Journal of Science and Technology in Civil Engineering, HUCE, 2026, 20 (2): 88–104

HEALTH AND SAFETY TRAINING IN A MULTILINGUAL CONSTRUCTION WORKFORCE: EVIDENCE FROM SOUTH AFRICA

Emma Ayesu-Koranteng[a,*], Arun Garg[a], Ayo Adeniran[a]

[a]*Department of Building and Human Settlement Development, Nelson Mandela University, Africa*

Article history:
Received 23/01/2026, Revised 20/3/2026, Accepted 08/5/2026

Abstract

The South African construction industry remains one of the most hazardous sectors despite the existence of comprehensive occupational health and safety (OHS) legislation and widespread provision of health and safety (H&S) training. The complexity of construction activities, rapid technological advancement, and an ageing workforce necessitate training that is not only well structured and continuously updated, but also effectively communicated. H&S training is a legal requirement, empowers workers, and plays a critical role in improving H&S performance. However, persistent poor safety outcomes suggest shortcomings in current training approaches. This paper reports on a quantitative study conducted among H&S service providers, construction managers, supervisors, and workers to investigate why poor H&S practices continue to prevail in the South African construction industry. Data was collected using self-administered questionnaires distributed in the Nelson Mandela Metropolitan Area. The findings reveal that the exclusive use of English as the language of instruction for H&S training is largely ineffective, particularly for general workers and laborers. In addition, current H&S training methods and materials were perceived as insufficiently aligned with construction-specific realities. While management respondents tended to believe that the language of instruction has limited impact on training outcomes, workers indicated that training delivered in their home language would significantly enhance understanding and retention. The study concludes that there is an urgent need to review existing H&S training methods, materials, and delivery criteria, with particular emphasis on language. A paradigm shift towards the use of workers' home languages in H&S training is required. The paper recommends the integration of Industry 4.0 technologies in training delivery, critical evaluation of training content, multilingual training provision across South Africa's official languages, and systematic assessment of training impact.However, as the study relies on perception-based measures rather than objective safety performance indicators, further research is required to determine the direct impact of multilingual training on accident reduction and behavioural safety outcomes.

Keywords: construction; health and safety; impact; language; training.

https://doi.org/10.31814/stce.huce2026-20(2)-07

1. Introduction

On international construction projects, it is a common practice to develop health and safety (H&S) notices in various languages and use interpreters or translators to manage communication [1]. Gamil and Rahman [2] note that multi-culturism is becoming more prevalent in the global construction sector, creating significant supervisory challenges particularly ensuring effective communication between diverse ethnicities. Mandela [3] famously observed that communicating with individuals in their own language has a deeper and more meaningful impact than communicating in a foreign language. Ofori and Chan [4] documented that foreign workers made up 81.2% of the total construction workforce in Singapore in 1998. Furthermore, Middle Eastern and European countries are seeing

*Corresponding author. *E-mail address:* emma.ayesu-koranteng@mandela.ac.za (Ayesu-Koranteng, E.)

steadily rising influxes of foreign workers into their construction workforces. In Saudi Arabia, which is also common of most Middle eastern Gulf countries, registered foreign labourers account for approximately 30% of the workforce [5]. Similar worries have recently emerged in the UK construction sector regarding the influx of undocumented workers from Eastern European nations, a trend that is likely to persist as Europe's refugee crisis gets worse [6].

Mismanagement of cultural diversity has been shown to result in serious consequences, including increased occupational stress, confusion, frustration, and conflict, which in turn lead to reduced motivation, lower productivity, diminished performance, and significantly higher accident rates [7]. Conversely, when effectively managed, cultural diversity can serve as a valuable organisational asset [8]. Loosemore and Lee [9] similarly observed that several successful global organisations have demonstrated the potential benefits of leveraging cultural diversity to enhance organisational performance. However, Steele and Sodhi [10] argued that such organisations remain the exception rather than the norm, noting that the construction industry in particular exhibits a poor track record in managing cultural diversity. Against the backdrop of increasing global migration, the effective management of cultural diversity has become an escalating challenge for current and future managers [11]. Among the various dimensions of cultural diversity, language barriers represent the most immediate and significant obstacle to the successful integration of migrant workers into the workforce [12]. Communication difficulties involving foreign workers have been identified as one of the five most critical challenges affecting productivity and efficiency in the Singaporean construction industry [13]. Despite these well-documented challenges and the likelihood of their intensification in the future, South Africa—while a multilingual nation with twelve official languages and relatively strict immigration policies—has received limited research attention in this area.

In South Africa, these challenges are particularly pronounced. Despite relatively strict immigration policies, the country is inherently multilingual, with twelve official languages recognized in the Constitution [14, 15]. Nevertheless, English remains the dominant language of instruction for H&S training across the construction industry. This practice persists despite evidence suggesting that limited comprehension of training content contributes to unsafe work practices and elevated accident rates. Although the Occupational Health and Safety Act 85 of 1993 mandates H&S training, still accident and incident rates in the construction industry remain unacceptably high. This raises critical questions about the effectiveness of current training approaches and the role of language in influencing workers' understanding and application of H&S principles.

The aim of this paper is therefore to examine the impact of language barriers on the effectiveness of H&S training in the South African construction industry. Specifically, the study investigates how the language of instruction influences workers' understanding of OHS training and, by extension, H&S performance. The objective is to contribute to improved training practices that better reflect the linguistic realities of the South African construction workforce.

2. Review of related literature

2.1. Legal framework for South African H&S training

South Africa's occupational health and safety (OHS) oversight and governance are primarily shared among three government entities: the Departments of Labour (DoL), Mineral Resources (DMR), and Health (DoH) [16]. Although numerous legislative instruments exist, the OHS Amendment Act No. 181 of 1993, the Labour Relations Act No. 66 of 1995, and the Construction Regulations of 2003 constitute key frameworks that promote health and safety (H&S) training and regulate operations within the construction industry [17]. The principal objectives of these Acts of Parliament, as articulated by Mollo, Emuze and Smallwood [18], are to ensure comprehensive H&S instruction

and training for employees and visitors in the workplace, as well as to establish an OHS advisory council. Raliile and Haupt [19] further noted that the OHS Act and Construction Regulations together form the legal foundation governing workplace OHS in South Africa. Section 8 of the OHS Act obligates employers to consult employees, or their representatives, on health and safety matters. In addition, Rikhotso, Morodi and Masekameni [20] observed that this legislative framework is designed to protect workers against safety, health, and environmental hazards and their associated risks. Despite the existence of these legal provisions and the availability of industry-accredited training programmes, construction-related incidents and accidents continue to occur at unacceptably high levels [21].

