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Items for Measuring the Construct of Workplace Oral Communication Skills (WOCS) amongst Civil Engineering Students: Step by Step Using Exploratory Factor Analysis (EFA)

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ABSTRACT

One of the most crucial factors that influence the success of a construction project is communication. However, past studies found that communication failure frequently occurs at civil engineering workplaces. Among communication failures reported were oral communications, such as giving instruction and briefing; skills, which are supposed to be mastered by engineering graduates during their study years. Thus, students need to equip themselves with proper oral communication skills before they enter the industry. As such, this study aimed to develop a valid and reliable survey instrument to measure Workplace Oral Communication Skills (WOCS) by performing a step-by-step instrument validation through exploratory factor analysis (EFA). The questionnaire consisted of nine components, with 39 items of Workplace Oral Communication Skills (WOCS). In the study, the EFA was carried out in three rotations until every item's factor loading met the minimum requirement of 0.60. Notably, *Bartlett's test of Sphericity* was significant ($p < 0.05$), and the *Kaiser-Meyer-Olkin* test was more than 0.60 in every rotation, which means that the sample size was adequate. Furthermore, all components showed a Cronbach Alpha >0.70, which indicates that the instrument is reliable. The final result of the EFA showed that the WOCS construct only had six components with 25 items. Therefore, this study had managed to validate the instrument. Thus, Confirmatory Factor Analysis (CFA) can proceed in the next study using the validated instrument.

Keywords: EFA, engineering, exploratory factor analysis, oral communication, workplace

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INTRODUCTION

Good workplace communication skills can assist engineering students in their career development by allowing them to function effectively in the workplace after graduation. However, recent studies reported an extremely high percentage of communication failures at engineering workplaces (Donnell et al., 2011; Saleh & Murtaza, 2018). Moreover, communication skills are the lowest soft skills dominated by engineering students, especially polytechnic students (Ismail et al., 2017; Mustapha et al., 2014).

Fresh engineering graduates are expected to be capable and excellent in oral communication, regardless of the language they use, as long as they can communicate effectively in the workplace (Sinha et al., 2019). On the other hand, the most important challenge in the construction industry is the lack of communication where poor communication is described as ineffective, unsuccessful, weak, and lack of project information communication processes that should be avoided (Gamil & Rahman, 2017; Yusof et al., 2018). A recent study by Baird and Parayitam (2019) found that 88 percent of the employers in their study rated oral communication as important. In Finalcad's (2020) report, 62 percent of employers stated that communication problems were the main cause of delays in construction projects. Correspondingly, Higher Learning Institutions (HLI) have been blamed for this problem because they are unable to supply graduates with good oral communication skills (Bhattacharyya, 2018).

The main issue and challenge of Technical and Vocational Education and Training (TVET) towards the Fourth Industrial Revolution (IR4) are the mismatches of skills and knowledge of graduates with the demands of the industry, especially in the civil engineering industry (Masduki & Zakaria, 2020). These mismatches include social skills that comprise good oral communication skills (Department of Polytechnic and Community College, 2018).

Poor oral communication skills lead to bad impacts on polytechnic engineering graduates where they find difficulties in searching for employment and are unable to position themselves in the industry (Husain et al., 2015; Ngadiman & Jamaludin, 2018). Notably, oral communication failure affects poor negotiating skills among students (Richards et al., 2020), and difficulties working in a team arise (Ngadiman & Jamaludin, 2018). Hence, the oral communication skills of future engineering graduates must be developed while they are in the institution so that they become effective at the workplace.

TVET institutions have applied various approaches to help students with employability skills, especially oral communication skills. Among the approaches are problem-based learning (Jabarullah & Hussain, 2019), competency-based training (Zakaria et al., 2018b), and extracurricular activities (Zakaria et al., 2018a). However, these efforts seem insufficient as the communication courses at HLI are not supported by the communication required at the workplace (Hudin et al., 2018). In addition, Winterton and Turner (2019) argued that there was only a little help from the employers to help students cope with the communication skill during their industrial training. Thus, the industry has requested that HLI prepare students with oral communication skills that align with such communication skills in the disciplines as required at the workplace (Bhattacharyya, 2018; Bhattacharyya & Zainal, 2015).

