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WILLING MINDS, EMPTY LABS: SECONDARY SCHOOL STUDENTS' EXPERIENCES OF COMPUTER EDUCATION IN PUNJAB, PAKISTAN

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Abstract

Computer education is now part of secondary schooling in Pakistan, but schools differ widely in how well they can teach it. This short study assessed the needs of computer education from the point of view of students. 30 Grade 9 students at a public secondary school in Punjab answered a 20-item yes/no questionnaire on their attitudes towards computer education, how it was provided in their school, and how it should be organized and assessed. Students' attitudes were almost uniformly positive: all 30 said they liked computer education, and between 28 and 30 agreed that it was beneficial, improved learning and helped the country's progress. Their views on provision were more mixed. Although all said computer education was offered and majority said their teacher took a personal interest in it, only one said they had a competent computer instructor however only 16 said their school had a well-equipped computer library. Majority wanted computer education to be compulsory, and only few thought it could be provided for a large population. The results point to a gap between students' strong wish to learn about computers and the resources available to teach them. Because the sample was small and drawn from one school, the findings should be read as an indication of needs to be tested in larger studies.

Keywords: Computer Education; Needs Assessment; Secondary School Students, ICT, Pakistan

1. Introduction

Computers are now an integral part of everyday life, additional study and most work and schools all over the world have introduced computer education into their curricula (Hubwieser et al., 2014, 2015). At secondary level computer science is taught in Pakistan (Government of Pakistan, 2000; Ministry of Education, 2009), but the equipment and teachers' awareness and time for this varies from school to school (Hassan & Sajid, 2013; Sarwar et al., 2021). Computer science teachers in public secondary schools reported that their computer labs were outdated (Iqbal et al., 2022; Qadir et al., 2014; Sarwar et al., 2021), and they had limited training time as well as inadequate training in computers and software (Qadir et al., 2014; Sarwar et al., 2021). The national reviews indicated a lack of computers and software in the secondary schools (Hali et al., 2021; Sarwar et al., 2021).

Evaluating needs involves examining the needs of learners compared to their current needs (Witkin & Altschuld, 1995). A majority of the evidence on computer education in Pakistan is derived from teacher, administrator and policy reviews (Akram et al., 2022; Qadir et al., 2014; Sarwar et al., 2021). Students' opinions are not listened to as much as they should be (Cook-Sather, 2002, 2006), as they are the ones they are supposed to be listened to. The study thus sought the secondary students' perceptions of computer education whether they appreciate it, how good it is being implemented in their school, and how they believe it should be structured (Mehboob & Nawaz, 2021; Qadir & Hameed, 2018).

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2. Literature Review

The findings of the study on technology in secondary classrooms in Pakistan indicate that students have positive attitudes towards technology in secondary schools. Most students in the study (n = 494) of science students in Grades 9 to 11 agreed that digital tools may enhance learning and that technology is beneficial in the classroom, but the authors noted that the use of technology was still not widely used (Akhter & Mehmood, 2023; Mehboob & Nawaz, 2021).

Good computer education not only requires the students' willingness to learn but also proper technological infrastructure, functional computer laboratories and opportunities for practical learning (Hubwieser et al., 2015; Sarwar et al., 2021).

There is no interest problem, the main restraints are provision (Mehboob & Nawaz, 2021; Sarwar et al., 2021). In the public secondary schools, computer science teachers report the following challenges: inadequate IT infrastructure, insufficient laboratory equipment in the school, insufficient opportunities for computer science teachers' professional development, and limited home computer access for students (Humna et al., 2021; Iqbal et al., 2022; Menekse, 2015; Ni et al., 2023; Qadir et al., 2014). This study was conducted in the context of elementary schools as only one out of twenty schools were found with a computer lab, most of which were not being used for actual instruction (Bhatti & Hassan, 2024; Jehan & Akram, 2023). This prompted the authors to test paper-based activities that are used to teach computing ideas without using computers (Jehan & Akram, 2023). A recent study on STEM education in Pakistan also revealed that research and practice in this area is low with many policy implementation gaps between the classroom and policy (Aslam et al., 2022; Hali et al., 2021).

Global evidence also cautions that technology enhances learning only when it is available, well-maintained, and well-planned for by well-trained teachers, and when provision is poorly planned, technology can exacerbate inequities between advantaged and disadvantaged learners (Hubwieser et al., 2015; UNESCO, 2023). Therefore, it is helpful to know what students need at the outset of planning computer education that works.

The study was focused on three questions:

RQ1. What are secondary school students' attitudes towards computer education?

RQ2. What is students' opinion about the provision of computer education in school?

RQ3. What are students' ideas about the organization and evaluation of computer education?

3. Method

3.1 Design and Participants

The descriptive survey design was used (Witkin & Altschuld, 1995). The population was students of public secondary schools of Bahawalnagar tehsil, Punjab in urban area. 30 students of grade 9 from one government secondary school were conveniently selected as participants.

3.2 Instrument

Literature review and consultations with a panel of education experts were used to develop a 20 item questionnaire with support for content validity. All items were short statements or questions with answers of "yes", "no" or "don't know". The questionnaire was clarified and tested with a small group of similar students prior to administration.

