The Effects of Instruction of Formulaic Sequences and Working Memory on Malaysian ESL Learners' Oral Fluency

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ABSTRACT

Despite being exposed to the English language for more than 13 years, Malaysian students have yet to reach the required proficiency level (i.e. appropriate selection and appropriate speech production in general and oral fluency in particular). Many of them experience difficulties at the workplace due to inadequate English skills, particularly in speaking. This study sheds light on the effects of explicit instruction of Formulaic Sequences (FSs) on low-intermediate and intermediate Malaysian ESL learners' use of formulaic sequences and oral fluency while considering their working memory capacity. A sample of 54 students enrolled in a preparatory English language course was selected through purposive sampling. They were classified as intermediate and low-intermediate ESL learners based on their Malaysian University English Test (MUET) results with band scores of 2 and 3, categorized as low-intermediate and intermediate users, respectively.They were divided into two groups: the experimental group (EG) and the control group (CG) by selecting them as similar as possible. The EG received a specific treatment encompassed the explicit instruction of FSs, fluency workshops, and conscious-raising awareness activities, embedded in the regular content materials for fifteen sessions with three-hour-long each session. Both samples were pre-tested and post-tested, followed by semi-structured interviews. In sum, both quantitative and qualitative findings revealed positive effects of explicit instruction of FSs on the participants' use of FSs and their L2 oral fluency related variables. However, the correlation between the working memory (WM) and participants' performance did not reach the hypothesized level. The results also supported the proficiency-related and language-dependent features of WM, the general capacity and general processing hypotheses, and the task-specific view. By integrating both communicative and cognitive approaches, this research would benefit the curriculum and syllabus designers, test developers and lecturers in ESL contexts for quality education.

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INTRODUCTION

Second language speaking and oral fluency, as two important factors in the evaluation of second language (L2) learners'proficiency (Rezai & Okhovat, 2016), are considered in the design of many second language instructional programs. However, oral fluency occupies a very small subset in the studies of language performance. It is usually described as the process of automatization and is strongly related to the automatic processing which is not restricted by the short-term memory capacity compared with the controlled processing which occurs at early stages of learning and requires high attention (Levelt, 1989, p. 2; Schmidt, 1992, p. 360). Considering the Chomskian model of language processing which involves both the analytic processing (combining words into phrases and sentences based on grammatical principles) and the holistic processing (relying on formulaic sequences (FSs)) (Sinclair, 1991, pp., 109-110), it can be posited that FSs play a significant role in automatic processing and oral fluency, providing processing advantages. FSs are stored as a whole in the long-term memory and retrieved as a unit during application and are considered to be essential for oral language fluency (Wood, 2010). Wray (2002) stated that Chomsky's remarks on the human innate competence for creating and comprehending sentences might have been exaggerated as completely reliable as a learner's preference for the specific expressions may be related to his/her prefabricated form which is considered to be alongside with the learner's capacity for creativity. FSs deviate from the language rules lexically, grammatically or semantically, as seen in the examples, *in terms of, part of the, this is a, be able to, you can see, you know what, and this is, kith and kin*, *by and large,* and *on the other hand* (Ohlrogge, 2009, p.375). In fact, using FSs can be a reliable resource for the non-proficient L2 learners, especially when they encounter challenges in creating new grammatical sequences (Foster, 2001).

In this study, efforts were made to examine the effects of explicit instruction of FSs on Malaysian low-intermediate and intermediate ESL learners' oral fluency, taking into account their working memory capacity (WMC). In a linguistically and culturally diverse society as Malaysia, the use of the English language is highly complex (Darmi & Albion, 2013; Wahi, 2015). Despite being exposed to the English language instruction for more than 13 years, Malaysian students are still unable to speak fluently and communicate effectively (Azman, 2016; Enxhi et al., 2012; Kamsin & Mohamad, 2020). According to Aziz and Kashinathan (2021), with considering the fact that a proficient English speaker is the one who can think quickly and reply immediately with less hesitation, improving Malaysian speaking skill and their oral fluency, as one of the main components of speaking skill, are always complicated and challenging. This poses a concern for a developing nation as Malaysia, aspiring to be a key competitor in the global business world (Aziz & Kashinathan, 2021; David et al., 2015; Nadesan & Shah, 2020). Moreover, the issue of Malaysian graduates' unemployment is highly related to their insufficient English language competence. As mentioned by Yong Enxhi et al. (2012), according to Vice Chancellor of Universiti Putra Malaysia, out of 6,946 undergraduates who finish their tertiary education, only 4,478 of them are able to find a job because of their poor communicative skills. Therefore, a comprehensive English teaching method is required for universities and vocational colleges (Aziz & Kashinathan, 2021; Idek et al., 2014; Ong et al., 2016).

There are various internal and external factors such as inhibition, the inability of what to say and how to say, limited knowledge of vocabulary and prefabricated phrases, a lack of presentation skills (Mei & Masoumeh, 2017; Paneer Selvam & Mohamad, 2019; Rajendran & Yunus, 2021), anxiety and low self-confidence, low motivation, negative L1 influence on L2, syllabus design, poor teaching methods, study habits, the quantity and quality of speaking practice, and lesson plans that could be attributed to this weakness (Aziz & Kashinathan, 2021; Nijat et al., 2019). Teachers still apply traditional methods including the approach of textbook-based instruction (Aziz & Kashinathan, 2021) without creative teaching methods.

