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### **Communicating health and safety on a multinational construction project: challenges and strategies**

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1 **Communicating health and safety on a multinational construction project: challenges**  
2 **and strategies**

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40 **Abstract**

41 The health and safety (H&S) of workers is a critical project management goal in construction. As  
42 globalisation and migrant movement increases, construction projects are becoming more nationally  
43 diverse. Amongst multinational workforces, language barriers present an obvious but largely  
44 unresolved H&S communication challenge, with current strategies in use yet to be assessed. On a  
45 large construction project in the United Kingdom, H&S communication strategies were explored  
46 through an ethnographic approach. This paper contributes by revealing the impracticalities of using  
47 employees as interpreters in workgroups of six or more; the limitations of technologies in a dynamic  
48 construction site environment, and highlights the unresolved challenge of translating safety videos in  
49 multiple languages. Challenges arose including translators refusing to translate, as they were not  
50 receiving extra financial benefits and it was not recognised as part of their workload; and translators  
51 being given favourable treatment during disciplinary processes as they were crucial to the continued  
52 operation of the site team. This reveals the complexities involved in implementing effective H&S  
53 communication strategies on international and multinational projects, which have previously  
54 remained largely ignored.

55

56 **Keywords:** Communication, ethnography, multinational, migrant workers, safety

57

58 Gary, one of the H&S advisors, and I drove towards his area of the construction site. New migrant  
59 workers from the Czech Republic had recently arrived on site, and he had posters with visuals and  
60 safety messages in Czech prepared, laminated, and ready to be fixed to the walls of the welfare unit. I  
61 took the posters and he grabbed the pins and staple gun as we exited the site vehicle; I tightly held  
62 onto the posters as we walked across the site in windy conditions. Gary said to me:  
63 'keep an eye out for the translator – he should have a black band on his hard hat.'  
64 We passed several small groups of migrant workers. 'Alright lads' was Gary's opener, but there was  
65 no response each time, and no black band in site. We walked into an empty welfare unit. There was  
66 high visibility clothing hanging up to dry; unwashed dishes piled up in the sink; newspapers spread out  
67 on the tables; and the H&S policies and procedures stapled on the wall in English. Gary turned to me:  
68 'I don't know if this is where the Czech guys are based. There is no point in putting these up if we are  
69 in the wrong unit, and you can't ask anyone [because of language barriers]. There are clearly  
70 problems with this one-in-six translator policy [one English speaker to every six non-English workers in  
71 a team]. What happens when half the team is on site, and the other half is in the office? The English  
72 speakers are usually the office guys, the project managers, or the engineers, or even the foreman –  
73 we could be looking in completely the wrong place. And what if they are away training, or ill or on  
74 their jollies [holidays], or just not wearing their black band? Then they aren't much help if you are  
75 trying to communicate with the guys out on the park [the construction site].'

76 The development of health and safety (H&S) notices in different languages and the use of translators  
77 or interpreters are common strategies for managing communication on multinational construction  
78 projects. However, as illustrated above, the effective implementation of these strategies in practice is  
79 not always straight forward.

## 80 Introduction

81 The opening extract is from an ethnographic study of a large multinational construction project in the  
82 United Kingdom (UK). Communicating health & safety (H&S) messages in such contexts can often be  
83 a construction project management challenge, and one which remains largely unresolved. Bust et al.  
84 (2008) stressed that a new approach to H&S management is likely to be required for internationally  
85 diverse projects in all countries, where many different languages may be present. Employers in  
86 construction across the world are tackling this problem in similar, yet myriad ways. These include, the  
87 use of multi-lingual supervisors, visual communication methods (Dainty et al., 2007; Bust et al., 2008)  
88 including films and cartoons (Kivrak et al., 2013), and translating instructions and guidance  
89 (inductions, tool box talks and training materials) into workers' first languages. However, there is  
90 little evidence to support the effectiveness of such initiatives, and a lack of empirical investigation  
91 into these methods (Bust et al., 2008). Hence, there is a clear need to evaluate the strategies being  
92 used in practice. This study, utilising empirical evidence from an ethnographic research project, takes  
93 a step to close this gap by assessing the strategies used for H&S communication on a large  
94 multinational project.

95 Migrant workers make up a significant part of the construction workforce at a global level, and the  
96 UK is no different (Bust et al., 2008). There is no universally accepted figure for the number of  
97 migrant workers in the UK, and statistics on their nationality or migration status are limited and  
98 uneven (Pink et al., 2010), although it has recently been estimated that they make up around 12% of  
99 the UK construction industry site-based workforce (in 2015 this amounted to approximately 240,000  
100 people) (McMeeken, 2015). The presence of a migrant workforce within the construction industry, be  
101 it on a UK or global level, is somewhat inevitable; but statistical evidence suggests they are  
102 unfortunately at greater risk on site, with migrant worker deaths in construction over twice that  
103 expected (e.g. Centre for Corporate Accountability (CCA), 2009, Health and Safety Executive (HSE),  
104 2011). Meardi et al. (2012) found overwhelming confirmation that H&S risks are most likely higher

105 for migrant workers; but statistical evidence for this in the UK is scarce, as numbers in accident data  
106 sets are either too low to be statistically significant or data-sets do not include nationality.

107 The inherent variation in demand for products and the project based nature of the construction  
108 industry requires a workforce that is flexible, transient, and peripatetic. Migrant workers can  
109 therefore make a significant contribution. The importance of migrant construction worker  
110 movements was highlighted in a study on six European countries (Italy, Portugal, Germany, the UK,  
111 the Netherlands and Switzerland) by Fellini et al. (2007), which found that there were labor shortages  
112 in all countries except Germany. The authors explained that company decisions on the recruitment of  
113 foreign workers were guided by two main (interconnected) aims: coping with labor shortages and  
114 minimising labor costs. Low-cost migrant workers can help in meeting the typically tight project  
115 schedules and profit margins associated with the construction industry. However, the growing  
116 reliance on migrant workers can further increase the cultural complexities of site management. There  
117 are especially issues with the health and safety management of an international workforce,  
118 associated with different working practices, management practices, worker welfare, and rules and  
119 regulations (Oswald et al., 2017).

120 The UK can be considered an 'advanced safety country', in that there is an established, respected and  
121 intricate system of regulations that is designed to increase pressure on companies to provide safe  
122 workplaces (Coulter, 2009). Migrant workers that come from countries with less rigorous legislative  
123 constraints on construction health and safety should therefore be able to take advantage of a safer  
124 and healthier working environment in the UK. However, this is not always the case, with Guldenmund  
125 et al. (2013) concluding that migrant workers formed a vulnerable group in the three European  
126 countries (Denmark, Netherlands, and the UK) that were the focus of their study. They argued that  
127 the scale of the migrant worker 'problem' will remain largely elusive, as long as numerous migrant  
128 workers remain unregistered in their host country, and the national accident records are not

129 adequately coded. This highlights the need for further investigation into the H&S experiences of  
130 migrant construction workers.