The communication needed in the industry focuses on communicative events, not on the language used. Even though English is crucial in most countries, the use of language at workplaces in Malaysia depends on the needs of the organization. In the Malaysian context, the Malay language is the mother tongue, while English is the lingua franca (the second language), which influences the use of language at the workplace. Small construction companies usually use the Malay language because these companies deal with communities' projects and small government projects. Meanwhile, larger construction companies use both Malay and English because of the need to deal with Government-Linked Companies (GLC) and staff of different races, including foreigners (Masduki & Zakaria, 2020).

Up to now, only a few studies have produced workplace oral communication models for civil engineering students in the country. The research to date has tended to focus on the gap in communication skills between students and the reality in the industry (Fareen, 2018) rather than determining the workplace oral communication elements or components. Most of the communication elements determined in past studies are general, emphasizing communication skills without focusing on oral communication at the workplace.

Although a few studies have focused on oral communication elements at the workplace, they only cater to the engineers and do not meet the needs of the students, such as the study of Wisniewski (2018). Moreover, many studies that include workplace oral communication do not relate to civil engineering students, such as Kovac and Sirkovic (2017), which concentrated on electrical and mechanical engineering, Cubero (2017) that emphasized multidisciplinary teams, and Hudin et al. (2018), which focused on entrepreneurship. Therefore, a study should be carried out to determine the elements of workplace oral communication skills that need to be learned and mastered by civil engineering students before, during, and after their industrial training.

Elements of Workplace Oral Communication Skills (WOCS)

There are several elements of Workplace Oral Communication Skills (WOCS) that need to be mastered by engineering students.

Oral communication at civil engineering workplaces emphasizes project communication management and discussions within the groups, where these communications also involve oral presentation (Saleh et al., 2019).

Presentation skills are important because the main strength that the employers look for in terms of communication is the graduates' verbal communication, especially the ability to deliver an impactful and effective presentation (Saleh et al., 2019; Solnyshkova & Makarikhina, 2017). Lenard and Pintarić (2018) stressed that students need to master presentation skills because they need to present information to customers or engage with assignments requiring them to speak in front of the audience. Bhattacharyya (2018) insists that oral presentations are becoming more pronounced in the Industrial Revolution 4.0 (IR 4.0) era, where the requirements and conditions of today's presentation are significantly higher than previous requirements.

Two-way communication in meetings is indispensable to any employer in the industry. However, Masduki and Zakaria (2020) found that communication in the meetings held was often one-way, and there was no response from the participants, perhaps because the participants had no idea to speak or were afraid to give any feedback (fear of being wrong or afraid of being criticized). It can be avoided if all participants in the meeting are open and accept the opinions of others and encourage each other.

A face-to-face conversation is essential as it builds up relationships and makes connections inside and outside the organization (Lenard & Pintarić, 2018). This type of conversation is used either formally or informally at the workplace. According to Masduki and Zakaria (2020), a face-to-face conversation enables graduates to develop their social skills because it makes them involved in numerous interactions, particularly when working in a team.

The telephone conversation was used by 43% in reporting safety issues at construction sites during inspections (Finalcad, 2020). While the study of Spence and Liu (2013) and Spitzberg (2018) found that the internet had competed with phones in communications, Linares and Breeze (2015) insisted that phone calls remain an important method of communication because information can be provided quickly and clearly through telephone conversations.

Briefings are imperative in a civil engineering organization as various elements can be applied when conducting briefings, such as verbal instruction, demonstration, talk on safety issues, discussions, and so on (Lenard & Pintarić, 2018). In addition, Phoya (2017) found that briefings are a safety routine at construction sites requiring responses if the briefing or explanation is unclear.

Finalcad (2020) found that 57% of the instructions delivered at the civil engineering workplace were verbal. Thus, the error of delivering instructions causes misunderstandings that may result in greater problems or errors (Gamil & Rahman, 2017). The spread of weak commands can cause many problems at construction sites (Yap et al., 2018). Safety at the construction site is highly dependent on communication between the workers, particularly in delivery and receiving instructions, where imperfect instructions can lead to accidents (Ahmad, 2016).

Oral communication is a way to make decisions, particularly during discussions regarding duties and policies in an organization (Quintero et al., 2019). Students must prepare themselves with discussion skills as team discussion is critical at the workplace. They must be actively involved in team discussions to avoid conflict and maximize the team's productivity (Masduki & Zakaria, 2020).

