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Assessing the Influence of Technical Teaching Resources on Competency Based Curriculum Implementation in Technical Schools in Kelantan State, Malaysia

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Abstract

This study investigated the effect of technical teaching resources on the implementation of competency based curriculum in Kelantan state's technical schools, with a specific focus on the Automobile Technology Trade. The study targeted 375 stakeholders; students, educators, administrators, and policymakers with a final sample of 194 respondents, including 178 students, 16 instructors, 10 administrators, and 3 policymakers. A mixed-methods approach was used, combining quantitative data from structured questionnaires and qualitative data from interviews, focus groups, and classroom observations. The study established a strong correlation with an R value of 0.873, indicating a high positive correlation between teaching equipment and the effectiveness of CBC Implementation. This confirmed the robustness of the relationship between resource adequacy and quality, and the effectiveness of CBC implementation. Additionally, for the facilities, the R value of 0.960 indicates a very strong positive correlation, suggesting that as the access and standard of facilities improve, CBC implementation significantly enhances. Importantly, the study also examined the influence of intervening variables including teacher training programs, administrative motivation, industry partnerships, and policy implementation. Regression results showed a statistically significant relationship, with an R value of 0.832 and an R Square of 0.692, indicating that 69.2% of the variance in CBC implementation is explained by these institutional factors. The Adjusted R Square of 0.654 and a standard error of 0.20174 further confirmed the strength of the model. Given the limited availability of qualified instructors, equipment, and training facilities, it is recommended to centralize the delivery of the trade in a single, well-equipped institution. This institution would serve as a specialized center of excellence for that specific trade, where all interested students from various areas can be enrolled and trained. This approach ensures efficient use of scarce Technical Teaching Resources and maintains high quality standards in the Implementation of the Competency-Based Curriculum in technical schools specifically in Kelantan state, Malaysia.

Keywords: *Technical Teaching Resources, Competency Based Curriculum, TVET Schools*

1.1 Introduction

This is a form of education that provides individuals with the technical skills, vocational knowledge, and hands-on experience necessary to work in various trades, crafts, and technical fields (Momanyi, 2022). It combines classroom instruction with practical training and is often linked directly to industry requirements. TVET aims to bridge the gap between education and employment by equipping students with market-relevant skills.

These resources include textbooks, digital content, lab equipment, workshops, and technological tools such as computers and software. Research indicates that schools with ample resources have higher student engagement, better learning outcomes, and improved job readiness among graduates (Peters, 2019 and Barkley, 2020). Conversely, resource inadequacies can lead to poorly delivered curricula, insufficient practical training, and ultimately, graduates who are ill-prepared for the job market. Resource inadequacies pose significant challenges to the implementation of the TVET CBC. Teachers in under-resourced schools often struggle to provide quality education due to a lack of essential materials, tools, and equipment. This inadequacy hinders the ability to conduct practical sessions and assessments, which are crucial for skills enhancement in TVET (Mulaudzi, 2024). Furthermore, a lack of resources can result in increased workloads for teachers, who must find alternative ways to compensate for the lack of materials, often at the expense of effective teaching (Okiridu, 2021). Research highlights that these challenges are particularly acute in developing regions, where educational funding and infrastructure are often lacking (Jacobson, 2016).

These refer to the tools, equipment, materials, technology and facilities used to facilitate practical and theoretical learning in technical fields. These may include qualified instructors, machinery, tools, instructional guides, models, and digital resources like software and online platforms (Hernandez-de-Menendez, 2019). In a CBC framework, these resources become the backbone of teaching methods, as they directly influence the quality of instruction (Adesina, 2016). In TVET, technical teaching resources are the specialized tools, equipment, materials, and instructional aids required to facilitate practical and theoretical knowledge and skills TVET. These resources encompass, but are not restricted to, machines, tools, devices, demonstration kits, lab facilities, software, digital resources, and reference materials (Abdulkadir, 2021).