131 Perhaps the most obvious challenge of a multi-national workforce is communication, both inter-  
132 organisational and inter-personal. Although the UK consistently has one of the lowest rates of fatal  
133 injury across the European Union (HSE, 2015), an increase in migrant workers has created additional  
134 safety management challenges. Bust et al. (2008: 585) suggested that the increase of migrant  
135 workers had 'put pressure on the management of health and safety at a time when the UK  
136 construction industry was progressing from relative successes in tackling safety issues to dealing with  
137 the health of construction workers'. Such increases in pressure stand to undermine efforts to  
138 improve the health and safety record of UK construction. This makes it essential to understand  
139 exactly how health and safety communication is managed amongst an international workforce, and  
140 what can be done about it.

141 The aim of this paper is to understand the challenges that the H&S department had in  
142 communicating with non-English speaking migrant workers on a large construction project in the UK;  
143 and to assess the success of the strategies that were put in place to overcome these challenges.  
144 Although inevitably grounded in a UK construction industry context, that many projects in many  
145 other countries also draw on migrant and multinational labor for their site workforce means this  
146 research is applicable at a global level. The specifics of the nationalities and languages involved is  
147 arguably less important than the H&S management strategies employed to support their safe  
148 employment within an environment in which their first language may not be that of the country in  
149 which they are working.

## 150 **Communicating H&S on multinational construction sites**

151 Health and safety is an emerging criterion for construction project success, supplementing the classic  
152 'Iron Triangle' model of time, cost, and quality (Alzahrani & Emsley, 2013). In construction projects, a

153 high level of collaboration among project teams is essential in order to achieve project success (Wu  
154 et al., 2017); and effective safety communication between all parties is an important part of safety  
155 performance (Jin et al., 2015). The UK Health and Safety Executive (2005) recommended that  
156 effective H&S communication within an organisation needs to occur in three directions:

- 157 • top-down: management to frontline workers;
- 158 • bottom-up: frontline workers to management; and
- 159 • horizontal: between peers or functional groups.

160 Such multi-directional communication can be more problematic on projects where language barriers  
161 are present. These barriers are a well-documented construction migrant labor challenge, (e.g.  
162 Trajkovski and Loosemore 2006, Bust *et al.* 2008, Tutt *et al.* 2011, 2013; Hare *et al.* 2009, 2012;  
163 Guldenmund *et al.* 2013, Oswald *et al.* 2014, 2015) as H&S standards, regulations, and accepted ways  
164 of working can vary significantly from country to country, and such variations need to be clearly  
165 communicated. In the UK, the Health and Safety Executive (HSE 2013) highlights a potential increase  
166 in risks for migrant workers on sites, attributing this to differences in language, culture, and  
167 understanding of UK health and safety legislation.

168 Dainty et al. (2007:2) identified that ‘migrant workers clearly face additional challenges in terms of  
169 the relatively short periods of work in the UK, their limited knowledge of UK health and safety  
170 systems, the ability to communicate with co-workers and supervisors, and in gaining access to  
171 appropriate training’. McKay et al., (2006) found that two-thirds of migrant workers actually received  
172 no safety training, and the other third received a short site induction that was often not understood  
173 or communicated effectively. Hare et al. (2009) argued that an essential starting point for  
174 improvements is the development of effective methods to support the communication of health and  
175 safety knowledge between non/low English speaking construction workers and English-speaking site  
176 managers. Chan et al. (2016) suggested providing safety training in ethnic minority languages; and  
177 Trajkovski and Loosemore (2006) also recommended that safety training be provided in a variety of



178 languages, which was an approach strongly supported by non-English speaking migrants in their  
179 study carried out in Australia. However, concerns have been raised that this may hinder the  
180 integration of migrant workers into the host nation's workforce, and could also discourage them  
181 from learning English at all (Commission on Integration and Cohesion, 2007). Hare et al. (2013) stated  
182 that providing English language courses is considered the best long-term investment. However, it  
183 would be a fallacy to assume that all English-speaking workers are safe, and the consideration that  
184 this approach is 'the best' needs to be further unpacked in terms of research knowledge. Most  
185 migrant workers are employed in the short term (McKay et al., 2006), which inevitably challenges any  
186 long-term communication strategies such as language education. Hence, even if financial investment  
187 was forthcoming, the logistical management of such courses on a short-term project-by-project basis  
188 is likely to be impractical. Thus, the most effective way to manage H&S communication on site is still  
189 unclear.

190 Tutt et al.'s ethnographic approach (2011) highlighted that the large increase of workers from  
191 Eastern European countries into the UK was presenting considerable additional challenges to  
192 employers' efforts to manage safety. The HSE (no date) recommend the following on-site strategies:

- 193 • English for Speakers of Other Languages (ESOL) courses for workers;
- 194 • Asking an employee who speaks good English to act as an interpreter;
- 195 • A buddy system of experienced workers with new or inexperienced migrant workers who  
196 speak the same language;
- 197 • Employ the services of a professional (accredited) interpreter;
- 198 • Provide written information in a relevant language(s), but ensuring they use a competent  
199 translator familiar with any technical terms; and
- 200 • Nonverbal communication to get the message across: for example DVDs or videos, audio  
201 tapes, and/or internationally recognised signs and symbols (which could include hand  
202 signals).

203 Bust et al. (2008) argued that issues relating to literacy, language and the communication of health  
204 and safety information also require further investigation, and that the effectiveness of management  
205 solutions to communication problems, such as the use of interpreters, needs to be assessed.

206 It can be argued that the effectiveness of such approaches can only be assessed through observing  
207 these activities in practice. Using an ethnographic approach, this paper explores the H&S  
208 communication within a multinational workforce on a large construction project (+£500m) in the UK.  
209 The following section details the approach used for data collection and introduces the concept of  
210 'Communities of Practice' that has been used for data analysis. The results are then presented  
211 thematically exploring, in turn, whose job it is to translate; the responsibilities and rewards of being  
212 multilingual and; communication problems in practice. The results and conclusions sections highlight  
213 the implications of these findings for H&S management amongst an international workforce. In  
214 particular, this makes suggestions for how current strategies might be developed for more effective  
215 H&S management.

