough understanding for the enhancement of students' achievement and success. It is assumed that a positive attitude towards technology has an influence on students' academic achievement and success in technical education.This study was aimed to exploring the students' attitude towards technology.

Objectives of the Study

The study was conducted to achieve the following objectives:

1. To explore students' attitude towards technology.

Research Questions

1. What is the level of students' attitude towards technology?
2. What is the level of public sector students' attitude towards technology?
3. What is the level of private sector students' attitude towards technology?
4. Is there any significant difference between public and private sector students' attitude towards technology?
5. Is there any difference among Civil, Electrical and Mechanical technology students' attitudes?

Research Design

The major approach adopted to conduct the study was quantitative. The researchers' purpose regarding this research was to exploring students' attitude towards technology. Hence the co-relational research design was selected for the study.

Sample

All the DAE students of Polytechnic institutes (PIs) and Colleges of Technology (CTs) in Punjab were the population of this study. Multistage sampling technique was applied to draw the sample from the population. The study was delimited to 3 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 Punjab. The population of study was distributed in all 36 districts of the Punjab province and these 36 districts are categorized administratively and geographically in 3 zones namely Centre zone, North zone and South zone by TEVTA (Technical Education and Vocational Training Authority).

Research Instrument

Pupils' Attitudes towards Technology (PATT USA) instrument was used to measure their attitude towards technology. The researcher adapted this instrument with the permission of its developer. The (PATT USA) instrument was developed in 1988 by Dr. Marc de Vries, Professor at Eindhoven University in 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 was re- established on the revised instrument.

Pilot Testing of the Instrument

The translated version of PATT USA in Urdu language was administered to 300 DAE students of 3rd year from Civil, Electrical and Mechanical technologies. The reliability of the scale was 0.71.During data collection for try out, researcher sensed that respondents were facing problems in understanding some of the statements. So, some changes were made in translation with the help of bi-lingual experts in accordance with the understanding level of the students and local culture. The instrument with rephrased items was again administered to 312 students. Cronbach's alpha reliability value of the scale increased from 0.71 to 0.89 due to rephrasing the items.

Scoring Procedure

The instrument Pupils' Attitudes towards Technology (PATT USA) used in the study consisted of five point Likert type statements. The possible responses on each statement were assigned weight age as Strongly Agreed 5, Agreed 4, Neutral 3, Disagreed 2, and Strongly Disagreed 1.The data were coded and every student was assigned a code. Negative statements were reversed after the entry of all data. The sum of all statements of each respondent showed his score on the attitude towards technology scale. So, the maximum possible score on the attitude scale was 5 and the minimum was 1.It means that higher score on the scale reflected the more positive attitude towards technology and vice versa.

Data Collection

Firstly, list of Polytechnic Institutes and Colleges of Technologies was collected from the Technical Education and Vocational Training Authority (TEVTA) secretariat, Lahore. The researcher personally visited the selected (11 public and 33 private) Polytechnic Institutes and Colleges of Technology and administered the adapted version of PATT USA tool. Data was collected with the permission of principals and class teachers of the concerned institutes.

Analysis of Data

Data was analyzed with the help of Statistical Package for Social Sciences (SPSS-15). Mean score of respondents on PATT USA scale and sub-scales was calculated, t-test was used to calculate the difference between attitudes of public and private sector students. ANOVA was applied to compare students' attitude of different technologies (Civil, Electrical and Mechanical) towards technology. Post hoc test was used for comparison among Civil, Electrical and Mechanical Technologies students on attitude scale and its sub- scales.

Research Question No.1

What is the level of students' attitude towards technology?

