Maritime skills development in KwaZulu-Natal: 2022

Leticia A Grimett[†] and Sihle Mzileni

ABSTRACT

The Operation Phakisa: Oceans Economy mandate, in line with the United Nations (UN) Sustainable Development Goals, calls for the extension of the benefits of maritime sector development to disadvantaged rural communities. This mandate can only be realised if the rural communities can actively partake in the sector. Research has shown that the coastal rural communities were unaware of the maritime sector, and few were prepared to partake in the maritime value chain. This maritime skills audit sought to determine the skills required by the maritime sector and the ability of the rural community to provide them. The research also sought to determine the geographical and educational gaps within the sector. Initially, the intention of the research was, to discover specific areas where skills shortages and education gaps were found. While the Protection of Personal Information (POPI) Act[1] proved to be a limiting factor, the study still uncovered the structural issues affecting the education and training of rural learners. The maritime sector is primarily urban. Maritime training is also done within the urban sectors. While it should be a simple matter of the rural learners moving to urban centres to study, the deficiencies in the education of the rural populations have created a major systemic bottleneck. This paper provides the results of the maritime business audit, together with the issues facing the rural education sector and the obstacles they present.

Keywords: maritime skills development, rural education, maritime skills shortages, critical skills, scarce skills

I INTRODUCTION

The Operation Phakisa: Oceans Economy document of 2014 provides for the growth and development of the maritime sector, targeting six maritime subsectors. These are coastal marine tourism, marine transport and manufacturing, aquaculture and fisheries, oil and gas exploration, marine protection, legislation and small harbour development.[2] The areas targeted are mainly coastal areas. By creating value within coastal communities through maritime development, the Operation Phakisa strategy plan seeks to establish a proper foundation for economic development within the urban and rural areas.

Economic development requires skilled individuals to undertake the relevant tasks and/or create sufficient value to grow these sectors.[3] The ability to source sufficiently qualified people to grow the maritime sector is a problem that the Operation Phakisa strategists sought to rectify by means of continuous skills development.[4]

Maritime employment in the coastal rural areas has been hindered by the lack of youth skills and inadequate youth schooling, which has impacted the youth unemployment rate. According to Statistics South Africa's 2021 fourth quarter statistics,[5] youth unemployment rate across all sectors in the fourth quarter of 2021 was 66.5%. Of this, 2.4% were university graduates, 51.6% had less than matric and 38.6% had matric.

The unemployment rate for youth between 15 and 34 had decreased slightly to 46.5% in the second quarter of 2022.[6] To meet the Operation Phakisa goals, government must adopt targeted intervention programmes. Without relevant information regarding the level of education of rural communities or their skill sets, it is difficult to adequately intervene. There is the additional question of why the youth appear to be so badly affected by unemployment, given that the education system is being upgraded and apartheid-related legacy issues are being rooted out of the system.[7]

II PROBLEM STATEMENT

There is an increasing gap between the direction that the economy is taking and that which it needs to take due to a shortage of skilled people. This conclusion can be reached from the research done on reasons for skills shortages in South Africa.[8] They uncovered a clear link between the scarcity of critical skills and the inability of businesses, and hence the economy, to grow at the required pace. Within both the public and private sector, communities struggled with the impacts of the lack of service delivery due to insufficient skilled labour. In the same way, businesses were hindered from implementing growth strategies. As such, the skills that potential job entrants must have to be able to make a meaningful contribution to the economy, and the rapidly changing global environment, need to change and align with global economic trends and the economy's shifting needs.[9] Increased automation, together with the Internet of Things (IoT) requires labour to have some understanding of technology and technological processes. The margin for absorption of unskilled labour into the economy is diminishing and, as automation increases, many semi-skilled jobs are falling away. Statistics indicate that the youth unemployment rate can be partly attributed to the lack of adequate education, insufficient or lack of skills, and lack of work experience.[10] Without a proper understanding of the dimensions and causes of this problem, it will be difficult for government to prepare for the interventions needed to redirect the South African economy.

III RATIONALE OF THE STUDY

While there are clear statistics on the nature of the unemployment crisis, the details relating to these statistics are unclear. As the unemployment crisis has impacted the youth sector the most, emphasis is being placed on youth employment and the development of rural areas, where the unemployment rate is highest.[11] While the Operation Phakisa: Oceans Economy document has identified activities in the maritime sector as a means of creating jobs, there is little known about the status of maritime education or the skills gaps that will need to be addressed.

5   PoliticalAnalysis 'Youth unemployment rate in South Africa 2022' *PoliticalAnalysis* 6 April 2022 (available from: <https://www.political analysis.co.za/youth-unemployment-rate-in-south-africa-2022/#:~:text=Unemployment%20affects%20the%20whole%20 population%2C%20but%20the%20youth,fourth%20quarter%20of%202021%2C%20released%20in%20March%202022>).

6   Statistics South Africa (Stats SA) *Quarterly Labour Force Survey Q2:2022* (Pretoria: Stats SA 2022) (available from: <https://www.statssa.gov. za/?p=15685#:~:text=Quarterly%20Labour%20Force%20Survey%20%28QLFS%29%20%E2%80%93%20Q2%3A2022%20The,Quarterly%20 Labour%20Force%20Survey%20%28QLFS%29%20for%20Q2%3A%202022>).

7   TD Thobejane 'History of Apartheid Education and the Problems of Reconstruction in South Africa' (2013) 3(1) *Sociology Study* 1–12.

8   AD Mateus, C Allen-Lle & CG Iwu 'Skills Shortage in South Africa: Interrogating the Repertoire of Discussions' (2014) 5(4) *Mediterranean Journal of Social Sciences*.

9   C Shaw 'The Digital Skills Revolution, McKinsey and Company Operations Blog' *McKinsey* 30 November 2018 (available from: <https://www. mckinsey.com/capabilities/operations/our-insights/operations-blog/the-digital-skills-revolution>).

10 SAMI op cit note 2.

11 Department of Planning, Monitoring and Evaluation *Executive Summary of the National Development Plan, 2030* (Pretoria: National Planning Commission 2022) (available from: <https://www.gov.za/sites/default/files/Executive%20Summary-NDP%202030%20-%20 Our%20future%20-%20make%20it%20work.pdf>).

IV OBJECTIVES

As there is little information available on the maritime sector education and skills gaps, the survey objectives sought to:

- Discover the educational and geographical areas with maritime skills shortages.
- Identify which are the:
  – core maritime skills
  – most critical maritime skills
  – future skills required by the maritime sector.