## 216 **Method: observing health and safety communication on site**

217 Ethnography studies specific groups in their natural setting, usually through participant observation  
218 (Phelps & Horman, 2010). Since the 1960s and 1970s, ethnographic research methods have been  
219 widely used by communication scholars (see, for example, Hymes, 1962), and amongst construction  
220 industry researchers there is a growing awareness of the utility of an ethnographic approach (Pink et  
221 al., 2012). Amidst increasingly complex operations, and a growing diversity in the construction  
222 workforce, understanding construction processes is becoming increasingly challenging. Ethnography  
223 offers a route to a deeper understanding of the actualities of social practices, relationships, and  
224 knowledge that inform the ways construction workers perform on site (Pink et al., 2010). In  
225 particular, observational research seeks not to intervene with the activities being investigated (Alder  
226 & Alder, 2000). This makes ethnography particularly suitable for studying sensitive issues (which

227 include safety in construction), and providing rich, detailed descriptions about topics (Li, 2008).  
228 Consequently, ethnography is arguably a highly appropriate method for this investigation of on-site  
229 health and safety communication.

## 230 **The project and participants**

231 This paper draws on data from an extended, three-year ethnographic study of a large civil  
232 engineering construction project (+£500m) in the UK. A multinational joint venture had been created  
233 between four organizations (based in Europe and North America) with approximately 100 non-UK  
234 workers on site at any one time. These were predominantly from the Czech Republic, Spain, Portugal,  
235 and the United States; but there were also workers from Romania, Croatia, Bulgaria and Poland. The  
236 total population on the project was approximately 1100 workers, but there was a high turnover  
237 throughout its duration. The numbers of migrant workers on site fluctuated due to works and  
238 contractor changes, which ultimately led to many personnel changes over the study period. Migrant  
239 workers undertook roles at different levels within the project's hierarchal structure including as  
240 project managers, H&S advisors, foremen and operatives. As this was a civil engineering project the  
241 operative trades were typically ironworkers, welders, scaffolders, concrete placers, carpenters etc.  
242 The majority of migrant workers were typically at foreman or operative level, and they often worked  
243 in nationally homogenous groups (e.g. Czech nationals would work together).

244 They were almost all male, and had a range of industry experience; some operatives had not worked  
245 in the industry before, while some project managers had 20+ years' experience. The levels of English-  
246 speaking ability also varied. Many at operative-level (site-based) did not speak any English, while all  
247 the office-based migrant workers, who were typically project managers or H&S advisors, were fluent.  
248 The foremen were supervisors of the operatives and had both site-based (e.g. supervision of the  
249 works) and office-based (e.g. paperwork) roles; their levels of English varied, with some being fluent,  
250 and others speaking in 'broken' sentences.

251 Access to the site for the researcher was ensured by a contractual agreement between the  
252 construction organisation (which had a Key Performance Indicator of supporting research) and the  
253 researcher's University. The employee that granted official permission for the project acted as the  
254 initial point of contact. Once on site, health & safety advisors acted as key informants, but also as  
255 gatekeepers, allowing access to observation opportunities. Each H&S advisor had a different physical  
256 area of the large construction site under their remit, and they would offer H&S support and advice to  
257 the different construction teams working within it. Because of their access to various areas, H&S  
258 advisors were able to ease the passage of entry to the field, and make the surroundings and contexts  
259 more visible and understandable. From here, a snowball sampling strategy was used, whereby these  
260 gatekeepers introduced a range of possible informants, who were then approached for additional  
261 data collection opportunities.

262 The researcher was limited to speaking to those who had basic to fluent English language skills. While  
263 this was the majority of available research participants, the researcher was unable to communicate  
264 with some of the foreign operatives. As the research aim explored in this paper unpacks the  
265 challenges communicating with multinational workforces, and members of the H&S team (both UK-  
266 based and non-UK-based) acted as gatekeepers, the views, opinions, and actions of this H&S team  
267 were also captured within this study. Middle-managers, such as the foremen (both UK- and non-UK-  
268 based) were also valuable participants, as they also communicated and managed H&S. The  
269 anonymity of all participants and the case study project has been protected through the use of  
270 pseudonyms.

## 271 **Data collection**

272 During the study, over 1500 hours were spent at the research setting, over 200 field records were  
273 written and 150 units of documentary data were collected. An overt research approach was used and  
274 the researcher did not hide the fact that health and safety was the topic of the investigation. As a  
275 male of White-British origin, the researcher blended in with site workforce, despite it being a multi-

276 national project. The researcher was viewed by construction employees as having an apprentice or  
277 trainee-like role, with the assumed understanding that he would go on to gain employment as a H&S  
278 advisor in the future. This role created a social expectation for the researcher to ask many questions,  
279 which was helpful to understand the actualities of the construction practices being undertaken.

280 The researcher 'followed the action' (Goffman, 2005) of where unsafe practices were occurring. In  
281 this approach, ethnography is emotionally charged, uncertain and even risky; features that make it  
282 interesting and capable of delivering profound insights (Marshall & Bresnen, 2013). This role included  
283 site walk-arounds, on site ad-hoc discussions with workers, and being present at accident and  
284 incident responses. These activities afforded the opportunity to observe and query health and safety  
285 activities as they were taking place, and engage with all actors on site. The researcher also attended  
286 weekly site safety meetings, where H&S advisors would discuss examples of both positive and  
287 negative H&S undertakings. The primary mode of recording these observations and interactions was  
288 through note-taking in the field where possible, as well as making more detailed notes as soon as  
289 possible after the observation (Pole & Morrison, 2003). A variety of tools were used for taking initial  
290 fieldnotes according to their suitability in different situations. These included: typing notes into the  
291 researcher's mobile phone; direct input into a computer when access was available in the office; or  
292 writing on hard copy minutes when in meetings. Conversations and observations were supported  
293 with available documentation, including: safety observation reports and meeting minutes.  
294 Photographs were rarely used because of the sensitive nature of the H&S events being observed. To  
295 ensure data collection consistency, establish rapport with participants and to reduce the risks of  
296 reactivity, such as the Hawthorne effect, a protocol was developed specifically for the project (see  
297 Author et al. 2014)

## 298 **Data analysis**

299 The data collected was analysed through an iterative approach, moving back and forth between data  
300 and theory to arrive at a series of themes, including: 'time pressure', 'safety observation reporting',

