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Needs Analysis of English Language Oral Communication Functions for Egyptian Engineers

A study based on a PhD Thesis

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مستخلص البحث

هدفت الدراسة الحالية الى الكشف عن أهم وظائف التواصل الشفهي باللغة الإنجليزية في المجال الهندسي. ولتحقيق الهدف من الدراسة قامت الباحثة بتصميم استبيان مكون من جزئين: الأول يضم عشرة وظائف تواصل شفهي بحيث يقوم المشاركون بتحديد أهمية كل منها على مقياس ليكرت الرباعي، بينما يضم الجزء الثاني من الاستبيان سؤال مفتوح يقوم فيه المشاركون بإقتراح أية وظائف أخرى هامة بالمجال الهندسي لم يتضمنها الجزء الأول من الاستبيان. وتشكلت عينة الدراسة من ٩٠ مهندس مصري يعملون بدول مختلفة بمجالات هندسية. وأوضحت نتائج الدراسة ان كلاً من مخاطبة الحضور وفهم المتحدثين باللغة الإنجليزية في حوار جاءتا في المرتبة الأولى من حيث الأهمية، وبالمرتبة الثانية المونولوج، ثم المشاركة في النقاشات الرسمية كالإجتماعات. وتعد هذه النتائج على درجة من الأهمية لمصممي برامج اللغة الإنجليزية للأغراض المتخصصة كخطوة هامة لبناء برامج تخاطب الإحتياجات العالمية بالسوق الهندسي. الكلمات المفتاحية: تحليل الإحتياجات، وظائف التواصل الشفهي، المهندسين المصريين

Abstract

The current study aimed at investigating the highly needed oral communication functions in the engineering workplace. The study adopted a mixed-methods exploratory applied design. It involved 90 Egyptian engineers employed in several engineering fields around the world. Both quantitative and qualitative data were collected through the participants' responses to a questionnaire that includes both close-ended and open-ended questions. The results indicated that both addressing audiences and understanding an interlocutor are the most required functions in the engineering workplace, followed by sustained monologue, formal discussion (meetings), and goal-oriented co-operation. The findings would empower ESP course designers to create customized courses on the basis of current authentic oral communication needs of Egyptian engineers.

Keywords: Needs Analysis, Oral Communication Functions, Egyptian Engineers

1. Introduction

Oral Communication (OC) is of paramount significance for engineers to excel in the current competitive globalized work market. English OC for engineers whose native language is not English has become as important as their major related skills. It is an essential requirement for a job applicant to be hired in Egypt as well as abroad. Additionally, engineers all around the world use English for fulfilling several job related tasks.

The emphasis placed on OC for engineers is based on several factors. To start with, Proficient communication is indispensable for engineers to liaise with multinational project teams in English as a recognized international language (Riemer, 2007). Second, OC is significant for both passing a job interview initially and for promoting at the workplace as well (Poedjiastutie & Rifah, 2019). Engineers encounter several difficulties in a job interview owing to the deficiency in communicating with their prospective employers (Sheth, 2015). Third, OC may be considered as one of the most demanded skills in the engineering work place. As Sheth (2015) asserted that in the engineering workplace there is only 20% of actual engineering and 80% of communication between co-workers and superiors. Thus, insufficient and ineffective communication may affect both the engineer and the career badly (Kovak, Sirkovik, 2017).

In a recent and significant needs analysis study in the Egyptian context, Erasmus + (2017) in partnership with some Egyptian universities -Nile University, Arab Academy for Science Technology and Maritime Transport, Ain Shams University, and Aswan University- aimed at

investigating the recent and future labour market needs in several engineering domains. They also paid careful attention to reasons, challenges and facts related to employability among engineers in Egypt. Both employers and engineers pinpointed the significance of communication skills. Concerning the current labour market needs, the study reported that employers are looking for employees who have “employability” skills such as communication skills that are required by employers everywhere, not just in Egypt.