In order to be an effective engineer, a student must practice questioning skills and be brave to ask questions to avoid misunderstandings or mistakes in performing their works (Zakaria et al., 2018a). However, the problem faced by most students is that they are shy to ask questions. Zakaria et al. (2019) found that the main shortcoming of engineering students among them was the fear of asking questions, while Zakaria et al. (2018a) insist that engineering students need to be skilled in asking for clarification on specific matters to develop careers effectively.

Technical expertise is undoubtedly significant for an engineer. However, an engineer should also be able to deliver ideas and share knowledge with his or her colleagues. If one idea cannot be well-expressed, team productivity can be affected (Mehta & Jha, 2020). By expressing ideas, graduates will also build their confidence, thus developing their careers well (Zakaria et al., 2018a). Ideas can be obtained through presentations, discussions, or questions and answers (Solnyshkova & Makarikhina, 2017).

Instruments Measuring Workplace Oral Communication Skills (WOCS)

Only a few questionnaires measure Workplace Oral Communication Skills (WOCS). Most established questionnaires measure workplace communication skills in general, not only focusing on oral communication. For example, Gray (2010) developed a WOCS questionnaire consisting of four constructs: listening skills, collegial communication skills, client communication skills, communication skills with management, and general audience analysis skills. However, this questionnaire is only suitable for use in accountancy workplaces.

Mohamed and Asmawi (2018) developed a questionnaire for engineering undergraduate students, but the questionnaire only focuses on technical oral presentations. Likewise, McLaren (2019) also developed a questionnaire in his study but focused on oral presentation, which catered to science students. Besides that, the WOCS questionnaire proposed by Nakatani (2006) emphasized the strategies in English oral communication rather than the elements of oral communication.

Thus, the objective of this study was to explore the suitable elements or components to be used in the research instrument. In addition, this study also aimed to develop a valid and reliable survey instrument that measures Workplace Oral Communication Skills (WOCS) among civil engineering students.

METHOD

Instrument

The questionnaire was developed from an analysis of semi-structured interview sessions by the researchers. The analysis of the interview data in the study used thematic analysis as proposed by Strauss (1987). In the qualitative data encoding model (Strauss, 1987), the categories or constructs are formed based on elements to give accurate meaning to the data obtained.

Prior to the instrument development, experts' approval of constructs and elements was verified. It means the results of the interviews encoded and given the themes went through the expert verification process and Cohen Kappa analysis before being used by the researchers to develop the questionnaire. The value of the total agreement for Cohen Kappa analysis in this study was 0.8, which is at a good level (Viera & Garrett, 2005).

The questionnaire also went through a pre-test (face validity, content validity, and criterion validity process). Therefore, all the necessary changes in the instrument were based on the pre-test result, as shown in Table 1.

The final construct for EFA consisted of nine elements or components, with 39 items as shown in Table 2. A semantic differential scale was used in this study (1 for strongly disagree to 5 for strongly agree). The semantic differential scale is proven to be better than the Likert scale version in terms of model matching and unidimensionality (Friborg et al., 2006; Hair et al., 2006). In addition, all elements in this study focus on communicative events rather than the use of language.

Table 2
Elements and number of proposed items for WOCS construct

Elements/Components		No. of Item
1.	**Oral presentation**	**5**
2.	**Meetings**	**5**
3.	**Face-to-face conversation**	**4**
4.	**Telephone conversation**	**4**
5.	**Briefing/ explaining**	**4**
6.	**Oral instruction**	**4**
7.	**Discussion**	**4**
8.	**Questioning**	**4**
9.	**Expressing ideas**	**5**
	Total	**39**

Table 1
Changes based on the pre-test result

Elements/ Components	Existing items	Commented items	Mended items	Removed items
Oral presentation	5	-	-	-
Meetings	5	-	-	-
Face-to-face conversation	5	1	-	1
Telephone conversation	6	2	-	2
Briefing/ explaining	4	-	-	-
Oral instruction	8	4	-	4
Discussion	4	-	-	-
Questioning	5	2	1	1
Expressing ideas	5	-	-	-
Total	**47**	**9**	**1**	**8**

Participants

The questionnaires were distributed online using Google Forms to 100 Civil Engineering polytechnic students who have just returned from their industrial training. According to Awang (2015), Bahkia et al. (2019), and Rahlin et al. (2019), 100 responses is enough to run the Exploratory Factor Analysis (EFA) in order to obtain reliable estimates of the parameter.

