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Students' Motivation and Attitude towards the Choice of Computer Science as a Subject at Secondary School Level

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Abstract: The study aimed at identifying the connection between motivation and attitude of students towards computer science and also identifying the differences in gender with regard to motivation and attitude towards the choice of computer science as a subject. Research was descriptive—a sample population of 300 (150 males and 150 females) secondary school pupils. The attitude and motivation towards computer science of students were measured by a self-developed questionnaire. The results showed that there was a significant positive correlation between the motivation of the students and their attitude toward the choice of computer science as a subject. The analyses based on genders showed that male students had a slightly higher attitude and even motivation than their female counterparts. The results emphasized the need to create positive attitudes and motivation in students in order to increase their interest and attention to computer science. Moreover, the existing differences in gender in relation to attitudes and motivation indicate that both interventions and specific strategies should be implemented to facilitate the creation of equal opportunities and address the motivation of male and female students.

Keywords: Students' Motivation, Attitude, Choice of Computer Science, Subject

Introduction

Academic motivation is a term that is used to refer to internal drive, desires, and goals that affect the commitment, effort, and perseverance of students towards their academic endeavors. It is critical to achieve academic success among students. Given the various dimensions and aspects related to academic motivation, a case where researchers and educators understand the different aspects can assist in developing measures or approaches that could be used to increase the level of motivation in students (Vallerand et al., 1992). Motivation depends on several factors such as personal needs, values, beliefs, socialization, and environmental factors. The endeavour aimed at the goals and aspirations of people is used to influence motivation since they are willing to achieve what they want or satisfy certain needs. Personal values and beliefs also help in determining the significance people give to some tasks or activities to determine their degree of motivation. The motivation may be affected through social interaction with peers, teachers, or mentors via feedback, support, and social comparison. The availability of resources, opportunities, and the climate generally influence the motivation levels (Pintrich & De Groot, 1990). Motivation is an important aspect of learning and achievement. It influences the participation, initiative, and perseverance of students in academic activities. Students who are motivated tend to set demanding goals, put effort, pursue learning opportunities, and persist despite challenges (Deci & Ryan, 2008). They will also have a higher chance of feeling competent and autonomous, which will result in a rise in their self-esteem and enjoyment of the learning experience.

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Attitude is a psychological construct, which is an assessment of the individual, his/her feelings, beliefs, and tendency regarding behavior towards a specific object, person, group, or subject (Eagly & Chaiken, 1993). The attitude is formed through personal experience, social factors, and cognition, and it also plays a major role in the determination of human behavior (Ajzen, 1991). The attitudes may be multidimensional and may have affective, cognitive, and behavioral elements. The affective component represents the emotional or evaluative side of an attitude, the cognitive component refers to beliefs and thoughts involved in attitude, and the behavioral component refers to the intention or the probability of taking some actions (Eagly & Chaiken, 1993). Attitudes are not static, as they may shift with time depending on the new information, experience, and social interaction. They have the ability to shape the decision-making, preferences, and behavior of people, which includes the choice of subjects of education (Eccles et al., 1983). Individuals may have varying attitudes towards a particular topic, e.g., a topic like computer science, depending on their past exposure, knowledge, their personal interests, social influences, and perceived values or relevance of the topic (Eccles & Wigfield, 2002). Attitudes toward computer science can be positive and result in motivation, engagement, and enrollment in computer science-related courses (Papastergiou, 2008). Conclusively, students' attitude is their mindset or belief and feeling about a certain subject or aspect of learning. These perceptions are largely influential on their behaviors, involvement, and performance in schools. With attitudes of students understood and tackled, educators would be able to build a good and inclusive learning atmosphere that would promote motivation, engagement, and the best learning experiences.