In contemporary corporate environments, organisational performance is frequently evaluated in terms of resource optimisation, with a strong emphasis on increasing productivity and reducing costs, often at the expense of adequate consideration for health and safety (Salguero-Caparrós et al. [22]). Although occupational health and safety practices within the construction industry have improved considerably over recent decades, Brauer [23] argued that further efforts are required to reduce both the human and economic costs associated with workplace incidents. As employees represent an organisation's most valuable resource in achieving operational and strategic objectives (Benn, Edwards and Williams [24]), it is therefore essential that they receive appropriate training across all aspects of their work, including health and safety (Duryan et al. [1]).

Both management and workers require continuous health and safety education, as incidents and accidents are often rooted in organisational culture, exposure to hazards, and deficiencies in management systems (Mannan, Mentzer and Zhang [25]). Moreover, because health and safety education plays a critical role in shaping organisational culture and management practices, its absence can have severe consequences. Employees who receive inadequate training may perform tasks incorrectly or unsafely, increasing the risk of serious injury or fatality (da Silva and Amaral [26]). Employers therefore have a legal and ethical responsibility to provide comprehensive health and safety training, ensure that employees are aware of workplace hazards, and maintain adequate supervision to promote safe work practices (Osei-Asibey et al. [27]).

2.2. Health and safety training

Training is a critical mechanism through which employees acquire new skills and knowledge, reinforce good work practices, and improve overall performance, innovation, and workplace safety, thereby reducing accident rates (Elnaga and Imran [28]). The first step in the development of any effective training programme is the identification of employees' training needs, commonly referred to as a *Training Needs Analysis* (TNA). A TNA involves identifying the gap between existing competencies and the skills and knowledge required to perform specific tasks effectively (Khan, Rahman and Khan [29]).

Despite this, much of the current health and safety (H&S) training remains generic in nature and adopts a "one-size-fits-all" approach (Oughton [30]). However, given the specialised and high-risk nature of construction activities, effective implementation of H&S training requires programmes that are tailored to industry-specific needs and informed by systematic needs assessments (Singh and Misra [31]). This presents a significant challenge for training service providers, as many continue to rely on routine "cut-and-paste" training materials that do little to address specific workplace contexts or learner needs (Umeokafor, Evangelinos and Windapo [32]).

The use of such generic approaches undermines the relevance and currency of training programmes. Effective training products should instead be dynamic and adaptable to the evolving needs

of trainees (Harris et al. [33]). Where limitations exist—such as language barriers—training content and delivery must be specifically adapted to address these constraints. Contemporary learning theory increasingly emphasises *andragogy*, a learner-centred approach that prioritises engagement, relevance, and learner support, in contrast to traditional pedagogy, which is largely instructor-centred [34]. Pedagogical approaches often render learners passive recipients of information, as instructors make all instructional decisions, thereby limiting learners' autonomy and capacity for meaningful engagement. Consequently, training methods should be designed with careful consideration of the target audience and adapted to their specific learning needs and contexts (Kukulska-Hulme et al. [35]).

Nielsen et al. [36] further argued that integrating interactive delivery systems that promote engagement between trainers and trainees enhances knowledge retention and learner participation. In the context of construction, H&S training that is tailored to trainees' educational levels and cultural backgrounds has the potential to significantly improve understanding, reduce near-miss incidents, and lower accident rates (Casey et al. [37]).

In South Africa, current H&S training programmes are predominantly generic, delivered exclusively in English, and typically span one to three days for entry-level courses and up to two weeks for advanced management programmes. The literature on training effectiveness therefore suggests a clear need for construction-specific H&S training delivered in trainees' home languages to address the industry's persistently poor safety performance. Effective hazard identification, risk assessment, and implementation of corrective measures require a sound understanding of the Occupational Health and Safety Act and Construction Regulations. Ross (2005) [38] emphasised that training should integrate theoretical knowledge with workplace experience to enable employees to identify and manage hazards effectively. However, familiarity with workplace hazards may also lead to complacency, underscoring the value of external training providers in mitigating this risk. Adapting training content to reflect actual workplace situations and experiences has been shown to improve knowledge retention and enhance the achievement of training objectives [38].

Table 1 presents the range of H&S courses available in South Africa, including their target groups, accreditation status, National Qualifications Framework (NQF) levels, credit allocations, and duration.

Table 1. H&S courses in the market (Adapted from Ayesu-Koranteng [39])

Course name	SAQA accreditation	Credits	NQF level	Target	No. of days
Advanced OHSACT	N/A	N/A	N/A	All personnel requiring an in-depth knowledge of the SHE legislation	2
Advanced SAMTRAC Construction Health and Safety Certificate	N/A	N/A	N/A	HSE and SHEQ practitioners, officers and managers General managers, senior line managers, and supervisors Operations and project management practitioners Personnel responsible for the management and implementation of CHS management plans and HSE management systems	N/A
Applying SHE Principles and Procedures (ASHEPP)	NO	4	2	Supervisory personnel and artisans	2