V RESEARCH METHODOLOGY

In researching this paper, a mixed-research methodology was adopted, with both primary and secondary data being utilised. The survey was conducted during June and July 2022 and was a targeted probability study, with a list of maritime-related companies having been acquired online and lists of maritime firms sourced from the Moses Kotane Institute partner organisations.
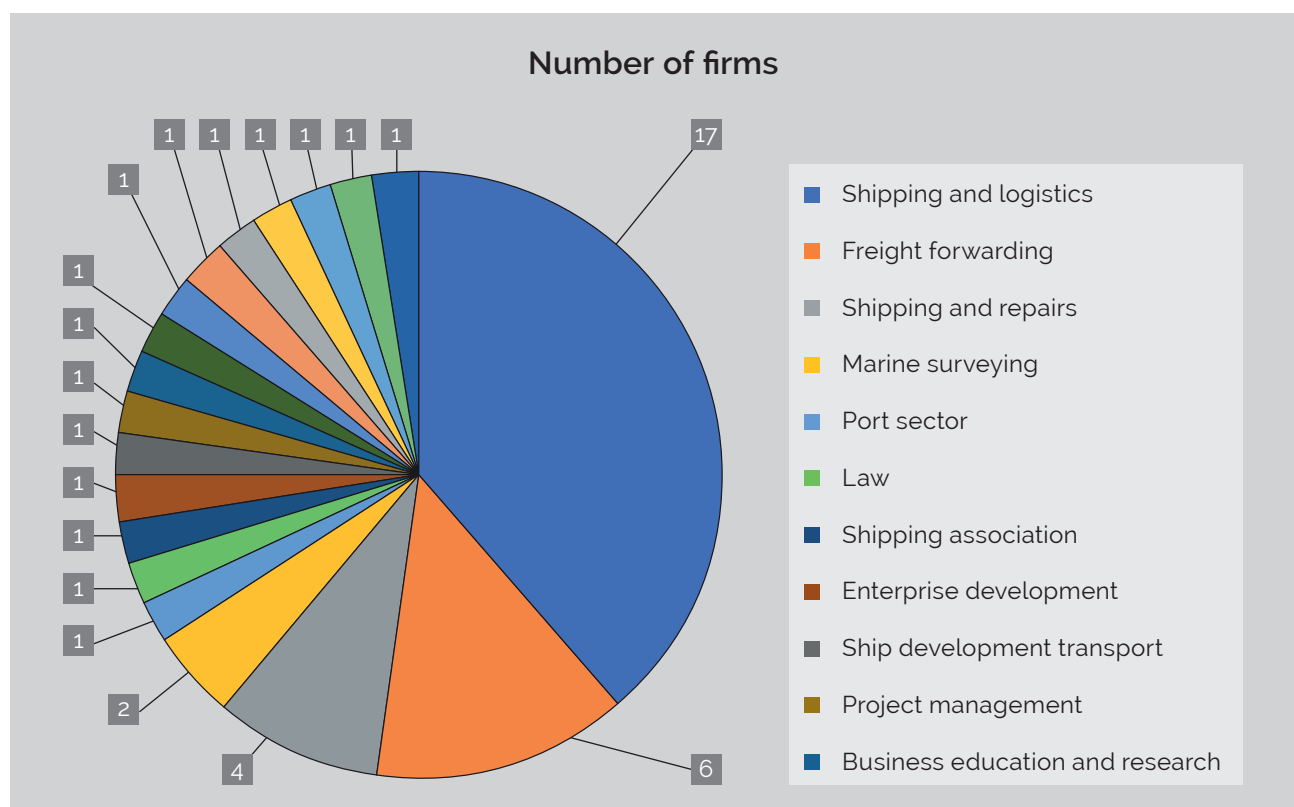

Figure 1: Number and Types of Firms in the Maritime Firms' Audit

In Richards Bay, semi-structured face-to-face interviews were conducted. Durban participants preferred to answer questionnaires online. The face-to-face interviews yielded more in-depth information, with participants explaining their reasoning in greater depth. While abstentions, narrowed the scope of the survey, the responses obtained are still substantial because many firms had substantial market share,

while others were monopolies. The marine engineering sector did not participate, although several large firms were approached. Secondary sources were used to fill this gap. Research indicated that the engineering subsector was represented throughout the maritime sector. The validity of the information was determined by referring to secondary sources and the results of previous research. The Transport Sector Education

and Training Authority (TETA) and the Department of Higher Education and Training were approached to verify information and to obtain the latest statistics. For up-to-date statistics, the study sought secondary data from the Statistics South Africa website. A reflexive approach was adopted to prevent bias, with data being analysed using a content and exploratory approach.

VI ETHICAL CONSIDERATIONS

The POPI Act prevents the sharing of personal information with external parties without a party's permission. This has become an obstacle to detailed research. All information obtained was treated with the utmost care, with the information provided being used to secure data for the research paper. To prevent breaches of confidentiality, participants gave permission for their inputs to be used in the study. In addition, participation was voluntary, with participants being aware of the purpose of the survey.

VII LITERATURE REVIEW

According to a Government Communications Insight Newsletter No 13,[12] South Africa's high unemployment rate is partly due to a skills mismatch, with a large proportion of the potential labour force being either semi-skilled or unskilled. This also contributes to the inability of the economy to absorb new job seekers. In the current economic climate, employers are reluctant to train new job seekers. Where government previously provided employment to unskilled youth and employment seekers by way of government projects such as roads and infrastructure projects, technology is changing this situation. Even basic jobs require some level of skill and expertise. Within the maritime sector, supply chain developments and global trade advancements are being affected by climate change provisions and trade-related conventions, such as the Trade Facilitation Agreement which requires rapid adoption of digital technologies, efficient renewable energy solutions, automation and other digital solutions.

The Maritime Sector Skills Technical Task Team (MSSTTT) Report of 2014[13] was the last complete maritime skills audit. The MSSTTT report[14] outlined the primary and secondary maritime industry clusters. The three primary clusters are:

1. shipping and transport, which includes maritime logistics infrastructure, shipping transport and ports, marine services and coastal administration.

2. marine resources, which include, fishing; pharmaceuticals, aquaculture, offshore energy and mining.

3. marine tourism, which consists of boating, cruising, sports, recreation and leisure. This sector has been publicised and encouraged, with tourism being taught at school level. This sector is a mass employer and includes hotels, bed and breakfasts, game reserves, gift shops, logistics, tour guides, food and beverages, clothing, farming and fishing, as well as road and beachfront infrastructure, construction, lifeguards, security and sports.

The four secondary industry clusters include:

1. operational support services, which include shipping logistics and marine technologies.

2. manufacturing and construction, which include civil engineering, marine manufacturing (ship/boat building, component manufacturing); ship repair and maintenance (ship modifications, oil and gas structures etc)

3. business services, which include maritime professionals within the banking, legal, insurance, information and communications technologies (ICT) and the consulting domain. These ancillary services support the maritime sector.

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12 Government Communications 'Understanding the root causes of unemployment' *Insight Newsletter* Issue 13 (Pretoria: Department of Government Communications 2014) (available from: https://www.gcis.gov.za/content/resourcecentre/newsletters/insight/issue13>).

13 Human Resources Development Council of South Africa (HRDS) *The Maritime Sector Skills Technical Task Team (MSSTTT) Report* (Pretoria: HRDC 2014) (available from: <http://hrdcsa.org.za/wp-content/uploads/publications-report/Maritime%20Sector%20Skills%20Technical%20Task%20Team%20Report.pdf>).

14 Ibid at 8.

4. the public interest cluster, which deals with maritime regulation, naval defence, enforcement, emergency and disaster management.

Table 1 shows the gaps within the maritime education system, identified by the 2014 HRDC MSSTTT survey.

In South Africa, training is done through the different Sector Education Training Authorities (SETAs). These include the Transport Education Training Authority (TETA); Manufacturing, Engineering and Related Services SETA (MERSETA); Culture, Arts, Tourism, Hospitality and Sports SETA (CATHSSETA); Chemical Industries Education and Training Authority (CHIETA); Media, Information and Communications Technologies SETA (MICT SETA); Mining Qualifications Authority (MQA); Agriculture SETA (AGRISETA), Food and Beverages Manufacturing SETA (FoodBev SETA); Wholesale and Retail Sector SETA (W&R SETA); Insurance Sector SETA (INSETA) and Banking Sector SETA (BANK SETA).