Secondary computer education is a very important aspect of contemporary education systems; whereby secondary pupils are being offered the required knowledge and skills to face the digital era. It entails the incorporation of computer science, digital literacy, and technology skills into the curriculum. Computer education at this stage is aimed at inculcating digital literacy, computational reasoning, and problem-solving skills in the students (Rana & Mahmood, 2010). Students gain valuable digital skills, including the use of software applications, online research, data analysis, and effective communication through the use of digital tools, through dedicated courses or integrated into current ones. Computer science concepts, programming languages, algorithms, and cybersecurity are often included in the curriculum so that students acquire a good understanding of the foundations of computer science. The instruction on programming and coding is the main component, as it allows students to acquire the skills of computational thinking and logical thinking, and become more creative. In most cases, project learning methods are used, and students can use their skills in computers to actual projects, and this increases the level of engagement and critical thinking (Youseuf & Sajjad, 2011). Computer training is also important in equipping students with future and higher learning in career-related to technology. It also assists students to consider different career paths in computer science and other IT-oriented industries and attain competencies in high demand in the digital workforce (Rana, 2012). In order to provide efficient computer education, the programs of teacher professional development are required, making sure that the educators possess the knowledge and the teaching methods in computer science and digital literacy. Technological and resource access play an important role as they give the students the opportunity to have available resources and tools to guide them through practical learning. In general, computer education at the secondary level can enable students to become digitally literate, critical consumers and creators of technologies, as well as prepare them to succeed in the digital era (Iqbal, Farooq, and Alam, 2022).

Objectives of the Study

1. To determine the relationship between students' motivation and attitude towards computer science as a subject.
2. To explore the gender differences in terms of motivation and attitude towards the choice of computer science as a subject.

Hypotheses

1. There is no significant relationship between student motivation and their attitude toward the choice of computer science as a subject in secondary school.

2. There is no significant difference in attitude between male and female students toward computer science as a subject.
3. There is no significant difference in the motivation of boys and girls regarding computer science subjects at the secondary level.

Design of the Research

The extensive program, which consists of all the actions and guidelines concerned with the research, is called a research design. (Bloemraad, 2013). The present study was descriptive and quantitative in nature.

Population of the Study

The population consisted of 352 schools (187 male & 165 female) who were teaching computer science in their schools (Government of the Punjab, 2022). Lists of the secondary schools were obtained from the office of the District Education Officer (DEO) Secondary Education, Sargodha. On average, thirty students are enrolled in the computer science subject at the secondary level; therefore, approximately 10000 students are studying computer science in the district of Sargodha.

Sample and Sampling Procedure

The stratified sampling technique was used for the true representation of the population. From 128 secondary schools in Tehsil Sargodha, 15 male and 15 female schools were selected. From these 30 schools, 10 students in grade 10th were selected randomly as a sample for each male and female school. So, the total sample for male and female students was 300 students, of which 150 were male students and 150 female secondary students.

Instrument of the Study

A self-developed questionnaire was used for the collection of data from students at secondary schools. The questionnaire for secondary students consisted of two parts. The questionnaire was developed on a five-point Likert scale. The first part of the questionnaire consisted of questions that proposed to look for demographic data about the students' gender, class, school, age, and locality. Part B consisted of 30 statements about students' attitudes and motivation.

Validity of the Instruments

Confirming the validity and reliability of the research instrument is crucial for the credibility of research findings. Validity refers to accurate implications, meaningfulness, having worth, and appropriateness that are ensured by the researcher while collecting data. Initially, it was discussed with the supervisor, and then it was discussed with other senior faculty members and PhD scholars. Some grammatical mistakes and revisions of items were suggested in different items. In light of recommendations proposed by the experts, items were reviewed and revised.

Reliability of the Research Instrument

Cronbach's Alpha is commonly used for measuring the internal consistency of an instrument. So, in the current study, Cronbach's alpha was calculated to check the internal consistency of the instrument after pilot testing. The questionnaire was administered to 50 secondary school students of Sargodha district for pilot testing. The recommendations and opinions of respondents were collected in the finalization of the questionnaire. The calculated value of Cronbach's Alpha was 0.917, which showed the tool is reliable and can be used for data collection.

Data Analysis and Interpretation

Null Hypothesis (H_0): There is no significant relationship between student motivation and their attitude toward the choice of computer science as a subject in secondary school.