Qualified instructors are essential for delivering CBC effectively, as they possess both pedagogical knowledge and technical expertise. According to Ayonmike et al. (2015), CBC requires trainers who can facilitate competency development through hands-on methods. The qualifications, experience, and ongoing professional development of instructors influence curriculum delivery and learner engagement. The physical learning environment significantly shapes the practical learning experience. Adequate infrastructure such as functional laboratories, well-equipped workshops, and appropriate classroom space enables effective competency demonstration and assessment (Thwala, 2017). Inadequate infrastructure can limit access to practical training, thereby undermining learning outcomes.

1.2 Statement of the Problem

In Malaysia, although the introduction of CBC was intended to align educational outputs with labor market demands (Ndihokubwayo, 2018), empirical studies on its actual implementation especially in technical trades such as Automobile Technology remain scarce. As highlighted by Nsengimana (2021), persistent shortages of instructional materials and skilled trainers significantly hinder CBC implementation. Yet, the specific impact of resource inadequacies on the

delivery of both soft skills and technical modules in trade-based qualifications at TVET Levels 3 to 5 is underexplored.

Furthermore, most previous research does not deeply explore intervening institutional factors—such as school leadership, training support, or partnerships—which mediate the relationship between available resources and CBC effectiveness (UNESCO, 2020; World Bank, 2018). These gaps create a need for context-specific, evidence-based research that captures the lived experiences of stakeholders in TVET schools in Kelantan state, where geographic and economic challenges may exacerbate resource limitations.

This study addresses these research gaps by examining how resource inadequacies affect CBC implementation in the Automobile Technology trade, with a special focus on both soft skills delivery and technical module execution. It also considers the role of institutional factors in mediating the effective use of available resources.

1.3 Research Objective

To evaluate the extent to which the existing technical teaching resources align with the prescribed requirements of the TVET CBC in the Automobile Technology trade, based on national curriculum standards and industry expectations.

1.4 Research Hypothesis

There are no existing technical teaching resources align with the prescribed requirements of the TVET CBC in the Automobile Technology trade, based on national curriculum standards and industry expectations.

2.0 Literature Review

2.1Theoretical Review

2.1.1 Experiential Learning Theory

Kolb's Experiential Learning Theory (1984) describes learning as a cyclical process involving four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation. TVET learners, particularly in technical trades like automobile technology, benefit most when they engage in all stages using real-world tasks and equipment. (Kolb, 1984). For instance, in automotive technology, students gain concrete experiences by working with real vehicles, reflecting on their actions, conceptualizing mechanical theories, and experimenting with different repair methods. When schools are resource-poor, students may be unable to complete the full cycle of experiential learning. Limited access to tools, equipment, and lab space may restrict students to observation rather than engaged participation, vital for acquiring competencies. Therefore, adequate teaching resources are crucial in implementing CBC, as they enable students to undergo experiential learning cycles that are fundamental to mastering technical skills (Najjuma, 2024).

Strengths: This theory emphasizes learning by doing, which is at the heart of CBC. It supports deep learning and skill retention through experience and it encourages learners to reflect and improve performance over time.

Weaknesses and Limitations: It requires ample resources (e.g., equipment, tools, materials) to facilitate experiential tasks. It is time-consuming and logistically demanding to implement effectively, and may not accommodate large class sizes or resource-constrained environments.

Relevance to the Study:

This theory is highly relevant for examining how resource inadequacies interrupt the experiential learning cycle. Without concrete tools and facilities, learners cannot fully participate in active experimentation and reflective learning, leading to poor implementation of CBC and suboptimal learner outcomes.

2.2 Empirical Review

Teaching Equipment

Teaching equipment includes machines, tools, and devices necessary for hands-on instruction in technical fields. The availability of modern and industry-aligned equipment ensures that learners develop relevant, transferable skills. Adesina (2016) notes that equipment adequacy improves students' ability to practice, repeat, and master skills central to CBC.