Moreover, working memory (WM) is deemed to play a role in retrieving multi-word sequences and language output (Ellis, 1996; Weissheimer & Mota, 2011). Research has shown that both phonological short-term memory (PSTM) and WM play a significant role in different aspects of language learning. For example, phonological loop is responsible for forming a prolonged mental representation of the new phonological items. These representations are particularly significant for the knowledge of the phonological components in FSs and words (Martin & Ellis, 2012). Furthermore, past research has emphasized the positive relationship between working memory and oral fluency (Rezai & Okhovat, 2016; Vu et al., 2024). Building on this argument regarding the research problem pertaining to Malaysian ESL learners' weakness in speaking skill in general and L2 oral fluency in particular, the research objectives guiding the current study are as follows:

1. To determine the effects of the explicit instruction of FSs for the performance of Malaysian intermediate and low-intermediate ESL learners on the use of FSs and on L2 oral fluency-related variables
2. To examine the correlation between the WMC of Malaysian intermediate and low-intermediate ESL learners at the hypothesized level (+/-.7 or higher) with their use of FSs and their L2 oral fluency-related variables

LITERATURE REVIEW

Fluency is mainly a temporal phenomenon and a very clear indicator of proficiency. The concept of fluency can be defined broadly. However, there is a consensus that speed and smoothness of delivery are considered to be the main indicators of a fluent speech, and the accuracy aspect remains open to the evaluating norms of L2 fluency (Schmidt, 1992). According to Mizera (2006), speaking fluently is more than retrieving words. It also requires the accurate use of grammatical rules and speed. Lennon (1990) defined fluency as the way that speech is processed and uttered in real time. Based on Lennon's (1990) definition, fluency has two components: a temporal one including "speed of delivery" and "a degree of freedom from different disfluency indicators such as repetitions" (p. 403). Fluency has been investigated using both quantitative and qualitative approaches (see Brumfit, 2000; Fillmore, 2000; Lennon, 1990). In a qualitative study, Fillmore (2000) recognized four main aspects of oral fluency including "the ability to talk at length with few pauses" and "the ability to have appropriate things to say in a wide range of contexts" (p. 51). One of the advantages of Fillmore's study is its attention to the significant role of FSs in fluency for filling the time. Brumfit (2000), who defined fluency as "natural language use" (p. 68), emphasized the role of cognitive elements as WM. However, Lennon's (1990) study was a comprehensive one. He investigated various aspects relevant to speed of delivery. One of the

advantages is that he utilized a narrative monologue to elicit speech rather than a dialogue, aligning with the focus of his study and the current study on productive fluency.

Building on scholars who asserted that more than 50 % of the language is formulaic in nature (Foster, 2001; Pawley & Syder, 1983), several studies have investigated FSs and their relationship with second language skills, including L2 oral fluency (Allami et al., 2022; Bakhshizadeh et al., 2015; Baleghizadeh & Shafeie, 2019; Boers & Lindstromberg, 2012; Ellis, 2012; Jasim, 2023; Khodadadi & Shamsaee, 2012; McGuire & Larson-Hall, 2017; Natsumi, 2014; Nergis, 2021; Taguchi, 2013; Tsou & Huang, 2012; Uchihara et al., 2022; Van Vu & Peters, 2022; Wood, 2010; Yan, 2020; Yu, 2022). Most of these scholars indicated that there is a significant correlation between the use of FSs and L2 oral fluency in terms of speech rate (SR) and mean length of run on re-tell tasks. Narkprom and Phoocharoensil (2022) have also revealed that FSs are underused by the non-native speakers with a finite number of such sequences as they lack adequate mastery of those limited ones. These studies also highlighted the difficulty that L2 learners face in recognizing and learning FSs even at the advanced level. Nergis (2021) investigated the effects of explicit learning of FSs on L2 utterance fluency with advanced EAP learners and found a significant improvement in speed fluency. However, Khodadadi and Shamsaee (2012) reported that among seven classifications of FSs proposed by Ohlrogge (2009), there was a significant correlation between the frequency in the use of personal stance markers and transitions with overall speaking proficiency rather than speech fluency. They mentioned that the relationship between the use of FSs and L2 oral fluency is not clear enough, and in some cases the results are mixed. They recommended further research to measure FSs from other aspects. Recently, Yu (2022) investigated the role of FSs in oral fluency among Chinese EFL learners and reported a significant correlation between frequency and variation in the use of FSs with speech and repair fluency respectively. Yu also mentioned the inappropriate use of FSs which disrupts fluency. Whilst Yan (2020) revealed that FSs have different effects on the pausing dimensions and rate of speech fluency. Moreover, these effects are influenced by the speaker's proficiency and task difficulty. However, none of the aforementioned studies considered the possible effects of memory on language performance as Taguchi (2013) recommended. WM, as the capability to briefly preserve and manipulate a restricted amount of data while performing mental activities (Baddeley, 2012), plays a significant role in many cognitive tasks including language output and retrieving FSs (Carruthers, 2013; Ellis, 1996). Therefore, the barriers existed in WM affect the second language performance (Fortkamp, 1999; Levelt, 1989; Temple, 1997).

The role of WM in learning and performance has been well-established (Jackson et al., 2016). Several studies have explored the relationship between WMC or PSTM with language learning, acquisition, and performance under various conditions as well as with the syntactic and lexical proficiency moderated by the articulatory rehearsal, language aptitude, and non-linguistics tasks (e.g., Baddeley et al., 1988; Conway & Engle, 1994; Daneman & Green, 1986; Ellis, 1996; Fortkamp, 1999; Harrington & Sawyer, 1992; Jackson et al., 2016; Kormos & Sáfár, 2008; Martin & Ellis, 2012; Rosenshine,1997; Temple, 1997; Weissheimer & Mota, 2011; Williams & Lovatt, 2003). Furthermore, following Levelt's (1989) dominant model of L1 speech production which later was modified by DeBot (1992) for bilingual learners, some researchers investigated the effects of WM on the second language development, production and oral fluency (Georgiadou & Roehr-Brackin, 2017; Guará-Tavares, 2013; Mizera, 2006; Rezai & Okhovat, 2016; Vasylets & Marin, 2021; Vu et al., 2024). Most of these studies found a positive relationship between the verbal short-term memory and vocabulary learning, between the verbal WM and syntax, or different areas of second language learning. For example, Daneman and Green (1986) found that

WM is a representation of skill-specific proficiency which is consistent with the task-specific view proposed by Cantor and Engle (1993). Osaka and Osaka (1992) indicated that WM is a language-independent system which is inconsistent with Fortkamp's (1999) explanations. The challenging results of these studies may be due to context, methodology, instruments, the task types used, or due to the nature of WM itself. Mizera (2006) investigated the relationship between WM and L2 oral fluency; however, he did not find any significant correlation between WM and L2 oral fluency, and that his suggestion for further research is methodological. He provided four explanations for his findings including the possible relationship between L2 fluent speech and other mental aptitudes, the various effects of WM in different phases of language learning or performance, and the influence of affective or personal factors on WM, and L2 oral fluency in some specific situations as in testing.