Table 1: Gaps Within the Maritime Education System

Industry	Scarce skills	Relevant SETA	Proposed solutions to address problems
Shipping and ports	Navigation officers; ship's engineers; engine and deck ratings; hydrographers; oceanographers; maritime technologists; marine ecologists; meteorologists; dockmaster; transport and logistics management; vessel traffic management; sea-watch and rescue operators; port captain/harbour manager	TETA; MERSETA; CATHSSETA	Skills transfer programmes • Increase capacity for training at public and private institutions • Import priority (eg ship masters and architects) skills as a short-term measure • Retired experts for training and skills transfer • More funding for skills development • Increased career awareness • Reskilling the unemployed graduates and upskilling the employed
Offshore oil and gas	Geologists/geophysicists; engineers (chemical, geotechnical, drilling, structural, marine, mechanical); deck officers; artisans	TETA; CHIETA; MICT SETA; MERSETA; MQA	
Fisheries and aquaculture	Aquatic health or aquaculturalists; deck officers; marine engineers; artisans; ratings, Engineers	TETA; AGRISETA; FoodBev SETA; W&R SETA	
Vessel construction and repairs	Naval architects; production managers; designers; electricians; electronics; metal fabricators; fitters, boiler makers and welders; riggers; technicians; boat builders and repairers	TETA; MERSETA	

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Industry	Scarce skills	Relevant SETA	Proposed solutions to address problems
Commercial services	Marine and environmental lawyers; maritime economists; marine financiers/underwriters; maritime consultants; crewing; training; research and innovation; business consultants	TETA; MERSETA; INSETA; BANK SETA	
Maritime tourism	Hospitality officers (chefs, stewards etc); marine conservation officers; dive videographers/photographers	TETA, FoodBev SETA; MERSETA; CATHSSETA; W&R SETA	

Source: MSSTTT Report[15]

A list of critical skills identified by TETA include:[16]

- business practices and management
- compulsory standards for training, certification and watchkeeping (STWC) revalidation
- occupational health and safety
- long- and short-range operations
- navigation skills
- fishing technologies
- fishing and merchant marine
- fish hunting
- pilotage
- leadership and management
- project management (shipping).

Despite the changes brought about by advances in technology, the World Economic Forum's The Future of Jobs Report[17] validates the MSSTTT report. It also provides the following additional inputs for South Africa:

Jobs that will be required include:[18]

- process automation specialists
- data analysts and scientists
- social psychologists
- management and organisation analysts
- business development professionals
- big data specialists
- assembly and factory workers
- compliance officers
- chemists and chemical laboratory scientists
- artificial intelligence (AI) and machine learning specialists.

These jobs apply across all sectors, including the maritime sector. The United Kingdom (UK) Maritime 2050 strategy document[19] states that the maritime sector will have changed by 2050. Factors affecting sector changes include climate change legislation, smart port development, digitalisation of supply chains, the movement away from analogue to digital systems, the need for seafarers to be able to handle shore-based and sea-based roles using transferable information technology (IT)-based skills and continuing professional development that allows them to update skills in line with technological advances. Maritime roles will have highly specialised elements. Science, technology, engineering and mathematics (STEM)

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15   Ibid.
16   Ibid.
17   World Economic Forum (WEF) *Future of Jobs Report 2020* (Cologny: World Economic Forum 2020) (available from: <https://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf>).
18   Ibid.
19   Department of Transport (United Kingdom) *Maritime 2050: Navigating the Future* (London: Department of Transport 2019) (available from: <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/872194/Maritime_2050_Report.pdf>).

skills will come to the fore. The future professional must be highly skilled and capable of occupying multiple roles. As technology changes, learning will have to evolve, often over short time frames. The movement towards autonomous shipping and the technology that will enable the navigation of these vessels will totally change the face of shipping and affect port development as will the movement towards alternative fuel usage.[20]

With regards to maritime skills development and training, the UK government report emphasised the following:[21]

- The skills profile of the maritime sector will change significantly over the next 30 years. The importance of science, technology, engineering and mathematics (STEM) subjects will increase as jobs become more skilled and data-driven in response to new technology. Industry roles will be multidisciplinary, potentially requiring the ability to create, operate and maintain autonomous and technological systems Upskilling the workforce to utilise emerging technologies such as robotics and AI, the agility to adapt training packages in a timely manner and regular review of skills needs will allow countries to capitalise on their skilled workforce.

- The pace of technological change is expected to continue into future years, requiring workforce skills to keep pace. Without continuous learning the industry risks increased costs from high staff turnover, and individuals could suffer in terms of career progression. Mapping career paths and building professional development into training programmes will allow a proactive approach to career planning and support cross-sector mobility. Better internet connectivity at sea would remove an existing obstacle to lifelong learning, while the application of technologies such as virtual reality could facilitate retraining in new systems and potentially change the way in which traditional training programmes are delivered.

- Seafarers suffer a high incidence of mental health conditions, primarily due to the pressures, nature, and isolation of working at sea. Changing technology could be utilised to improve sea connectivity.

As critical as education is, the skillsets required within the maritime sector are just as important. The World Economic Forum (WEF) Future of Jobs report of 2020 referred to the following attributes that will be required of the future workforce:[22]

- analytical thinking and innovation
- critical thinking and analysis
- troubleshooting and user experience
- leadership and social influence
- complex problem-solving
- systems analysis and evaluation
- creativity, originality, and initiative
- technology use, monitoring and control
- quality control and safety awareness
- persuasion and negotiation
- emotional intelligence
- technology installation and maintenance
- resilience, stress tolerance and flexibility
- reasoning, problem-solving and ideation
- active learning and learning strategies.

Strategic learning will need to move beyond the classical rote learning and regurgitation methodology currently found in schools to one that embraces the whole person and builds into the learning systems the development of character and resilience. Unfortunately, many of these attributes cannot be taught but developed through life experience. As far as possible, where they can be, intelligent taught, systems will need to be created.[23]

From the MSSTTT Report of 2014,[24] it was clear that the maritime education sector has focused more on the shipping sector, with the following four sectors receiving the greatest attention:

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20 Ibid.
21 Ibid.
22 WEF op cit note 17.
23 Ibid.
24 MSSTTT op cit note 13.

1. **Port industry** (deals with shipping and handling of cargo)

Cargo handling and storage, stevedoring, cold storage operators, terminal operations, equipment operators, terminal management, marine services, vessel traffic services, marine pilots, tug masters, engineers, ratings, berthing masters, berthing shore hands bunkering services barge masters

2. **Freight and logistics** (services supporting the import/export of cargo)

Freight forwarding, international trade and logistics, clearing and forwarding customs clearance, warehousing and storage, logistics management.

3. **Vessel operations** (management, crewing and facilitation)

Vessel management and crewing vessel manager, crewing manager, ship superintendent, vessel planning, vessel planner, ship chartering, maritime economics, international trade.

4. **Vessel operational support industry**

Ship repair and maintenance, dockmaster, boilermaker, welder, millwright, vessel bunkering, bunker trading, bunker handling, vessel agency, ship agency, stores and victualing supplies (ship chandelling) and stores management.

The report also referred to two distinct types of maritime activities in the country, namely local (domestic) and international maritime activities. Domestic activities are governed by domestic laws that do not have to comply with international instruments. These include training for port operations, ship repair skills, professionals, cargo and terminal operations, oil, and gas operations etc.[25]

The conduct and operations at sea are governed by several multilateral instruments and institutions as the sector is subject to international, continental and regional governance and frameworks. These institutions include:

- the UN and its specialised agencies such as the International Maritime Organization (IMO)
- the International Labour Organization (ILO)
- the UN Food and Agriculture Organization (FAO)
- the World Trade Organization (WTO)
- the United Nations Conference on Trade and Development (UNCTAD)
- the United Nations Convention on the Law of the Seas (UNCLOS)
- the International Hydrographic Organization (IHO)
- the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA)
- organs such as the African Union (AU), Southern African Development Community (SADC) and South African government departments at various levels of governance
- the Offshore Petroleum Industry Training Organization (OPITO)
- the Industrial Rope Access Trade Association (IRATA).

