Revisiting Maritime Education and Training Offerings in the Public TVET Sector to Advance a Sustainable Ocean Economy

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ABSTRACT

This article explores the role that technical and vocational education and training (TVET) colleges play in higher education, with a particular focus on maritime education and training (MET). Like universities, TVET colleges are classified as providers of higher education in South Africa's education system under the country's National Plan for Post-School Education and Training (NPPSET). However, the status of TVET colleges has been criticised. This article argues that TVET colleges face several challenges relating to training facilities, alignment with industry needs, funding and governance. The aim of the article is to explore the current state of MET in TVET colleges, identify gaps and provide recommendations to enhance MET offerings in TVET colleges. The article concludes that curriculum development requires a close collaboration between TVET colleges and the industry.

Keywords: skills development, curriculum development, maritime education and training, oceans economy, TVET sector

I INTRODUCTION

The maritime sector plays a central role in facilitating global economic development. The major reason is that more that 80 percent of global trade is transported by sea. (United Nations Conference on Trade and Development [UNCTAD], 2021). The maritime industry also provides employment opportunities for millions of people directly and indirectly. For example, seafarers, shipbuilders, port workers, logistics providers and marine service providers are some occupations that depend on the maritime industry. Likewise, the maritime industry contributes to the social and environmental wellbeing of the world by supporting various activities such as fishing, tourism, recreation, research and conservation. The maritime industry is, therefore, a key sector that connects people, markets and regions, and enhances the quality of life for many.

Notwithstanding, the importance of having a welltrained and competent workforce to ensure this sector's safe and efficient operation cannot be stressed enough. The International Maritime Organization (IMO) is the leading international organisation that sets global standards for seafarers' training, certification and welfare. IMO defines MET as 'the process of imparting knowledge, understanding and proficiency to seafarers to enable them to carry out their duties on board ships safely and efficiently' (IMO, 2011). In other words, in the traditional sense, MET prepares seafarers to work on board vessels. The curriculum for seafarers is designed to meet international standards set by the IMO, particularly the Standards of Training, Certification and Watchkeeping for Seafarers (STCW) Convention (IMO, 2017). This ensures a consistent level of competence across the global maritime workforce.

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MET institutions play a vital role in training individuals for maritime professions by imparting the necessary knowledge, skills and competencies (Manuel, 2017). Knowledge, skills and competencies can cover various fields and specialisations such as seafaring, marine engineering, maritime law, maritime security, marine sciences, fisheries, aquaculture, port management, shipbuilding and repair, offshore oil and gas, marine tourism, coastal management and marine conservation. MET institutions aim to equip learners with skills and qualifications that are aligned with the international standards and conventions of the maritime industry and the sustainable development goals of the ocean economy (Brewer & Comyn, 2013). This form of learning in South Africa is primarily offered at higher education institutions. The higher education sector in South Africa comprises various types of institutions, including 50 public technical and vocational education and training (TVET) colleges (Transport Education Training Authority [TETA], 2020). Historically, South Africa's TVET colleges have not focused significantly on MET. As of July 2024, South Africa has only one public TVET college (Umfolozi College) that offers maritime-specific training programmes.

The aim of this article is to provide an overview of the state of MET in the public TVET system in South Africa and identify the gaps and challenges that need to be addressed to advance sustainable MET offerings. The article will achieve this by qualitatively analysing relevant policy documents and the literature. The article will also propose strategies and recommendations for enhancing the capacity and quality of TVET colleges to deliver accredited and relevant MET programmes that meet the needs of the maritime industry and support the development of a sustainable ocean economy in South Africa.

II HISTORICAL BACKGROUND AND POLICY CONTEXT OF TVET AND MET IN SOUTH AFRICA

In South Africa, TVET and MET have a long and complex history that reflects the political, economic and social changes that the country has undergone over the past decades, characterised by deep racial divisions and inequalities. During the apartheid era, TVET institutions were racially segregated, providing unequal access and poor-quality education. These institutions were primarily used to reinforce the oppression and marginalisation of the majority black population, providing cheap and unskilled labour for the white-dominated economy. As a result, TVETs were characterised by low relevance and low status (Akoojee, Gewer & McGrath, 2005).

Similarly, MET was largely inaccessible and irrelevant to the majority of the population as the industry was dominated by foreign-owned and operated shipping companies, and maritime institutions that catered mainly for the white minority and had little connection or contribution to the local development needs and aspirations of the country (South African Maritime Safety Authority [SAMSA], 2011). After the end of apartheid and the dawn of democracy in 1994, the new government embarked on a series of reforms and initiatives to transform and revitalise the TVET and MET sectors in line with the principles of equity, quality, relevance and development. Some of the key policy documents and frameworks that have shaped and guided the TVET and MET are mentioned in Table 1.