Given the significance of teaching and notice-based tasks for instruction of FSs (Boers & Lindstromberg, 2012) and L2 oral fluency on one hand, and the value of having a high level of WMC to learn vocabulary or speak fluently on the other hand (Ellis, 1996; Levelt, 1989), this study was conducted to examine the effects of explicit instruction of FSs in terms of frequency and variation (see Qi & Ding, 2011) on low-intermediate and intermediate ESL leaners' oral fluency in a Malaysian context. We also considered the participants' WMC as a moderator factor for the relationship between their FSs knowledge and L2 oral fluency.

METHODOLOGY

We employed quasi-experimental research with a non-equivalent control group and a mix-methods embedded design. A non-equivalent control group design was used because this study does not have a random sampling from the population; instead, intact classes were utilized. This design is commonly used in educational studies, featuring both control group (CG) and experimental group (EG), but without the pre-treatment sampling equality (Cook & Campbell, 1979). The inclusion of a CG, even if non-equivalent, helps control for extraneous threats. Confirming the similarity of the two groups through their pre-test scores is crucial as it enhances the effectiveness of controlling for maturation, testing and instrumentation, and historical factors (Campbell & Stanley, 1963). We employed both methodological and theoretical triangulation.

PARTICIPANTS

In alignment with the previous studies and considering factors such as student availability, population nature, scheduling constraints, study objectives, participants' proficiency levels, research methods, the number of variables, materials, and data gathering and data analysis procedures, Fifty four Malaysian low-intermediate and intermediate ESL learners were selected out of 106 students for this research through simple purposive sampling after they filled out the consent form and a written background questionnaire adopted from the previous studies (Čolović-Marković, 2012; Mizera, 2006; Tsou & Huang, 2012). These learners were enrolled in a preparatory English language course during the second semester of the academic session 2015-2016 at one of the public universities in Malaysia. All participants had previously passed the Malaysian University English Test (MUET) with band scores of 2 and 3, categorizing them as low-intermediate and intermediate users based on their MUET results. Then the participants were mixed in the intact classes and divided into two groups: 26 in CG and 28 in EG. The participants involved 40 females and 14 males with ages ranging from 19 to 23 with an average age of 21.

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INSTRUMENTS

NARRATIVE MONOLOGUE TEST

Following the experiments conducted by Lennon (1990) and Wood (2010), and in order to examine the two research objectives, one narrative monologue test was administered. This test involved the participants describing an event from their academic life, evaluating their performance on the use of FSs in terms of frequency (Freq.) and variation (Var.) and L2 oral fluency-related variables. The participants were required to provide details on when, where, and what happened, the effects on their lives and others, and the reasons for deeming it important. The L2 fluency-related variables assessed are speech rate (SR), speed (Spd.), smoothness (Smth.), and morphosyntactic accuracy (Acc.).

SPEAKING SPAN (SSPAN) TEST

To examine research objective 2 and align it with the task-specific view (Cantor & Engle, 1993; Conway & Engle, 1994), the speaking span test (SSPANT) adopted from Daneman and Green (1986) was selected as a linguistic measurement for both the storage and processing capacity of WM. In this test, the participants were required to read a set of words presented individually on a computer screen, with each word appears on the screen for one second. The words were presented in five groups, including the five two-word sets and five six-word sets, making a total of 100 words. These words, each with two syllables and seven letters in length, were unrelated to each other. After the presentation of the last word in a set, a question mark was displayed on the computer screen. Then the participants were asked to produce creative sentences for each word that were both syntactically and semantically correct. They were allotted 60 seconds to produce their sentences for each set and were instructed not to repeat the same pattern for the next sentence. Upon completing the test, the participants were asked some questions adopted from Mizera (2006) to see whether a conscious and skillful application of the strategies would expand the function of WMC.

MATH SPAN (MSPAN) TEST

To address research objective 2, and in line with the experiment conducted by Mizera (2006), the math span test (MSPANT) was administered to examine the extent to which this aspect of WM involved in a different cognitive processing correlates with L2 oral fluency or the use of FSs in this specific context. This test, adopted from Roberts and Gibson (2002) and Salthouse and Babcock (1991), measures the storage and information processing capacity of the non-language aspect of WM. The administration of this test was similar to the SSPANT. However, in this test, the participants were shown some easy subtraction and addition questions (e.g., 5+3=? 6-2=?). Each question appears on the computer screen for five seconds. In this procedure, the participants were required to perform two tasks. The first task was to answer the question aloud instantly, and the second task was to recall the second digit of each question in the same arrangement. At the end of the test, the participants were asked whether they have used some strategies to remember the target digits while doing the task.

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NON-WORD REPETITION TEST (NWRT)

To address research objective 2, a non-word repetition test (NWRT) adopted from Gathercole (1995) was selected to examine PSTM. In this auditory test, a group of 32 non-words (meaningless) was presented to the participants. The words were in four groups, ranging from the two-syllabic words and five syllabic-words. They were pronounced and recorded by an English native speaker and each word was produced after three seconds. The participants were asked to repeat the words immediately after hearing a pair of words and their voices were recorded. At the end, a linguistically sophisticated lecturer evaluated the participants' performance.

INTERVIEW

Considering the aims and nature of the present study for more comprehensible results regarding the two research objectives, semi-structured interviews were conducted. The interview consists of five questions adopted from the previous studies (Mizera, 2006; Tsou & Huang, 2012). All the participants of the treatment group (28) have been interviewed.