The study also noted that non-technical skills including soft skills, life skills, and language skills are as important as the technical skills and need to be considered in the lifelong learning of engineers. Significantly, the study recommended conducting specialized courses for “Effective communication in English language” and “Presentations skills” (Erasmus +, 2017, p. 74).

On the one hand, researchers conducted significant needs analysis studies to identify the most common OC functions in the engineering field in different countries (e.g. Russ, 2015; Guan, Lazim, & Shaharuddin, n.d.; Poedjiastutie & Rifah, 2019; Zaid & Kamarudin, 2011). On the other hand, there is a scarcity in the needs analysis studies that investigate the highly required Oral Communications Functions (OCF) in the Egyptian context.

1.1 Context of the Problem

It is noteworthy to point out that the research body related to OC for engineers in Egypt is scarce as mentioned above. Most of the studies in this area investigated OC in different educational levels and sectors including the preparatory stage, the secondary stage, Al-Azhar schools, the Maritime sector, the Police sector, and EFL teachers

(e.g. Abd Ellateef, 2021; Akl, 2020; Ali, 2019; El-Sayed, 2020; Khalil, 2018; Magdy, 2020; Shabana, 2019; Sobh, 2018). To the best of the researcher's knowledge, slight studies (e.g. El-Abbassy, 2018) were conducted to investigate OC in the Engineering field, which even focused only on analyzing the linguistic OC skills needed for engineers and did not shed light on the related functions in which these linguistic skills are employed to provide engineering students with authentic learning experiences.

1.2 Statement of the Problem

In light of the previous review, it is crucial to specify the most common and highly required (OCF), the activities that oral communicators engage in continuously at the engineering workplace to achieve business-related objectives specifically in the Egyptian context as an initial step for designing proper ESP programs to address the current needs of the work market.

Thus, this study aimed to answer the following main question:

What are the highly needed Oral Communication Functions (OCF) -in light of the Common European Framework of Reference for Languages New Companion CEFR NC (2018) - for Egyptian engineers?

1.3 Significance of the Study

1. The current study attempts to identify the OCF required for the Egyptian engineers that would empower course designers to construct effective OC courses and assessment tools on the basis of authentic and current needs.

2. Furthermore, the functions included in the current study were driven from CEFR NC (2018) to be in line with the international recognized standards in EFL and ESP. Hence, the results of the current study would be significant globally; not just in Egypt.

1.4 Delimitations of the Study

Since it was beyond the limits of a single study to consider a wide range of factors, the current study was confined to:

1. A group of Egyptian engineers (n=90) employed at different engineering sectors in Egypt, Saudi Arabia, Qatar, UK, USA, and Germany.
2. A set of 10 OCF adapted from CEFR NC (2018) divided into two categories: oral production activities and oral interaction activities. First, the oral production category included: 1) sustained monologue and 2) addressing audiences. Second, the oral interaction category combined: 3) understanding an interlocutor, 4) conversations, 5) formal discussion (meetings), 6) goal-oriented co-operation (e.g. discussing a document, organizing an event etc...), 7) obtaining goods and services, 8) information exchange, 9) interviewing and being interviewed, and 10) using telecommunications.
3. The questionnaire was administered to the study sample in Fall Semester, 2021/2022.

2. Review of Literature

2.1 Needs Analysis in ESP Programs

English for Specific purposes (ESP) originated basically to address English language needs required for staff in specific domains. ESP includes teaching and

learning the specific skills and language required by particular learners for a particular professional purpose currently needed or will be needed in their careers (Day& Krzanowski, 2011).

With respect to needs analysis, it is considered the base of any ESP program. It is the initial step in the program-design cycle in ESP. Needs that stem from the academic or workplace settings instruct the informational content and identify the target communicative situations an ESP learner is likely to encounter. Needs analysis simply is “what learners need in order to operate in the target communicative situation” (Woodrow, 2017, p. 21). Long (2005, p.1), likewise, considers needs analysis as a crucial “prerequisite for effective course design.”