Policy/initiative	Year	Description
National Qualifications Framework (NQF) Act	1995	Established a single integrated system of education and training that recognises and articulates qualifications across different levels and sectors and aims to facilitate access, mobility, progression and quality assurance for learners and providers.

Table 1: Key policies and initiatives shaping skills development and maritime education in South Africa

Policy/initiative	Year	Description	
Skills Development Act	1998	Introduced a levy–grant scheme to fund skills development initiatives through the establishment of the sector education and training authorities (SETAs) responsible for identifying and addressing the skills needs and priorities of various economic sectors, including the maritime sector.	
Further Education and Training (FET) Act	1998	Restructured and renamed the former technical colleges as further education and training (FET) colleges and gave them greater autonomy and flexibility to offer a range of vocational and occupational programmes that respond to the needs of the labour market and the community. The Further Education and Training Act of 1998 (later replaced by the Continuing Education and Training Act of 2006) provided the framework for the establishment of TVET colleges.	
South African Maritime Safety Authority (SAMSA)	1998	For maritime education specifically, the establishment of the SAMSA in 1998 was a key development. SAMSA became responsible for setting standards for maritime qualifications and accrediting training providers. This is done in collaboration with various institutions including TETA.	
Skills Development Levies Act	1999	The Act established a levy–grant scheme to fund skills development initiatives through the establishment of SETAs to oversee skills development in different economic sectors.	
National Skills Development Strategy (NSDS) I, II and III	2001– 2016	Provided the strategic direction and framework for implementing and coordinating skills development initiatives in the country based on the vision of a skilled and capable workforce that supports an inclusive growth path and a decent work agenda.	
National Qualifications Framework Act of 2008	2008	Created an integrated national framework for learning achievements.	
White Paper on Post-School Education and Training (PSET)	2013	Outlined the vision and goals of PSET, which encompasses all forms of education and training beyond the compulsory schooling level, including TVET, higher education, adult education and skills development. The White Paper envisaged PSET that is diverse, differentiated, articulated, responsive, accessible, inclusive, equitable and quality assured.	
Operation Phakisa: Oceans Economy initiative.	2014	Operation Phakisa: Oceans Economy, launched in 2014 by the government as part of the National Development Plan (NDP) 2030, which is the long- term vision and strategy for the country's development. It is a results-driven approach aimed at unlocking the potential of the ocean economy, which is estimated to contribute up to R177 billion to gross domestic product (GDP) and create up to 1 million jobs by 2033.	
South African International Maritime Institute (SAIMI)	2014	To coordinate and promote maritime education and training.	

Policy analysis

During the apartheid period, the higher education was shaped by significant restrictions that limited access to quality education for a large segment of the population. These inequalities were institutionalised by the Bantu Education Act 47 of 1953, which created barriers that restricted educational opportunities for many. In the post-apartheid era, the South African government has made efforts, through the introduction of various policies, to promote equitable access to education and the desegregation of schools. One of these policies is the National Qualifications Framework Act 67 of 2008, which aimed to provide quality assurance and nationally recognised qualifications.

While progress has been made as a result of these polices, the education system is still largely influenced by the legacy of apartheid, presenting challenges such as imbalances in resources and educational opportunities across different socioeconomic groups (Akoojee, Gewer & McGrath, 2005). In response to current economic demands, subsequent policy reforms have attempted to correct previous inequities. By giving priority to the expansion of MET in TVET colleges, initiatives like Operation Phakisa: Oceans Economy (2014) highlight the government's commitment to economic growth by developing the maritime industry. SAMSA, an entity established in 1998, further highlights the need for regulatory frameworks that guarantee high standards in maritime qualifications. Additionally, the White Paper on Post-School Education and Training (2013) presents a vision for a diverse and fair educational system that acknowledges TVET as a vital component for workforce development. Collectively, these measures show a calculated strategy to improve the employability of graduates, while tackling urgent problems like inequality and unemployment in South Africa.

These policy frameworks have set the foundation and direction for the enhancement of MET in TVET colleges in South Africa and highlight the importance of MET in addressing the skills shortages, unemployment, poverty and inequality issues that the country faces. However, despite the policy objectives, the implementation of MET in TVET colleges faces various challenges such the lack infrastructure, expertise, the need to meet international maritime training standards and collaboration between the relevant government departments and entities involved in skills development (Mapulane, 2019).