301 and 'blame culture'. This article draws specifically on the emergent theme of 'H&S communication  
302 challenges', which was prominent in the data. Through this iterative-inductive approach the analysis  
303 became progressively focused; adopting the characteristic 'funnel structure' of ethnography  
304 (Hammersley & Atkinson, 2007:160). Internal reliability in the data analysis was sought through  
305 triangulating multiple data sources, and asking informants from the field to comment on  
306 interpretations of the data. Ethnographic researchers spend long periods being amongst participants  
307 and this mode of data collection allows for continual data analysis and refinement. NVivo was used to  
308 store, organise, and thematically analyse the data, which was coded according to ideas associated  
309 with 'Communities of Practice'. This concept has been used by construction scholars to think about  
310 how novices learn safety on construction sites, how knowledge is managed by partnered  
311 construction organisations, and how migrant workers adopt on-site practices (Gherardi & Nicolini  
312 2002; Koch & Thuesen 2013; Tutt et al. 2013a). The phrase Community of Practice (CoP), developed  
313 by Lave and Wenger (1991), is indicative of "participation in an activity system about which  
314 participants share understandings concerning what they are doing" (Lave & Wenger, 1991: 98).  
315 According to this concept, learning is a process of being an active participant "in the practices of  
316 social communities and constructing identities in relation to these communities" (Wenger 1998: 4,  
317 emphasis in original). There are three aspects of CoP that are used to discuss the empirical material  
318 presented in Section 4: the construction of identities, varied degrees of membership in the  
319 community, and learning processes. Each of these will now be briefly explored.

### 320 ***Identity in the community***

321 Operating within a community is more than participating in a certain set of activities. It is a social  
322 undertaking that requires becoming 'a kind of person', or assuming a particular identity (Lave &  
323 Wenger 1991: 53). Membership within the CoP "offers form and context as well as content to  
324 aspiring practitioners, who need not just acquire the explicit knowledge of the community but also  
325 the identity of a community member" (Duguid, 2005: 113). Wenger notes that identity is "not merely

326 a category, a personality trait, a role, or a label” (1998: 163); instead, its development is a continuing,  
327 complex process, achieved through extended participation in the practice of the community. This  
328 idea is valuable for thinking about whether migrant workers given the task of translating actually  
329 consider this as part of their identity, and in turn, who takes responsibility for H&S amongst migrant  
330 workers in construction.

### 331 ***Degrees of membership in the community***

332 Construction projects often rely on heterogeneous and temporary groups, and individuals may not  
333 share the same level of membership in the community. Indeed, in their selection of the term  
334 ‘community’, Lave and Wenger “assume that members have different interests, make diverse  
335 contributions to activity, and hold varied viewpoints” (1991: 98). In this, membership can be valid  
336 through participation at multiple levels in the community. Many studies applying this approach have  
337 been based in environments where the individuals being studied (and thus the ‘community’) are  
338 situated in the same place, for example the construction site (Gherardi & Nicolini 2002; Koch &  
339 Thuesen 2013; Tutt et al. 2013a). However, it is important not to assume that co-location equates to  
340 homogeneous practice, particularly when workers with different language capabilities are on site.  
341 Indeed, Koch and Theusen (2013: 160) note that temporary groups might lead to “multiple  
342 memberships of communities with different degrees of participation”. This is particularly important  
343 for construction health and safety, where all members of site are expected to be operating according  
344 to the same rules.

### 345 ***Learning in the community***

346 Learning to be a member of a particular CoP is achieved through a process of ‘legitimate peripheral  
347 participation’. This term is intended to capture the social dimension of knowledge, suggesting that  
348 learning is situated in, and an integral part of, social practice (Lave & Wenger 1991: 35). ‘Legitimate  
349 peripheral participation’ is intended to capture different aspects which are essential to the social

350 learning process: legitimacy infers accepted ways of belonging, whilst peripherality captures the  
351 varied, more or less engaged, ways of being a part of the community (Lave & Wenger 1991: pp.35-6).  
352 This composite concept has been used to understand the on-going learning work of community  
353 members (see for example, Brown & Duguid 1991; Koch & Theusen 2013). Importantly, a common  
354 language (be that verbal or otherwise) is an essential requirement for developing knowledge, as it  
355 enables the flow of information within the group (Koch & Theusen, 2013).

356 Through these three aspects of community membership, three important ideas associated with H&S  
357 communication challenges have been identified. These are presented in the following three sections:  
358 Translator identities: whose job is it?; Varied community memberships: the responsibilities and  
359 rewards of being multilingual; and Learning to communicate: problems in practice.

## 360 **Results**

### 361 **Translator identities: whose job is it?**

362 Communication within a multinational workforce was a predictable challenge that was duly raised by  
363 the H&S team when preparing for the arrival of migrant workers. Formal protocols were put in place  
364 in an attempt to improve the flow of safety messages and communications. These included multi-  
365 language signage, wallet cards to be developed with common statements, and the identification of  
366 English speaking translators by the addition of black bands to their hardhats. The use of interpreters  
367 is a common approach on multinational projects (Bust et al., 2008), and was the main strategy  
368 adopted on this project. Specifically, the project policy was that for every six non-English speaking  
369 migrant workers, at least one interpreter was required. The terms 'interpreter' and 'translator' were  
370 used interchangeably on-site, and so have also been used as such in this paper. Whilst translation  
371 may seem a simple way of ensuring health and safety communications are passed on to those  
372 without English as a first or indeed any language, this approach generated several challenges in  
373 practice.



374 A predominant issue was that individuals were never employed with the sole task of translating.  
375 Instead, they juggled this role with other on-site activities as Dmitri, a H&S advisor, explained whilst  
376 in the H&S office:

377 *Dmitri exhaled a large sigh and shook his head. I looked up from my laptop, caught his eye, and*  
378 *asked: 'What's up?'*

379 *Dmitri replied: 'Sometimes I just wish I didn't speak Polish.'*

380 *I laughed as a smile came to his face. He spread his arms and opened the palms of his hands directing*  
381 *them towards his computer and added: 'I've just come back from translating an induction; I need to*  
382 *do the briefs every morning; and now I've just received an email asking to translate something else. I*  
383 *feel like I spend about 40% of my time on 3% of the job.'*

384

385 The H&S advisors were not usually required to be at the morning briefs, but Dmitri's attendance was  
386 necessary to perform translation duties and he was repeatedly asked to undertake translation for  
387 small workgroups. He estimated that this activity constituted '3%' of his work area, yet he felt he  
388 spent '40%' of his time on it. Here, Dmitri, who spoke three languages, identifies the proportion of  
389 time used to carry out the translation of safety briefs and induction information, but did not  
390 recognise this as a significant part of his role. Thus, translating only featured as a very small part of  
391 Dmitri's worker identity, and became a frustrating thing to juggle amongst his other, more valued,  
392 tasks.