The EFA

EFA is an analysis technique used to identify the factors that influence or do not influence a variable of a study. This method is used to reduce certain numbers of variables and items to a limited number of constructs or dimensions yet still maintains the same characteristics that are to be used in the subsequent analysis (Al-Khamaiseh et al., 2020; Ledesma & Valero-Mora, 2007; Rahlin et al., 2019). To identify the elements of Workplace Oral Communication Skills (WOCS) of Civil Engineering students in the polytechnics, the researchers conducted the Exploratory Factor Analysis (EFA) through Principal Component Analysis (PCA) method using IBM SPSS 25.0. The EFA was performed using the extraction method of the principal component through a varimax rotation.

RESULTS AND DISCUSSIONS

EFA for the First Rotation

This construct was measured using 39 items of WOCS that were listed as L1 to L39. The item statements and their means and standard deviations are shown in Table 3.

EFA using Principal Component Analysis (PCA) was performed as an extraction method for these 39 items to measure the WOCS construct. Table 4 shows that Bartlett's test of Sphericity was significant ($p<0.05$), and the Kaiser-Meyer-Olkin test was greater than the value of 0.60. It means that the total number of samples used in the study was sufficient and indicates that factor analysis can proceed (Ehido et al., 2020; Muda et al., 2018, 2020; Shkeer & Awang, 2019).

The number of variances contributing to the factors was 75.31%. The orthogonal rotation through the varimax method had established eight factors to explain the

Table 3
The item statements, the mean and standard deviation for items measuring WOCS

Descriptive Statistics			
Item	Item statement	Mean	Std. Deviation
L1	Present in front of colleagues	3.91	0.712
L2	Present in front of clients	3.74	0.787
L3	Present in front of a superior	3.98	0.791
L4	Sense of humor in presentation	3.46	0.858
L5	Encourage audiences to ask questions during presentation	4.20	0.739
L6	Giving responses in meetings	4.00	0.725
L7	Two-ways communication in meetings	4.01	0.810

Table 3 *(continue)*

Descriptive Statistics			
Item	Item statement	Mean	Std. Deviation
L8	Voicing disagreements in meetings	3.83	0.739
L9	Giving opinion in meetings	4.10	0.704
L10	Listening carefully/active listening in meetings	4.43	0.624
L11	Etiquettes in telephone conversation	4.18	0.869
L12	Use telephone to convey messages clearly	3.99	0.870
L13	Take messages from telephone conversations to be delivered to others correctly	3.46	1.068
L14	Use proper language in telephone conversation	4.25	0.770
L15	Deliver briefings at the construction site before work starts (toolbox meeting)	4.20	0.853
L16	Explain specific matters to suppliers/ subcontractors	4.23	0.709
L17	Questioning and answering in briefing	3.97	0.674
L18	Inject motivational elements in briefings	4.10	0.732
L19	Able to give clear instructions verbally to subordinates	4.27	0.709
L20	Able to communicate accurate instructions to colleagues	4.44	0.656
L21	Receiving instructions from a superior	4.45	0.657
L22	Receiving instructions from colleagues	4.51	0.611
L23	Comply with instructions issued by any interested party	4.24	0.605
L24	Respond to the instructions given	4.28	0.637
L25	Receive instructions from suppliers/customers	3.96	0.680
L26	Listen carefully to the instructions given	4.13	0.706
L27	Asking for opinions	4.33	0.637
L28	Ask about the things that you do not understand	4.38	0.648
L29	Ask about the things that you don't know how to do	4.45	0.592
L30	Ask if there are other things to learn	4.33	0.637
L31	Conveying a clear message verbally	3.66	0.997
L32	Conversing fluently	3.59	0.933
L33	Create work-related conversations	3.47	1.020
L34	Report the progress of a project orally	3.57	0.987
L35	Communicate to generate ideas	4.15	0.626
L36	Always share ideas in solving problems	4.27	0.649
L37	Express ideas clearly	4.20	0.711
L38	Convey ideas confidently	4.17	0.739
L39	Providing quality/ creative ideas	4.12	0.715

Table 4
KMO and Bartlett's test for WOCS construct (first rotation)

Test	Value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.854
Bartlett's Test of Sphericity	0.000 (sig.)

number of variances, as shown in Table 5. Eight factors were extracted and had eigenvalues exceeding 1. Eigenvalues help determine the number of factors that should be used in the analysis. An orthogonal rotation was selected to ensure that the variables were not correlated. The varimax method rotated the items in certain factors with their load.