III RESEARCH METHODOLOGY

This article undertook a systematic literature review and a document analysis using official SAIMI documents as data sources. Boote and Beile (2005) state that a systematic review of the literature provides access to existing literature, and identifies gaps, trends and debates, and highlights the need for further research. The authors also state that a document analysis process involves reviewing and interpreting various policy documents such as the White Paper on Post-School Education and Training, the National Skills Development Strategy, Operation Phakisa: Oceans Economy, in the South African context. Some of the reports and studies consulted during the data gathering process includes the Maritime Sector Skills Development Study, which was conducted by SAMSA in 2011, and the TVET Readiness for Maritime Education and Training Report published in 2018. These policy documents and reports provided a deeper insight into the state of MET in TVET colleges in the country.

Thus, the study combined both a systematic literature review and a document analysis to provide an in-depth and critical overview of the current state of MET in TVET colleges.

Analysis

As has been mentioned, the study adopted a mixedmethods approach, using a systematic literature review and desktop or document analysis to identify and evaluate relevant literature and publications that addressed the skills gaps in the maritime sector in order to advance the MET in TVET colleges. A review of the literature on MET in South Africa's TVET sector was conducted using the Google Scholar search index with the key terms 'maritime education and training', 'South Africa', and 'TVET' or 'technical vocational education and training'. This search yielded 19 results, eight of which were deemed relevant. The systematic literature review focused on articles published over a 10-year period (2013–2023). However, a few key papers published before this period were included because they provided foundational insights and remain highly relevant to the study. The relatively low number of relevant scholarly publications suggests that research on MET in South Africa's public TVET sector is largely underexplored. Table 2 indicates the total number of studies obtained and analysed. The work informing the table is based on the preferred method, namely a systematic literature review (SLR) approach.

Table 2: Systematic literature review summary

Description	Number
Total number sourced from Google Scholar	19
Number of literatures deemed relevant	8

Key findings

Key findings from the literature revealed that TVET colleges in South Africa have limited involvement in maritime training beyond basic artisan skills production. Initiatives are underway, particularly by SAMSA, to assist selected TVET colleges to start maritime training programmes for ratings and workshop training for marine engineering students. The lack of TVET involvement in maritime training represents a gap in the skills development pipeline for the maritime sector in South Africa. Expanding TVET offerings could help address skills shortages. Some TVET colleges, like the False Bay TVET College, have begun offering maritime-related programmes, although details on these programmes were limited in the scholarly literature. The need to better align TVET maritime training with industry requirements is recognised.

The literature suggests the need for closer cooperation between industry and TVET colleges on curriculum development and performance management. Funding and infrastructure for maritime training at TVET colleges were identified as challenges that need to be addressed to expand course offerings. Creating awareness of maritime careers and improving the maritime culture, starting from the basic education level, was highlighted as important for attracting students to maritime TVET programmes. The literature review revealed that MET in South Africa's TVET sector is still in the early stages of development, with recognition of its importance but limited current offerings. There are initiatives underway to expand TVET involvement but more research may be needed to fully assess the current state and future potential of maritime TVET programmes in South Africa.

Developing maritime training programmes requires specialised facilities, equipment and instructors. TVET colleges lack the proper infrastructure and resources to offer quality MET. For instance, there is a lack of training simulators, workshop facilities and specialised equipment (Maritime Sector Skills Technical Task Team [MSSTTT], 2014). Additionally, there are a limited number of instructors with the necessary maritime qualifications and industry experience to teach at TVET colleges. Attracting the staff with the relevant expertise is challenging and costly. This is particularly true for TVET colleges because they typically offer lower salaries than universities (World Maritime University [WMU], 2020).

The misalignment between education or training and industry needs is another significant limitation. The MSSTTT (2014) highlighted a disconnect between education and training institutions and the industry, resulting in outputs that do not necessary meet industry demands. This misalignment is likely even more severe at the TVET level, given the historical lack of maritime programmes. Developing relevant and up-to-date curricula that meet evolving industry requirements remains an ongoing challenge. Furthermore, the complex regulatory environment surrounding maritime education presents challenges for TVET colleges seeking to establish new programmes. Maritime training standards are regulated internationally by the STCW Convention, requiring programmes to meet specific accreditation requirements. Aligning the South African Qualifications Authority (SAQA) qualifications to STCW standards could be difficult for TVET colleges without prior maritime expertise (WMU, 2020).

Generally, there is a lack of awareness about maritime career opportunities among South African youth, particularly those from disadvantaged backgrounds. The MSSTTT (2014) also highlighted the fact that there is weak maritime culture in the country. These challenges impact on the ability of the industry to attract candidates to the industry. TVET colleges face difficulties in attracting students to maritime programmes when awareness is low. Additionally, developing new maritime programmes requires significant financial investment. Without dedicated funding streams, TVET colleges struggle to allocate resources to establish and maintain maritime training facilities and programmes (MSSTTT, 2014).