393

394 As a H&S advisor, translating health and safety information for colleagues might still be considered as  
395 an aspect of Dmitri's identity. However, many bilingual workers, including operatives, foremen,  
396 engineers or project managers, were also asked to translate in an even more informal capacity. For  
397 these workers, the amount of time spent translating was particularly frustrating. Dmitri explained:

398 *'I'm not the only one frustrated, there are guys [bi-lingual workers] out there [on-site] that refuse to*  
399 *wear their black bands. One of the guys told me that his job description says steel fixer, not translator.*  
400 *Though he understands English, if you speak to him in English, he will just say "que?" (he laughed).*  
401 *I enquired: 'so he is just point blank refusing to do it?'*  
402 *Dmitri explained: 'well he would be willing to do be a translator, if he was paid extra money to do so'.*

403 Being asked to translate was common for bi-lingual workers, including operatives and foremen. Their  
404 translating tasks included being called away from site to help with interpretation during the H&S  
405 briefings, translating conversations on site, safety documents, and other H&S messages. For some,  
406 these tasks were not recognised as part of their worker identity; they became so frustrated that  
407 eventually they refused to co-operate. If the H&S advisor was frustrated with the time and efforts  
408 required for such translations, it is perhaps unsurprising that those who are on site to earn money  
409 working at their construction trade (identifying as operatives or engineers, for example) and whose  
410 pay may be linked to their productivity, are even more reluctant to become involved. Furthermore,  
411 given their limited time on site, it is unlikely that these workers have the time or inclination to  
412 reconceptualise their identity in this way. Although learning is only possible through engaging in the  
413 practices of the community, in the case of translating, the informality of the process and a lack of  
414 financial recognition for interpretation activities actually became part of the problem.

415 The project policy of having one English speaking interpreter for every six non-English speakers was  
416 under constant strain. Translators could not be physically present to interpret at all times due to:  
417 geographical fragmentations (site and office); training courses; a high turnover; resistance from  
418 migrant workers to act as translators; holidays and illnesses. Indeed, the opening extract of this paper  
419 gives an example of a communication barrier due to the translator not being available; and this  
420 happened several times during this research. This unavailability disrupted the communication flow  
421 and made the one-in-six policy frequently unworkable in practice. This was raised numerous times by  
422 the H&S team. However, the translators became so important for the operation of the site that, in

423 some cases, they were given what was viewed as preferential treatment. This created perceptions of  
424 inequality and inconsistency in the application of the rules, as discussed in the following section.

425 **Varied community memberships: the responsibilities and rewards of**  
426 **being multilingual**

427 Translators were not only valuable for safety communication, but they also became highly trained  
428 and skilled members of the community. Normally 'safety representatives' would be nominated and  
429 selected for the role by their work colleagues, but this changed after the arrival of migrant workers.  
430 Instead, those that were bilingual were automatically asked to take on the role. In addition, bilingual  
431 workers would be asked to undertake training in, for example, work at height or first aid. As  
432 members of the community with this precious translating skill, they were put forward for these  
433 additional duties so they could subsequently explain the work processes and H&S requirements to  
434 their non-English speaking colleagues on site. Many of the translators did not have this role as a  
435 formal part of their job description; however, with this additional training, an increased reliance was  
436 placed upon them. As Roger (H&S advisor) explained:

437 *'They could be away for training [so they can't translate on-site]. They are being trained for*  
438 *everything, and I don't know about your areas, but Jim [Construction Manager] thinks they have too*  
439 *much responsibility'*

440 In taking on these additional duties translators had to spend time off-site for training, resulting in  
441 these valuable members of the community being ironically unavailable for the actual task of  
442 translating for large periods of time. However, Roger's comments also demonstrate the concern that  
443 some members of the site team held about the level of responsibility placed on the translators. The  
444 interpreters were not health and safety professionals, and could at times be found breaking the H&S  
445 rules themselves. Their additional training and responsibilities would often help them when 'caught'  
446 doing unsafe acts, as Fred (H&S advisor) explained when discussing the repercussions of a health and  
447 safety infraction during one meeting:

448 *'Technically it is a red card [dismissible offence] but your bilingual foreman is a different kettle of fish*  
449 *to your subcontractor operatives. If a subbie [subcontractor worker] was trying to float up there like*  
450 *that foreman, he wouldn't step foot on the job again; but like last time, and the time before, we will*  
451 *see this get rescinded by the powers that be, and that will be turned into a yellow card. It is not a level*  
452 *playing field. And that throws your "one project one team" culture that senior management are trying*  
453 *to push out the window.'*

454 Serious violations, such as working at height without adequate fall protection, often led to  
455 disciplinary action. The project used a green, yellow, and red card scheme – green cards were used to  
456 highlight positive safety behaviours, yellow cards were used for the first safety violation, and red  
457 cards (or dismissal) for the second. Serious violations could bypass yellow cards and go straight to  
458 red. The H&S team believed there were inconsistencies with the use of the disciplinary procedure,  
459 with some community members, such as the highly trained and bilingual foremen, being privileged  
460 and excused more than others. This demonstrates how, despite working within the same community,  
461 these varied memberships can lead to quite distinct manifestations of H&S rules. Further, the client  
462 expressed their dissatisfaction with the safety practices occurring on the site to the H&S department  
463 when standards were not met. For example one H&S client employee stated to the researcher on a  
464 site walk-around:

465 *'...it is the different working practices. The photos speak for themselves. We have guys hanging out*  
466 *MEWPS [Mobile Elevated Work Platforms], working at height on beams not clipped on or tied to blue*  
467 *rope; and some of these guys are the supervisors... and you are like, "hang on, you are the guys giving*  
468 *the briefs in the morning?"*

469 Different nationalities had different working practices, and distinct perceptions of appropriate ways  
470 of working. In this case, the client sent photographs of safety violations to the H&S team to express  
471 their concerns. As the leaders of a workgroup, bilingual foremen had influence over how their  
472 workers would undertake tasks. When this way of working was deemed to be unsafe by UK

473 standards, and the client witnessed such acts, they would contact the H&S department. The client  
474 was concerned about what the bilingual foreman were communicating to the workers, as safe or  
475 unsafe; the H&S team were also concerned about whether their H&S messages were being delivered.  
476 This is indicative of the power that particular, multi-lingual, members of the community held in  
477 determining how tasks were carried out and what information was communicated to work teams.  
478 Where bilingual workers were unavailable the task of translation was far from straight forward, as  
479 discussed in the following section.