Instructional Materials

Instructional materials refer to learning guides, manuals, textbooks, digital content, and simulation software used to support teaching. These materials help structure learning, clarify procedures, and standardize assessments. Their quality, relevance, and accessibility directly impact how well learners understand and internalize competencies (Peters, 2019).

Resource Adequacy

Resource adequacy refers to the sufficiency of available teaching and learning materials in terms of quantity and suitability for instructional delivery. Adequate resources ensure that each student has access to essential tools and experiences for skill mastery. Inadequate resources result in limited hands-on training, which directly impacts skill acquisition and performance (Bizimana, 2014; Kipngetich, 2022).

Resource Quality

Quality refers to the relevance, functionality, and up-to-date status of instructional tools and infrastructure. Outdated or non-functional equipment reduces the fidelity of learning experiences, thus impeding students' ability to meet current industry standards (Thwala, 2017; Barkley, 2020).

3.1 Research Methodology

The research employed Slovin's formula size calculation to select as sample of 194 individuals. Data was collected using a combination of questionnaires with both open and closed-ended questions, as well as face-to-face interviews, particularly for respondents who did not have time to complete the written questionnaires. The primary data was then edited, coded, and entered into MS Excel and SPSS for quantitative analysis and statistical generalization, while qualitative information was presented in a narrative form to complement the quantitative findings.

4.1 Findings and Discussion

Table1: Descriptive Statistics of Teaching Equipment, Tools and Materials

Statements	N	Minimum	Maximum	Mean	Std. Deviation
The institution provides adequate and up-to-date textbooks relevant	194	2.00	4.00	2.9124	.86231
Digital learning resources, such as e-books, simulation software, and online learning platforms, are accessible to both students and instructors	194	1.00	4.00	2.1649	.98360
The teaching materials used in the program align with the Competence-Based Curriculum (CBC) requirements and industry standards.	194	1.00	4.00	2.7062	.80880
The institution provides modern diagnostic and testing tools to facilitate hands-on training.	194	1.00	3.00	2.1186	.54948
There are enough practical tools and equipment to ensure that all students get hands-on experience during training sessions.	194	2.00	3.00	2.3608	.48148
The available teaching equipment and materials are regularly updated and maintained to keep up with technological advancements.	194	2.00	5.00	3.7887	.84048
Instructors can access adequate teaching aids such as projectors, multimedia resources, and instructional videos to improve learning.	194	2.00	4.00	3.0258	.82346
The institution supports the integration of digital learning tools to improve skill development.	194	2.00	4.00	2.9588	.76066
Valid N (list wise)	194				

Source: primary data, 2025

Note: Strongly Disagree = [1[= **Very Low mean;** Disagree= [1-2[=**Low mean;** Neutral= [2-3[=**moderated mean**; Agree= [3-4[=**High mean**; Strongly Agree= [4-5[= **Very High mean**

Adequate provision of teaching materials is essential for effective learning. The mean score for "The institution provides adequate and up-to-date textbooks relevant to the curriculum" is 2.91 (SD = 0.86231), suggesting that while textbooks are available, their sufficiency and relevance could be improved upon. Access to digital learning resources such as e-books, simulation software, and online platforms scored significantly lower at 2.16 (SD = 0.98360). This indicates a major gap in digital resource integration, which could hinder students' exposure to modern learning tools. Similarly, the availability of modern diagnostic and testing tools scored 2.12 (SD = 0.54948), further highlighting the need for improved access to industry-standard equipment. Teaching materials must align with CBC requirements and industry expectations. The statement "The teaching materials used in the program align with the CBC requirements and industry standards" received a mean score of 2.71 (SD = 0.80880). While this score is moderate, it suggests room for improvement in ensuring that materials reflect real-world industry needs. Additionally, practical tools and equipment availability scored 2.36 (SD = 0.48148), indicating that many institutions struggle to provide enough hands-on learning tools for students. This limitation can negatively impact students' ability to develop practical skills necessary for the job market. Regular updating and maintenance of teaching equipment are vital for keeping up with technological advancements. The statement "The available teaching equipment and materials are regularly updated and maintained to keep up with technological advancements" received the highest mean score of 3.79 (SD = 0.84048), indicating that institutions recognize the importance of maintenance and updates. However, the effectiveness of these efforts may vary across institutions. The use of teaching aids