Despite these challenges, there have been efforts and initiatives aimed at expanding MET opportunities, including at TVET colleges. In 2014, SAMSA launched an initiative to equip TVET colleges to offer MET programmes, piloting maritime training at 12 TVET colleges with 500 artisans (WMU, 2020). SAMSA has also been working in partnership with the Department of Higher Education and Training (DHET) to develop a maritime curriculum for TVET colleges so as to ensure that programmes align with both national qualification standards and international maritime requirements. Efforts to strengthen cooperation between industry and TVET colleges in curriculum development and workplace learning have also been made. For example, the South African Oil and Gas Alliance (SAOGA) has programmes to fast-track industry placement capacity for trainees (WMU, 2020).

While many challenges continue, there have been some positive developments, such as the National Skills

Fund (NSF) allocating R93 million towards various maritime skills development initiatives, including empowering public TVET colleges (MSSTTT, 2014). The development of a comprehensive MET policy has been proposed to provide a more coordinated national approach, potentially addressing some of the regulatory and funding challenges facing TVET colleges (MSSTTT, 2014).

To address these challenges, several strategies have been proposed in the literature. Enhanced collaboration between industry and academia is one such strategy, where closer partnerships between MET institutions and maritime companies can facilitate the exchange of knowledge and expertise, making teaching roles more attractive to industry professionals (Manuel, 2017). Improved career development opportunities, such as offering clear career progression paths and continuous professional development, can also help attract and retain qualified staff (Dyers, 2021). Establishing working employment models that are flexible, including parttime or adjunct teaching positions, allow active seafarers to contribute their expertise without having to leave their sea-going careers (Gabedava & Kakabadze, 2021). Furthermore, it is critical that investment in technology and facilities is secured because this will provide stateof-the-art training equipment and facilities, making teaching roles more appealing, resulting in enhanced the quality of education (Demirel, 2020). Additionally, programmes aimed at promoting maritime careers and raising awareness about maritime professions and the importance of MET can help attract both students and potential instructors to the field (Kuhlase, 2021). Another strategic consideration is international cooperation, which is also vital. This is so in order to foster collaboration between MET institutions globally to facilitate knowledge sharing and the development of best practices (De Klerk, Manuel & Kitada, 2021).

With the evolution of the maritime industry, several trends influencing the future of MET. This has impact on learning mechanism. To keep up with ever changing demands of the maritime industry, digitalisation and e-learning are becoming increasingly important, especially in light of global events such as the Covid-19 pandemic (Demirel, 2020). Considering the advanced technologies, simulation-based training has proved to be crucial. Using advanced simulation technology, provides realistic, hands-on training experiences without the need for expensive shipbased practical sessions (Vidan et al., 2019). There is also a growing recognition of the importance of nontechnical skills, such as leadership, communication, and cultural awareness, in maritime education (Manuel, 2017). Sustainability and environmental awareness are increasingly being incorporated into MET programmes, emphasising content related to environmental protection and sustainable shipping practices (De Klerk, Manuel & Kitada, 2021). Finally, as the industry moves towards greater automation, MET institutions are also beginning to adapt their methods and curricula to prepare seafarers for roles in monitoring and managing autonomous vessels (Roos & Sandell, 2020).

IV DISCUSSION

MET institutions are crucial for ensuring the safety, efficiency, and sustainability of the maritime industry. Although strides have been made in South Africa to expand MET opportunities, there remain substantial challenges to the development of effective MET programmes at public TVET colleges. Some of the most significant issues that are still lagging that need attention include infrastructure and resource constraints, shortage of qualified instructors, misalignment with industry needs, regulatory complexity, limited awareness and funding shortages. This article examines these challenges and suggests that addressing identified issues requires sustained and coordinated efforts among stakeholders such as government, industry and educational institutions.

Enhancing the maritime training capacity of the TVET sector is essential in order for South Africa to fully realise its maritime potential and provide accessible pathways to maritime careers. Alongside this, it is important to ensure that future initiatives prioritise dedicated funding mechanisms for maritime infrastructure and equipment at TVET colleges, including programmes for instructor training and development. It is further important to strengthen partnerships within the industry and to ensure curriculum relevance, while streamlining accreditation processes and implementing targeted awareness campaigns. This will help attract students to maritime fields.