### 480 **Learning to communicate: problems in practice**

481 Many problems arose around verbal communication, as well as with attempts to mobilise technology  
482 and the body as tools to try to overcome them.

#### 483 ***Verbal communication: 'we have little or no idea what they are saying, or how they*** 484 ***are delivering it'***

485 Verbal communication is particularly challenging where members of the workforce do not speak the  
486 same language, and there is no translator available. One striking example was during an arranged  
487 walk-around with a H&S advisor, a H&S representative from the client and the works manager, where  
488 communication problems quickly became apparent:

489 *As we walked through the site we passed an oncoming migrant worker, and Bill, the client's*  
490 *representative, said: 'Alright mate, how you doing?' The migrant worker passed without*  
491 *acknowledgement and Bill turned, shook his head and said to me 'I could have been saying anything'.*  
492 *Another migrant worker approached and he again tried to engage: 'Alright big man, how's it going?'*  
493 *Again the worker passed without any form of acknowledgement. He again turned and looked at me:*  
494 *'See that. It's frightening, we can't even communicate with these guys. The only way I could get him to*  
495 *stop would be if jumped in front of him waving my hands all over the place.'* I nodded in agreement,  
496 *and then he added: 'This is the biggest problem the project faces'.*

497 In this case, Bill highlighted the difficulty of communicating with an elementary greeting. Shared  
498 practice in the community is a foundation for learning (Koch & Theusen, 2013), so not only are these  
499 failed acknowledgements awkward for both Bill and the migrant workers, they may be indicative of  
500 an inability to share knowledge and understandings. When non-English speaking workers were  
501 isolated in this way, it increased the safety risk on the project. For example, an incident occurred  
502 when two foreign workers entered an area, signed onto the briefing sheet without being able to read  
503 it and therefore understand it, and tried to use the hoist. On the briefing sheet it had stated that the  
504 hoist was out of order. Furthermore, neither of the workers were trained to use the hoist and ended  
505 up getting accidentally locked inside and had to be rescued. Signing briefings and inductions as a  
506 matter of course readily becomes a substitution for understanding or shared verbal communication.  
507 This lack of shared language is problematic when circumstances change, as they did in this example  
508 around the use of the hoist.

509 Broad accents and slang words that are commonly used on construction sites add yet another  
510 dimension to multi-lingual communication problems, including those around safety. For example, in  
511 an operation being carried out by a Romanian and a Scottish worker a small steel structure was being  
512 lowered onto the back of a trailer, and once it had landed it was light enough that they could push it  
513 into place if it was slightly off-centred. The Scottish operative took the lead and said in a very broad  
514 accent: '*Wee bit mair on the eirrse of it*'. Or in other words, 'a little (wee) bit more on the back of it'.  
515 At the time, the H&S advisor laughed at this, because he knew there was '*no way*' the Romanian  
516 worker would understand this communication. Even if the Romanian worker understood English, this  
517 is unlikely to be the pronunciation or phraseology that they learnt. If workers do not speak the  
518 language, and non-standard phrases and words are used, it can be very difficult to establish *exactly*  
519 what has been communicated or indeed, learn the correct community practice. This is especially  
520 important with regard to the communication of health and safety messages, where a lack of  
521 transparency could have serious implications. This issue was highlighted by Alan, a H&S advisor,

522 during a meeting which was dominated by discussion of the challenges relating to the recent increase  
523 in numbers of multinational workers. Alan noted:

524 *'The concern I have is the messages getting through. We are relying on these guys to communicate*  
525 *important messages and we have little or no idea what they are saying or how they are saying it. Are*  
526 *they emphasising the key H&S messages, or is it just a tick box exercise for them?'*

527 On numerous occasions the H&S team would express their concerns about what messages were  
528 being successfully communicated. The team were aware that it was difficult, indeed impossible, to  
529 check if all of the H&S messages were being communicated, and more specifically the ways in which  
530 they were being communicated. For example, if information was being communicated with  
531 appropriate emphasis and stressed importance on key areas, or whether it was just being repeated  
532 by the translator as a 'tick box' exercise. This was an on-going problem, and a subject that frequently  
533 emerged during team meetings and discussions on site. There appeared to be a lack of ideas for any  
534 resolution to this particular problem, as there was an absence of engagement and feedback from  
535 workers on H&S messages that were sent from senior management. Within a CoP, members do not  
536 have to rely on verbal interaction alone for learning. Indeed, meaning can be negotiated through  
537 other strategies (Koch & Theusen, 2013); on this construction site these included the use of  
538 technology and the body.

539 ***Using technology to communicate: 'it came out just complete nonsense! Like***  
540 ***hamburgers, sausages, washing powder!'***

541 Technology was used to help translate written safety communications in the office. H&S documents  
542 were first put through Google Translate, and then passed to native speaking interpreters for final  
543 translation. One of the Czech supervisors, Michael, explained that his responsibilities included  
544 delivering the ten-minute H&S brief to the Czech workers and helping translate the safety climate  
545 survey to Czech from English. For this, he explained:

546 *'I am given what I think is a Google Translate' (he smiled)...*

547 *I asked: 'And how is that?'*

548 *He replied: 'Emm no no not good, the sentences...' (he moved his hands around )...*

549 *I interrupted: 'are formed in a different way?'*

550 *He agreed: 'Yes yes, I think that makes the Google Translate not good.'*

551 The strategy of including a native speaker helped to improve and correct the language to ensure that  
552 the document could be readily understood by the workforce. However, Michael identifies some of  
553 the challenges with using Google Translate, namely, that this software does not always translate  
554 information accurately. Further, documents in different languages cannot be made available for  
555 every possible exchange that takes place on a construction site, and, as highlighted in the previous  
556 section, translators are not always available for these tasks. Technology was employed in efforts to  
557 overcome such language barriers in the dynamic context of the works. For example, one of the site  
558 supervisors, Barry, was in the office putting his gloves on in preparation for going on-site. He noted  
559 that some new foreign workers had joined last week and there had been some communication  
560 issues. When asked how he was working around this, Barry said:

561 *'The translator usually [when he/she is available], but other than that we just been having to use lots*  
562 *of hand and body signals... they seem to get the idea so far. I tried using an app on my phone to*  
563 *translate...'*

564 *Me: 'Any luck?'*

565 *Barry (shaking his head with a big grin): 'No mate, it came out just complete nonsense!...like*  
566 *hamburgers, sausages, washing powder!'*

567 The use of technology as a strategy to communicate H&S on site had limited success. The mobile  
568 phone applications alone could not translate accurately, and more often than not they resulted in  
569 comical rather than practical outcomes. In the dynamic construction site environment the technology  
570 that was being used (such as apps on mobile phones) was not effective. Other forms of technology



571 were used for communicating safety messages, such as safety videos. Although the images provided  
572 some cues, the language used was English meaning that non-English speaking migrant workers'  
573 understandings were limited. Translating the subtitles from English to other languages would be a  
574 very time consuming procedure. When a H&S advisor asked a bilingual migrant worker to help  
575 translate the video, he dismissed it in a light-hearted manner with 'if you pay me another salary'. In  
576 this case, the non-English speaking supervisors were not shown the safety video, as it was not  
577 deemed worthwhile. A final communication strategy that became apparent through this fieldwork  
578 was the use of the body; this is discussed in the following section.

