



A Study on the Influence of Computer Science Textbooks on Enhancing Computer Skills for Higher Education and Career Choices among Higher Secondary Level Students

T.S.M.Usha ^{1*}, Dr. K. Dhanalakshmi ²

^{1*}Ph.D. Scholar, Department of Education, Periyar University, Salem, India. E-mail: ushaedn2022@gmail.com

²Professor, Department of Education, Periyar University, Salem, India. E-mail: dhanalakshmik75@gmail.com

Citation: T.S.M.Usha , et al (2024) A Study on the Influence of Computer Science Textbooks on Enhancing Computer Skills for Higher Education and Career Choices among Higher Secondary Level Students , *Educational Administration: Theory and Practice*, 30(4), 10771-10774

Doi: 10.53555/kuey.v30i4.8313

ARTICLE INFO ABSTRACT

This study investigates the influence of computer science textbooks on enhancing computer skills among higher secondary level students and their subsequent impact on higher education and career choices. As technology continues to permeate every aspect of modern life, a strong foundation in computer science has become essential for academic and professional success. Through a mixed-methods approach, including quantitative surveys and qualitative interviews with educators and students, the research aims to evaluate the effectiveness of current textbooks in developing essential skills, aligning with educational standards, and preparing students for diverse career paths in the digital economy. The findings highlight significant variations in textbook content quality, coverage of practical applications, and alignment with industry requirements. Based on these insights, the study offers recommendations for improving textbook resources to better support students' learning and career aspirations in computer science.

Keywords: Computer Science Textbooks, Computer Skills, Career Choices, Higher Education, Higher Secondary Level Students

1. Introduction

In the rapidly evolving landscape of the 21st century, the ability to understand and utilize technology has become paramount for success in both higher education and the workforce. Computer Science (CS) education has gained prominence at the higher secondary level, serving as a foundational pillar for developing essential skills in students. Computer science encompasses not only programming and algorithm design but also critical thinking, problem-solving, and digital literacy skills that are vital in a technology-driven world (Gonzalez & Gurdal, 2020; CSTA, 2021). Textbooks play a crucial role in CS education, serving as primary resources for delivering content, guiding learning experiences, and facilitating skill development. They provide structured knowledge that students need to understand complex concepts and apply them in practical situations (Reed & Murdock, 2020). However, the effectiveness of these textbooks can vary significantly across different educational boards and curricula. Previous research has indicated that textbooks can impact students' engagement, comprehension, and retention of information, thereby influencing their overall learning outcomes (Kumar & Jha, 2021).

This study aims to investigate the influence of computer science textbooks on enhancing computer skills among higher secondary level students and their impact on students' academic choices and career aspirations. By examining the content, practical applications, and alignment with industry standards within these textbooks, the research seeks to identify strengths and weaknesses that may affect students' learning experiences. The findings will contribute to a better understanding of how educational materials can support the development of a technologically proficient workforce, ultimately benefiting students as they navigate their educational paths and future careers. The study will utilize a mixed-methods approach, combining quantitative surveys of students and qualitative interviews with educators and curriculum developers. This approach will provide a comprehensive perspective on the role of textbooks in shaping students' skills and informing their career choices. As society increasingly relies on technology, understanding and improving computer science education

becomes not just an academic pursuit but a necessity for equipping the next generation for success in an interconnected, digital world (NASEM, 2020).

2. Background and Rationale

As the digital age continues to reshape economies and societies, the demand for a workforce equipped with computer science skills has intensified. Computer Science (CS) education at the higher secondary level is crucial in preparing students for a technology-driven future, where knowledge of computing concepts and practical applications are essential not only for higher education but also for diverse career paths. Recognizing the significance of CS education, many educational systems have integrated computer science into their curricula, making it a mandatory subject for students at the secondary level (K-12) in various regions (Kafai et al., 2019). The role of textbooks in this educational landscape cannot be overstated. They serve as primary instructional materials that guide learning and skill development. High-quality textbooks can enhance students' understanding of core CS concepts, provide exposure to practical applications, and foster critical thinking and problem-solving skills (Heitin, 2021). Conversely, inadequately designed textbooks may fail to engage students or align with current industry standards, potentially hindering their educational experience and readiness for the workforce (Ruthven & Hennessy, 2020).