Table 1

Summary Statistics of Attitude of Students towards Technology

Name of Technology	No. of Students	Min value	Max. value	*M*	*SD*	95% CI
Civil	1121	3.41	5.00	4.13	0.36	4.11- 4.15
Electrical	1143	3.41	4.95	4.14	0.36	4.12-4.16
Mechanical	1074	3.41	5.00	4.19	0.32	4.17-4.21
Whole sample	3338	3.41	5.00	4.15	0.33	4.14-4.16

The results given in table show the highest level of attitude of Mechanical technology respondents with their mean score of (*M*=4.19, *SD*=0.32).The mean score of Electrical technology respondents was (*M*=4.14, *SD*=0.36) while students of Civil technology were having the lowest mean score (*M*=4.13, *SD*=0.36) as compared to the mean score (*M*=4.15, *SD*=0.33) of whole sample. Mechanical technology respondents were higher in attitude towards technology followed by Electrical technology respondents while civil technology respondents were having the lowest attitude towards technology.

Research Question 2

What is the level of public sector students' attitude towards technology?

Table 2

Summary Statistics of Attitude of Public Sector Students towards Technology

Name of Technology	No. of students	Min. value	Max. value	*M*	*SD*	95%CI
Civil	277	3.41	4.89	4.07	0.36	4.03-4.11
Electrical	311	3.41	4.95	4.16	0.34	4.13-4.20
Mechanical	314	3.41	4.93	4.18	0.31	4.15-4.22
Whole Sample	902	3.41	4.95	4.14	0.34	4.12-4.16

The distribution of subjects by public sector and their attitude towards technology is detailed in table . The highest attitude with mean score of (*M*=4.18, *SD*=0.31) is of Mechanical technology respondents followed by Electrical technology respondents with mean scores (*M*=4.16, *SD*=0.34) and the lowest attitude with mean score of Civil technology respondents (*M*=4.07,*SD*=0.36).Hence, it is evident that in public sector Mechanical technology respondents had higher attitude towards technology followed by Electrical and Civil technologies respondents' attuitude respectively.

Research Question 3

What is the level of private sector students' attitude towards technology?

Table 3

Summary Statistics of Attitude of Private Sector Students towards Technology

Name of Technology	No. of students	Min. value	Max. value	*M*	*SD*	95%CI
Civil	844	3.41	5.00	4.15	0.33	4.13-4.17
Electrical	832	3.41	4.95	4.13	0.33	4.10-4.15
Mechanical	760	3.41	5.00	4.20	0.31	4.17-4.22
Whole sample	2436	3.41	5.00	4.16	0.32	4.14-4.16

The distribution of subjects by private sector and their attitude towards technology is detailed in table 3.The Mechanical technology respondents were higher in their attitude towards technology with mean score of (*M*=4.20,*SD*=0.31) followed by Civil technology students having mean score (*M*=4.15,*SD*=0.33) and Electrical technology students with the lowest mean score (*M*=4.13,*SD*=0.33) as compared to mean score (*M*=4.16,*SD*=0.32) of the whole sample. Hence, it is apparent that in private sector Mechanical technology respondents had higher attitude towards technology followed by Civil and Electrical technologies respondents' attitude respectively.

Research Question No. 4

Is there any difference between public and private sector students' attitude towards technology?

Table 4

Comparison of Public and private sector students' attitude towards technology

	Public		Private		*t*-value	*df*	*p*-value
	M	*SD*	*M*	*SD*			
Attitude on overall scale	181.91	15.81	182.57	15.06	-1.11	3336	0.268
General interest in technology	54.54	5.65	54.85	5.34	-1.46	3336	0.145
Attitudes towards technology	45.92	5.06	46.31	4.66	-2.05	3336	0.040*
Consequences of technology	21.39	2.92	21.23	2.84	1.41	3336	0.159
The concept of technology	60.06	6.39	60.19	6.77	-0.49	3336	0.624

*P<0.05

To compare attitude of public and private sector respondents independent sample *t*-test was applied. The results of independent t-test showed that there is no significant difference in public and private sector respondents' attitude on overall attitude scale towards technology as the level of significance α=0.05 (t=-1.11, p=0.268). Although there is significant difference in public and private sector respondents' "Attitude towards Technology"(sub –scale) as mean score of public sector respondents (Mean=45.92, SD=5.06) is less than the mean score of private sector respondents (Mean=46.31, SD=4.66).Analysis also shows that private sector respondents have higher attitude towards general interest in technology than public sector respondents. Similar pattern was also seen in the case of all other sub-scales except the Consequences of technology sub-scale on which public sector respondents have higher attitude than private sector respondents. While private sector respondents showed significantly higher Attitude towards technology sub-scale than public sector respondents.