As a result of this distinction, some modes of education can be governed by recognised South African channels such as the South African Maritime and Shipping Authority (SAMSA), universities, the Department of Labour and the various SETAs. This influences access to maritime sector training. Without bursary support and/or scholarships, it is difficult for disadvantaged communities to enter some maritime sectors, given the cost of training.[26]

Another challenge is the difficulty of placing learners on ocean-going vessels for practical experience and time at sea. For other maritime training, learnerships require that learners receive training with companies in the industry. As many companies have their own on-site training, there are few openings available for outside learners.[27]

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[25] Ibid.
[26] Ibid.
[27] Ibid.

Kuhlase[28] emphasised the importance of both formal and informal education for societal and economic development. He highlighted the need for maritime awareness and skills development in South Africa, particularly in previously disadvantaged communities through funding establishing maritime skills centres in those communities.

In a 2018 article for Safety4Sea,[29] the editors highlighted the skillsets that will be required, together with the types of jobs for which there is now increasing demand. These include ship automation specialists, cybersecurity specialists, 3D printing technicians, energy efficiency optimisation specialists and data protection specialists.

In KwaZulu Natal, the ports of Durban and Richards Bay have been the centre of maritime-related activities. Employment opportunities have thus been linked to urban areas. The Centre for Education Policy Development (CEPD) Booklet on Education (Gardiner, 2008),[30] referred to the historical background of urban versus rural development and the corresponding educational differences and difficulties. Traditionally, under the apartheid dispensation, the urban areas were reserved for the development of the white population, while rural areas were reserved for the black majority. The education systems were unequal, with the white population being groomed for gainful employment opportunities, while the black population were doomed to suffer from inadequate access to opportunities, greater costs of accessing mostly urban-based employment opportunities and much lower education and skills levels.[31]

A 2019 study by Du Plessis and Mestry[32] on teachers in rural areas addressed the issue of rural education in greater detail. At the heart of the survey lay the question of whether the current educational policies adequately address the inadequacies of rural education. Despite the time frame between the CEPD report and this 2019 study, the status of rural education was still poor. Contributing factors, according to Du Plessis and Mestry, were the following:[33]

- The difference between the administration, governance and attendance of school governing bodies in rural and urban areas. Urban parents generally had a greater understanding of school processes and paid more interest to the schooling of their children. As the role of the school governing body is policymaking and governance, affluent parents were more likely to contribute towards the schooling of their children and the needs of the school, especially in private and semi-private schools. Within the rural areas, meetings were mostly attended by grandparents and, where parents attended, many were not well educated. Without an understanding of the role that they were meant to play in these bodies, the vision of the schools would be left to a school principal.

- Because many educators viewed teaching in rural areas as being detrimental to their careers, younger, more ambitious teachers chose not to work in the rural areas. Conditions and pay in urban areas were deemed to be better. Rural schools were generally understaffed, with average class sizes of 45 or more leaners. They also found themselves teaching multiple subjects over different grades. Their increased workload, combined with lower pay, affected teachers' ability to properly attend to their lesson preparation and their learners. The quality of training received by teachers placed

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28 PM Kuhlase 'The importance of maritime education and training within the secondary education system in South Africa' (Unpublished Master's dissertation: World Maritime University 2020) (available from: <https://commons.wmu.se/cgi/viewcontent.cgi?article=2449&context=all_dissertations>).

29 Editorial Team (Safety4Sea) 'Drivers of the 4th Industrial Revolution in maritime industry' *Safety4Sea* 17 September 2018 (available from: <https://safety4sea.com/cm-drivers-of-the-4th-industrial-revolution-in-maritime-industry/?__cf_chl_jschl_tk__=pmd_iagP9SSrFUiYOWP.tYDiUMPB5PYIJHFgmKun1uYbwVk-1633516624-0-gqNtZGzNAiWjcnBszQhl>).

30 M Gardiner 'Education in Rural Areas' (2008) 4 *Issues in Education Policy* Center for Education Policy Development, Layout 1 (saide.org.za) (available from: https://www.saide.org.za/resources/Library/Gardiner,%20M%20-%20Education%20in%20Rural%20Areas.pdf.).

31 Ibid.

32 P du Plessis & R Mestry 'Teachers for rural schools—A challenge for South Africa' (2019) 39(1) *South African Journal of Education*.

33 Ibid.

an additional burden on learners. Older teachers were trained under the old, segregated training systems, unlike younger teachers who received their training at universities or integrated teaching colleges. It was also difficult to attract teachers of science, technology, engineering and mathematics (STEM) subjects and other professionals to rural areas. Rural teachers often taught subjects they had not specialised in. There was the additional challenge of learners not wanting to engage in these topics.

- Practical issues such as lack of amenities, up-to-date equipment, access to water and electricity, and internet connectivity all affect the quality of education within the rural areas. An additional challenge was the lack of access to computers. Within many schools, insufficient security enabled computer theft.

- The language barrier was deemed to be one of the biggest obstacles. Prior to Grade 3, learners are taught in English; from grades 3 to 7, there is the option of dual language tuition and from grades 8 to 12, there is mother tongue tuition. When English is taught by non-mother tongue speakers, and learners return to homes where parents or grandparents do not speak English, their foundational training is impacted. This hinders their schooling career, resulting in learning frustration and underperformance in later years.

The Department of Basic Education's Action Plan to 2024: Towards the Realisation of Schooling 2030[34] confirms the Du Plessis and Mestry's[35] survey findings. According to this report,[36] although KZN has improved its educational status, these changes are mostly limited to urban areas. Rural education remains problematic. Audit findings included the following:

- Just under half of South Africa's school learners do not earn their National Senior Certificate

(NSC). If this figure is stable over 10 years, that would mean that about half of job seekers within South Africa are unskilled, without a Grade 12 pass.

- With regard internet usage, in 2017 access by principals, teachers and learners to the internet in secondary schools was 68%, 59% and 21%, respectively. In primary schools, the figures were slightly better at 72%, 66% and 36% respectively. The 2016 Community Survey of Stats SA[37] indicated lower figures, namely that 7% of learners at the primary level – grades 1 to 7 – and 9% at the secondary level – grades 8 to 12 – had access to the internet at their schools.

- Currently, around 10% of public school Grade 12 learners attend schools where no learner achieves a mark of 50% or more in mathematics and physical science. Around 2% of public-school learners are in schools where no one takes mathematics as a subject, while the figure for physical science is 5%.

- KwaZulu-Natal displays a below-average traditional pass rate.

With the status of education as it is, the skills gap in KwaZulu-Natal is unlikely to be bridged without radical reform of the current rural education system. The NDP seeks to target 450 000 university-level NSC passes by 2030 in South Africa. Of learners with a university-level NSC pass, it is likely that a small percentage will study science and mathematics courses because few will be qualified to do so.

VIII RESEARCH RESULTS

This section of the report presents the feedback from the survey conducted. Employers of maritime-related firms in Durban and Richards Bay, the maritime centres of KwaZulu-Natal, were interviewed.