In addition to the eigenvalue criteria exceeding 1, the confirmation of factors can also be determined by looking at the plot of eigenvalue through the scree plot. Based on the scree plot, the number of factors is determined by the eigenvalue, which decreases sharply before the eigenvalue starts horizontally. The number of factors that are retained is the data point above the horizontal line that is drawn (Williams et al., 2010). Figure 1 below also summarizes that only eight factors were taken into account for the construct.

Table 5
Total variance explained for WOCS (first rotation)

Component	***Eigenvalues***		
	Total	**Varians (%)**	**Cummulative (%)**
1	15.319	39.280	39.280
2	3.355	8.602	47.883
3	2.542	6.517	54.399
4	2.280	5.847	60.246
5	1.837	4.711	64.958
6	1.535	3.937	68.894
7	1.297	3.326	72.220
8	1.203	3.085	75.305

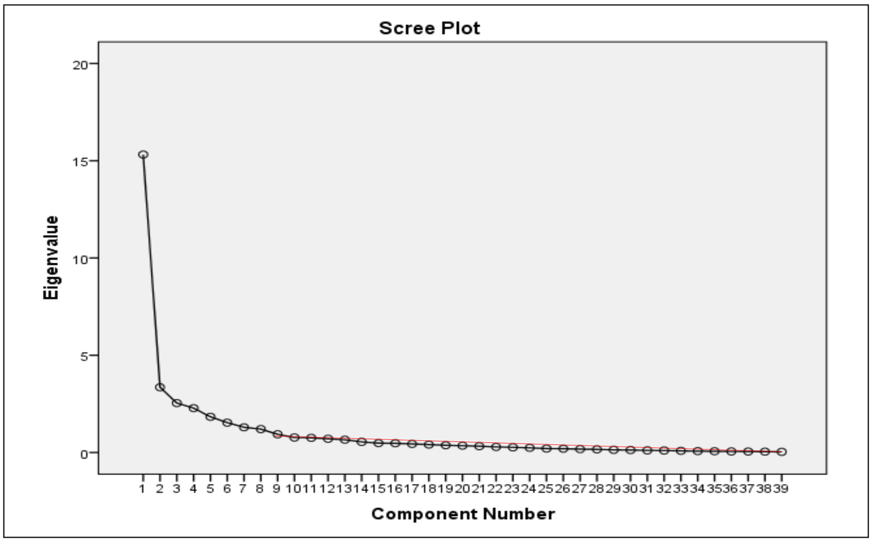

Figure 1. Scree Plot for WOCS (first rotation)

Generally, when looking at the contents of these eight sets of items, the factors are oral instruction (eight items), expressing ideas (five items), briefing or explaining (four items), face-to-face conversation (four items), oral presentation (four items), telephone conversation (four items), discussion (two items), and meetings (two items).

After the review, ten items were removed from the 39 items. These items were L6, L7, L9, L15, L24, L26, L4, L8, L23, and L25. These items had factor loading values that were less than 0.60. According to Hair et al. (2014), items less than the value of 0.60 should be removed because they are insignificant and do not contribute to the constructs.

EFA for the Second Rotation

Next, we conducted a second EFA analysis for WOCS construct after dropping the items with the *factor loading* value <0.60 and setting the factors to extract to 8. Table 6 shows that Bartlett's test of Sphericity was significant (p = 0.000), and the Kaiser-Meyer-Olkin test was greater than 0.70. This value increased compared to the first analysis. It means that the total number of samples used in the study was sufficient and provides an indication that factor analysis can proceed (Alias et al., 2019; Muda et al., 2018, 2020).

The number of variances contributing to the factors was 76.424%. The orthogonal rotation with the varimax method had established six factors to explain the number of variances, as shown in Table 7. Therefore, six factors were extracted and had an eigenvalue that exceeds 1.