MATERIALS

Two types of materials were applied in this study: the normal content materials given to both the non-treated and treatment groups, and the treatment materials given only to the treatment group. The normal content materials were based on the preparatory English language course syllabus. Therefore, the instructor received the programs, lesson plan, and the schedule of examinations from the School Board directly. The preparatory English language course is a prerequisite for entering to the more advanced levels and the aim of passing this course is to improve the students' reading, speaking, and writing skills, as well as their vocabulary and grammatical knowledge. To promote noticing, automatization and memorization with a primary focus on the monologue speech, the experimental treatment encompassed the explicit instruction of FSs, fluency workshops, conscious-raising awareness activities, homework, individual practice, and group discussions based on the experiments conducted by Keller and Warner (2005), Nation (1989), Oberg and Pavlov (2013), Simpson-Vlach and Ellis (2010), Tsou and Huang (2012), and Wood (2010). The instructional sessions were conducted during a fifteen-week period including a session of 180 minutes per week (two sessions a week). The instruction generally included four stages (see Table 1 for more details).

TABLE 1. Treatment Procedures

Stage	Activity
1. The Input/ Comprehending Stage	Guessing the meaning of some FSs embedded within sentences or contextualized for depth of processing, Filling in the blanks with the appropriate FSs, Matching the statements and rewriting them by using FSs, Making sentences with the given target FSs, Ordering the scrambled paragraphs which included FSs, Adding the appropriate FSs in the provided texts, Completing the provided incomplete sentences including FSs, Essay writing based on the provided outline using FSs and comparing their own essay with the original one, Disappearing text, Introducing the chains and the framework of academic conversation features of Zwiers and

		Crawford (2009)
2.	**The Automatization Stage**	Gambits tests, Creating the role-play conversation, 4/3/2 fluency activity, Mingle jigsaw, and Dictogloss techniques
3.	**The Practice and Production Stage**	Speech production based on the given topics, outlines, and words
4.	**The Free Talk Stage**	Reporting the results of a survey based on the provided outline and words, Narrating a picture-cued task, Describing an event in their life. Examples of FSs: *as you can see, due to the fact that, it should be noted, a variety of, at the time of, and so forth, and so on, be used to, as shown in, in the next section, in order to, is affected by, as well as, in conjunction with, in other words, at the same time, point of view, in the case of,* and *referred to as.*

PROCEDURES

After running a pilot study and before conducting the actual study, the researchers administered a pre-test including the WMC tests and a spontaneous narrative monologue test to check the comparability and homogeneity of both groups. In order to evaluate the participants' WMC, a speaking span (SSPAN) test, a math span (MSPAN) test, and a non-word repetition (NWR) test were administered once. Moreover, a narrative monologue test was administered to assess the participants L2 oral fluency and their FSs knowledge. The pre-narrative monologue test and WMC tests were administered in the language laboratory at the target Malaysian public university. With regards to the nature of WMC tests, the researchers administered a trial set for each participant separately in the language laboratory. In the case of narrative monologue test, the participants were asked to produce their narratives spontaneously with no preparation time. While the participants were given 3-minute timeframe for this section, the researchers only considered one minute out of 3 minutes for data analysis because many participants were unable to speak for the full duration.

After conducting the pre-test, a specific treatment which generally encompassed the explicit instruction of FSs, fluency workshops, and conscious raising awareness activities was given to the EG. The normal content materials which were based on the preparatory English language course syllabus were given to the CG. After that, both groups were post-tested with the same tests administered in the pre-test, and 28 out of the 54 participants were also interviewed as interview is the most important instrument for gathering data in qualitative research studies to be able to better evaluate the participants.

SCORING PROCEDURE

The scoring procedure for SSPANT, MSPANT, and NWRT is outlined in Table 2.

TABLE 2. Scoring SSPANT, MSPANT and NWRT

Types of Tests	Types of Scoring	Explanation
SSPANT	**Strict score (STS)**	The repetition of correct form of the target word in the sentence (accuracy)
	Lenient score (LS)	Producing a word in its different form (fluency)
	Span score (SPANS)	The largest set of words, from two to six that the participants could carry out the task for three out of five times and it

		ranged from 0 to 6 (A half point was considered for those participants who could perform the task for two out of five times). The participants were required to produce the sentences which were syntactically and semantically grammatical.
MSPANT	**Total Score (TS)**	The total number of times out of 100 that the participants could answer the questions and recall the mentioned digits error-free, and it ranged from 0 to 100. No answer was a negative number, the digits in the questions were from 1 to 9, and the target digits were not similar successively.
	Span Score (SPANS)	The largest number of questions that the participants could perform the task in each set; that is, at least three out of five times and it ranged from 0 to 6. The participants would receive a half-point, if they could perform the task for two out of five times.
NWRT		The total number of the correct repetitions, and the maximum score was 32. The participants' responses were scored as correct or incorrect by a linguistically sophisticated lecturer (The participants should not delete or add a phoneme or change the stress of syllables, and also their production had to be phoneme switches-free. However, those changes which were due to their accent were not considered as a problem).
	Correct/Incorrect	

After recording and transcribing the participants' narrative monologue, the researchers employed the subsequent steps for preparing and scoring the raw data for further analysis. These steps were mainly adopted from sources such as Lennon (1990), Mizera (2006), Qi and Ding (2011), and Simpson-Vlach and Ellis (2010). Consider Table 3 for more details.