579 ***The body as a communication tool: 'You feel like you are doing the Funky Chicken'***

580 *Gary scurried into the H&S office. Addressing all the H&S team he exclaimed: 'It is crazy out there!*  
581 *Sometimes you are using so many hand and body movements, you feel like you are doing the Funky*  
582 *Chicken [a dance]. I noticed a welder was working without a fire extinguisher close by, and asked him*  
583 *'where is your extinguisher', but he did not understand. So I started trying to represent the size of the*  
584 *extinguisher with my hands, pretended to pick it up, and then made the sound of an extinguisher*  
585 *hosing down a fire... however, he still did not understand. I tried again: 'where is your fire*  
586 *extinguisher?', but then he panicked, shouting back at me 'FIRE?! FIRE?!' So I had to quickly reassure*  
587 *him 'No! No! No!'*

588 Gary explained he had to use so many body and hand symbols when the interpreter was not present  
589 that he might as well have been dancing. Barriers communicating with the spoken word resulted in  
590 understandings having to be negotiated through non-verbal means, but this was far from ideal.  
591 Although the communication of some content could be made through body and hand signals, this  
592 was limited. Many of the hand signals, such as a 'stop' sign or 'cut throat' action, could be perceived  
593 as abrupt and even confrontational by the workforce. One of the client representatives, Bill explained  
594 on a site-walk-around that:

595 *'with words I can soften the intervention. Nobody likes being told what they are doing is wrong. With*  
596 *these hands what can I do? [he does a 'stop' and 'cut throat'] There is nothing positive about that.'*

597 Bill, and the other H&S advisors, found it difficult to intervene in a positive manner using hand signals  
598 alone. The significance of learning *as part of* the community was demonstrated by the need to  
599 establish rapport with workers, which acted as a foundation for ensuring safety standards and  
600 expectations were achieved. The H&S advisors relied upon building relationships with workers so  
601 they could intervene in a non-confrontational way when H&S standards were not being met.

602 There were instances where language was simply put to one side, and instead hand signals and other  
603 gestures were used for communication. The use of hand signals is already part of the 'language' of  
604 many construction sites and readily recognised throughout the industry. For example, the banksman  
605 is not always able to talk to the crane driver up in the cab and so a variety of different signals are  
606 used for 'raise', 'lower', 'danger' and many more movements of the load. H&S advisors on this  
607 project explained how the use of hand signals amongst the team and the workforce had increased in  
608 frequency; as the numbers of non-English speaking workers increased and so communication  
609 through the spoken word became less effective. Thus, on a multinational construction site, workers  
610 are unable to rely on a shared verbal language for communication. However, in this community,  
611 workers sought to create a language through other means, for example, the use of technology and  
612 the body. These are essential for developing shared, safe working practices.

## 613 **Discussion**

614 Globalisation and a rise of multinational construction projects has resulted in construction  
615 management and engineering studies exploring areas such as: cross-cultural understanding (Chen et  
616 al. 2009); managing cultural diversity (Ahmed et al., 2017); and ethnic minority construction workers  
617 (Chan et al., 2016). One of the most obvious challenges is how to effectively communicate H&S on  
618 multinational construction projects, yet research into the effectiveness of currently adopted

619 communication strategies on multinational projects is limited, and these strategies need to be  
620 assessed.

621 Previous research has found that some migrant workers had such poor English they could barely  
622 understand what was going on (see, for example, McKay et al., 2006). Within the construction  
623 industry, international project management teams are attempting to deal with such language  
624 barriers in similar ways, through the use of translators, visual aids, and documentation in different  
625 languages, or a combination of all three. The translators on this project were primarily workers, such  
626 as operatives or foremen, who were unpaid for their additional translating duties; this created some  
627 resistance. Tutt et al. (2013b) queried whether the informal unpaid translation of H&S  
628 documentation is asking too much of migrant workers, since it has little long-term benefit on their  
629 up-skilling or moving through the construction sector. They suggested that health and safety  
630 translation and interpretation work needs to 'fit in' between and around on-going trade work. This  
631 research has revealed informal translation work to be a frustrating distraction that proved difficult  
632 for bilingual employees' to accommodate amongst more formal roles, and indeed, often featured as  
633 only a small part of workers' identity. It also identified that interpreters would have frequent  
634 absences from the workplace itself, so the one-in-six policy could not be adhered to at all times. It  
635 was when interpreters were not available to carry out translation duties, for example, if they were  
636 away on training, that their importance became most apparent.

637 Bilingual foremen became powerful members of their organisations and the site workforce. They  
638 were highly trained (for example in first aid, working at height, or as safety representatives) which in  
639 itself created problems around their on-site availability as a consequence of increased attendance on  
640 courses, as noted above, yet this was undertaken with the understanding that they could then  
641 communicate this knowledge to workers. Despite being subcontractors on temporary contracts, they  
642 therefore became very important employees and they were the only individuals that communicated

643 top-down messages to their workforces. Hence, all work tasks and safety messages had to be  
644 communicated through them.

645 Being from outside of the UK, they had to adapt to different safety expectations, rules and  
646 regulations, and this research found that sometimes they were themselves in breach of safety rules  
647 themselves. However, their importance to the site team meant that they were often treated  
648 favourably despite such infractions, which in turn could create tensions amongst other workers.

649 Dekker (2016) describes how a 'just culture' – one of trust, learning and accountability – is positive  
650 for organisational safety. Where there is a lack of trust due to accountability being dependent on  
651 individual circumstances, and community memberships vary significantly, a just culture is hard to  
652 create. In a just culture gross negligence, wilful violations and destructive acts are not tolerated; yet  
653 this research found that bilingual foreman, due to their importance to the organisation would receive  
654 warnings rather than dismissals for such acts, which was inconsistent with others on the project.