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34 Department of Basic Education (DBE) *Action Plan to 2024: Towards the Realisation of Schooling 2030* (Pretoria: DBE 2020) (available from: <https://www.education.gov.za/Portals/0/Documents/Publications/Sector%20plan%202019%2015%20Sep%202020.pdf?ver=2020-09-16-130709-860>).
35 Du Plessis & Mestry op cit note 32.
36 DBE op cit note 34.
37 Statistics South Africa *Community Survey 2016* (Pretoria StatsSA 2016) (available from: <https://www.statssa.gov.za/?page_id=6283>).

Depending on the size of the firm, participants were either human resources (HR) managers, company owners or operations managers as these groups of respondents were deemed to be most able to respond to the survey questions. Of the 44 firms surveyed, 12 employed more than 250 people, five employed between 50 and 250 people, 11 firms employed between 11 and 50 people and 16 firms employed 10 or fewer people. The distribution of firms was well balanced in terms of business since, enabling data to be collected from micro, small, medium and large firms. Participants from all of the 44 participating firms answered all the survey questions.

The types of skillsets, attributes and qualifications most desired by these maritime-related firms are displayed in Figure 2.
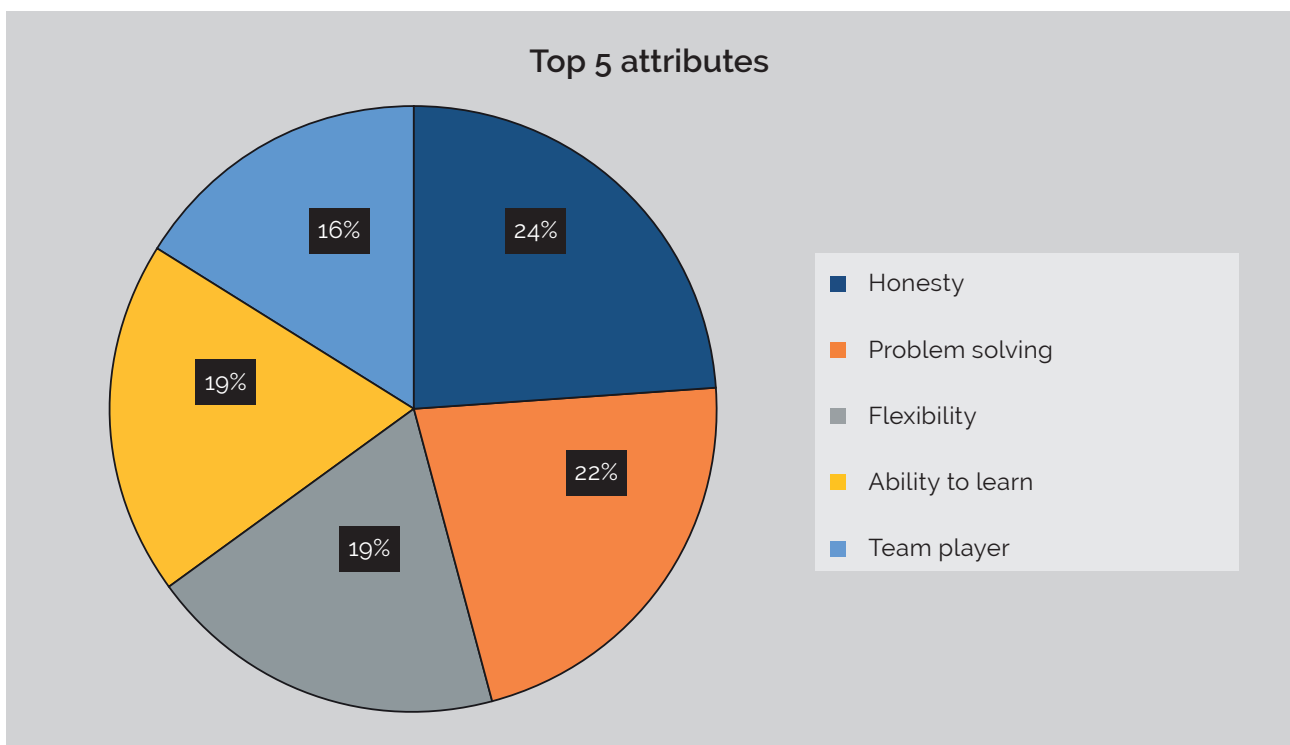

Figure 2: Top Five Attributes Most Desired by Businesses

The purpose of this question was to determine whether the requirements of South African firms aligned with the changing requirements of global maritime employers.

With regard the importance of IT skills, 24 companies said they were very important, 13 said they were moderately important and only seven companies said that they were not important (Figure 3).
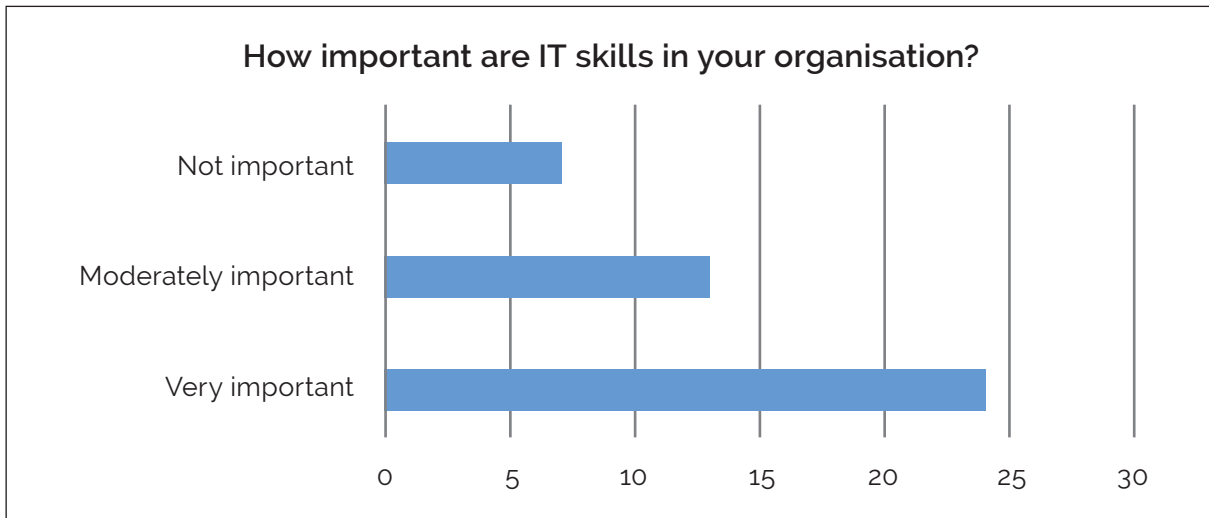
How important are IT skills in your organisation?

Not important	(≈7)
Moderately important	(≈13)
Very important	(≈24)

Figure 3: The Importance of IT Skills in the Organisation

Figure 3 illustrates the importance and relevance of IT skills in the various organisations.