TABLE 3. Scoring the Quantitative Data

Step	Procedure
Data Cleaning	Deleting the repetitions, false starts, and self-repairs
Identification of FSs	Recognition of FSs by Test-Lex Compare v.3 software (Cobb, 2010), the native speaker's judgment, and following the previous scholars' categorization of FSs.
General criteria for the identification of FSs	* A FS should be made up two or more than two words. * A FS should be functioned as a phrase. * A FS should not be consisted of any pauses, whether silent pauses or filled pauses. * A FS should be mentioned in the dictionaries such as Longman Dictionary of Contemporary English (2003). * A FS should be confirmed by a native speaker.
Tallying FSs	Measuring FSs in terms of frequency and variation
Measuring L2 Oral Fluency	Measuring the number of pruned syllables produced per minute excluding corrections, repetitions, or SR. Measuring the mean length of runs or speed: the number of pruned syllables produced during hesitations Measuring the number of filled (non-words such as "uh" or "mmm") and unfilled inter-clauses and intra-clauses pauses occur per minute or smoothness. The number of pauses was measured both manually with the use of audacity software. The minimum amount of silent time which was set for measuring intra-clausal pauses was 400 msec, and for inter-clausal pauses was longer than 30 seconds. Measuring the morphosyntactic accuracy or the number of errors occurred

	per 100 words evaluated by two raters to check for the inter-rater reliability and measured based on the preposition accuracy, object-pronoun accuracy, copula accuracy, coordinate conjunction accuracy, subordinate conjunction accuracy, present-tense verb accuracy, past-tense verb accuracy, indicative accuracy, subjunctive accuracy, person accuracy: in both verbs and pronouns, coordinate-clause count, plural-adjective accuracy, plural-pronoun accuracy, plural-verb accuracy, feminine-adjective accuracy, feminine-pronoun accuracy, and subordinate-clause count. Furthermore, the participants' use of broad categories such as gender, number, person, tense, and mood were taken into consideration.

Furthermore, Table 4 demonstrates the applied steps list for scoring and analyzing the qualitative data (Creswell, 2012).

TABLE 4. Scoring the Qualitative Data (Interview)

Step	Procedure
1	collecting the data through recording the interviews
2	preparing the data through transcribing the recorded interviews and eliminating the redundancies
3	reading the transcription several times
4	getting the general conception of the material
5	determining the conceptions related to the research objectives
6	looking for the common themes
7	looking for the important individual differences and contextualization of themes
8	coding both text for themes and text for descriptions

RESULTS

PRELIMINARY DATA ANALYSIS

The results of sample characteristics indicated that the test scores were approximately normally distributed for each sample which paved the ground for conducting a t-test to identify any apparent differences between the two samples (refer to Table 5).

Moreover, the reliability coefficient of scores given by two raters on the participants' morphosyntactic accuracy was calculated. The inter-rater reliability coefficient was .97 for CG and .96 for EG ($r>.7$) in the pre-test. Lastly, the findings of an independent-sample t-test demonstrated that there was no significant difference in the mean L2 oral fluency related-variables scores and in the use of FSs in terms of frequency and variation at the $p\leq.05$ level for EG and CG. Additionally, the results of independent-samples t-test demonstrated that there was no significant difference in the mean NWRT scores, different scoring types of SSPANT and MSPANT at the $p\leq.05$ level for EG and CG.

Following these results which show the homogeneity of both groups, the subsequent section addresses the research objectives by comparing the mean scores of the participants' L2 oral fluency and FSs-related variables. The mean scores were evaluated both within- and between-groups. A correlational analysis was also performed between the scores of WMC related-tests with L2 oral fluency and FSs-related variables.

TABLE 5. The Results of Sample Characteristics

Group	N	Variable	SKEW	SE	KURT	SE
CG	26		.31	.456	-1.58	.887
EG	28	**SR**.	.80	.441	-.74	.858
CG	26		1.60	.456	-0.35	.887
EG	28	**Spd**.	.93	.441	-.46	.858
CG	26		.66	.456	-1.45	.887
EG	28	**Smth.**	.68	.441	-1.00	.858
CG	26		1.44	.456	-1.24	.887
EG	28	**Acc.**	.53	.441	-.33	.858
CG	26	**Freq. FSs**	1.19	.456	-.54	.887
EG	28		-.24	.441	-.64	.858
CG	26	**Var. FSs**	.33	.456	-.20	.887
EG	28		.39	.441	-.57	.858
CG	26	**WMC**	1.41	.456	-.31	.887
EG	28		.39	.441	.09	.858

THE EFFECTS OF EXPLICIT INSTRUCTION OF FSs ON THE USE OF FSs AND L2 ORAL FLUENCY

To address research objective 1, any change or improvement in the performance of subjects in the spontaneous narrative monologue test on their use of FSs in terms of frequency and variation as well as their L2 oral fluency-related variables including SR, Spd., smoothness and morphosyntactic accuracy has been reported. However, before conducting the descriptive and inferential statistics, reliability statistics for both groups' morphosyntactic accuracy in the post-test was conducted. The inter-rater reliability coefficient was .98 for the CG and .97 for the EG, indicating high inter-rater reliability (r>.7). As shown in Table 6, the independent-samples t-test indicated a significant change or increase at the p<.05 level for EG in some of the fluency-related variables including SR and Spd., respectively (M= 189.36; 10.77, SD=45.79; 4.86; t (43.51; 41.51) =-8.44; -5.28, *p*= .00] with the effect size of 2.2 for SR and 1.4 for Spd. (d>1.0). These effect sizes demonstrate a very large effect (Cohen, 1988, pp.21- 23). However, no significant change [M=104.46; 5.24, SD= 26.17; 2.56) was found for CG. This significant change in the mean scores of EG at time two was also checked by the within-groups comparisons. The paired-samples t-test indicated a significant increase in the participants' SR and Spd., respectively from Time 1 (M=109.93; 5.30, SD=39.66; 1.84) to Time 2 [M=189.36; 10.77, SD=45.79; 4.86; t (27) =-7.95; -5.66, *p*=.00] with the effect size of 1.6 for SR and 2.1 for Spd.

Another paired-samples t-test was also performed to compare any probable outstanding change in the scores of CG on L2 oral fluency-related variables. The findings of this statistical analysis demonstrated that there was no significant improvement at the probability level *p*<.05 in the results of CG from pre-test (M=103.00; 5.32, SD=28.48; 3.17) to post-test [M=104.46; 5.24, SD=26.17; 2.56; t (25) =-1.20; .246, *p*=.24; .81].