Based on the scree plot, it can be formulated that only six factors were considered, as shown in Figure 2.

As a result of the analysis of the second rotation using the scree plot criteria, the six factors formulated were; factor 1,

Table 6
KMO and Bartlett's test for WOCS construct (second rotation)

Test	Value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.866
Bartlett's Test of Sphericity	0.000 (sig.)

Table 7
Total Variance Explained for WOCS (second rotation)

Component	*Eigenvalues*		
	Total	**Varians (%)**	**Cummulative (%)**
1	12.213	42.115	42.115
2	2.972	10.250	52.365
3	2.305	7.949	60.314
4	1.933	6.667	66.980
5	1.455	5.018	71.999
6	1.283	4.425	76.424

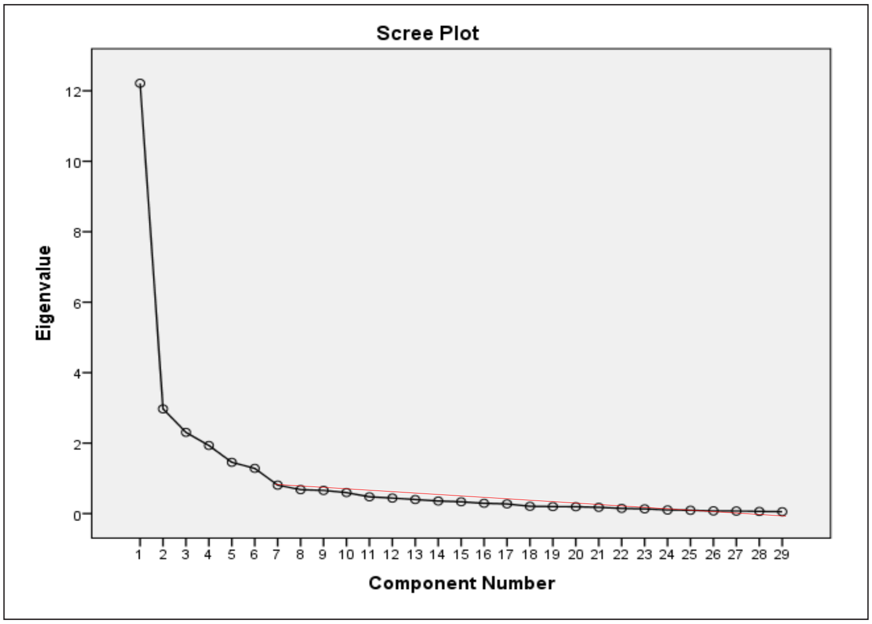

Figure 2. Scree Plot for WOCS (second rotation)

namely, expressing ideas, which had five items; factor 2 was oral instruction that had four items; factor 3 was the face-to-face conversation, which had four items, factor 4 was briefing or explaining which had four items, factor 5, which was the oral presentation with four items, and factor 6, which was the telephone conversation with four items. In this analysis, all the items had a high communality value, > 0.40. However, after the revision was carried out from the second analysis, items L30, L28, L27 and, L10 were removed from the oral communication construct due to the factor loading value of less than 0.60.

EFA for the Third Rotation

Researchers then conducted a third EFA analysis of the construct after dropping the items with *a factor loading* value < 0.60 and setting the *factors to extract* to 6. Hooper (2012) pointed out that when deciding on the number of factors, it is highly recommended not to experience performance deficiencies (opting for too few factors). It is considered a bigger mistake than determining too many factors. According to Cattell and Vogelmann (1977), choosing too few factors can lead to deviations in which two factors are combined into a common factor to obscure the actual structure of factors.

Table 8
KMO and Bartlett's test for WOCS construct (third rotation)

Test	Value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.855
Bartlett's Test of Sphericity	0.000 (sig.)

Table 8 shows that Bartlett's test of Sphericity was significant ($p = 0.000$), and the Kaiser-Meyer-Olkin test was 0.855, which is greater than the value of 0.60. The finding means that the total number of samples used in this study was sufficient and indicates that factor analysis can proceed.

The number of variances contributing to the factors was 79.059%. The orthogonal rotation with the varimax method set six factors to explain the variance, as shown in Table 9. Six factors were extracted and had an eigenvalue that exceeds 1.

