Enhancing Vocational Education in Computer Science: Implementing the Discrepancy Evaluation Model (DEM) for Quality Assurance

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ABSTRACT

Vocational education is essential for developing human resources to support national progress. However, aligning academic curricula with industry needs is a significant challenge that impacts vocational education quality. This study uses a quantitative approach to evaluate the quality assurance of vocational education in computer science using the Discrepancy Evaluation Model (DEM) and information technology. Results reveal that learners reacted positively to curriculum and policy changes despite variations in technology infrastructure and experiences with online platforms. Training sessions received favorable feedback, although adherence to technology policies was inconsistent. The integration of information technology in learning was deemed beneficial for enhancing the quality of education and improving students' skills, although challenges remain. These findings underscore the necessity for continuous evaluation to enhance quality assurance in vocational education through information technology, ensuring alignment with industry demands and adequately preparing students for the digital age.

Keywords: DEM, quality assurance, vocational education

INTRODUCTION

Vocational education is crucial for economic progress and workforce development in Asia, with countries like South Korea, Japan, and Singapore implementing dual education systems to create employable graduates while maintaining relevance to industry needs. (Rakhmankulovna 2023)

Vocational education aims to create a well-prepared workforce for industry requirements. However, challenges include misalignment between academic curricula and industry needs, leading to graduates lacking the necessary skills and hindering their smooth integration into the workforce. (Ayonmike et al., 2015; Kovalchuk et al., 2022; Wafudu et al., 2022).

The Indonesian government is enhancing vocational education quality through revitalization and link and match policies, aligning with industry needs for economic growth and workforce development. (Gasmelseed, 2021) This research assesses quality assurance in computer science vocational education using IT, identifying strategies for improving quality and recommending a comprehensive curriculum integrating TVET policies. The study emphasizes the importance of soft skills, a robust framework, advisory boards, and mandatory internships in computer science vocational education. (Arifudin et al., 2022; Handoyono, 2022). It evaluates curriculum alignment, technology infrastructure, online learning platforms, and skills enhancement, using the Discrepancy Evaluation Model to assess performance and identify deviations (Qarni et al., 2022).

RESEARCH QUESTIONS

How does the use of the Discrepancy Evaluation Model (DEM) assess the quality assurance of vocational education in computer science?

The study utilized the Discrepancy Evaluation Model (DEM) to evaluate the quality assurance of vocational education, utilizing validated questionnaires and quantitative descriptive analysis (John & Yusri, 2021). The study analyzed the effectiveness of quality assurance in 38 students from East Java's IT and Computer Science vocational schools through pre-fieldwork, fieldwork, and data analysis (Cheung, 2020; Darteh, 2021). The study shows learners want curriculum changes for the digital era but worry about infrastructure quality. 74% see a positive impact of IT policies. (Purnami et al., 2021).

Learners believe policy design enhances learning by improving accessibility, efficiency, and effectiveness with online resources and technology. Barriers may include accessibility issues and inadequate infrastructure. The variations could indicate different learning styles and should be taken into account when creating IT policies in education (Cheng et al., 2022). Learners generally have positive experiences with technology infrastructure in their institutions, focusing on accessibility, speed, and reliability (Adekola et al., 2017; Benavides et al., 2020). However, they may encounter constraints like slow internet connections and technical problems. Understanding learners' needs and experiences is crucial for effective management (Asad et al., 2023).

Online platform integration in education has generally positive experiences, enhancing engagement, access to learning materials, and understanding (Asiyai, 2022). However, challenges like technical issues, navigation difficulties, and lack of support can hinder learning. Learning preferences and alignment between platforms and materials also impact

engagement. Well-designed platforms tailored to learners' needs are more effective in achieving learning objectives (Awang-Hashim et al., 2019; Khan et al., 2017). Considering learners' needs, preferences, and experiences is crucial for effective strategies in education.

Learners appreciate information technology training for its efficiency, productivity, and work quality, valuing well-designed, tailored education in the digital era (Marjona, 2024). Information technology in education enhances scientific understanding and engagement and deepens understanding through relevant applications and software, aligning with the growing trend of technology adoption in education.

Learners believe existing policies align with their needs and expectations for using information technology, promoting adherence to established rules (Espinoza & Martinez, 2023). Continuous assessment of technology use is crucial to maximize its positive impact on learning quality, engagement, and academic achievement despite variations in perceptions and institutional contexts (Asiyai, 2022). Learners reported positive experiences with digital tools, enhancing understanding and skills, improving proficiency, increasing efficiency, and providing access to resources but faced challenges or felt technology did not yield significant benefits (Greere, 2023).

CONCLUSION

Information technology enhances the quality of computer science education, but learners' responses vary. Institutions should improve infrastructure, provide training, and implement diverse policies while strengthening industry cooperation and continuous staff training.

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REFERENCES

Adekola, J., Dale, V. H., & Gardiner, K. (2017). Development of an institutional framework to guide transitions into enhanced blended learning in higher education. *Research in Learning Technology, 25,* Article 1973. https://doi.org/10.25304 /rlt.v25.1973.