such as projectors, multimedia resources, and instructional videos scored 3.03 (SD = 0.82346), indicating that while some institutions provide these resources, their usage could be further optimized. Similarly, support for digital learning tool integration had a mean score of 2.96 (SD = 0.76066), suggesting a moderate level of digitalization in TVET training programs. The descriptive statistics on teaching equipment, tools, and materials reveal that while there are efforts to maintain and update resources, gaps remain in digital learning accessibility, practical tool availability, and alignment with industry standards. Addressing these challenges through increased investment, policy reforms, and institutional support will greatly enhance the effectiveness of CBC implementation in TVET institutions.

Human resources play an important role in the successful implementation of the CBC in TVET institutions. The effectiveness of CBC largely depends on the availability, qualifications, and CPD of instructors. The following analysis in table 14 interprets the descriptive statistics regarding human resources in TVET institutions and their impact on CBC implementation.

Table 2: Descriptive Statistics of CBC in TVET

Statements	N	Minimum	Maximum	Mean	Std. Deviation
The curriculum effectively ensures that students acquire the necessary knowledge, skills, and attitudes required for their chosen trade.	194	2.00	5.00	3.5000	0.78357
The delivery of soft skills is integrated into the technical training of the Competency-Based Curriculum.	194	2.00	5.00	3.6907	0.76667
The technical-specific modules are delivered in a way that allows students to gain practical knowledge and hands-on experience.	194	2.00	5.00	3.4381	0.92113
Students are provided with sufficient opportunities for both theoretical learning and practical hands-on experiences to develop their competencies.	194	2.00	4.00	3.0928	0.72815
The real-world application of competencies, through internships, field visits, and live projects, is well incorporated into the TVET curriculum.	194	1.00	5.00	3.0670	1.13386
The formative assessments are aligned with the Competency-Based Curriculum and effectively measure student progress.	194	2.00	4.00	3.3454	0.67471
The summative assessments are comprehensive and effectively assess both theoretical knowledge and hands-on skills.	194	1.00	4.00	2.5464	0.80182
There is adequate feedback provided to students after assessments, enabling them to understand their strengths and areas for improvement in both theoretical and practical competencies.	194	2.00	5.00	3.5515	0.81433
Valid N (list wise)	194				

Source: primary data, 2025

Note: Strongly Disagree = [1[= **Very Low mean;** Disagree= [1-2[=**Low mean;** Neutral= [2-3[=**moderated mean**; Agree= [3-4[=**High mean**; Strongly Agree= [4-5[= **Very High mean.**

One of the critical objectives of CBC is to ensure that students acquire the necessary knowledge, skills, and attitudes required for their chosen trade. The mean score for this statement is 3.50 (SD = 0.78357), indicating a moderately positive perception among respondents. This suggests that while the curriculum is generally effective, there is still room for improvement in aligning content

with industry needs and enhancing skill acquisition strategies. Another important aspect is the integration of soft skills into technical training. The mean score of 3.69 (SD = 0.76667) shows that respondents generally agree that soft skills are incorporated into CBC.

However, given the increasing demand for employability skills such as communication, teamwork, and problem-solving, further enhancement in soft skills training could improve workforce readiness. Practical Learning and Hands-On Experience, Practical knowledge and hands-on experience are essential in TVET education. The mean score of 3.44 (SD = 0.92113) for technical-specific module delivery suggests that students gain practical exposure, though the variation in responses indicates differing experiences across institutions. Similarly, the statement regarding opportunities for theoretical and practical learning received a mean score of 3.09 (SD = 0.72815), which is relatively lower. This suggests that while practical learning is a key component of CBC, some institutions may lack adequate facilities, equipment, or industry partnerships to fully support hands-on training. Real-world application through internships, field visits, and live projects scored the lowest among practical learning aspects, with a mean of 3.07 (SD = 1.13386). The high standard deviation suggests significant variation in student experiences, implying that some institutions may not fully integrate real-world applications into their curriculum. Strengthening industry linkages and ensuring all students have access to practical exposure could enhance competency development.