On the question of whether the firms employed learners without experience, 27 firms said that they did, while 17 indicated that they did not employ learners. This is a worrying response because it means that more than a third of the maritime firms are closed to new entrants and would not employ inexperienced new job seekers. Employment by the firms was subsector-specific, with firms seeking experienced employees.
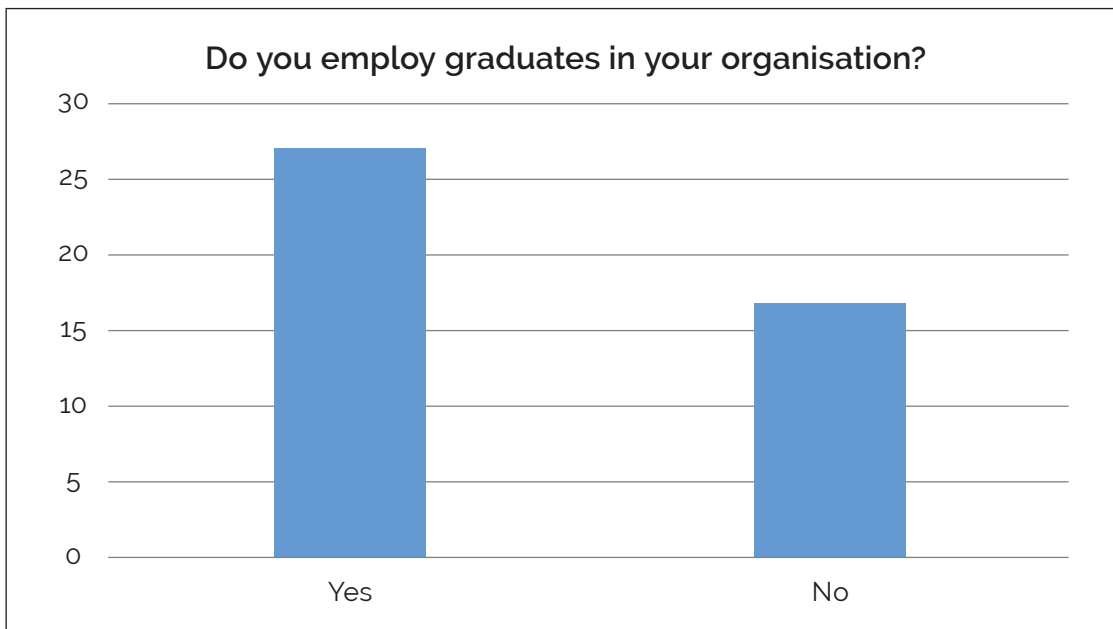
Do you employ graduates in your organisation?

Yes	No
(≈27)	(≈17)

Figure 4: Employment of Graduates in the Organisation

Figure 4 illustrates that the majority of organisations (27 of the 44) employ graduates with no working experience.

Of the firms surveyed, 26 had in-house training academies. This is a welcome insight as it means that these firms could facilitate the development of desired skills in-house.
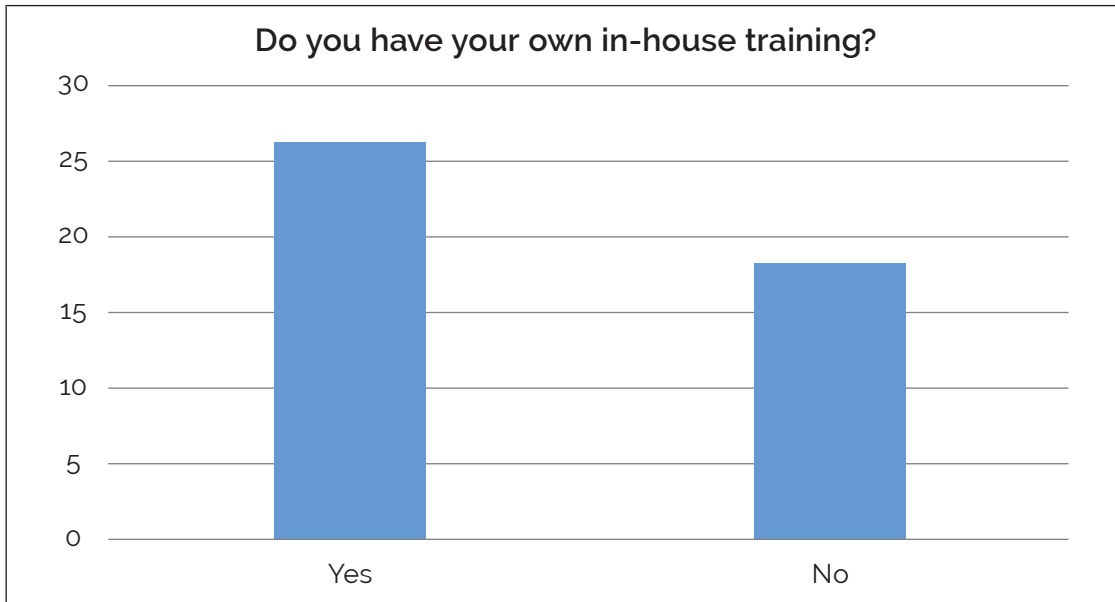

Figure 5: Number of Organisations That Have Their Own In-house Training

As illustrated in Figure 5, most of the organisations have their own in-house training that they offer their employees.
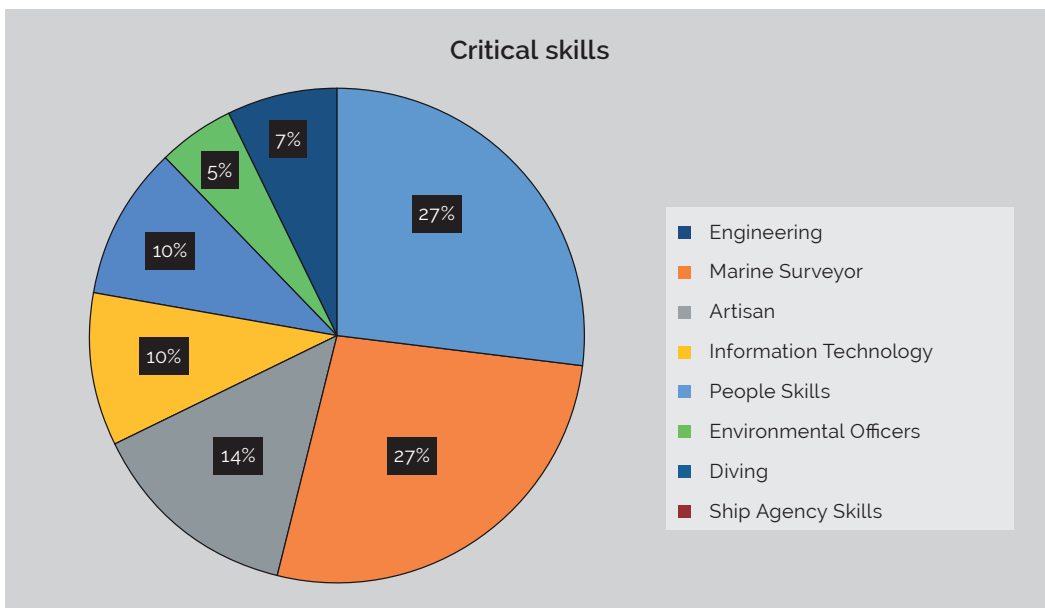

Figure 6: Critical Skills in the Maritime Industry

As indicated in Figure 6, marine surveying skills, engineering skills and artisan skills are highlighted as the top three scarce skills within the current labour force. These skills are required throughout the maritime sector, except for the maritime skills and training sector.

A number of skills are deemed essential to the success of maritime companies. As most maritime firms surveyed had multiple departments, the skills that are deemed essential overlapped. In many of these firms, management-related skills were also highlighted. As most of the firms were involved in either shipping and logistics, freight forwarding or shipbuilding and repairs, there were many elements that they had in common. As indicated in Table 2, support functions were deemed as important as direct functions.