Course name	SAQA accreditation	Credits	NQF level	Target	No. of days
Basic SHE Inspections	NO	N/A	N/A	Employees required to conduct workplace inspections Supervisors, Safety representatives	2
COIDAct Training Course	N/A	N/A	N/A	HR staff, Occupational health staff	1
Environmental Awareness	NO	N/A	N/A	All employees	1
Excavation Inspector	N/A	N/A	N/A	Excavation inspectors, supervisors, managers	1
Fall Arrest & Rescue	SAQA ID: 229995	3	3	Person working at heights (higher than 2 meters from their feet to the ground or within 2 meters of an edge where there is a possibility of a fall taking place) where the use of Fall Arrest Systems and specific type of PPE (ropes and knots) are going to be utilised, as well as where a rescue needs to be performed	3
Advanced Fall Arrest	SAQA ID: 229999	4	4	Person working at heights (higher than 2 meters from their feet to the ground or within 2 meters of an edge where there is a possibility of a fall taking place) where the use of Fall Arrest Systems and specific type of PPE (ropes and knots) are going to be utilised, as well as where a rescue needs to be performed	3
Hazard Identification and Risk Assessment (HIRA)	N/A	N/A	N/A	Management and supervisors SHE practitioners and SHE representatives Any person who is expected to carry out formal hazard identification and risk assessments	2
Intro to Occupational SHE	NO	N/A	N/A	Employees: who are small-group team leaders, or those who are newly elected SHE representatives. who have no formal SHE training or new to the industry	2
Introduction to Occupational Health & Safety Act	N/A	N/A	N/A	Management and supervisory personnel	1
NEBOSH International General Certificate in Occupational Health and Safety	N/A	N/A	N/A	Managers Supervisors Non-safety specialists Worker representatives who have both general and specific health and safety responsibilities within their organisation	11

Course name	SAQA accreditation	Credits	NQF level	Target	No. of days
NEBOSH International Certificate in Construction Health and Safety	N/A	N/A	N/A	People who have an involvement in construction work and need to provide advice on health, safety and welfare in construction work	16
NOSA Auditor	SAQA ID 12674	12	5	SHE representatives, members of internal audit teams, Supervisors, departmental managers and quality practitioners	5
NOSA Incident Investigation Level 3	N/A	N/A	N/A	Department managers, supervisors and investigators Team members, SHE reps, committee members and SHE practitioners	3
Preliminary Incident Investigation	N/A	N/A	N/A	SHE representatives Members of investigation teams	3
Safety for Supervisors Training Course (SSTC)	N/A	N/A	N/A	Supervisors	2
Safety for Supervisors Training Course with Practical (SSTC)	N/A	N/A	N/A	Supervisors	3
Scaffold Inspection	N/A	N/A	N/A	Scaffold inspectors, supervisor, managers	1
SHE Representative Course	N/A	N/A	N/A	SHE union, employee reps, practitioners and committee members Management, supervisors, employees involved with SHE representatives or their functions	1

Despite all the training and legislation, there are still many accidents that occur in the construction industry.

2.3. South African construction industry accident

The South African construction industry employs a substantial proportion of the national workforce and makes a significant contribution to the country's economic growth. Despite this, the industry continues to exhibit poor health and safety (H&S) performance, characterised by persistently high accident and fatality rates (DoL, 2012) [40]. In response to these challenges, the Occupational Health and Safety (OHS) Act was enacted to improve workplace H&S conditions and to provide guidance on legislative requirements for H&S management and enforcement. Section 8 of the Act places a legal obligation on employers to provide and maintain a working environment that is safe and without risk to the health of employees. Furthermore, employers are required to develop and maintain Safety Management Systems (SMS), comply with applicable safety legislation—particularly the Construction Regulations (CR)—and provide appropriate construction health and safety (CH&S) training to employees to ensure a safe and healthy working environment (OHS Act [41]).

Despite these legislative measures, accident statistics remain concerning. Haupt and Smallwood [42] reported that in 1999 alone, 14,418 medical aid cases, 4,587 temporary total disablements,

315 permanent disablements, and 137 fatalities were recorded by the Compensation Commissioner in South Africa. These figures translate to one temporary disablement for every 102 workers, one permanent disablement for every 1,041 workers, and one fatality for every 3,925 workers. The disabling injury incidence rate of 0.98 indicates that nearly one worker per 100 sustained a disabling injury, exceeding the overall industry average of 0.78. Furthermore, the fatality rate among construction workers insured by the Accident Fund was reported as 25.5 fatalities per 100,000 full-time workers, a figure that is unfavourable when compared with international benchmarks.

Haupt and Smallwood [42] further explained that the severity rate (SR), which reflects the number of working days lost due to accidents per 1,000 hours worked, stood at 1.14 for the construction industry. This represented the fourth-highest severity rate among South African industries, after fishing, mining, and transport. During 1999, the industry lost an average of 2.28 working days per worker, equivalent to approximately 1.0% of total working time. These figures underscore the continued need for robust OHS legislation, effective implementation of the Construction Regulations, and coordinated multi-stakeholder efforts to improve CH&S performance.

The persistently high rates of accidents and fatalities raise serious concerns regarding the effectiveness of H&S training programmes delivered by service providers within the construction industry. Consequently, this study seeks to examine the effectiveness of H&S service providers' training programmes in promoting occupational health and safety within the South African construction industry. Supporting the urgency of this inquiry, Haupt, Shakantu, and Smallwood [43] estimated that approximately 60,000 fatal occupational accidents occur globally each year, with one fatality reported every ten minutes. Moreover, between 25% and 40% of these fatalities occur on construction sites, despite the sector employing only 6% to 10% of the global workforce. These statistics highlight the importance of strengthening H&S education, including the incorporation of H&S curricula into tertiary and vocational training programmes, and ensuring that such training is delivered effectively.

3. Research methodology

The researcher utilised the quantitative data collection method to collect primary data from a sample surveyed through two questionnaires whilst collecting secondary data from books, the internet, professional journals, and articles. The Nelson Mandela Metropolitan Area was selected as a sample from the Eastern Cape province as a source of primary data collection. The sampled population consisted of service providers, health and safety practitioners, construction managers, supervisors, and workers. It was impossible for the researcher to contact every member of the population for the study, therefore, a purposive sample technique was employed to select respondents in the service providers' categories, whilst a random systematic sampling technique was used to select employees in the construction personnel category.