Effective assessment is crucial for measuring student progress in CBC. The mean score of 3.35 (SD = 0.67471) for formative assessments suggests that they are generally aligned with CBC and effectively measure progress. However, summative assessments, which evaluate overall competency, received a significantly lower mean score of 2.55 (SD = 0.80182), indicating concerns about the comprehensiveness and effectiveness of final evaluations. This suggests that summative assessments may not adequately capture theoretical knowledge and hands-on skills, necessitating reforms to ensure a balanced evaluation approach.

Feedback after assessments is essential for student improvement. The mean score of 3.55 (SD = 0.81433) indicates that students receive feedback, but the variation in responses suggests inconsistencies in the feedback process across institutions. Implementing a standardized feedback mechanism can enhance student outcomes and competency development. While the curriculum is generally effective in delivering technical and soft skills, practical learning opportunities and assessment methods require further enhancement. Addressing these gaps will help improve student competency, better align TVET education with industry needs, and enhance graduates' employability in the labor market.

Relationship of Teaching Equipment, Tools and Materials to CBC in TVET

The successful implementation of the Competency-Based Curriculum (CBC) in TVET institutions heavily depends on the availability and quality of teaching equipment, tools, and materials. These resources have a pivotal impact on equipping students with hands-on skills essential for competency-based learning. This essay provides an in-depth interpretation and analysis of the statistical data regarding their impact on CBC implementation in TVET institutions.

Table 3: Model Summary of Teaching Equipment, Tools and Materials to CBC in TVET

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.873[a]	0.762	0.722	0.19306

a. Predictors: (Constant), teaching equipment

Source: primary data, 2025

The model summary provides crucial insights into the relationship between teaching equipment and CBC. The R value of 0.873 indicates a significant positive relationship between teaching equipment and CBC implementation. This means that as the accessibility and standard of resources improve, the effectiveness of CBC also increases. Furthermore, the R Square value of 0.762 suggests that 76.2% of the variance in CBC implementation is explained by teaching equipment, tools, and materials. The adjusted R Square value of 0.722 ensures the reliability of this predictive model, confirming that the variable used in the study is a strong determinant of CBC success. The low standard error of 0.19306 further reinforces the accuracy of the model.

TABLE 4: ANOVA of Teaching Equipment, Tools and Materials to CBC in TVET

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.715	1	0.715	19.183	0.005[b]
	Residual	0.224	6	0.037		
	Total	0.939	7			

a. Dependent Variable: CBC

b. Predictors: (Constant), teaching equipment

Source: primary data, 2025

The Analysis of Variance (ANOVA) results help to assess the significance of the relationship between teaching equipment and CBC implementation. The F-value of 19.183 indicates that the regression model is a good fit for the data. Additionally, the p-value of 0.005 is well below the 0.05 significance level, suggesting that the relationship is statistically significant. This confirms that teaching equipment, tools, and materials are vital contributors to the successful implementation of CBC in TVET institutions.

Table 5: Coefficients of Teaching Equipment, Tools and Materials to CBC in TVET

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.679	0.372		4.518	0.004
	Teaching equipment	0.581	0.133	0.873	4.380	0.005

a. Dependent Variable: CBC

Source: primary data, 2025

The regression analysis provides a clearer understanding of how teaching equipment impacts CBC. This means that for every one-unit increase in the availability and quality standards of teaching equipment, CBC implementation improves by 0.581 units. The standardized Beta coefficient of

0.873 further confirms that teaching resources significantly influence CBC success. The t-value of 4.380 and the p-value of 0.005 strongly suggest that the impact of teaching equipment on CBC implementation is statistically significant.