SAIMI leads the efforts to enhance MET in South Africa. In this regard SAIMI plays a crucial role in coordinating skills development and capacity building in the maritime sector. To this extent, SAIMI's initiatives include the recent launch of the rescue and implementation plan for reviving Umfolozi College so as to address critical challenges in MET. In its efforts, SAIMI has implemented a two-phased rescue plan directed at solving issues of subject non-completion and expired accreditations, which have negative impact in students' progression. This plan involves contracting qualified instructors to assist students and the facilitation of block accreditation with SAMSA to expedite the renewal process. These efforts have seen strengthening of industry stakeholders, ensuring that curricula remain relevant and that students have access to necessary sea time training opportunities. The coordination of efforts in the industry is essential to overcome existing barriers and establishing effective MET programmes that can effectively support South Africa's maritime aspirations.

It is suggested that TVET colleges could play a vital role in developing South Africa's maritime workforce. This would have the effect of supporting the growth of South Africa's ocean economy by means of continuous investments. TVET colleges, therefore, have the potential to significantly improve employability, productivity and socioeconomic development by providing relevant and quality education that meets the needs of various sectors and occupations. In addition, TVET contributes to other sectors, such as social inclusion, environmental sustainability and social justice. These are achieved by addressing skills gaps, promoting access and equity and empowering marginalised groups.

This article puts forward several recommendations that can help to improve MET in TVET colleges in South Africa. Firstly, developing dedicated maritime curricula and programmes. This can be achieved with collaboration between institutions such as SAMSA, DHET and industry partners to create standardised maritime curricula aligned with STCW requirements and national qualifications frameworks. Secondly, investing in infrastructure and equipment is another critical recommendation. This requires the provision of funding for specialised maritime training equipment like simulators, workshops and labs at designated TVET colleges. Thirdly, developing partnerships with industry to access equipment and facilities where possible. This can help to mitigate resources constraints. Fourthly, another crucial factor is building lecturer and instructor capacity. To build the required capacity in MET, it is necessary that recruitment programmes be directed to the appointment of qualified maritime professionals as lecturers or developing programmes to train existing TVET lecturers in maritime subjects. This can also be achieved by employing innovative solutions, like shared lecturers across colleges or remote instruction for specialised topics. Strengthening industry partnerships is another key recommendation. Establishing formal partnerships with maritime companies, ports and other stakeholders can ensure curriculum relevance and provide workplace learning opportunities.

Introducing advisory boards with industry representation to advise on programme development can further enhance these partnerships. Another crucial factor is improved access to sea time and workplace experience. This can be achieved by using integrated systems between the South African government and the maritime industry to increase berths available for cadets on South African and international vessels. This can be done together with developing structured workplace learning programmes with industry employers.

A further recommendation is to leverage technology and alternative learning methods. Implementing e-learning and blended learning approaches, where appropriate, especially for theoretical components, could enhance the learning experience. This would be an added benefit for student support and career guidance. Providing maritime-specific career guidance and support services for TVET students and developing clear articulation pathways between TVET qualifications and further education or career progression, could help students navigate through their career paths. Improving awareness and recruitment is another key recommendation. Increased awareness campaigns to attract students to maritime programmes at the TVET level and working with schools to promote maritime careers earlier in the education pipeline could generate learner interest. Another approach would be to address regulatory and accreditation issues, which are equally crucial. Streamlining processes for SAMSA accreditation of TVET maritime programmes and ensuring alignment between SAQA, Quality Council for Trades & Occupations (QCTO) and SAMSA requirements for qualifications could simplify the regulatory landscape.

Lastly, securing sustainable funding is essential. Developing dedicated funding mechanisms for maritime programmes at TVET colleges and exploring industry co-funding models is important. This could be done together with leveraging currently existing skills development funding to provide the necessary financial support to students to alleviate the financial burden. Implementing these recommendations will require coordinated efforts from government, TVET colleges, industry and other stakeholders. A phased approach, starting with pilot programmes at selected colleges, may be advisable in order to build capacity and demonstrate success before wider rollout.

V CONCLUSION

South Africa TVET institutions offering MET face significant challenges, particularly in attracting and retaining qualified instructional staff. Addressing these challenges requires a multi-faceted approach involving collaboration between industry players, academia, and government bodies. This article recommends that future research should focus on evaluating the effectiveness of various strategies for improving staff recruitment and retention in MET institutions.

Further, studies examining the impact of emerging technologies and industry trends on MET curricula, including teaching methods, would be valuable in guiding the future development of maritime education. As the maritime industry continues to evolve, it is important that MET institutions adapt and innovate to meet the sector's ever-changing needs. This could assist in the continued development of a skilled and competent maritime workforce capable of navigating the challenges of the 21st century.

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