The research instrument used for this research was a questionnaire. The questionnaire was structured into 4 sections comprised of a set of questions and statements designed to gather information from participants. The questions rated the perception of the respondents on the effectiveness of H&S relative to construction. Two questionnaires were designed, questionnaire one for respondents from the construction sector and questionnaire two for service providers in the industry. The response options were structured using a 5-point Likert Scale however, the point system to measure the respondents' level of acceptance were different. This study made use of Likert scale type questions where questions required respondents to rate their opinions or perceptions on statements or questions on the H&S training relative to construction. Respondents were instructed to select one of five responses. For the purpose of marking the overall mean, the scoring system from Sarrafzadeh, Martin & Hazeri [44] was adopted for the decision rule in the data analysis section where 1.00 to 1.44 means they

strongly disagree, 1.45 to 2.44 means they disagree, 2.45 to 3.44 means they are neutral undecided, 3.45 to 4.44 means they agree and 4.45 to 5.00 means they strongly agree. The responses to the items were combined to identify respondent categories with the most approving and disapproving response.

Random sampling was used for sampling Top, Senior and Middle Management (TSMM) professionals and General Workers or Labourers (GWL). A total of 100 questionnaires were hand delivered to TSMM and GWL to complete. Relative to questionnaire two, which was specific to H&S service providers, the researcher contacted service providers to brief them on the study, explain the importance of their participation and obtained permission to email the questionnaire. Response time was stipulated on the cover letter and the researcher collected the completed questionnaires. To achieve reliability of the study, the researcher carried out a pilot study involving 5 people to see whether the study would yield the desired results. Information from the pilot study resulted in some changes to the questionnaires. The validity of data in the research tool was improved using a pilot study. The questionnaire was subjected to a small-scale survey with respondents that were not reconsidered in the main study.

The researcher was aware of ethical considerations of research practices. Assurance was given to participants that all participation was entirely on a voluntary basis and therefore, participants had the right to terminate their participation at any stage of the study if they wished to. The informed consent of participants formed the basis of this research. Confidentiality was paramount for treating information obtained from questionnaires and this was conveyed to respondents. Responses from participants received anonymous treatment, such that no one would be able to trace the participant who supplied the researcher with any information for the purposes of the research. The researcher used descriptive statistics and one-sample t-tests to analyse the data using Excel. Although ANOVA was initially considered, it was not applied in the final analysis.

This study measured perceived understanding and training effectiveness rather than direct safety performance outcomes such as injury rates or incident reduction. Therefore, conclusions regarding the relationship between language and H&S outcomes are inferential and grounded in established literature linking training comprehension to safety performance.

4. Results

4.1. Demography

The demography of the respondents as presented in Table 2 revealed that 45% (29) are white followed by 34% (22) black while 19% are of the coloured extraction and 2% (1) are others. In terms of gender, 88% (56) are male while a minority 12% (8) are female. As per educational qualifications, Table 2 shows that 42% (24) of the respondents have National Certificate and followed by National Diploma with 23% (13) while 20.3% (13) indicated that they have National Higher Diploma / B Tech. Eight respondents (12.5%) indicated that they have Bachelor's Degree and one (1.6%) have Honour's Degree while none indicated that they have Master's or Doctoral Degree. Five (7.8%) stated that they had other qualifications and seven (10.9%) prefer not to say. When asked which stakeholder group the respondents belonged to, forty- four (68.8%) of the respondents and four (6.3%) are subcontractor while five (7.8%) stated that they are H & S Practitioners. Eight (12.5%) stated that they are others while three (4.7%) preferred not to say. A further enquiry was made as to the position of the respondents in their organisations, seventeen (26.7%) advised that they were top management and thirty-two (50%) stated that they were middle management while eleven (17.2%) were artisans and general workers, one indicated others and three preferred not to say.

Table 2. Demography

Race	Frequency	Percentage
Black	22	34.4%
White	29	45.3%
Coloured	12	18.8%
Indian	0	0.0%
Other	1	1.6%
Total	64	100.0%
Gender	**Frequency**	**Percentage**
Female	8	12.5%
Male	56	87.5%
Total	64	100.0%
Highest educational qualification	**Frequency**	**Percentage**
Matric	2	3.1%
National Certificate	24	37.5%
National Diploma	13	20.3%
National Higher Diploma / B Tech	4	6.3%
Bachelor's Degree	8	12.5%
Honour's Degree	1	1.6%
Master's Degree	0	0.0%
Doctoral Degree	0	0.0%
Others	5	7.8%
Prefer not to say	7	10.9%
Total	64	100.0%
Stakeholder group	**Frequency**	**Percentage**
General contractor	44	68.8%
Subcontractor	4	6.3%
H & S Practitioner	5	7.8%
Others	8	12.5%
Prefer not to say	3	4.7%
Total	64	100.0%
Position	**Frequency**	**Percentage**
Top management	17	26.6%
Middle management	32	50.0%
Artisans & General workers	11	17.2%
Others	1	1.6%
Prefer not to say	3	4.7%
Total	64	100.0%

4.2. Respondents' languages of communication

The question sought to know the languages of communication (reading, writing and speaking) in which the respondents could well communicate, and their responses are presented in the Venn diagram in Fig. 1. Thirty of the respondents indicated that they could communicate in English and Afrikaans followed by 13 who indicated English, isiXhosa/isiZulu and Afrikaans and a further 7 stated that they could communicate in English, isiXhosa/isiZulu only. Fig. 1 further revealed that three respondents each indicated that they could communicate easily in English, isiXhosa/isiZulu and others, isiXhosa/isiZulu only and English and others while one each indicated they can communicate in English, Afrikaans and English Afrikaans and others. Finally, two respondents indicated that they could communicate in other languages such as French and Dutch.