Research Question No. 5

Is there any difference among Civil, Electrical and Mechanical technologies students' attitudes?

Table 5

ANOVA Summary: Comparison among Civil, Electrical and Mechanical Technologies Students on attitude scale and its sub- scale.

	Civil		Electrical		Mechanical		*F*-value	*p*-value
	M	*SD*	*M*	*SD*	*M*	*SD*		
Attitude on overall scale	181.67	14.74	182.02	14.67	184.43	13.68	11.85	.000***
General interest in technology	54.53	5.06	54.95	4.93	55.54	4.84	11.58	.000***
Attitudes towards technology	46.30	4.46	46.25	4.41	46.56	4.25	1.61	.200
Consequences of technology	21.23	2.98	21.05	3.02	21.34	2.87	2.78	.062
The concept of technology	59.58	6.84	59.75	6.83	60.96	6.34	13.92	.000***

***P<0.001

Table 5 reflects difference among Civil, electrical and mechanical technologies respondents' attitudes towards technology. It shows that there was significant difference in attitude on overall attitude scale among respondents of Civil, Electrical and Mechanical technologies. The value of F (2, 3335) =11.85, p=0.000 was significant at α=0.001.The results of this table also show that there was a significant difference in the attitude on sub-scale, "General interest in technology" among students of civil, electrical and mechanical technologies. The value of F (2, 3335) =11.58, p=0.000 is significant at α=0.001.Whereas it reflects that there was no significant difference in attitude on sub-scale, "Attitude towards technology" among students of Civil, Electrical and Mechanical technologies. The value of F (2, 3335) =1.61, p=0.200 was not significant at α=0.001.

The results of this table also show that there was no significant difference in attitude on sub-scale, "Consequences of technology" among students of Civil, Electrical and Mechanical technologies. The value of F (2, 3335) =2.78, p=0.062 was not significant at α=0.001. Analysis also shows that there was significant difference in attitude on sub-scale, "The concept of technology" among students of Civil, Electrical and Mechanical technologies. The value of F (2, 3335) =13.92, p=0.000 was significant at α=0.001.Hence, it is evident that there was significant difference in attitude among respondents of civil, electrical and mechanical technology on overall attitude scale as well as on sub-scale, " General interest in technology" and sub-scale, "The concept of technology". Analysis reflects that mechanical technology respondents had higher attitude towards General interest in technology than electrical and civil technology respondents. Similar pattern was seen on attitude towards The

Concept of technology with significant difference. ANOVA only tells us that there was significant difference on overall attitude scale and its sub-scales whereas to know about the mean difference on attitude scale and its sub-scales among students of different technologies Post Hoc Test was applied.

Conclusions

This study was conducted to investigate the factors that influence students' attitude toward technology for the first time in Pakistan. Findings from this empirical study should add to the existing body of knowledge. Similarly, with respect to locality differences, this study's findings were consistent with those reported elsewhere.

Students Attitude towards Technology Scale

1. The locality bases comparison reflects the difference in attitude on overall scale between public and private sector respondents. It was found that public and private sector respondents did not differ significantly in their attitude towards technology.
2. The technology wise comparison shows the difference in attitude on overall attitude scale among respondents of Civil, Electrical and Mechanical technologies. The attitude of Mechanical technology respondents is greater than the attitude of Electrical technology as well as the Electrical technology respondents is higher than Civil technology respondents in their attitude towards technology on overall attitude scale.