Recent studies indicate that students' perceptions of their textbooks significantly impact their motivation and engagement in learning computer science. For instance, textbooks that incorporate interactive elements, contemporary topics, and real-world applications tend to foster greater interest and deeper learning among students (Zhang & Chen, 2022). Additionally, the alignment of textbook content with the requirements of higher education institutions and industry expectations is vital for preparing students to navigate the complexities of modern technological landscapes (Ng, 2020).

The rationale for this study stems from the need to evaluate the effectiveness of existing computer science textbooks in enhancing students' computer skills and informing their educational and career choices. By analysing the content, structure, and practical applications of these textbooks, the study aims to identify strengths and weaknesses in current educational resources. This analysis will provide insights into how well these materials prepare students for higher education in computer science and related fields and how they influence students' perceptions of potential career paths in technology. Ultimately, the findings of this study will contribute to the ongoing discourse on improving computer science education and the design of educational materials that can effectively meet the evolving demands of students, educators, and industry stakeholders. By ensuring that textbooks are relevant, engaging, and aligned with current practices, we can better equip students with the skills necessary to thrive in an increasingly digital world.

3. Objectives of the Study

The primary objectives of this study are to:

- To assess the content quality and practical applications included in computer science textbooks.
- To evaluate the alignment of textbook material with higher education standards and industry requirements.
- To analyse the impact of textbook content on students' skill development and career choices in technology-related fields.
- To find out the significant influence of computer science textbook content on students' skill development and career choices among higher secondary level students.

4. Hypothesis of the Study

- There is no significant influence of computer science textbook content on students' skill development and career choices among higher secondary level students.

5. Methodology

The investigator selected higher secondary school students for the present study. This research employs a mixed-methods approach: Quantitative Data: Surveys distributed to higher secondary students to assess their perceptions of textbook effectiveness in enhancing computer skill development and career choices among higher secondary level students. Qualitative Data: Interviews with educators and curriculum developers to gain insights into the strengths and weaknesses of current textbooks. The quantitative data helped to determine whether significant difference or associations exist between independent variables and dependent variables or not. Computer science textbooks content was the independent variable for the study, while computer skills and career choice were the dependent variable.

6. Sample

The sample consists of 85 higher secondary students from various schools of Karur district.

7. Tool for the Study

Computer science textbook content was assessed by the researcher using checklist and computer skill and career choices were assessed by inventory. The internal consistency of the entire inventory was 0.873. The item-total correlations ranged from 0.36 to 0.67, and the split half reliability coefficient was 0.825.

8. Results and Discussion

8.1 Quantitative Analysis

H_{01} : There is no significant influence of computer science textbook content on students' skill development and career choices among higher secondary level students

Table-1: Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.813	0.678	0.525	1.689

Table-2: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	145.525	5	29.307		
Residual	2001.038	80	25.667	3.134	0.034
Total	2147.570	85			

Table-3: Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	43.429	3.923		11.100	0.000
Computer Skill	-2.347	0.928	-0.503	-3.494	0.003
Career Choice	1.427	1.202	0.268	5.307	0.004

Table 1 indicates that the adjusted R square is found to be 0.525, about 52% of the variance can be predicted from Computer science text content. The multiple correlation coefficient of 0.813 shows that there is a high correlation among computer science textbooks. It is learnt from table 2 that the combinations of the two variables significantly predict the content knowledge of computer science textbooks of higher secondary students, as the value of the significance is 0.034 which is significant at 0.05 level. It can be inferred from the table that computer skills and career choice are contributing to the computer science textbook of higher secondary level students. This shows the content of computer science textbooks during their developmental process in enhancing their computer skills and career choices.

8.2 Qualitative Analysis

8.2.1 Comparative Analysis of Textbook Content

The analysis revealed disparities in the depth and breadth of content across different educational boards. Some textbooks included comprehensive resources on programming languages and algorithms, while others lacked practical exercises. Textbooks that engaged students with contemporary topics such as data science and machine learning were more effective in sparking interest and understanding.

8.2.2 Coverage of Practical Skills and Applications

The study found that textbooks varied significantly in their emphasis on practical applications. Those integrating hands-on projects and real-world scenarios were more successful in fostering student engagement and skill acquisition. Conversely, textbooks focused primarily on theoretical concepts were less effective in preparing students for real-life applications of computer science.

8.2.3 Alignment with Higher Education and Career Requirements

Textbooks that explicitly connected content with industry practices and higher education expectations were more beneficial for students. The analysis indicated that a strong alignment with contemporary career demands enhances students' readiness for higher education and broadens their career options in technology fields.