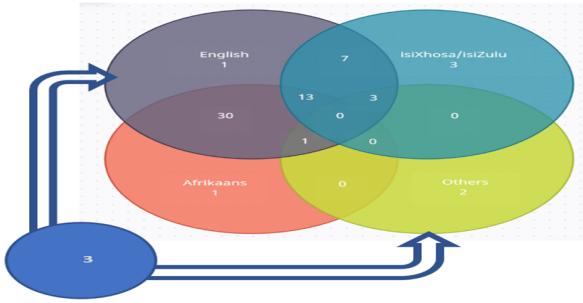

Figure 1. Language of communication of respondents

4.3. H&S Courses / Training Completed

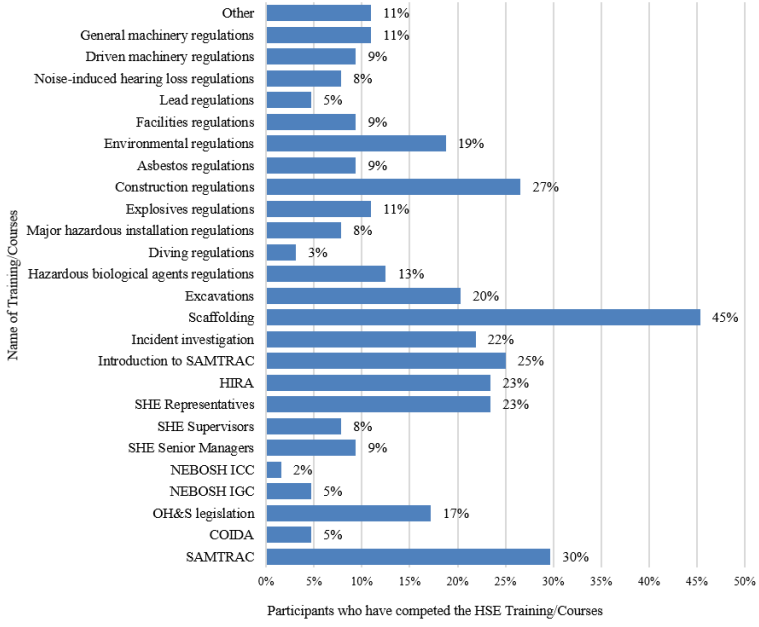

Figure 2. Training/ courses done

Fig. 2 illustrates various OH&S course / training the respondents have completed. From the analysis, majority of the respondents had not completed the listed most common OH&S courses required to equip workers to perform and work safely in their workplaces. The analysis also showed that some of the courses of particular interest to SHE management in the construction industry such as

excavations, construction regulations, COIDA, environmental regulations, HIRA, OH&S legislation, scaffolding, SHE representative, SHE supervisor and manager had not been completed by the majority of respondents. With the exception of courses / training in Scaffolding, SAMTRAC, Construction Regulations, Introduction to SAMTRAC, which is a prerequisite of SAMTRAC, HIRA and Incident Investigation, which had been done by between 21–49% of the respondents, all the other courses / training had been completed by 20% or less of the respondents.

4.4. Language of instruction for completed courses/training

The analysis additionally showed that all the courses completed were in English and none conducted in Afrikaans, isiXhosa or isiZulu which are predominantly the most spoken languages in the population the Eastern Cape as seen in Table 3.

Table 3. Language of instruction for completed courses/training

Courses	Afrikaans	English	isiXhosa/isiZulu	Others
SAMTRAC	0	15	0	0
COIDA	0	2	0	0
OH&S legislation	0	8	0	0
NEBOSH IGC	0	3	0	0
NEBOSH ICC	0	1	0	0
SHE Senior Managers	0	5	0	0
SHE Supervisors	0	4	0	0
SHE Representatives	0	9	0	0
HIRA	0	11	0	0
Introduction to SAMTRAC	0	13	0	0
Incident investigation	0	9	0	0
Scaffolding	0	21	0	0
Excavations	0	9	0	0
Hazardous biological agents regulations	0	4	0	0
Diving regulations	0	2	0	0
Major hazardous installation regulations	0	3	0	0
Explosives regulations	0	4	0	0
Construction regulations	0	10	0	0
Asbestos regulations	0	5	0	0
Environmental regulations	0	9	0	0
Facilities regulations	0	2	0	0
Lead regulations	0	2	0	0
Noise-induced hearing loss regulations	0	2	0	0
Driven machinery regulations	0	4	0	0
General machinery regulations	0	4	0	0
Other	0	7	0	0

4.5. Perception of respondents on the influence of language on courses/training completed

Respondents were requested to indicate from their experience if language of training influenced their understanding on the courses / training completed. Table 4 illustrates the influence of language on the courses / training completed by the respondents by category and organiser of training. For the

In-house training of Senior, Top and Middle Management and that of the General workers / Labourers with mean scores of 3.30 and 3.31 respectively, it can be deduced from the decision rule that they are neutral / undecided while for the training run by Service providers for senior, Top & Middle Management and General workers / Labourers with mean score of 4.00 and 4.03 respectively, the respondent agree that the language if training influenced their training. Meanwhile, with an average mean score of 3.66, the implication of this is that the respondents agreed that the language of training of the courses / training done would have had a better influence and deeper understanding if the training was in their home language. The Cronbach's alpha coefficient for the scale measuring the perception that training offered in trainees' home language enhances understanding was 0.85, indicating high internal consistency reliability among the items.

Table 4. Perception of respondents on the influence of language on courses/training completed

Category	(Strongly Disagree)	(Disagree)	Neutral	(Agree)	(Strongly Agree)	Total	Mean
In-house training (Senior, Top & Middle Management)	1	9	10	12	5	37	3.30
In-house training (General workers / Labourers)	2	8	14	11	7	42	3.31
Service provider (Senior, Top & Middle Management)	0	1	7	12	9	29	4.00
Service provider (General workers / Labourers)	0	2	6	12	11	31	4.03
Mean score							3.66

A one sample t-test was conducted to examine whether the mean ratings for different groups and training effectiveness were significantly below the reference value of 2.6 as shown in Table 5. A one-tailed one-sample t-test was employed because the hypothesis was directional and based on prior literature indicating that language barriers reduce training effectiveness. The alternative hypothesis tested whether the mean score was significantly lower than the neutral reference value ($\mu < 2.60$). The one-sample t-test reference value of 2.60 was selected based on established interpretation of the 5-point Likert scale used in this study. Given that the scale (1 = strongly disagree to 5 = strongly agree) yields category boundaries at approximately 1.80, 2.60, 3.40, and 4.20 for successive levels of agreement, a reference value of 2.60 represents the threshold between disagreement and neutral perception (i.e., where respondents move from negative to not negative attitudes). Similar operationalisation of Likert scale thresholds has been used in previous safety perception research where means below a threshold indicate weaker perceptions of effectiveness. Therefore, a reference value of 2.60 reflects the minimum score at which respondents can be interpreted as not disagreeing with the statement under consideration.