655 Learning to communicate is essential for the transfer of H&S messages. Chan et al. (2016) suggested  
656 ethnic minority construction workers learnt the local language to improve safety performance; as  
657 communication barriers can restrict workers' engagement with raising hazards, reporting injuries and  
658 offering feedback, which have been linked to a reduction of accidents in a variety of studies (e.g.  
659 Carder and Ragan, 2003; Shearn, 2005). Thus, communication difficulties can have obvious  
660 implications for worker engagement and safety management (Hare et al., 2013). Worker engagement  
661 is regarded as increasingly important for safety; rather than relying on a more traditional top-down  
662 enforcement model. Sherratt et al. (2013) have highlighted a paradigm shift to personalisation,  
663 engagement, and participation around safety, making successful communication even more  
664 important. However, this approach may simply not be possible given the communication challenges  
665 illuminated here. If translating standard H&S messages and briefings to be cascaded down to the  
666 workforce is itself a challenge, and there is little shared understanding of what exactly is being  
667 translated, it is likely be all the more difficult to receive bottom-up communication from workers.

668 Members of this community had sought to overcome some of these communication barriers through  
669 incorporating non-verbal means of communication and technologies into their everyday work. In  
670 particular, hand signals and the body acted as a means to communicate simple instructions, whilst  
671 Google Translate and mobile phones were used to aid in interpreting written guides and on-site  
672 conversations. Mobile phones have an ambiguous status on construction sites. Though in some  
673 contexts they are banned (see, for example, Oswald & Turner, 2017), they can also often solve and  
674 support workplace processes to encourage safe working (Pink et al., 2010). Indeed, Pink et al. (2010)  
675 suggested that mobile phones need to be understood in relation to the huge variety of trade and  
676 work tasks in construction. For example, in Tutt et al.'s (2013a: 518) study, the use of the mobile  
677 phone was revealed as a key part of the coordination of the work at hand. In the current study, whilst  
678 mobile phones contributed to the development of a shared language amongst the community, they  
679 were found wanting. These challenges, coupled with the potential for mobile phones to help with the  
680 communication in multinational projects gives more reasoning for researchers to better understand  
681 their use in construction.

## 682 **Conclusions**

683 The large UK construction project in this study adopted the use of informal translators in order to  
684 communicate throughout the multinational workforce. As a cost-neutral management solution,  
685 bilingual employees were asked to act as informal translators without extra payment. The language  
686 skills of the translators, particularly at foreman level, varied from basic to fluent English. This caused  
687 challenges with communicating often complex safety critical messages amongst the workforce. There  
688 is room for introducing more formal and comprehensive language skills assessments to ensure that  
689 translators have a sufficient grasp of the English language ahead of being allocated this role on site.  
690 This finding strengthens the UK Health and Safety Executive's recommendation that workers should  
691 go through ESOL training, or other language based qualifications. For successful language  
692 management, such a strategy would need to be properly planned and priced for, in a similar way to

693 the more fundamental aspects of construction such as labor, equipment, and materials. While this  
694 may incur a small initial cost with better English language skills amongst employees, communication  
695 would become more successful and efficient. This should improve safety along with other project  
696 goals such as time, cost, and quality. The HSE recommended ESOL courses for workers are thus an  
697 important consideration, and deserve further attention in both practical and research terms.

698 The use of professional interpreters was not adopted in this case study. The communication  
699 challenges found in this work suggest that such interpreters are strongly worth considering as an  
700 investment for reasons of both safety and overall project efficiency. The HSE also recommend using a  
701 bilingual employee to act as an interpreter, or as a 'buddy' for inexperienced workers. In practice, this  
702 approach was limited to the one-in-six policy, as there were not enough bilingual employees for a  
703 buddy system with more interpreters. Further, even one-in-six was difficult to achieve in practice, as  
704 bilingual employees were frequently taken away from their jobs to translate elsewhere on site.

705 Providing written information in relevant languages was aided with technologies that could provide a  
706 basic translation for interpreters to work with. This saved valuable time, but this approach was not  
707 effective at all in the dynamic construction site environment, and even site office generated H&S  
708 document translation was restricted. Non-verbal methods were also found to be limited. For  
709 instance, when a safety issue arose, hand signals were perceived as being abrupt and  
710 confrontational. Furthermore, training videos and audio were in English, which would reduce the  
711 learning experience for non-English speakers. Interpreters refused to translate them, and so the  
712 training videos were not deemed worthwhile for non-English speaking workers. They refused  
713 because they were not being paid anything extra, and were busy with their everyday tasks. This  
714 suggests that for effective H&S communication, translation should be seen as part, or all, of the  
715 translator's workload.

716 In summary, this research has provided deep insights and practical recommendations on an area of  
717 international construction project management that, despite calls from various researchers, has

718 received little attention. In particular, this ethnographic investigation has demonstrated that their  
719 use is not a panacea to the problems of H&S management within a multi-lingual workforce, and  
720 indeed creates its own challenges, which included:

- 721 • Levels of English ability that varied greatly between translators, as there was no set standard;
- 722 • Some informal translators refused to translate as they were not receiving extra financial  
723 benefits, and it was not recognised as part of their workload;
- 724 • Informal translators were given favourable treatment in the disciplinary process as they were  
725 crucial to the operation of the site team, which created feelings of injustice amongst others.

726 A further contribution to the body of construction engineering and management knowledge was  
727 assessing the strategies that were adopted on this project. The findings are summarised below:

- 728 • The use of one 'informal' translator (worker/translator) for every six workers is impractical  
729 and causes communication breakdowns;
- 730 • Technologies, such as mobile phone apps, help translate documentation in draft form, which  
731 can then be refined by the translators; but has limited use for translating verbal  
732 communication on a dynamic construction site;
- 733 • Translating video safety training into different languages can be problematic, and therefore  
734 non-English speaking workers may have difficulty interpreting this safety information.

735 These ethnographic insights are valuable for industry in preparing for future multi-national projects,  
736 and can therefore be used to support the development of a more successful and effective approach  
737 for safety communication in such contexts. It is recommended that professional translators are  
738 provided to aid informal translators; that informal translators are trained; and that informal  
739 translators' duties are recognised as part of their role and remunerated accordingly. Future  
740 international construction projects should look to ensure effective H&S communication is adequately  
741 considered, and adopt more sophisticated strategies through which the value of successful H&S

742 communication is duly acknowledged and acted upon accordingly. As projects become more  
743 international, it is essential that good planning and necessary investments are made to consider the  
744 additional complexities this brings, in order to best manage and ensure the ongoing health and safety  
745 of their multinational workforce.

## 746 **Data Availability Statement**

747 Data generated or analyzed during the study are available from the corresponding author by request.

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