TABLE 6. Inferential Statistics of Between-and Within-Groups Mean L2 Oral Fluency-Related Variables Scores Comparisons

Group	N	Variable	Time	Mean	SD	t	df	p
CG	26	**SR**	-	104.46	26.17	-8.44	43.51	
EG	28		-	189.36	45.79			.00
CG	26	**Spd**	-	5.24	2.56	-5.28	41.51	

EG	28		-	10.77	4.86			.00
CG	26	**SR**	1	103.00	28.48			.24
CG	26	**SR**	2	104.46	26.17	-1.20	25	
EG	28	**SR**	1	109.93	39.66			.00
EG	28	**SR**	2	189.36	45.79	-7.95	27	
CG	26	**Spd**	1	5.32	3.17			.81
CG	26	**Spd**	2	5.24	2.56	.246	25	
EG	28	**Spd**	1	5.30	1.84			.00
EG	28	**Spd**	2	10.77	4.86	-5.66	27	

**. Difference is significant at the 0.01 level (2-tailed).

As seen from Table 7, the independent-samples t-test also revealed a significant difference in the mean of FSs-related variables values including frequency and variation, respectively (M=15.46; 7.61, SD=4.90; 1.83; t (48.52; 51.69) =-6.11; -5.79, *p*=000] for EG at the probability level *p*<.01 with the effect size of 1.6 for frequency and 1.5 for variation (d>1.0). However, no significant change [M=8.46; 4.92, SD=3.44; 1.57) was found for CG. The paired-samples t-test also exhibited that there was a significant difference at the probability level *p*<.01 in the mean FSs-related variables scores of EG that is, frequency and variation respectively in the pre-test (M=8.89; 4.96, SD=3.77; 1.83) and post-test [M=15.46; 7.61, SD=4.90; 1.83; t(27)=-6.29; -8.10, *p*=000] with the effect size of 1.3 for frequency and 1.5 for variation.

Another paired-samples t-test was administered to make a within-group comparison on the mean scores of CG as well. The findings demonstrated that there was no significant difference at the probability level *p*<.05 in CG's mean FSs-related variables values in the pre-test (M=8.12; 4.62, SD=3.83; 1.55) and post-test [M=8.46;4.92, SD=3.44; 1.57; t (25)=-1.81;-1.49, p=.08;.15].

TABLE 7. Inferential Statistics of Between-and Within-Groups Mean Scores for FSs Related-Variables Comparisons

Variable	Group	Time	N	Mean	SD	t	df	*p*
Freq. FSs	CG	-	26	8.46	3.44	-6.11**	48.52	.00
	EG	-	28	15.46	4.90			
Var. FSs	CG	-	26	4.92	1.57	-5.79**	51.69	
	EG	-	28	7.61	1.83			
Freq. FSs	CG	Time 1	26	8.12	3.83	-1.81	25	.08
		Time 2	26	8.46	3.44			
	EG	Time 1	28	8.89	3.77	-6.29**	27	.00
		Time 2	28	15.46	4.90			
Var. FSs	CG	Time 1	26	4.62	1.55	-1.49	25	.15
		Time 2	26	4.92	1.57			
	EG	Time 1	28	4.96	1.83	-8.10**	27	.00
		Time 2	28	7.61	1.83			

**.Difference is significant at the 0.00 level (2-tailed).

While some of the participants of the EG in their interview mentioned the difficulty in memorizing and retrieving FSs, the effect of other factors in speech fluency failure such as stress, lack of grammatical knowledge, interaction with native speakers, and the effect of reading in promoting speech fluency was revealed. For example, a female interviewee with 21 years old said that "*this type of oral teaching was very stressful, although such techniques are useful for improving my speaking skill, but I think learning FSs is very difficult, because a huge part of language is full of FSs*". Another female interviewee stated that "*I am not sure about the important role of FSs in L2 oral fluency, but I think interaction with the native speakers or reading newspaper*

is more effective than these types of techniques". The qualitative data also demonstrated the advantages of teaching and learning FSs. For example, one of the interviewees described FSs as fillers and stated "*FSs help us to improve our speaking and use them when we want to keep going in our oral performance or when we do not remember what we should say in that specific time*". Most of the interviewees in the EG mentioned that the proposed method of teaching and learning FSs to boost their oral fluency was more interesting and effective than the traditional method as it adopts different interesting activities. They believe that using FSs makes them more confident in creating a more organized speech and helps them make better communication with their peers. This is also in line with Foster's (2001) claim that by using FSs, L2 learners can have enough time to plan their speech.

THE CORRELATION BETWEEN THE WMC, USE OF FSs, AND L2 ORAL FLUENCY

To address research objective 2, after conducting the SSPAN, MSPAN, NWR tests and the spontaneous narrative monologue test, the Pearson's Product-Moment Correlation was administered. As seen from Table 8 only for CG, a moderate significant correlation was seen in the pre-test between TSs of MSPANT and variation in the use of FSs at the $p<.05$ level with the effect size of 1.0 (Fisher's Zr=0.4735/55.4%).