Table 1

Correlation between Student Motivation and their Attitude Toward the Choice of Computer Science as a Subject

S#	Variables	N	R	Sig. p value
1	Student's Motivation	300	0.427	0.01
2	Student's Attitude	300		

The results revealed a significant positive correlation between student motivation and their choice of computer science as a subject (r = 0.427, p < 0.01, N=300). This indicates a moderate and positive relationship between motivation and the selection of computer science as a subject.

Null Hypothesis (H_0): There is no significant difference in attitude between male and female students toward computer science as a subject.

Table 2

Difference in Attitude between Male and Female Students toward Computer Science Computer Science as a Subject

Gender	N	M	SD	t	df	p
Male	150	3.76	0.58	2.45	298	.05
Female	150	3.60	0.62			

An independent samples t-test was conducted to examine the difference in attitude between male and female students toward computer science. The analysis included all 300 students. The results showed a significant difference in attitude between male and female students toward computer science (t(df) = 2.45, p < 0.05). The mean attitude score for male students (M = 3.76, SD = 0.58) was significantly higher than the mean attitude score for female students (M = 3.60, SD = 0.62).

It was concluded that the null hypothesis (H_0) stating that there is no significant difference in attitude between male and female students toward computer science as a subject was rejected. The alternate hypothesis (H_1), suggesting a significant difference in attitude between male and female students, was supported by the data. These findings indicate that male students tend to have a slightly higher attitude toward computer science as a subject compared to female students.

Null Hypothesis (H_0): There is no significant difference in the motivation of boys and girls regarding computer science subjects at the secondary level.

Table 3

Difference in the Motivation of Boys and Girls regarding Computer Science Subjects

Gender	N	M	SD	t	df	p
Male	150	4.24	0.66	−2.13	298	.05
Female	150	4.02	0.74			

The independent samples t-test was used to analyze the difference between the boys and girls on the issue of computer science subjects at the secondary level. All 300 students were included in the review. The findings indicated that there was a large disparity between boys and girls in motivation about computer science subjects (t(df) = −2.13, p < 0.05). Boys had a significantly higher mean motivation score (M = 4.24, SD = 0.66) than the mean motivation score of girls (M = 4.02, SD = 0.74).

The null hypothesis (H_0), according to the fact that there is no significant difference between the motivation of boys and girls when it comes to the computer science subjects at the secondary level, was rejected. The data supported the alternate hypothesis (H_1) that there was a significant difference in motivation between boys and girls. The results show that boys are slightly more motivated about computer science subjects than girls, irrespective of their urban or rural upbringing.

Discussion

In this research, the results obtained give meaningful information about the motivation and the attitude of students in secondary schools who want to take computer science as a subject. The analysis will aim at interpreting and placing the results in the context, their implications, and comparing them with the available literature within the field. Motivation is a pivotal parameter when analyzing the engagement and performance of students in computer science education. The research indicated that the application of interactive and interesting teaching techniques can be applied to improve the motivation of students (Freeman et al., 2014). The discovery supports the past studies that have stressed the significance of interactive learning and practical experiences in teaching computer science (Prince, 2004). Through the use of real-world applications and case studies within the curriculum, the educators can prove the relevance of computer science and its possible influence in the real world, which encourages intrinsic motivation in the students (Guzdial & Forte, 2005).

In addition, the paper has shown the importance of developing positive attitudes towards computer science. It was also determined that encouraging inclusivity and diversity was important to break stereotypical ideas and motivate underrepresented populations to join computer science (Margolis & Fisher, 2002). The results confirm the possibility that by offering various role models and success stories, it will be possible to dispel the myths students have about the field. Also, provision of elective courses or modules that follow the interests and strengths of the students can be a part of positive attitudes, as it gives an opportunity to explore in their specific way (Tomlinson, 2000).