First, the t-test statistic for Top, Senior & Middle Management as revealed in Table 5 shows the mean score of 2.67 which was not significantly lower than the test value of 2.60, $t = 0.45$, $p = 0.329$, $df = 45.00$ showed that the result was not statistically significant indicating that the null hypothesis could not be rejected. This means that trainees in these categories understood the course material more clearly in English. However, in terms of General Worker labourer, the statistic test indicates that mean score of 1.97 and $t = -4.18$, $p < 0.0005$, $df = 34.00$, $d = 0.71$ Medium and it reveals

a statistical significance suggesting that general workers and labourers' trainees did not get a full grasp of the course content in English. It can therefore be inferred that for General Worker labourer, language plays a role in how well trainees understood the course content and that this group would have understood the concepts better if it were offered in their home language. However, this did not apply to Top, Senior & Middle Management, who are generally educated and more proficient in English. The test of statistic on the effectiveness of training and material relative to construction, the mean score of 1.66 and $t = -10.31$, $p < 0.0005$, $df = 52.00$, $d > 0.80$ largely reveals statistical significance hence an indication that training and material are not effectively relative to construction.

Table 5. The statistics test results

Variable	n	M	SD	H_0	t	df	p-value	Cohen d	Effect
Top, Senior & Middle Management	46	2.67	1.12	$M < 2.60$	0.45	45	0.329	n/a	n/a
General Worker labourer	35	1.97	0.89	$M < 2.60$	-4.18	34	< .0005	0.71	Medium
Effectiveness of training and material relative to construction	53	1.66	0.66	$M < 2.60$	-10.31	52	< .0005	1.42	Large

One-sample t-Tests Constructs (H1: $\mu < 2.60$).

5. Discussions

Several decades of legislated OHS in South Africa has not reduced the rate of construction accidents. The demographic information from the respondents aligns with literature. In terms of race, the survey findings show that respondents are spread across the various racial divide of South Africa except for Indians who are not prominent in the Eastern Cape. The survey revealed that there are more male respondents than women and the reason for this may not be unconnected with the fact the construction industry has been adjudged to be a male dominated industry (English and Hay [45], Shah, Pitroda and Shah [46], Shibani et al. [47]). Kent and Becerik-Gerber [48] explained that understanding the construction industry is a function of education, experience, and training among other factors and as revealed in the findings, the respondents all have one form of education or another and are involved in the construction industry and hence they have a first-hand knowledge of the subject matter. A common denominator of these respondents is that English is not their first language, supporting Lestari et al [49] who contended that language problems can have an impact on OHS compliance rates in the industry largely because there is currently no provision for training in languages other than English. Meanwhile, Brenzinger [50] advised that without giving English or any of the other ten languages any special status, the 1996 South African Constitution recognised Sepedi, Sesotho, Setswana, siSwati, Tshivenda, Xitsonga, Afrikaans, English, isiNdebele, isiXhosa and isiZulu as official languages on an equal footing. In 2023, the South African Sign Language was officially recognised as the twelve-official language (RSA [14, 15]). A guiding principle for the selection was to make sure that each of the eleven official languages is official in at least one province and that of the Eastern Cape where the study took place is isiXhosa, Afrikaans, Sesotho and English (RSA [51]). The study findings align with this as majority of the languages of communication as indicated by the respondents belong to the recognised twelve official languages of the Republic.

The H & S courses that the respondents indicated they attended are all aligning with those listed by Nosa [52] and Ayesu-Koranteng [39] as the available courses, physical or virtual for South African

patrons. While Johari and Jha [53] identified that construction workers have an apathy towards undergoing skill development and training programmes, the findings of this study report otherwise as all the respondents have attended trainings and programmes in H & S. The reason for this however could be because of legislation which mandates workers to undergo such training for the skills, they need for executing their jobs. The trainings and programmes the respondents have undergone are not just local certifications or trainings but international trainings such as NEBOSH (Hughes and Ferrett, 2015) and HIRA (Suhardi et al [54]) among others. The respondents also have trainings in local certifications such as SAMTRAC (Haupt [55], Gogo [56]) but the medium of training for either the local or international training is English language as indicated by all the respondents despite that South Africa has twelve official languages.

The findings indicate that the language of instruction is perceived to influence trainees' understanding of health and safety training, particularly among general workers and labourers. This suggests that language may be an important factor affecting the perceived effectiveness of safety training in multilingual construction environments. This finding is consistent with Mandela's [3] observation that speaking to a person in his native tongue has a more profound impact than speaking to him in a foreign language. However, the test of statistical significance suggests that trainees in Top, Senior & Middle Management categories understood the course material more clearly in English and this is in tandem with the observation of Okpara and Wynn [57]. However, in terms of general workers and labourers, the statistic test reveals a significance suggesting that general workers and labourers' trainees did not get a full grasp of the course content in English, and this may be because of their level of education as indicated by Fugar, Ashiboe-Mensah and Adinyira [58]. The findings of the study also indicates that training and material are not effective relative to construction.

6. Conclusions and recommendations

This study examined the role of language in influencing the perceived effectiveness of H&S training in the South African construction industry. The findings reveal a differential impact across respondent groups. While Top, Senior, and Middle Management respondents did not demonstrate statistically significant limitations in understanding English-delivered training, general workers and labourers exhibited statistically significant evidence of reduced comprehension when training was conducted exclusively in English. This suggests that language barriers disproportionately affect lower-level employees, who are often more directly exposed to operational hazards.