TABLE 8. *Both Pre-and Post-Tests Inferential Statistics for EG and CG in the Relationship between WMC Scores and FSs Scores*

			EG			
	Time	**Freq.FSs**	**Var.FSs**	**Time**	**Freq.FSs**	**Var.FSs**
LS.SST	Pre-Test	.245	.258	Post-Test	.040	.063
STS.SST	Pre-Test	.204	.350	Post-Test	.161	.103
SPS.SST	Pre-Test	.150	.288	Post-Test	.148	-.069
TS.MST	Pre-Test	-.121	-.102	Post-Test	.264	-.106
SPS.MST	Pre-Test	-.138	-.134	Post-Test	.210	-.246
NWRT	Pre-Test	.044	.290	Post-Test	.058	.183
			CG			
	Time	**Freq. FSs**	**Var. FSs**	**Time**	**Freq. FSs**	**Var. FSs**
LS.SST	Pre-Test	-.028	-.001	Post-Test	-.127	-.309
STS.SST	Pre-Test	.060	.081	Post-Test	-.105	-.261
SPS.SST	Pre-Test	.087	.141	Post-Test	-.216	-.267
TS.MST	Pre-Test	.189	.441*	Post-Test	.012	.064
SPS.MST	Pre-Test	.083	.274	Post-Test	-.005	.054
NWRT	Pre-Test	-.079	.061	Post-Test	-.222	-.234

**. Correlation is significant at the 0.01 level (2-tailed)

*. Correlation is significant at the 0.05 level (2-tailed)

Regarding the correlation between WMC and L2 oral fluency, as shown in Table 9, a small to moderate correlation, but negative (within the ranges -.37 to -.51) was found for EG in the post-test between the strict and SPANSs of SSPANT and morphosyntactic accuracy at the levels of $p<.05$ and $p<.01$, respectively with the effect sizes of -.81 and -1.16 (Fisher's Zr=-0.3954/47.4% &-0.5506/58.9%).

TABLE 9. Both Pre-and Post-Tests Inferential Statistics for EG in the Relationship between WMC and L2 Oral Fluency

Time	Variable	SR.	Spd.	Smth.	Acc.
Pre-test	**LS.SST**	.225	.209	.095	-.119
	STS.SST	.235	.182	.195	-.227
	SPS.SST	.274	.288	-.036	-.211
	TS.MST	-.187	-.194	-.062	-.149
	SPS.MST	-.219	-.223	-.054	-.271
	NWRT	.264	.289	-.064	.150
Post-test	**LS.SST**	.165	-.074	.036	-.177
	STS.SST	.248	.028	.027	-.376*
	SPS.SST	.116	.052	.029	-.501**
	TS.MST	.288	.207	-.227	-.132
	SPS.MST	.243	.230	-.249	-.269
	NWRT	.017	.215	-.058	-.025

**. Correlation is significant at the 0.01 level (2-tailed)

*. Correlation is significant at the 0.05 level (2-tailed)

In the same fashion, Table 10 shows a small to moderate correlation (within the ranges .40 to .44) between TSs and SPANSs of MSPANT with speech rate, respectively with the effect size of .9 (Fisher's Zr=0.4296 & 0.4489) which means 51.6%, and also between SPANSs of MSPANT and speed at the level of $p<.05$ with the effect size of 1.0 (Fisher's Zr=0.466/55.4%) for CG in the pre-test. Table 10 also represents a statistically significant negative correlation in the expected direction between SPANSs of SSPANT and morphosyntactic accuracy at the level of $p<.05$ which means that the higher span, the less errors with the effect size of -0.8 (Fisher's Zr=-0.413/47.4%). It also shows a small to moderate correlation for CG in the post-test between TSs and SPANSs of MSPANT with speech rate at the levels of $p<.01$ with the effect size of 1.4 and 1.0, respectively (Fisher's Zr=0.6505/68.1% &0.466/55.4%).

TABLE 10. Both pre-and post-tests inferential statistics for CG in the relationship between the WMC and L2 oral fluency

Time	Variable	SR.	Spd.	Smth.	Acc.
Pre-Test	**LS.SST**	-.194	-.330	.295	.012
	STS.SST	-.092	-.283	.225	-.048
	SPS.SST	.234	.202	-.265	-.293
	TS.MST	.405*	.321	-.047	.109
	SPS.MST	.421*	.435*	-.218	.218
	NWRT	.132	-.085	.107	.061
Post-Test	**LS.SST**	.260	.038	.077	-.292
	STS.SST	.220	-.008	.106	-.367
	SPS.SST	-.004	.151	-.144	-.391*
	TS.MST	.572**	.280	-.018	.269
	SPS.MST	.435*	.302	-.237	.322
	NWRT	.272	-.091	.078	-.101

**Correlation is significant at the 0.01 level (2-tailed)

*Correlation is significant at the 0.05 level(2-tailed)

The qualitative data extracted from the EG participants' interviews also revealed the positive effect of using strategies such as repetition, labeling fingers, imagination, imaging, memorizing the digits in their L1, and making acronyms strategies in performing WMC tests.

DISCUSSION

In the case of the effects of explicit instruction of FSs on L2 oral fluency and use of FSs, the results indicated that EG outperformed CG for some of the L2 oral fluency-related variables as well as FSs. The difference was significant at the level $p<.01$ which means that the improvement was attributable to the treatment, not by chance. In the same fashion, the interview data regarding the benefit of noticed-based or conscious raising awareness activities for teaching FSs in addition to fluency teaching echoed the quantitative results. The qualitative data (interview) revealed the positive perception of the participants towards the explicit instruction of FSs. They believe that using FSs can decrease the load on WM. For example, three participants, believe FSs help them to keep going the conversation with others when they cannot remember what to say and how to say at a specific situation. Moreover, the qualitative findings extracted from the interviewees are consistent with the findings reported in Ellis (2012), Natsumi (2014), and Taguchi (2013) which revealed that memorizing and retrieving FSs is also difficult for L2 learners. For example, an interviewee revealed that learning and retrieving FSs is stressful, time consuming, and difficult for her, while a huge part of English language is full of these FSs.

Furthermore, the results of this research support Wood's (2010) and Tsou and Huang's (2012) findings that asserted the considerable role of practicing FSs in increasing speech rate, speed, articulation rate, phonation/time ratio, the total range of pauses, the mean length of runs, and formula/run ratio. It also reinforces the assertions in the work of Ellis (2012) and Wray (2002) that FSs play a significant role in language instruction, fluency, processing, and idiomaticity. This is in line with the results of the studies conducted by Bakhshizadeh et al. (2015), McGuire and Larson-Hall (2017), Natsumi (2014), Nergis (2021), Rafieyan (2018), Van Vu and Peters (2022), Wood (2010), Yan (2020), and Yu (2022). Moreover, the participants made some internal and external errors in the use of FSs which is in line with Qi and Ding's (2011) results. This may be due to the fact that the mastery in the use of FSs is possible only after multiple encounters with the target sequences. In addition, L2 learners should have deep knowledge of FSs to be able to transfer FSs to their long-term memory which results in processing advantages (Boers & Lindstromberg, 2012). In fact, obtaining this kind of knowledge depends on the degree of frequency of FSs and the context in which they occur as several studies indicated that learning FSs tends to be slow and inaccurate (Natsumi, 2014). These results again emphasize the complicated nature of speaking skill.