Table 2: Skills Essential for Company Success

| Skills directly related to company mandate	Support skills
Drivers, mechanical, environmental officers, research, cargo surveyors, marine engineers; safety and quality officers; artisans (carpentry, welding and painting etc), stevedoring, deck officers, diving, STWC/port ops, ratings, nautical supps, freight forwarding, clearing and forwarding.	IT supply chain planning specialist, logistics operations specialist, operations manager, warehouse managers, transport manager, sales and marketing, customer service, technical skills; communications, technical superintendents, discharge advisors, contract managers, crewing & HR, finance, legal, fleet operations, procurement, finance, commercial manager, marketing; knowledge management.
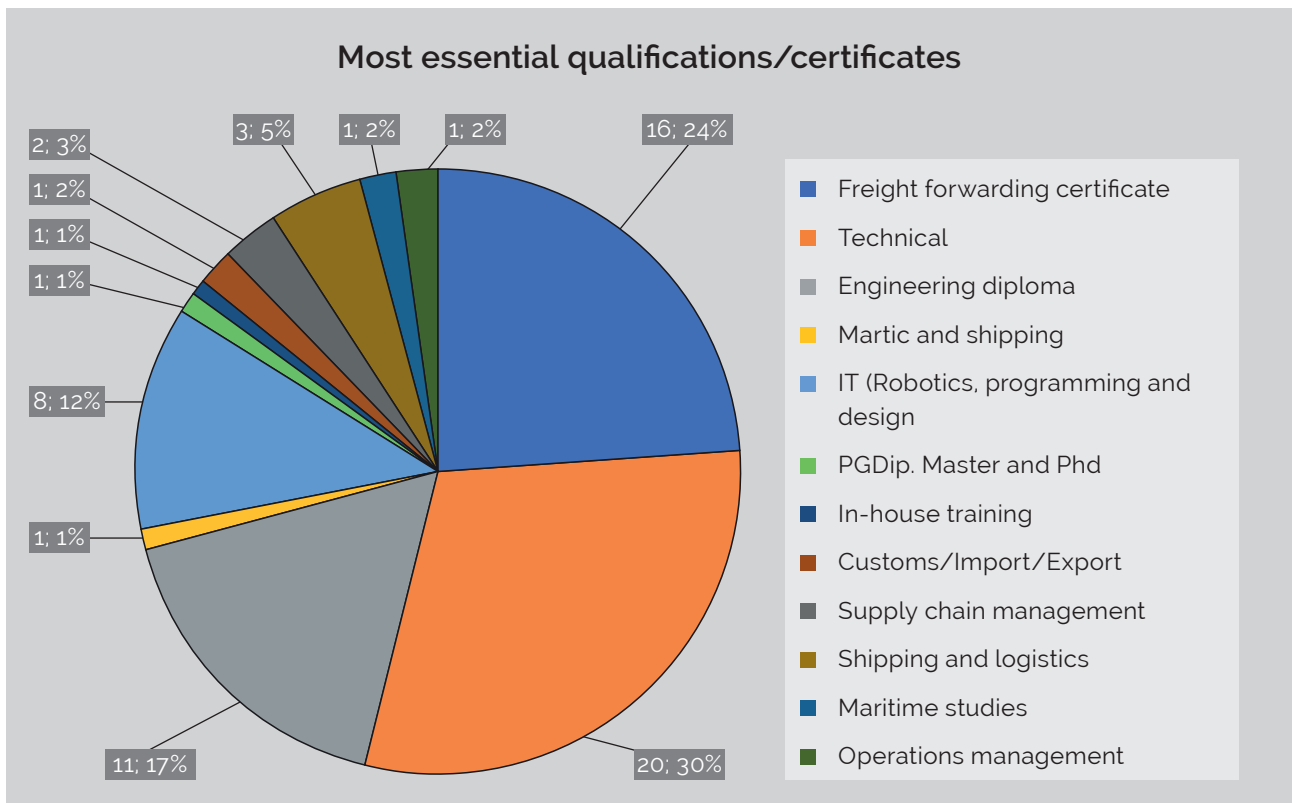
Figure 7: Most Essential Qualifications/Certificates

Figure 7 indicates those qualifications deemed most relevant to the industry. The percentages obtained are directly related to the number of respondents in the different sectors. Within the freight forwarding sector, freight forwarding certificates were required. Freight forwarding firms also required technical certificates, although these were required across most sectors.

Engineering qualifications were also required across multiple sectors. Of the companies surveyed, fifteen required internationally recognised training.

The skills that participants deemed to be of increasing importance to the growth of their companies include the following:

- IT
- Data engineering
- Shipping background
- Mariners' technical insurers
- Project management, financial and budget management, marine and mechanical pipefitting
- Sales and marketing, business development and business planning, warehousing – technical
- marine manufacturing, fish farming, technology
- Forwarding controllers, customs brokerage, and invoice clerk
- Research
- Logistics and management
- Personal development in terms of upskilling
- Experience and understanding of vessels
- Entrepreneurship skills, more international language such as Swahili, French and Portuguese, etc
- Artisans
- Tanker, mooring masters, diving
- Freight forwarding
- Diving, operators (machinery), technicians
- Global logistics and freight forwarding viewpoint.
- Black skippers
- Environmental sensitivity mapping and economic evaluation
- Welding, bronco cutting and dredging
- Leadership, analytics, controlling
- Both deck and engineering officers
- Ships agency skills
- Customer service
- Chief marine engineering officers, chief dock masters

Skills such as IT, data engineering, management and sales, and other support-related skills were required across the maritime sector. Other skills, such as crewing and black skippers, are specific to the shipping and logistics sector. The freight forwarding sector deemed communication essential, with firms seeking multilingual employees.

A number of soft skills and attributes are sought by maritime firms. Within the shipping and logistics sector, communication was emphasised. Employees were also required to have high levels of emotional intelligence. The main soft skills required are:

- Level-headedness, dedicated and able to follow procedure

- Communication
- Understanding of logistics supply chain
- Strong personality
- Patience, flexibility and dedication.

Table 3 lists the different types of training offered by the organisations. These results address the third objective of the research, which was to identify the current training offered. Some maritime firms prefer to train their own employees. The training obtained in-house may not necessarily be available in the mainstream education sector.

Table 3: Types of In-house Training Provided by the Industry

Sector/department	Skills and training programs offered by the maritime industry
The shipping logistics and shipbuilding and repair sector	Work learnership programmes Shipping, logistics – warehousing, transport operations, clearing and forwarding, port and stevedoring operations, sales and marketing, logistics administration Boat building, entrepreneurship Safety, procedure in accident reporting, first aid Introduction to shipping through the Institute for Chartered Shipbrokers ICS Company/industry-specific hospitality-related programmes. Cadetship for deck and engine, rating learnership, dive trainee programme, Courses offered to students. These provide access to vessels for on-board work and exposure to port authority Set programmes with marketing, communication skills, introduction, and exposure to the logistics sector
Legal firms	Contract chains, maritime background, litigation
Projects based on scarce skills identified by the sector	Artisan recognition of prior learning ARPL–SAMSA courses Apprenticeships in fitting and turning, mechanical fitting, boiler making, welding, pipe fitting, plumbing and electrical
Maritime education sector	The University of KwaZulu-Natal has a Maritime Law and Maritime Studies Unit.
Freight forwarding sector	Learnership in freight forwarding. Customs clearance, transport management
Other/across sector	Basic commercial diving skills Internship, cadetship and maritime study bursaries. Maritime survey Port state Bunkering Oil spill response Deck and engineering cadetship for seafarers Technical skills, engineering skills

IX ASSESSMENT OF RESULTS

The results portrayed in the tables and figures, especially tables 2 and 3 and figures 5 to 7, align with the information obtained from the literature review. Survey results indicate that there is still a lack of skilled labour in the basic maritime portfolios. Because domestic employers have not yet fully embraced the digital revolution, many of the global digital portfolios are not yet required by domestic firms, although survey results indicate a move towards more digital skills, like 3-D printing and IT. it is also clear that many skills deemed critical by the maritime sector, apart from robotics and officer training, are available for study at most tertiary learning institutions. The qualifications required by the maritime sector are available either through tertiary institutions or in-house training. The maritime industry places as much importance on support functions as it does on core functions and skills. Support functions required include managers as well as people with a deeper understanding of the shipping industry.