Owing to this significance, it is important to shed light on the means of collecting needs analysis data in ESP. Both quantitative and qualitative methods can be deployed for this purpose. As for the quantitative methods, they may include questionnaires, language audits and language tests, while interviews, observations and discourse analysis are examples of the qualitative methods (Woodrow, 2017). Long (2005) argues for triangulation of data sources and methods; data should be collected from a range of sources including research in the area, previous students and courses, and domain experts.

Needs analysis studies in the engineering domain particularly, (e.g. Al-Tamimi & Shuib, 2010; Chandrasena, 2017; Kim, 2013 ; Kotak & Ami , 2015; Kovak& Sirkovik, 2017; Patil & Karekatti, 2012; Poedjiastutie & Rifah, 2019; Russ, 2015; Sattar & Zahid, 2011; Sheth, 2015; Tinh, 2015) pointed up the importance of OC to engineering graduates; they also identified the highly required functions of OC in an engineering workplace.

Significantly, Poedjiastutie and Rifah (2019, p.72) pointed out that Civil engineering students -included in their study- considered OC as “the first skill that should be mastered by the engineers.”

Hence, the following section moves on to demonstrate various OC-related aspects specifically in the engineering field including definitions, and workplace functions.

2.2 Oral Communication

2.2.1 Defining Oral Communication

This section sets out to define OC through presenting the different views of scholars. For example, Kuivamäki (2015) pointed out that OC is characterized by being interactional; including at least two parties; in which they play the role of a speaker and a listener alternately. Likewise, Shashikala (2018, p.933) defined OC as the ability to “establish a spoken interaction between two or more people.”

Another key aspect highlighted in OC definitions is its verbal and non-verbal elements. For instance, Mishra (2015) defined OC as the process of transmitting information and ideas verbally from one individual or group to another to participate effectively in different formal and informal forms of OC. Additionally, Kotak and Ami (2015) suggested that non-verbal elements of OC are as significant as the verbal ones. Simply, it is a process that is quite complex and whose success is the result of a multitude of elements to be mastered as a whole (Cately, 2011).

The previous review reveals that OC is a complex, multidimensional, and interactive process that includes a diversity of integrated elements employed for fulfilling

numerous functions. Hence, for deeper investigation of OC, the next section presents a review of the functions of OC in the engineering context.

2.2.2 Workplace Functions of Oral Communication

OC is required for communicating effectively through fulfilling several functions that the oral communicator needs in specific contexts either at the workplace or in academic settings. These functions are the activities that oral communicators engage in continuously to achieve academic or business-related objectives.

Researchers (e.g. Guan, Lazim & Shaharuddin, n.d.; Poedjiastutie & Rifah, 2019; Russ, 2015; Zaid & Kamarudin, 2011) conducted significant needs analysis studies to identify the most common OC functions in the engineering field. Russ (2015), for instance, indicated that among the situations requiring OC in an engineering profession, the most notable would be participating in discussions/ meetings/ negotiations; giving oral presentations/ instructions; and conversing over the phone and other similar communication media. Correspondingly, Guan, Lazim, and Shaharuddin (n.d.) investigated the OC needs of computer science undergraduates at the workplace situation based on their practical training experience. Students considered oral presentation skills, face to face interactions with superiors, interactions at meetings, discussion skills, negotiation skills, briefing skills, conversation skills, and pronunciation as very important at the workplace; however, they placed less emphasis on telephone skills.

Additionally, Zaid and Kamarudin (2011) asserted that delivering a speech, giving instructions or briefings, external meetings (with clients), internal meetings (with

staff), doing presentations, participating in seminars, and making telephone conversations are the potential OC needs for the mechanical engineering workplace. Poedjiastutie and Rifah (2019) indicated that civil engineers need OC to carry out their professional activities such as meetings, discussions, presentations, telephone conversations, speeches, seminars, and giving clear job instructions.