3.3 Procedure and Analysis

The researcher personally administered the questionnaires, so that each item was explained if necessary, and 100% response rate was achieved. Students were given the choice to participate and they were informed that their responses would only be used for research. No student responded "don't know" and all selected "yes" or "no" to each question. For each item, we report the number and percentage of students answering "yes". Percentages are presented with a 95% range (using Wilson (1927) method) because these can vary significantly due to chance from a group of 30 (Agresti & Coull, 1998; Brown et al., 2001; Newcombe, 1998). The meaning of two items was not apparent to the researcher: whether 'people of Pakistan understand computer education' (as in it relates to the public, and not to the students' personal experience) or whether computer education 'affects the moral values of students' (which does not specify which moral values, and whether it is a beneficial or deleterious effect).

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The remaining 18 items were grouped into three areas for reporting: attitudes towards computer education (9 items), provision in the school (5 items) and organization and assessment (4 items).

4. Results

4.1 Attitudes Towards Computer Education

Students' attitudes were almost uniformly positive (Table 1). All 30 said they liked computer education, that it created interest in study and that it was important for producing information. 29 agreed that it made students more intelligent, improved learning, built good habits, helped solve problems in time and helped the country's progress, and 28 agreed that it was beneficial.

4.2 Provision in the School

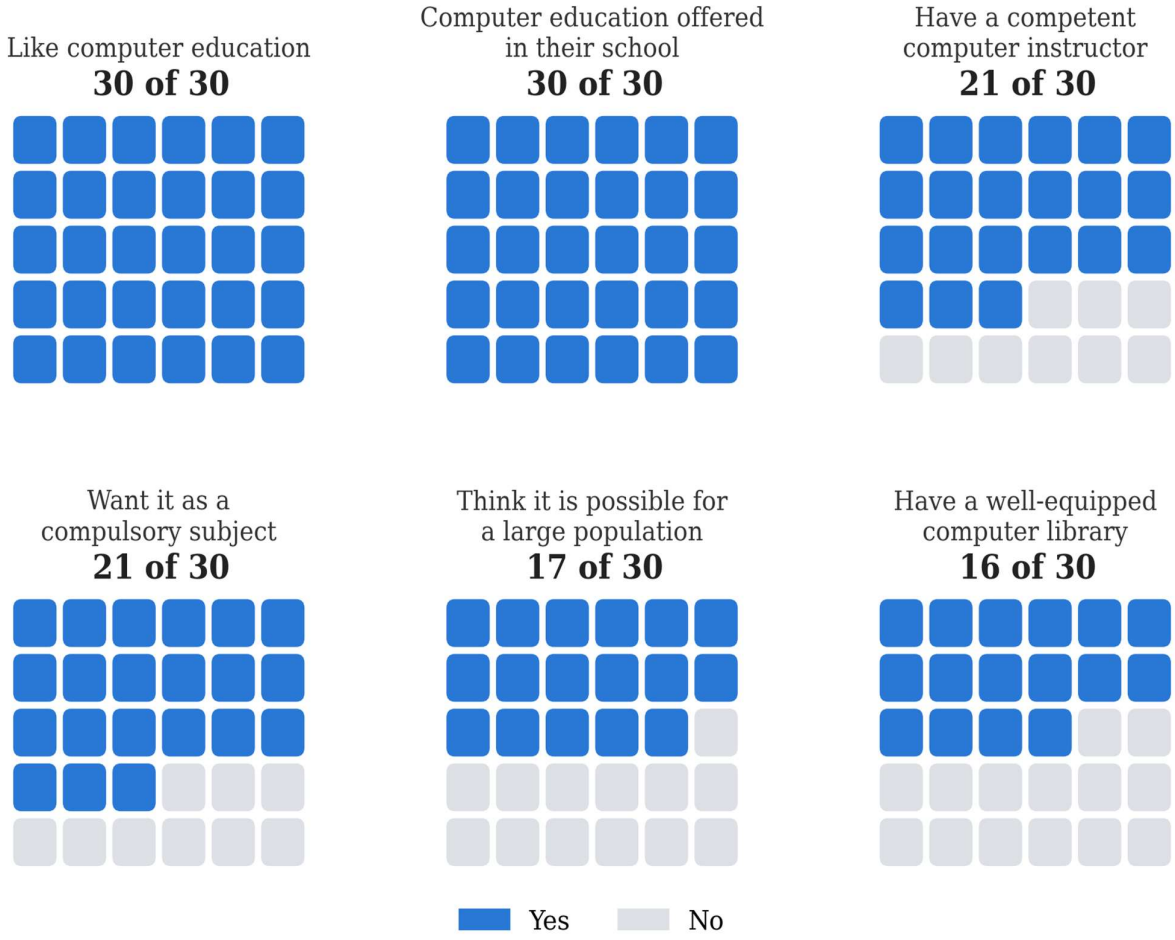
Views on provision were more mixed (Figure 1). All students said computer education was offered in their school, 29 said it was accessible, and their teacher took a personal interest in it. However, 21 of the 30 (70%) said they had a competent computer instructor, and computer should be as compulsory subject, and only 16 (53%) said the school had a well-equipped computer library. These were the two lowest rated aspects of provision.