Most support qualifications can be studied at universities or technical vocational education and training colleges. The survey also highlighted the importance of soft and leadership skills within the sector. While some of these characteristics are taught, attributes such as honesty, flexibility and ability to learn are not. Other important soft skills are people skills, communication skills and language skills. These, too, are based on innate ability and character, although they can be trained.

Although not all job categories require STEM subjects, there is an increasing trend towards technology, science and engineering. An objective of the study was to determine critical skills, essential skills and the skills that are becoming more important. In-house training provides for some of the needs of the maritime sector that are neglected by the mainstream academic sector. Boatbuilding and artisan or technical skills are the least catered-for skills segments. Other neglected areas are maritime law, commercial diving, navigation, maritime engineering and ship building and repair. There is a clear gap between understanding the industry and its needs and the preparation of students for potential employment in the industry. The maritime sector may be deemed to be too small to be catered for on a larger scale. The lack of educational capacity could also be due to the lack of interest in the sector by potential employees, who are steered towards more mainstream jobs or more popular areas within the maritime sector.

The overall purpose of the study was to determine the bottlenecks in the current system. The first objective was to determine the areas of education and geographical skills shortages. The research area included the King Cetshwayo, uMkhanyakude, iLembe and Ugi Districts of the Eastern Cape. The literature reviewed uncovered a rural–urban education and skills gap. Most maritime-related firms are found in the urban areas, as are the training institutions. Rural learners struggle to transition into the job market because of a lack of the required skill sets. The transition gap is directly linked to the quality of rural education. Communication skills, especially good English and other language skills are lacking in rural and some urban schools. These communication difficulties impact negatively on the ability of youth to find employment in the urban maritime context. Without exposure to STEM education, they are deprived of the opportunity to enter many maritime professions. This is an unfortunate reality for 59% of KZN's rural youth. Learners attending semi-private or private schools are in a better position, as they can acquire the skills needed for the relevant maritime qualifications The Operation Phakisa: Oceans Economy mandate seeks to include rural populations into the maritime value chain. Given the obstacles that the rural population faces, policy initiatives must begin with the upgrading of rural education. As these challenges are deeply entrenched, they cannot be overcome overnight. Additional challenges are linked to connectivity, cost of data and electrification in schools and houses. There are many challenges in rural areas and, without proper government assistance, they will be difficult to overcome.

As the maritime industry, schools and universities are primarily urban, it is difficult to incorporate rural populations into the maritime value chain. While rural students can migrate to urban areas for tertiary education, the statistics are not promising. The available literature indicates that learners who obtain

mathematics- and science-based university-level matric passes are few in number. A better option would be for learners to obtain artisan or technical training. There are, unfortunately, few institutions offering technical training. An issue seldom raised is the cost of education. As many qualifications are specialised, they are costly. Industry is unlikely to pay for the cost of learner training unless they can obtain bursaries. Even where aid is available, there are restrictions and limitations. Within the SETA category, learnerships usually require pure mathematics. Given that almost 51% of rural learners do not pass matric, the future is even bleaker. From the survey and the literature review, it can be concluded that learners from urban areas with access to practical STEM training and with good communication abilities are the most likely to be absorbed by the maritime industry.

X CONCLUSIONS

Conclusions that can be drawn from the above include the following:

- Except for the identified areas, the current tertiary education sector can provide most of the skills required by the maritime sector.
- The skills deficit appears to be related to a lack of interest of graduates in maritime career paths.
- Four of the eight areas identified as critical require that learners are proficient in STEM subjects.
- The maritime sector is practical and requires skilled or semi-skilled employees. It cannot be relied on to absorb unskilled labour. Even though many maritime firms do train in-house, this training is basic, with employees expected to invest in their own training and become lifelong learners.
- Awareness of the maritime sector is highest in the port cities of Durban and Richards Bay. The rural areas are less likely to invest in maritime skills education. The biggest education failure can be attributed to the schooling system, especially within the rural areas, where STEM subjects are lacking.
- There is a scarcity of managers Reasons for this lack will need to be investigated.

XI RECOMMENDATIONS

1. The training of rural populations and the extension of maritime skills is linked to the entrenched issues of poverty, unequal schooling and other administrative failures. Overcoming these issues requires radical government intervention. The process of eradicating structural issues must be accelerated. Factors such as connectivity, electrification, provision of water to schools and changing school body governance approaches in rural schools and rural areas can provide short-term victories.

   - Electrification and connectivity: The pre-paid payment system in rural areas has made access to electricity easier. There are, however, still areas without such access to electricity. Rural areas are known for their poor telephone connectivity. While optical fibre is being laid in the urban areas, few rural areas have benefitted from this. While this could be linked to a lack of financial incentives, it remains substantially unjust. Even though the urban areas call forth greater investment, the rural areas need more intense interventions. For this reason, it would be reasonable to suggest that the government put together a subsidy or tax incentive package to encourage optical fibre companies to extend their reach into the rural areas to encourage economic development.

   - Access to water is another major issue. To assist, the government could provide boreholes, were this is feasible. Other options are rainwater harvesting at the schools and creating dams.

   - To deal with the school body administration problem in rural areas, government could make provision for an alternative governing approach. As rural parents struggle to shoulder the responsibilities placed on urban parents, a grading system can be introduced to evaluate the level of intervention required. This same system can be used to prevent misuse and provide for the graduation of rural areas to the acceptance of greater responsibility.

2. The development of artisan training centres in the rural areas to provide alternatives for rural school learners. This will provide them with access

to both mainstream industry and the maritime sector. Artisan training is not only needed in the rural areas, however. More research is needed to determine why there is this lack and how this education and training gap can be addressed. With regard the scarcity of available skills, where possible there is a need to align the requirements of the maritime industry with education centres in surrounding cities. This can be done by way of awareness training and skills development planning within industry and the education sector.

3. The need for linguists is not often stressed, however, language learning is also something that can be encouraged in learners in both the rural and urban areas. As global trade increases, this is a skill that could provide learners with opportunities outside of the normal value chain and enable them to travel. There is also a need for educators to address the development of soft skills in learners from an early age, with learning packages being introduced that facilitate attributes like people skills, honesty, teamwork, adaptability and problem-solving. Given that future employees will need to be adept at both learning and interpersonal skills, the education system must adapt.

XII CONCLUSION

The skills required by the maritime sector are diverse, including technical, technological, scientific and engineering categories. Although there are many overlapping skills, there are also many sector-specific training requirements. The need for both domestic and international training, together with the fact that some segments of the maritime sector do not take inexperienced employees, makes it a difficult sector to penetrate. The fact that employees are required to be skilled or semi-skilled means that new unskilled entrants are not easily absorbed, although the learnership programmes provide some hope for young school leavers. Besides specialised shipping qualifications, there is also room for operations and supply chain management practitioners. Companies are also looking for honest employees, with ethics being important to the industry. Because of the complexity of the industry and the challenges facing learners, there

are no quick fixes. Time and development will assist with the elimination of the skills crisis, if the correct measures and interventions are consistently adopted and rural learners are given the attention they deserve.

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Leticia Grimett

Sihle Mzileni