Based on the scree plot as shown in Figure 3 below, it can be formulated that only six factors were considered.

As a result of the analysis of third rotation using *the scree plot criteria,* the researchers summarized the six factors: idea-expression (five items), face-to-face conversation (four items), oral instruction (four items), briefing or explaining (four

Table 9
Total Variance Explained for WOCS (third rotation)

Component	***Eigenvalues***		
	Total	**Varian (%)**	**Total**
1	10.315	41.258	41.258
2	2.937	11.749	53.007
3	2.238	8.953	61.959
4	1.726	6.903	68.863
5	1.318	5.271	74.134
6	1.231	4.925	79.059

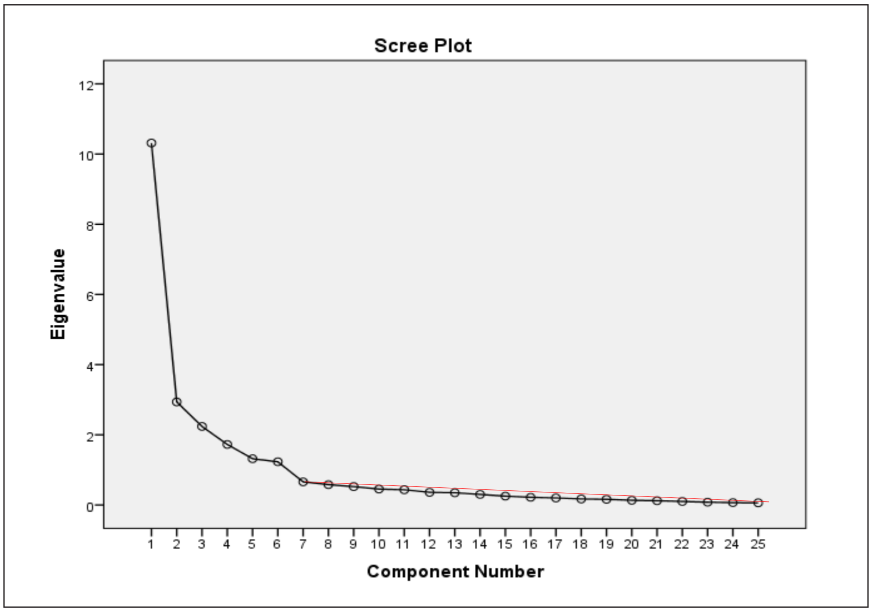

Figure 3. Scree Plot for WOCS (third rotation)

items), oral presentation (four items), and telephone conversation (four items).

The factor loading and communal values of each item are clearly stated in Table 10 below. Table 10 also shows that the item commonality is high. If an item has a communal value that is lower than 0.40, the item will be dropped, while if the item has a communal value approaching or greater than 0.40, the item is retained. In this analysis, all items had high communal values, > 0.40, and no items were removed from the oral communication construct as all items had a factor loading value of more than 0.60.

The number of items eliminated until the final rotation (third rotation) of the oral communication construct was 14, as shown in Table 11. Overall, from the nine elements and 39 items that were developed to measure the WOCS construct, the final result of EFA showed that the WOCS construct only consisted of six elements and 25 items.

Table 10
Factor loading and communal values for WOCS construct

Item	Factor						*Extraction value*
	Idea	Instruction	Conversation	Briefing	Presentation	Telephone	
L37	0.838						0.836
L39	0.826						0.789
L38	0.824						0.834
L36	0.738						0.864
L35	0.636						0.743
L33		0.905					0.897
L34		0.874					0.825
L32		0.869					0.798
L31		0.846					0.792
L21			0.797				0.848
L20			0.756				0.813
L22			0.748				0.825
L29			0.742				0.758
L18				0.822			0.794
L17				0.816			0.734
L19				0.779			0.793
L16				0.684			0.742
L2					0.822		0.811
L3					0.813		0.793
L1					0.716		0.764
L5					0.705		0.722
L12						0.817	0.791
L13						0.765	0.750
L11						0.710	0.708
L14						0.644	0.742

Table 11
Numbers of rotations, eliminated items, and remaining items of WOCS construct

Numbers of rotations	Eliminated items	Numbers of eliminated items	Numbers of remaining items
3	L6, L7, L9, L15, L24, L26, L4, L8, L23, L25 (first rotation), L30, L28, L27, L10 (second rotation)	14	25

Item L6, L7, L8, L9, and L10 belonged to the "meeting" construct. These items were eliminated because the nature of civil engineering workplaces demands engineers to work more at the construction sites rather than at offices (Yusof et al., 2018). So, they would have briefings and discussions more than meetings as meetings usually took place at the offices.