The analysis confirms that teaching equipment, tools, and materials have a vital impact on the successful execution of CBC in TVET institutions. With an R Square value of 76.2%, the findings suggest that improving these resources will significantly enhance CBC outcomes. Therefore, TVET institutions, policymakers, and stakeholders must prioritize investments in modern teaching tools to improve student competency and workforce readiness. By ensuring well-equipped learning environments, TVET institutions will enhance practical skill acquisition and strengthen the link between education and industry demands, ultimately producing highly skilled graduates prepared for the job market.

Potential solutions and strategies proposed by students, teachers, and administrators

For students, "the school could collaborate with industry partners to get more tools and materials." "A digital library with online resources and e-books would help students access learning materials easily." "The CBC is good at providing technical skills, but soft skills like teamwork and communication are not always emphasized." "We need more practical sessions with real-world industry exposure to develop both technical and soft skills." "More hands-on training with modern equipment would improve our technical skills." "Workshops and guest lectures from industry experts would help us understand the practical applications of what we learn." "Regular industrial visits and internships would give us more exposure." "Creating mentorship programs where industry professionals guide students would be very beneficial."

In interviews, teachers also raised some potential solutions and strategies like: "Partnering with industries to donate or lend equipment would be helpful." "Developing open-source digital content and e-learning platforms can supplement learning materials." "We should include more teamwork-based projects and communication training in our teaching methods." "Encouraging industry-based learning through internships will help students develop both technical and interpersonal skills." "More investment in up-to-date learning tools and regular training for teachers would be beneficial." "We need structured professional development programs to stay updated with industry trends." "Industry collaborations can provide training equipment and internship opportunities for students". "Having industry experts as guest lecturers would give students a real-world perspective on their field."

Administrators proposed that "Government funding should be increased for TVET institutions to acquire modern learning tools." "Encouraging public-private partnerships can help institutions access better resources." "Incorporating mentorship programs with industry professionals can improve soft skills training." "Workshops and career development programs should be introduced to prepare students for the job market." "Partnering with companies to provide on-the-job training and apprenticeships would be beneficial." "Companies could donate or loan equipment to schools for training purposes." "Government agencies should ensure proper funding and policy support for TVET institutions." And "Development partners can offer technical support, funding, and training opportunities to improve TVET programs."

5.1 Conclusion

This study investigated the effect of technical teaching resource on the implementation of the Competency-Based in the TVET Automobile Technology trade in Kelantan state. The findings were structured to respond to each specific research objectives.

To analyse the extent to which available resources align with the requirements of the TVET CBC in Automobile Technology trade. The study found that, while some institutions have made progress in acquiring resources, there remains a significant mismatch between available resources and CBC requirements. Instructors reported that outdated or insufficient equipment limits their ability to deliver up-to-date practical training. In many cases, facilities were overcrowded or poorly maintained, and the availability of diagnostic tools and automotive components was inconsistent. These discrepancies limit the alignment of training with industry standards and the full realization of CBC goals.

This study concludes that the effective implementation of the TVET Competency-Based Curriculum (CBC) in Kelantan state is significantly influenced by the availability and quality of teaching resources. the study established that the resources currently available in TVET schools do not fully align with the practical and technical demands of CBC. The lack of modern, industry-relevant tools and equipment limits the ability of educators to deliver hands-on training aligned with curriculum requirements.

In summary, successful CBC implementation requires not only the provision of adequate teaching and learning resources, but also a strong institutional framework to ensure their efficient use. Bridging these gaps is key to enhancing students' practical competencies and preparing graduates who meet the needs of the labor market.

6.1 Recommendations

Maximize Utilization of Available Resources: Students should be encouraged to consistently and purposefully use the technical teaching and learning resources (e.g., tools, equipment, and ICT materials) provided in their schools to build strong practical skills aligned with the CBC approach. Educators should participate in training programs and workshops to stay updated on modern teaching methodologies and technological advancements, ensuring the effective implementation of CBC. Moreover, TVET authorities should allocate adequate and sustainable funding to equip schools with updated and industry-standard training materials, facilities, and digital infrastructure.

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