Students Attitude towards Technology (Sub-Scales)

1. It is evident from the findings that private sector respondents have higher attitude towards General interest in technology than public sector respondents. Similar pattern can be seen through the findings of all other sub-scales except the Consequences of Technology Scale on which public sector respondents have higher attitude than private sector respondents. Whereas, private sector respondents showed significantly higher Attitude towards technology scale than public sector respondents.
2. It can be concluded from the findings that Mechanical technology respondents have higher attitude towards General interest in technology scale than Electrical and Civil technologies respondents'. Similar pattern was seen on attitude towards the Concept of technology scale with significant difference.

Discussion

This study explored students' attitude towards technology which will serve as a mile stone in Pakistani scenario. The educational potential of technology is hassled in different ways (Becker, 2000, Cooper and Brna, 2002 and Godfrey, 2001). For example, Godfrey (2001) stresses the latent 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 outfit for individual differences. Literature reflects the evidence of students' positive attitude towards technology as quoted by (e.g., Krueger, Hansen, & Smaldino, 2000). The related review of Kay (2006) recapitulates key strategies to familiarize technology to pre-service teachers which can be more supportive for solidification the attitude of students.

The present initiative empowers the conceptual framework which is already evident from the literature. Although previous research has not directly indicated the relationship between students' attitude towards technology and their academic achievement but it is partially discussed by (Yuan, 2006) and same is discussed by Marcinkiewicz (1993) who pointed out that full addition of technology to the educational system is a detached goal except there is reconciliation between teachers and technology perception. The findings of the study reflect that there is the highest level of attitude of Mechanical technology respondents with their mean score of (Mean=4.19, SD=0.32).The mean score of Electrical technology respondents was (Mean=4.14, SD=0.36) while students of Civil technology have the lowest mean score (Mean=4.13, SD=0.36) as compared to the mean score (Mean=4.15, SD=0.33) of whole sample. Analysis shows that Mechanical technology respondents are higher in attitude towards technology followed by Electrical technology respondents while Civil technology respondents have the lowest attitude towards technology.

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 not receiving such training. Same is documented by Ertmer (2005) as how to use technologies for instruction rests 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), the assumption is also seconded by (e.g., Becker, 2000, Hermans et al., 2008 and Wang et al., 2004). Other factors, next to technical

knowledge and skills appear to underwrite to teachers' successful technology incorporation. For example, knowledge, beliefs, and attitudes of students were hassled by Cuban (1993), since they figure out what they indicate to do in their classrooms and describe the staple of instructional practices that have suffered over time. Compared to teachers, less devotion was paid to exploring students' perceptions of the technology used in classrooms. Several studies (Ng & Gunstone, 2002; Nugent, Soh, & Samal, 2006; Shyu, 2000 ;) explored the influence of technology and concluded that technology could motivate students for learning.

Recommendations

The following recommendations can be given on the basis of major findings:

1. The curriculum planners may consider the findings of the study as well as developing technology related curriculum as it will serve as facilitator for teaching learning process.
2. Educational planners may consider this study during planning technical education reforms.
3. The management of technical institutions may use findings while determining the attitude of students taking technical education which will improve their work output.
4. This study may be helpful for the administrators of Polytechnic institutes and Colleges of Technology in terms of identifying the kind of students who take technical education. Taking into consideration the students' attitude towards technology might provide information about the output of their learning such as academic achievement.
5. Curriculum planners, policy makers, technical teachers and parents will be advised to co-ordinate in an effective way so that students after graduating from educational institutions will have favorable attitude towards technology and better academic achievement in technical education.
6. The educational players may use it to improve the quality of the teaching and learning.
7. For understanding, explanation and implications of this study, more confirmation is required by conducting studies which include qualitative information through observations and interviews from students.
8. Similar research should be conducted in other provinces so that an ample image of technology related attitudes and achievement in technical education can be emerged, which may facilitate better decision making for the development of technical education in Pakistan.

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