Item L23, L24, L25, and L26 were regarding external instructions outside the organizations. These items were removed because they were less important than internal instructions from the organizations, like the instructions from the superior. Item L4 was regarding the sense of humor in the presentation. This item is not valid as the presentation at engineering workplaces is a serious task (Bhattacharyya & Zainal, 2015) involving coordination, specifications, requirements, progress, budget, and many more, that need to be presented carefully without mistakes. Finally, item L15 was the toolbox meeting. Toolbox meeting in construction projects is usually delivered by a health and safety officer (Phoya, 2017).

Moreover, items L27, L28, and L30 were deleted because these items were related to asking questions/opinions. Students did not find asking questions and opinions important because they were afraid that they would ask silly questions and be negatively evaluated by others. According to Masduki and Zakaria (2020), students are usually shy to ask questions because they do not want to look incompetent in front of their superiors or colleagues. Therefore, item L29, which was "asking the things they do not know how to do," is not eliminated because students feel it is important to ask their superior if they do not know how to do certain tasks or works so that they will perform the tasks without any mistake and avoid conflicts.

All the remaining items in this study had high factor loadings (> 0.60); thus, these items were pivotal and contributed to the WOCS construct. It means that all the remaining items are valid and undoubtedly portray the construct, which can be used as the instrument to measure workplace oral communication skills in the civil engineering industry.

Internal Reliability

In this study, the internal reliability was measured using *Cronbach's Alpha* for every component (Alias et al., 2019; Ehido et al., 2020). According to Loewenthal (2001), the reliability index of 0.70 and more is satisfactory, while 0.80 and more is good. The reliability index of 0.90 and above is very well-received. Thus, the higher the alpha value, the higher the reliability of the built-in instrument. The result for *Cronbach's Alpha* for all components was 0.931, as shown in Table 12, which means the instrument is very reliable.

Table 12
Cronbach's Alpha for internal reliability

	Component	Cronbach's Alpha
1.	Idea expression	0.937
2.	Face-to-face conversation	0.929
3.	Oral instruction	0.912
4.	Briefing/ explaining	0.883
5.	Oral presentation	0.861
6.	Telephone conversation	0.806
		0.931

CONCLUSION

The current study enhances the outstanding contribution to the measurement of the WOCS construct, primarily in the context of civil engineering. The outcome of EFA has shaped a formation that determines six components of WOCS that can be measured using the 25 items developed in this study. With the high value of Cronbach Alpha, Bartlett's test of Sphericity was significant, and KMO was > 0.70. All factor loadings surpassed the minimum requirement of 0.60. Thus, this result indicated that the final elements are valid and firm for the samples. Therefore, it can be concluded that the extracted elements or components with their corresponding items are reliable.

The aim of performing an EFA is to define a multidimensional data set using fewer variables (Samuels, 2017). So, all deleted items in the EFA process functioned to improve the instrument, which means that the instrument became fixed and validated after the EFA. This also means that the eliminated items in this study increased the validity of the instrument. All items with high factor loadings (> 0.60) remained because these items were significant and contributed to the WOCS construct. Thus, the instrument can be used in future research to perform Confirmatory Factor Analysis (CFA). Although CFA has yet to be done, this finding can still be used by civil engineering students to prepare themselves with the oral communication skills needed at the workplace.

Limitations and suggestions for future research

Due to resource and time constraints, the results of this study have several drawbacks that require further study.

This study is limited to elements of oral communication skills at the workplace; as such future research may investigate other constructs of communication skills, such as written and interpersonal communication skills. Besides that, the survey is a method that most researchers widely use as this method saves cost and is consistent in terms of data collection. In this study, the questionnaire was conducted online, and the questions that were posed may not be clear to some respondents and could have influenced a biased response. Therefore, it is proposed that future researchers distribute the questionnaire face-to-face so that they can explain the question items clearly in front of the respondents.

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