In addition, respondents across categories indicated that existing training materials may not fully align with construction-specific contexts, pointing to the need for improved contextual relevance in training design.

Based on these findings, the study suggests that reconsidering English-only training models and exploring multilingual delivery—particularly for general workers—may enhance comprehension. The development of construction-specific, context-sensitive training materials also warrants further consideration. The incorporation of digital and interactive training technologies may provide additional support, although this was not directly tested in the study.

It is important to note that this research relied on self-reported perceptions of training effectiveness and did not measure objective safety outcomes such as accident frequency, behavioural safety compliance, or near-miss incidents. Therefore, conclusions regarding the direct impact of language on accident reduction should be interpreted cautiously. Future research should incorporate longitudinal and behavioural performance data to examine whether improved linguistic alignment translates into measurable improvements in H&S outcomes.

The study did not directly assess respondents' English proficiency levels. As such, it was not possible to determine whether differences in comprehension were attributable primarily to job position, education level, or language proficiency. Future research should include validated measures of language proficiency to better isolate its influence on training effectiveness.

References

[1] Duryan, M., Smyth, H., Roberts, A., Rowlinson, S., Sherratt, F. (2020). Knowledge transfer for occupational health and safety: Cultivating health and safety learning culture in construction firms. *Accident Analysis & Prevention*, 139:105496.

[2] Gamil, Y., Rahman, I. A. (2017). Identification of causes and effects of poor communication in construction industry: A theoretical review. *Emerging Science Journal*, 1(4):239–247.

[3] Mandela, N. (2015). *Project Leadership*.

[4] Ofori, G., Chan, S. L. (2000). Growth paths of construction enterprises in Singapore, 1980-98. *Engineering, Construction and Architectural Management*, 7(3):307–321.

[5] Saudi Arabia Ministry of Labour and Social Affairs (1998). *The annual statistics report of labourers*. Riyadh: SAMLSA.

[6] Burton, M. (2022). *From Broke to Brexit: Britain's Lost Decade*. Springer Nature.

[7] Teck, A. G. P., Abdullah, M. N., Asmoni, M., Misnan, M. S., Jaafar, M. N., Mei, J. L. Y. (2015). A review on the effectiveness of safety training methods for Malaysia construction industry. *Jurnal Teknologi*, 74 (2).

[8] Lyu, S., Hon, C. K., Chan, A. P., Wong, F. K., Javed, A. A. (2018). Relationships among safety climate, safety behaviour, and safety outcomes for ethnic minority construction workers. *International Journal of Environmental Research and Public Health*, 15(3):484.

[9] Loosemore, M., Lee, P. (2002). Communication problems with ethnic minorities in the construction industry. *International Journal of Project Management*, 20(7):517–524.

[10] Steele, A., Sodhi, D. (2006). Race, ethnic minorities and the construction industry. In *Managing Diversity and Equality in Construction*, Routledge, 205–218.

[11] Żilinskaite, M., Hajro, A. (2020). Responsible global migrant workforce management: Leadership challenges and opportunities. In *Responsible Global Leadership*, 101–119.

[12] Yue, H., Pizzi, E. (2022). Breaking Through the Language Barrier: The Role of Language Policy in Migration Decisions. *China: An International Journal*, 20(3):23–51.

[13] Lim, E. C., Alum, J. (1995). Construction productivity: issues encountered by contractors in Singapore. *International Journal of Project Management*, 13(1):51–58.

[14] Republic of South Africa (1996). *Constitution of the Republic of South Africa (Act No. 108 of 1996)*. Pretoria: Government Printer.

[15] Republic of South Africa (2023). *Constitution Eighteenth Amendment Act, 2023 (Act No. 1 of 2023)*. Pretoria: Government Printer. Amendment recognising South African Sign Language as the 12th official language of South Africa.

[16] Michell, K. (2017). Governance of occupational healthcare services in South Africa: Cohesion or conflict? *Occupational Health Southern Africa*, 23(2):10–17.

[17] Nene, S. S. (2015). Occupational health and safety and industrial relations in the South African construction industry: case studies of selected construction firms in Grahamstown. Doctoral dissertation, Rhodes University.

[18] Mollo, L. G., Emuze, F., Smallwood, J. (2019). Improving occupational health and safety (OHS) in construction using Training-Within-Industry method. *Journal of Financial Management of Property and Construction*.

[19] Raliile, M. T., Haupt, T. C. (2023). A Study on Knowledge, Attitudes and Commitment of Managers Within Construction Firms Towards the Recent Construction Health and Safety Legislation Changes. In *Construction in 5D: Deconstruction, Digitalization, Disruption, Disaster, Development*, Springer, Cham, 425–437.

[20] Rikhotso, O., Morodi, T. J., Masekameni, D. M. (2022). Occupational health and safety statistics as an

indicator of worker physical health in South African industry. *International Journal of Environmental Research and Public Health*, 19(3):1690.

[21] Okonkwo, N. P. (2019). Health and safety management and performance among construction contractors in South Africa. Doctoral dissertation, Stellenbosch University, Stellenbosch.

[22] Salguero-Caparrós, F., Pardo-Ferreira, M. D. C., Martínez-Rojas, M., Rubio-Romero, J. C. (2020). Management of legal compliance in occupational health and safety. A literature review. *Safety Science*, 121: 111–118.

[23] Brauer, R. L. (2022). *Safety and Health for Engineers*. 4 edition, Wiley Publishing.

[24] Benn, S., Edwards, M., Williams, T. (2014). *Organizational Change for Corporate Sustainability*. Routledge.

[25] Mannan, M. S., Mentzer, R. A., Zhang, J. (2013). Framework for creating a Best-in-Class safety culture. *Journal of Loss Prevention in the Process Industries*, 26(6):1423–1432.

[26] da Silva, S. L. C., Amaral, F. G. (2019). Critical factors of success and barriers to the implementation of occupational health and safety management systems: A systematic review of literature. *Safety Science*, 117:123–132.

[27] Osei-Asibey, D., Ayarkwa, J., Acheampong, A., Adinyira, E., Amoah, P. (2021). Framework for improving construction health and safety on Ghanaian construction sites. *Journal of Building Construction and Planning Research*, 9(2).