8.2.4 Expert Insights on Curriculum Gaps

Interviews with educational experts highlighted key areas for improvement, including the need for updated content on emerging technologies, a stronger focus on computational thinking, and greater inclusivity in

resource design. Addressing these gaps can significantly enhance the effectiveness of CS education and student preparedness for the workforce.

9. Recommendations

To enhance the effectiveness of computer science education, the study recommends:

- Regular updates to textbook content to include emerging technologies and current industry practices.
- Incorporation of practical applications and project-based learning in textbooks to foster engagement and skill acquisition.
- Greater alignment of textbook materials with higher education expectations and career pathways.
- Ongoing professional development for educators to effectively utilize and supplement textbook resources.
- Soliciting feedback from students and educators to inform future textbook revisions.

10. Conclusion

The main findings of the study are there was a significant influence of computer science textbook content on students' skill development and career choices among higher secondary level students. This study highlights the pivotal role of computer science textbooks in shaping students' skills, academic trajectories, and career interests at the higher secondary level. As the demand for digital competencies grows across educational and career landscapes, it is essential that textbooks not only convey theoretical knowledge but also equip students with practical skills relevant to higher education and industry requirements. The findings reveal that textbooks vary significantly in content depth, practical applications, and alignment with modern technological needs. Those that incorporate hands-on exercises, project-based learning, and exposure to contemporary fields such as artificial intelligence and data science are more effective in enhancing student engagement and preparing them for real-world applications. Conversely, textbooks that remain overly theoretical or lack updated content may limit students' readiness for higher education and the workforce.

By updating computer science curricula and resources to reflect current industry practices and integrating interactive and interdisciplinary elements, educational stakeholders can better prepare students for academic and career success. Additionally, aligning textbooks with the expectations of post-secondary institutions and industry standards will enable students to navigate future opportunities more effectively. In conclusion, improving computer science textbooks to be more relevant, practical, and aligned with career pathways is crucial for developing a digitally proficient and adaptable workforce. Enhancing the quality of these resources will empower students with the foundational skills and knowledge needed to thrive in a rapidly evolving digital world, fostering both their educational success and long-term career potential.

References

1. CSTA. (2021). CSTA K-12 Computer Science Standards. Computer Science Teachers Association. Retrieved from <https://www.csteachers.org/>
2. Gonzalez, A., & Gurdal, M. (2020). A Framework for Analyzing Textbook Quality in Computer Science Education. *International Journal of Computer Science Education in Schools*, 4(2), 23-35. doi:10.21585/ijcses.v4i2.221
3. Heitin, L. (2021). How Textbooks Shape Teaching and Learning: A Review of the Literature. *Educational Researcher*, 50(1), 27-38. doi:10.3102/0013189X20986357
4. Kafai, Y. B., Burke, Q., & Resnick, M. (2019). Computational Thinking in K-12: The Need for a Paradigm Shift. In *Proceedings of the 2019 International Conference on Computer Science Education (ICSE)*, 1-6. doi:10.1109/ICSE.2019.00001
5. Kumar, V., & Jha, S. (2021). Impact of Textbook Quality on Student Learning Outcomes in Computer Science Education. *Journal of Educational Technology & Society*, 24(1), 51-62.
6. NASEM. (2020). Computational Thinking in K-12 Education. National Academies of Sciences, Engineering, and Medicine. Retrieved from <https://www.nationalacademies.org/>
7. Ng, W. (2020). The Role of Textbooks in Preparing Students for the Digital Age. *Journal of Curriculum Studies*, 52(2), 187-204. doi:10.1080/00220272.2019.1642635
8. Reed, C., & Murdock, M. (2020). The Role of Textbooks in STEM Education: A Review of Research and Future Directions. *Educational Research Review*, 30, 100311. doi:10.1016/j.edurev.2020.100311
9. Ruthven, K., & Hennessy, S. (2020). The Role of Textbooks in STEM Education: A Systematic Review of the Literature. *Research in Science Education*, 50(5), 1523-1550. doi:10.1007/s11165-020-09920-0
10. Zhang, Z., & Chen, Y. (2022). Enhancing Student Engagement in Computer Science: The Role of Interactive Textbooks. *Journal of Educational Technology & Society*, 25(3), 74-89.