3. Method

To answer the research question, a mixed-methods approach was employed. This approach offers a better perspective about the issue under investigation. Both quantitative and qualitative methods were employed through a questionnaire including open- and close-ended questions.

The quantitative approach is appropriate for investigating the most required OCF. For this purpose, data were obtained quantitatively from a Likert-scale type questionnaire and analyzed statistically to answer the research question. On the other hand, the qualitative approach was used to analyze data obtained from open-ended question included in the same questionnaire to identify further OCF if any.

3.1 Participants

For analyzing the OCF needed for Egyptian engineers in the current globalized work market, Engineering Oral Communication Functions Questionnaire was administered to 90 Egyptian engineers working at different engineering fields across several countries. Table (1) shows the participants' demographics.

Table 1

The Demographics of the Engineers Responded to the Engineering Oral Communication Functions Questionnaire

Demographics Details

Nationality	Egyptians
Country of Residence	Egypt, Saudi Arabia, Qatar, UK, USA, Germany
Qualification	BA, MA, PhD in Engineering
Specialization	Electrical and Electronic, Civil, Structural, Architectural, Biomedical, Nuclear, Petroleum, Aeronautical, Communication and Networking, Computer Science, and Mechanical Engineering
Experience	1:39 years
Level	Juniors, seniors, and academicians

3.2 Study Instrument

The Engineering Oral Communication Functions Questionnaire aimed at defining the required and most common engineering OCF. It includes 10 OCF that are categorized into two groups: oral production and oral interaction activities. The questionnaire is a 4-point likert scale: very important, relatively important, less important, and irrelevant. Each level is given an estimated value and the points devoted to these levels are 4,3,2,1 respectively. The advantage of using the closed-form of Likert scale is that the elicited data can be easily recorded and analyzed with the statistical procedures (Perry, 2011). Participants were also asked to specify any other needed OCF.

3.2.1 OCF Questionnaire Reliability and Validity

A) Questionnaire Validity

• Content Validity

To validate of the questionnaire, it was submitted to a jury of ESP and EFL specialists in curriculum and instruction. They were requested to give their opinions concerning the appropriateness of the functions to the engineering context. They were also asked to suggest any modifications and give comments. The researcher modified the questionnaire according to the jurors' comments and suggestions, for instance, erasing names from the required demographics. The Content Validity Ratio (CVR) among jurors ranged from 83% to 100% and the questionnaire in its final form combined 10 OCF.

• Internal Consistency

The researcher tried out the questionnaire on a sample of engineers employed in different engineering fields (n=37) to calculate the internal consistency of the test items. The correlation value between the mark of each item and the total mark of the questionnaire was calculated for this purpose. Table (2) shows the correlation values.

Table 2

Internal Consistency Values of the Questionnaire Items

Item	Correlation Value	Item	Correlation Value
1	0.341*	6	0.313*
2	0.688**	7	0.377*
3	0.781**	8	0.339*
4	0.728**	9	0.723**
5	0.325*	10	0.768**

(*) Significant at the 0.05 level

(**)Significant at the 0.01 level

Table (2) indicates that some of the correlation values between the mark of each item and the total mark of the part are significant at the 0.05 level and other values

are significant at the 0.01 level (using SPSS Version 28). This proves that the test items are of adequate level of consistency.

B) Questionnaire Reliability

• Cronbach's Alpha Coefficient

Cronbach's Alpha was used to calculate the reliability coefficient of the test through excluding the item mark from the total mark of the questionnaire. The calculated reliability coefficient was 0.727 verifying the reliability of the test. Table (3) shows Cronbach's Alpha Coefficient of every item.