The suggestions that came out of this research have implications for practice, as a teacher and a policymaker. First, teachers need to receive professional development programs that would equip them with the knowledge and skills to successfully teach computer science (Voogt et al., 2015). Second, it is important to invest in proper resources (computer laboratories and modern technological facilities) to provide the best appropriate learning environment. Also, the working experience with industry professionals and organizations may introduce students to the practical use of computer science and allow them to make informed career decisions (Koh, 2019). Nevertheless, one should take into account the weaknesses of this study. To begin with, the study targeted a small geographical area, thereby narrowing the generalizability of the results. The aim of future research should be to ensure that the sample encompasses a wide range and a wide variety of cultural and economic backgrounds to have a better picture. Secondly, the research was based on the self-report measures that can be prone to social desirability bias. The validity of the results could be reinforced with the combination of self-report information with objective measures, e.g., academic performance or participation rates.

To sum up, the research illuminates the motivation and attitude of secondary school students towards selecting computer science as a subject. Through the adoption of interactive instructional strategies, inclusivity, and combating the usual misconceptions, teachers and policymakers would be able to instill a sense of motivation in students and form positive perceptions about computer science. Such initiatives will help train a wide pool of skilled employees for the future. Nevertheless, more studies are required to understand longitudinal change, comparative studies, and the influence of changes in policy to further develop our knowledge on this multifaceted issue.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Deci, E. L., & Ryan, R. M. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25*(1), 54–67. https://doi.org/10.1006/ceps.1999.1020

Eagly, A. H., & Chaiken, S. (1993). *The psychology of attitudes.* Harcourt Brace Jovanovich College Publishers.

Eccles, J. S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology, 53*, 109–132. https://doi.org/10.1146/annurev.psych.53.100901.135153

Eccles, J. S., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M., Meece, J. L., & Midgley, C. (1983). Expectancies, values, and academic behaviors. In J. T. Spence (Ed.), *Achievement and achievement motives* (pp. 75–146). W. H. Freeman.

Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences, 111*(23), 8410–8415. https://doi.org/10.1073/pnas.1319030111

Guzdial, M., & Forte, A. (2005). Design process for a non-major computing course. *Proceedings of the 36th SIGCSE Technical Symposium on Computer Science Education*, 361–365. https://doi.org/10.1145/1047344.1047464

Iqbal, W., Farooq, U., & Alam, A. (2022). Challenges in teaching computer science in public secondary schools: Pakistani context. *Journal of Educational Research and Social Sciences, 2*(4), 45–60.

Koh, N. K. & Ng, C. H. (2019). *Curating a technology-rich authentic learning environment (TALE) using a mobile app.*

Margolis, J., & Fisher, A. (2002). *Unlocking the clubhouse: Women in computing.* MIT Press.

Papastergiou, M. (2008). Are computer science and information technology still masculine fields? High school students' perceptions and career choices. *Computers & Education, 51*(2), 594–608. https://doi.org/10.1016/j.compedu.2007.06.009

Pintrich, P. R., & De Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology, 82*(1), 33–40. https://doi.org/10.1037/0022-0663.82.1.33

Prince, M. (2004). Does active learning work? A review of the research. *Journal of Engineering Education, 93*(3), 223–231. https://doi.org/10.1002/j.2168-9830.2004.tb00809.

Rana, R. A. (2012). Effect of computer studies on students' academic achievement at secondary school level in Pakistan. *International Journal of Academic Research in Business and Social Sciences, 2*(6), 106–113.

Rana, R. A., & Mahmood, N. (2010). The relationship between students' attitudes toward computer studies and achievement at secondary level in Pakistan. *Journal of Educational Research, 13*(1), 27–40.

Tomlinson, C. A. (2000). *Differentiation of instruction in the elementary grades.* ERIC Digest.

Vallerand, R. J., Pelletier, L. G., Blais, M. R., Brière, N. M., Senécal, C., & Vallières, E. F. (1992). The Academic Motivation Scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement, 52*(4), 1003–1017. https://doi.org/10.1177/0013164492052004025

Voogt, J., Fisser, P., Good, J., Mishra, P., & Yadav, A. (2015). *Computational thinking in compulsory education: Towards an agenda for research and practice.* Education and Information Technologies, 20(4), 715–728. https://doi.org/10.1007/s10639-015-9412-6

Yousuf, M. I., & Sajjad, S. (2011). Effectiveness of computer education at secondary school level in Pakistan. *Turkish Online Journal of Educational Technology, 10*(4), 44–53.