In this study, no improvement was seen in the mean participants' morphosyntactic accuracy scores. Therefore, this study did not support the findings of Ellis' (1996) study which demonstrated that learning lexical bundles improves morphosyntactic accuracy, at least in this context.

Furthermore, the results obtained from the interview revealed the importance of some other factors for the participants' performance which is partly in line with Mizera's (2006) explanations, such as stress, grammatical proficiency, personal attitudes, environmental factors, interacting with native speakers, and reading newspapers. For example, four interviewees think the interaction with native speakers or reading newspapers is more effective for increasing their L2 oral fluency. They generally have problems in memorizing new pieces of vocabulary, and feeling stressed or thinking about grammar, sometimes makes retrieving FSs almost impossible at the disfluency times. They also believe they should focus more on the grammatical skill to be more confident during a speech

event. Furthermore, they shared that letting others to correct their grammatical errors is a good strategy to learn grammatical rules. They also referred to their used strategies while planning their speech whereby most of them use pauses and fillers such as *em* and *eh* which is a very common strategy in Malaysian English. One of the participants indirectly stated the effect of unconscious mind in learning, saying " *No need to learn FSs explicitly, we can learn them through reading and use them automatically*". Two interviewees indirectly referred to the environmental factors as well as L1 transfer. They very often use their mother tongue outside the academia for their families' lack of education. They also referred to some influential factors such as stress when they have a formal presentation. Oral presentation anxiety has a negative influence on non-native learners of English not only in ESL context, but also in EFL context as reported by Fong et al. (2022) in Malaysian context and Ka-kan-dee and Al-Shaibani (2018) in Thai context, respectively. The former stated that ESL Malaysian Chinese students in a private university showed moderate levels of presentation anxiety. The latter stated that the majority of Thai EFL students have high Oral Communication Apprehension (OCA) levels in all communication contexts. Both studies recommended a rehearsal as it is one of the best coping strategies in this respect.

Pertaining to the correlation between WMC and the use of FSs, no high correlation was found between WMC of the participants in EG and their use of FSs in terms of frequency and variation; the discovered small correlations cannot be generalized. Therefore, the results of this experiment are not consistent with Weissheimer and Mota′s (2011) results which revealed that the higher span individuals with the intermediate proficiency level tend to use more FSs than novel words which may be due to the existence of competing purposes in speech performance. The reason of this inconsistency may be due to the instrumentation and design or methodology used in the past studies. Moreover, the results of the current study did not support Mizera's (2006) statement when getting high level of proficiency, the effect of other factors such as motivation becomes bolder than WM. On the contrary, our findings revealed the role of the WM in the participants' L2 oral fluency was stronger after they had received the treatment. In fact, this study is different from Mizera′s (2006) experiment in several aspects. For example, WMC tests in Mizera′s (2006) experiment were administered in the participants' native language to prevent from any possible influence of L2 proficiency in their performance because Mizera considered WMC as a language-independent faculty. However, in this study, WMC tests were administered in English language, and the results support the view that WM is language-dependent and content-independent faculty (Ellis, 1996; Fortkamp, 1999; Harrington & Sawyer, 1992; Temple, 1997; Williams & Lovatt, 2003).

The results of this study can be explained by referring to Baddeley et al.′s (1988) findings in which a significant relationship between PSTM and learning unfamiliar words was discovered. However, in the case of correlation between WMC or PSTM and L2 oral fluency, no statistically significant correlation was found at least at the hypothesized level (+/-.7 or higher). Furthermore, our findings demonstrated the role of WMC on language learning is bolder among low-proficient learners which is partly in line with the results of the studies conducted by (Fortkamp, 1999; Kormos & Sáfár′s, 2008; Martin & Ellis, 2012; Temple, 1997). Following previous studies such as Daneman & Green (1986), our findings also support the task-specific view and that the effect of WM on language is skill-specific (Cantor & Engle, 1993; Conway & Engle, 1994).

Regarding the performance of the participants in the WM tests, both qualitative and quantitative data revealed the performance of these students who applied cognitive strategies is better than the performance of those who have not applied such strategies. In fact, the cognitive strategies help the students to perform the complicated tasks (Rosenshine, 1997).

CONCLUSION

Research on L2 oral fluency and the possible influential factors on it has been well-established; nevertheless, the role of formulaic sequences and working memory capacity on L2 oral fluency have received little attention. Therefore, this empirical study was devoted to this area and it was different from the previous studies in its focus and results. This research by integrating both the communicative and cognitive approaches would benefit the curriculum and syllabus designers, test developers, and instructors. Overall, it can be said that considering both the analytic processing system and holistic processing system in language learning is very effective in the holistic educational system to develop both creativity and formulacity aspects of language for quality education. In sum, the findings of the present study have significant implications for solving the Malaysian ESL learners speaking skill in general and their oral fluency in particular, especially when they are not able to what to say or how to say or to create new sequences. Therefore, the significant role of FSs in second language learning and teaching should not be neglected. It is hoped the present study with introducing a systematic framework and instructional methodology eliminates some of the shortcomings that Malaysian undergraduate students may have in English language learning in general, and specifically L2 oral fluency. However, since the qualitative findings of this research has also revealed some possible influential factors such as environmental factors and grammatical proficiency, more studies with different methodologies, instruments, treatment, test techniques, and also with bigger sample size in different contexts should be conducted for more accurate information on this topic.

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