Table 3

Alpha Coefficient Values of the Questionnaire Items

Item	Alpha Coefficient	Item	Alpha Coefficient
1	0.725	6	0.722
2	0.723	7	0.721
3	0.723	8	0.719
4	0.720	9	0.718
5	0.724	10	0.724

Table (3) indicates that all the values of Alpha Coefficients for the questionnaire items are less than the overall Alpha Coefficient which asserts that questionnaire items are of adequate level of reliability.

• Split-half

The split-half method was used to verify the reliability of the overall questionnaire. The correlation coefficient between the two parts of the questionnaire was 0.575. Using Spearman-Brown formula the reliability coefficient

of the overall questionnaire was 0.730, which indicates that the questionnaire is reliable.

Based on the previous reliability and validity procedures the final form of the questionnaire included 10 OCF that was used later for collecting data from the actual sample of the study.

3.3 Study Procedures

1. The researcher used Google forms to create an electronic version of the questionnaire to facilitate the participation of Egyptian engineers residing around the world.
2. The researcher tried out the questionnaire (Google Form) in its final form on a small sample of engineers (n=10) to monitor any problems that may arise during its real administration. The researcher then, for instance changed the settings of the Google form to allow the participants to select ONLY one option rather than selecting several options to rate the importance of the given activities/ functions.
3. The questionnaire (Google form) was administered to the actual sample of the study (n=90 engineers).
4. The data was processed statistically and analyzed afterwards.

4. Data analysis

First, the collected quantitative data were analyzed statistically through Relative Weights (Importance) Analysis (RWA) to calculate the relative importance of the functions included in the questionnaire. Second, qualitative content analysis was employed to find common themes for identifying further OCF required for engineers.

5. Results and Discussion

5.1 Quantitative Results & Discussion

The current study aimed at investigating the highly needed OCF for Egyptian engineers, Hence, this section is dedicated for answering the main question of the current study:

What are the highly needed Oral Communication Functions (OCF) -in light of the Common European Framework of Reference for Languages New Companion CEFR NC (2018) - for Egyptian engineers?

Table (2) below answers the research question through presenting the relative importance of the functions included in the questionnaire.

Table 4

RWA of Egyptian Engineers' Responses to the OCF Questionnaire

NO.	Very important	Relatively important	Less important	Irrelevant	Total of Weights	Relative Weights	Estimated Percentage	Rank
1	46	34	10	0	306	3.4	85%	2 nd
2	54	32	2	2	318	3.53	88.3%	1 st
3	54	30	6	0	318	3.53	88.3%	1 st

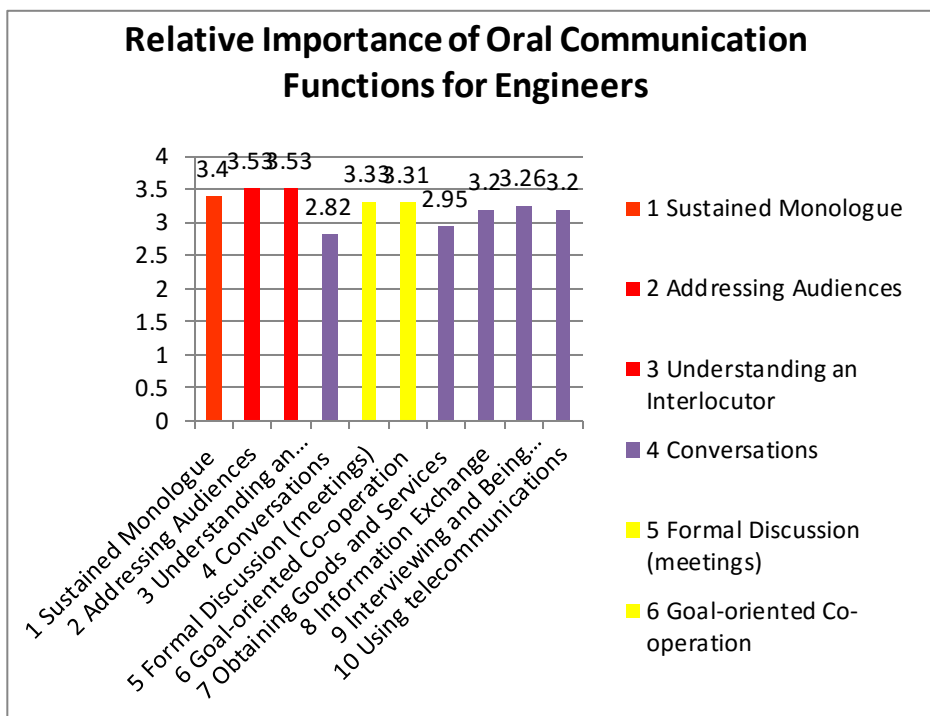
4	14	48	26	2	254	2.82	70.5%	8 th
5	46	28	16	0	300	3.33	83.3%	3 rd
6	46	28	14	2	298	3.31	82.7%	4 th
7	36	22	24	8	266	2.95	73.8%	7 th
8	36	40	16	0	288	3.2	80%	6 th
9	40	38	8	4	294	3.26	81.6%	5 th
10	38	36	12	4	288	3.2	80%	6 th