Arifudin, O., Trisnamansyah, S., & Sauri, R. S. (2022). Implementation of internal quality assurance system in order to improve the quality of polytechnical research. *International Journal of Social Science, Education, Communication and Economics (SINOMICS JOURNAL), 1*(3), 297-306. https://doi.org/10. 54443/sj.v1i3.39.

Asad, M. M., Mahar, P., Datoo, A. K., Sherwani, F., & Hassan, R. (2023). Impact of quality assurance on TVET programs for the digital employment market of IR 4.0 in Pakistan: A quantitative investigation. *Education+ Training, 65*(6/7), 891-908. https://doi.org/10.1108/ET-08-2022-0295.

Asiyai, R. I. (2022). Best practices for quality assurance in higher education: implications for educational administration. *International Journal of Leadership in Education, 25*(5), 843-854. https://doi.org/10.1080/ 13603124.2019.1710569

Awang-Hashim, R., Kaur, A., & Valdez, N. P. (2019). Strategizing inclusivity in teaching diverse learners in higher education. Malaysian *Journal of Learning and Instruction, 16*(1), 105-128. https://doi.org/10.32890/mjli2019.16.1.5

Ayonmike, C. S., Okwelle, P. C., & Okeke, B. C. (2015). Towards quality technical vocational education and training (Tvet) programmes in Nigeria: Challenges and improvement strategies. *Journal of Education and Learning, 4*(1), 25-34.

Benavides, L. M. C., Arias, J. A. T., Serna, M. D. A., Bedoya, J. W. B., & Burgos, D. (2020). Digital transformation in higher education institutions: A systematic literature review. *Sensors, 20*(11), 3291. https://doi.org/10. 3390/s20113291

Cheng, M., Adekola, O., Albia, J., & Cai, S. (2022). Employability in higher education: A review of key stakeholders' perspectives. *Higher Education Evaluation and Development*, *16*(1), 16-31. https://doi.org/10.1108/ HEED-03-2021-0025

Cheung, R. W. Y. (2020). Quality assurance in vocational higher education: A case of Macau. *Journal of Advances in Humanities and Social Sciences, 6*(3), 89-99. https://doi.org/110.17051/ ilkonline.2021.04.93

Darteh, E. (2021). *Factors for ensuring quality assurance of technical and vocational education (TVE) delivery in Ghana* [Doctoral dissertation, Kwame Nkrumah University]. Kwame Nkrumah University. https:// ir.knust.edu.gh/ handle/123456789/14379

Espinoza, R., & Martinez, Y, N. (2023). *Quality matters: A comparative analysis of quality assurance mechanisms in adult education and training in OECD countries* (Working Paper No. 302). OECD. https:// doi.org/10.1787/fc5ae97c-en

Gasmelseed, A. M. (2021). Quality assurance practices in public technical and vocational education and training institutions in the Khartoum State-Sudan. *Journal of Educational and Social Research, 11*(5), 21-31. https://doi.org/10.36941/jesr-2021-0102

Greere, A. (2023). Training for quality assurance in higher education: Practical insights for effective design and successful delivery. *Quality in Higher Education, 29*(2), 165-191. https://doi.org/10.1080/13538322.2021.2020 978

Handoyono, N. A. (2022). Comparative study of curriculum, learning models, and quality assurance in vocational education. *Journal for Education and Vocational Future, 1*(2), 1-8.

John, W. S., & Yusri, K. B. (2021). Realistic quality assurance for technical vocational education and training towards enhanced productivity: Literature review. *Ilkogretim Online, 20*(4), Article 858. https://doi.org/10.17051/ilkonline.2021.04.93

Khan, A., Egbue, O., Palkie, B., & Madden, J. (2017). Active learning: Engaging students to maximize learning in an online course. *Electronic Journal of E-learning, 15*(2), 107-115.

Kovalchuk, V., Maslich, S., Tkachenko, N., Shevchuk, S., & Shchypska, T. (2022). Vocational education in the context of modern problems and challenges. *Journal of Curriculum and Teaching*, *11*(8), 329-338.

Marjona, A. (2024). Education system and organization of education in the case of Uzbekistan and Finland. *European Journal of Learning on History and Social Sciences, 1*(1), 120-124. https://doi.org/10.47134/jtp.v1i3.258

Purnami, A. S., Mulyanto, M., & Utomo, S. (2021). Teaching factory, internal quality assurance system, and vocational teacher quality culture. *Journal of Education and Learning (EduLearn), 15*(3), 406-413. https://doi.org/10. 11591/edulearn.v15i3.18947

Qarni, W., Nasution, D. A., & Riinawati, R. (2022). Analysis system and procedure deletion goods owned by state center for the development of quality assurance of vocational education in building and electricity sector. *International Journal of Social Science, Education, Communication and Economics, 1*(1), 15-24. https://doi.org/10.54443/sj.v1i1.3

Rakhmankulovna, A. S. (2023). The system of educating the students in vocational education. *International Scientific and Current Research Conferences, 1*(1), 123–126.

Wafudu, S. J., Kamin, Y. B., & Marcel, D. (2022). Validity and reliability of a questionnaire developed to explore quality assurance components for teaching and learning in vocational and technical education. *Humanities and Social Sciences Communications, 9*(1), Article 303. http://dx.doi.org/10.1057/ s41599-022-01306-1