4.3 Organization and Assessment

All 30 students agreed that computer education should be assessed, and 28 considered the results of computer assessment reliable. 21 (70%) students supported making computer education compulsory, and only 17 (57%) thought computer education was possible for a large population.

Figure 1

Answers of the 30 Students to Six Items



Note. Each square is one student; blue squares show "yes" answers.

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Table 1
Students Answering "Yes" to Each Item (n = 30)

Item	Yes (n)	Yes % [95% range]
Attitudes		
I like computer education	30	100.0 [88.6, 100.0]
Computer education creates students' interest in study	30	100.0 [88.6, 100.0]
Computer education is important for producing information	30	100.0 [88.6, 100.0]
Computer education makes students more intelligent	29	96.7 [83.3, 99.4]
Computer education improves students' learning	29	96.7 [83.3, 99.4]
Computer education builds good habits among students	29	96.7 [83.3, 99.4]
Computer education helps solve problems in time	29	96.7 [83.3, 99.4]
Computer education helps the progress of the country	29	96.7 [83.3, 99.4]
Computer education is beneficial	28	93.3 [78.7, 98.2]
Provision in the school		
Computer education is offered in my school	30	100.0 [88.6, 100.0]
Computer education is accessible	29	96.7 [83.3, 99.4]
My teacher takes a personal interest in computer education	29	96.7 [83.3, 99.4]
My school has a competent computer instructor	21	70.0 [52.1, 83.3]
My school has a well-equipped computer library	16	53.3 [36.1, 69.8]
Organisation and assessment		
Assessment of computer education is necessary	30	100.0 [88.6, 100.0]
The results of computer assessment are reliable	28	93.3 [78.7, 98.2]
Computer education should be a compulsory subject	21	70.0 [52.1, 83.3]
Computer education is possible for a large population	17	56.7 [39.2, 72.6]

Note. All students answered "yes" or "no" to every item. The 95% range is the Wilson interval. Two items with unclear meaning were excluded.

5. Discussion

The attitude of the students in this study towards computer education was very positive. All of them found it to be a welcome addition and felt that it assisted learning, created good habits and contributed to the development of the country. This is in line with previous research which has confirmed that technology has an impact on secondary students' learning in Pakistan (Jan, 2018; Mehboob & Nawaz, 2021). Students' interest, therefore, is not the problem.

The needs that arose relate to provision. Nearly a third of the students were not impressed with their competent instructor, and almost half did not feel that their school had a well-equipped computer library. These responses are similar to teachers' experiences of outdated labs and lacking training in public schools (Iqbal et al., 2022; Qadir et al., 2014; Sarwar et al., 2021) and the overall situation of a lack of equipment (Hali et al., 2021; Sarwar et al., 2021). The primary result of this study is that there is near-universal demand for

students to learn about computers, and much less is the reverse; students feel they can learn about computers but not very well.

Although all the students agreed that they liked computer education, 70% desired it to be compulsory and just over half believed that it could be offered to a large number of people. One interpretation is that students had a realistic understanding of their school's resources—when they have few resources available in their own school, they may not think that the subject can be available for everyone (Qadir & Hameed, 2018; Sarwar et al., 2021). This is an interpretation that needs to be investigated in future studies, where students are asked to explain their answers.

5.1 Implications

The results indicate that efforts to enhance computer education should be directed to the equipment and teachers (Qadir et al., 2014; Sarwar et al., 2021), not convincing students of the benefits of the education. Most important will be good laboratory facilities, the availability of current material and computer teacher training (Menekse, 2015; Ni et al., 2023). If there is a lack of equipment, the use of low-cost methods to teach ideas about computing without the use of computers can be considered as a temporary solution in the interim (Jehan & Akram, 2023).

5.2 Limitations

This study was small. It was based on 30 Grade 9 students from a single public school, selected for convenience, in order to ensure that results could not be generalized to other schools or regions; the ranges are wide and are due to this (Brown et al., 2001). There was no indication of the strength of opinion in the yes/no format (Krosnick, 1999), nor were gender and other background information recorded. A few were general, and two were omitted due to ambiguity. Further research is recommended that includes more schools across a wider range of schools, rating scales with established reliability (Krosnick, 1999; Podsakoff et al., 2003), and a combination of students' perceptions and perceptions of teachers and direct inspection of school resources.

6. Conclusion

In the present study, secondary school students were very interested in computer education and found lots of benefits in it, however many students felt that their school is not well equipped and having a skilled teacher to teach computer education well. Meeting the needs in computer education will be more dependent on providing schools the facilities they need and trained teachers the subject needs.

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Contribution of Authors

All the authors participated in the ideation, development, and final approval of the manuscript, making significant contributions to the work reported.

Conflict of Interest Statement

The authors declare no conflicts of interest.

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Informed Consent

Informed consent was obtained from all individual participants included in the study.

Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Data Availability

The datasets generated during and analysed during the current study are available from the corresponding author on reasonable request.

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