Table (4) shows that the differences between the relative weights of the functions are slight ranging from 3.53: 2.8 which indicates that all the functions included in the questionnaire are significant for engineers. Additionally, the analysis showed that both functions (2), addressing audiences, and (3), understanding an interlocutor, are the most important OCF for engineers with a relative weight of 3.53. Which were followed by function (1), sustained monologue with a relative weight of 3.40. Function (5), Formal discussion, occupied the third rank with 3.33.

Then Function (6), goal oriented co-operation, in the fourth rank with a relative weight of 3.31, Function (9), interviewing and being interviewed, in the fifth rank with a relative weight of 3.26, and Functions (8), information exchange, and (10), telecommunication, in the sixth rank with a relative weight of 3.20. Finally, the last two ranks were occupied by functions (7), obtaining goods and services, and (4), social conversations, with a relative weight of 2.95 and 2.82 respectively. Figure (1) below clarifies the relative importance of the OCF according to the views of the study sample.

Figure 1

The Relative Importance of Oral Communication Functions for Engineers



The results of the current study correspond with the results reported by previous needs analysis in this domain (e.g. Russ, 2015; Guan, Lazim, & Shaharuddin, n.d.; Poedjiastutie & Rifah, 2019; Zaid & Kamarudin, 2011). While the previous studies presented the most common and required functions, the current study prioritized them to enable course designers and ESP instructors to consider the most important ones.

5.2 Qualitative Results & Discussion

The open-ended question was analyzed qualitatively in order to find common themes for identifying further OCF required for engineers. The analysis showed that although the questionnaire provided participants with detailed description and examples for the included functions (in

both English and Arabic); most of them did not propose new functions. Actually, their suggestions were examples for the already existing functions in the questionnaire. For example, the participants suggested discussing and presenting technical drawings, understanding and taking notes while listening to a foreign speaker, and communicating for daily routine purposes which belong to Goal-oriented co-operation, Understanding an interlocutor, and Conversations categories respectively. Others proposed ways for developing OC including taking workshops, using short videos, and roleplaying.

This may prove that the list of functions provided in the questionnaire was inclusive and represented most of the common functions at the engineering workplace.

6 Conclusions and Recommendations

The results of the current study assert that addressing audiences and understanding an interlocutor are the highly required OCF in the engineering workplace, followed by sustained monologues and formal discussions according to the views of a sample of Egyptian engineers. Accordingly, ESP course designers should consider these functions while constructing OC courses to cater for the Egyptian engineers' needs.

The current study addressed a research gap related to investigating OCF in the Egyptian context, further studies in this domain are recommended for further identification of the needs of Egyptian engineers as an initial step for enhancing required English language skills.

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