[28] Elnaga, A., Imran, A. (2013). The effect of training on employee performance. *European Journal of Business and Management*, 5(4):137–147.

[29] Khan, M., Rahman, W., Khan, S. A. (2021). Training Needs Assessment, Trainees' Work Passion and Training Effectiveness in Government Training Institutes of Khyber Pakhtunkhwa. *City University Research Journal*, 11(2):267–288.

[30] Oughton, N. (2013). Managing occupational risk in creative practice: A new perspective for occupational health and safety. *Archives of Environmental & Occupational Health*, 68(1):47–54.

[31] Singh, A., Misra, S. C. (2021). Safety performance & evaluation framework in Indian construction industry. *Safety Science*, 134:105023.

[32] Umeokafor, N., Evangelinos, K., Windapo, A. (2022). Strategies for improving complex construction health and safety regulatory environments. *International Journal of Construction Management*, 22(7): 1333–1344.

[33] Harris, F., McCaffer, R., Baldwin, A., Edum-Fotwe, F. (2021). *Modern Construction Management*. John Wiley & Sons.

[34] Seipel, B., Bailey, P., Teasdale, R. (2022). Changing Gears in the Assessment Cycle: Preparing for Gradual yet Substantial Shifts. In *Handbook of Research on Policies and Practices for Assessing Inclusive Teaching and Learning*, 157–182.

[35] Kukulska-Hulme, A., Bossu, C., Charitonos, K., Coughlan, T., Ferguson, R., FitzGerald, E., Gaved, M., Guitert, M., Herodotou, C., Maina, M., Prieto-Blázquez, J. (2022). *Innovating Pedagogy 2022: Exploring New Forms of Teaching, Learning and Assessment, to Guide Educators and Policy Makers*. Milton Keynes: The Open University.

[36] Nielsen, K., Shepherd, R., Vignoli, M., Prieto, L. L. (2021). The integrated migrant worker safety training evaluation model: IMSTEM. *Safety Science*, 139:105246.

[37] Casey, T., Turner, N., Hu, X., Bancroft, K. (2021). Making safety training stickier: A richer model of safety training engagement and transfer. *Journal of Safety Research*, 78:303–313.

[38] Ross, D. (2005). Training Providers – sorting the good from the bad. *Human Resources Magazine*, 9: 28–29.

[39] Ayesu-Koranteng, E. (2017). The effectiveness of health and safety service providers' relative to construction. Msc treatise, Nelson Mandela University.

[40] Department of Labour (2012). *Annual Report of the Department of Labour 2011/2012*. Pretoria: Government Printer.

[41] (2006). *Occupational Safety and Health Act, 2006 (Act 9 of 2006)*. Uganda. Published 8 June 2006.

[42] Haupt, T. C., Smallwood, J. (2007). Impact of the South African Construction Regulations on construction

health and safety: Architects' perceptions. *Journal of Engineering, Design and Technology*, 5(1):23–34.

[43] Smallwood, J. J., Haupt, T. C., Shakantu, W. (2009). *Construction Health & Safety in South Africa: Status and Recommendations*. Pretoria: Construction Industry Development Board (CIDB). CIDB Report, pp. 1–42.

[44] Sarrafzadeh, M., Martin, B., Hazeri, A. (2010). Knowledge management and its potential applicability for libraries. *Library Management*, 31(3):198–212.

[45] English, J., Hay, P. (2015). Black South African women in construction: cues for success. *Journal of Engineering, Design and Technology*.

[46] Shah, P., Pitroda, J., Shah, M. (2020). Gender Inequality in Construction Industry: A Review. *Journal of Emerging Technologies and Innovative Research*, 7(7).

[47] Shibani, A., Saidani, M., Hassan, D., Agha, A., Alghodi, M., Alawanati, N., Gherbal, N., Abduelmula, M. (2021). Challenges and Barriers to Women in the UK Construction Industry. In *11th Annual International Conference on Industrial Engineering and Operations Management, IEOM*, Singapore.

[48] Kent, D. C., Becerik-Gerber, B. (2010). Understanding construction industry experience and attitudes toward integrated project delivery. *Journal of Construction Engineering and Management*, 136(8):815–825.

[49] Lestari, F., Sunindijo, R. Y., Loosemore, M., Kusminanti, Y., Widanarko, B. (2020). A safety climate framework for improving health and safety in the Indonesian construction industry. *International Journal of Environmental Research and Public Health*, 17(20):7462.

[50] Brenzinger, M. (2017). Eleven official languages and more: legislation and language policies in South Africa. *Revista de Llengua i Dret*, 67:38–54.

[51] Republic of South Africa (2012). *Use of Official Languages Act (Act No. 12 of 2012)*. Pretoria: Government Printer.

[52] Nosa (2026). *List of all courses*.

[53] Johari, S., Jha, K. N. (2020). Challenges of attracting construction workers to skill development and training programmes. *Engineering, Construction and Architectural Management*, 27(2):321–340.

[54] Suhardi, B., Laksono, P. W., Rohani, J. M., Ching, T. S. (2018). Analysis of the potential hazard identification and risk assessment (HIRA) and hazard operability study (HAZOP): case study. *International Journal of Engineering & Technology*, 7(3.24):1–7.

[55] Haupt, T. C. (2021). *Management of Safety, Health and Environment in South Africa: A Handbook*. Cambridge Scholars Publishing.

[56] Gogo, S. E. (2021). The Role of Leadership in the Transformation of Health and Safety Culture in the South African Construction Industry. PhD thesis, University of Johannesburg, South Africa.

[57] Okpara, J. O., Wynn, P. (2008). The impact of ethical climate on job satisfaction, and commitment in Nigeria: Implications for management development. *Journal of Management Development*, 27(9):935–950.

[58] Fugar, F. D., Ashiboe-Mensah, N. A., Adinyira, E. (2013). Human capital theory: Implications for the Ghanaian construction industry development. *Journal of Construction Project Management and Innovation*, 3(1):464–481.