Effectiveness of a dynamic usage based computer assisted language program

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The current paper explores whether a Dynamic Usage Based (DUB) approach – which takes authentic meaningful language use with repetition and scaffolding for comprehension as its basis – can also be implemented in a CALL environment. The effectiveness of the DUB-CALL program was tested in a semester-long experiment, comparing it with a teacher-fronted DUB program (using the same materials as the CALL program) and a traditional CLT program; 228 university undergraduates in Sri Lanka participated. Language gains were assessed in a pre-post design with an objective General English Proficiency (GEP) test and a writing task. The results show that the students in the DUB-CALL condition performed significantly better on the GEP test than the students in the two teacher-fronted classes. The results of the writing tests show that all groups improved significantly, but here there were no differences among groups.

Keywords: computer assisted language learning, dynamic usage based approach, L2 instruction, effectiveness study

1. Introduction

Since the introduction of communicative language teaching (CLT), the approaches to teaching English as a second/foreign language have seen a shift, which Long (1997) likened to a revolution. CLT gives precedence to communication over form and rejects previous structural approaches to language learning. It embraces the use of authentic texts, texts that are created for genuine communicative purposes rather than for use in the language classroom. The focus is on teaching of communication through language and not on the teaching of language as a subject (Allwright, 1979).
As a global trend, CLT approaches came to be introduced in schools and universities in the late 1980s. However, in practice, many so-called CLT approaches are not really implemented as they were originally conceived. This is especially true in environments which are faced with large student numbers of various proficiency levels and confined classroom spaces, leading to a reality where it is hard to put students into small subgroups. This is often seen in the Asian context and has been described in detail for the Vietnamese context (cf. Hong, 2013). In Sri-Lanka, too, studies have found the CLT approach to be largely unsuccessful, also because providing authentic input has proven difficult here (Nagasundaram, 1996). One way to tackle the confounding problems of large class sizes and various proficiency levels is to introduce a CLT-inspired computer-assisted language learning (CALL) program.

In this study, the effectiveness of such a CALL program is explored by means of a pre-test post-test design using 228 university undergraduates enrolled in English as a second language classes at a Sri Lankan university. The main aim of this study is to assess whether a CALL program can lead to a successful implementation of CLT in a context where it has proven to be difficult to implement, as its ultimate aim is to see if greater individually-tailored progress can be achieved.

2. Rationale for a dynamic usage based teaching approach

Most current CLT approaches are originally inspired by notional-functional approaches to language as, for example, Wilkins (1976) advocated. These approaches take the communicative rather than the purely linguistic needs of the learner as a starting point. Up until the introduction of CLT, most language teachers took a structural approach towards their teaching, mostly treating specific linguistic structures such as verb tenses and verb forms and lexical items in isolation, which are expected to be assembled online by the learner when needed. In other words, the language is taught as a set of rules that needs to be mastered to be able to use the language meaningfully. Very little authentic input is provided in the course of such a structurally-based approach to language use and learning.

Such a structure-based view of language use and learning, however, is put into question by dynamic usage based (DUB) theoretical insights (Verspoor, 2017). In DUB theory, linguistic units are defined as symbolic units or form-meaning mappings, conventionalized in the speech community and entrenched as language knowledge in the learner’s mind (Langacker, 2008). Thus, DUB linguists argue that language is not a rule-driven entity, but a dynamic set of conventions learned by experience in a bottom-up process; conventions at many interacting levels are learned through repetition and become routinized incrementally and eventually
schematized (Schmid, 2015). From this perspective, teaching language as fragmented forms to be pieced together by the learner is not in line with how language in general is structured and used.

Within a DUB perspective, Schmid (2017) argues that the actual learning takes place through association. There are four types of association as illustrated with the conventionalized utterance, *If you know what I mean.*

- A symbolic association is a form-meaning link. The form /mi:n/ is associated with meaning ‘think, want to convey’.
- A syntagmatic association is provided by the sequential order. *If* is followed by *you, you* is followed by *know*, and so on.
- A paradigmatic association is a link with a potential alternative; *know* can be associated with *believe, assume, and be aware of* and the whole phrase can be associated with *you know, you see*.
- A pragmatic association is the inferred meaning association of the communicative utterance within the actual context. The whole phrase is pragmatically associated with a request for confirmation; *I* is pragmatically associated with the speaker, *you* with the hearer. As these associations are formed one by one, a large number of repetitions of related utterances are required before learners can reproduce them as a whole and automatize them. Then, after enough exposure and use, schematization – the recognition and production of the general patterns in these utterances – emerges inductively.

Following Tomasello (2003), Schmid (2017) suggests that L1 development moves from holophrases, short word combinations, pivot schemas, low-level schemas to more complex schemas. As far as L2 learning is concerned, Verspoor (2017) argues that even though L2 learners are different from L1 learners in that they are usually conceptually and cognitively more mature and have an entrenched L1, a similar process is likely to take place. Therefore, exposure to and repetition of meaningful utterances within a meaningful context is more useful in learning an L2 than making learners aware of the “rules” of the language. Langacker also stresses the fact that ‘learning’ or ‘exposure’ should “occur in meaningful context exchanges, approximating socially and culturally normal usage events” (2008, p.81). Thus, if second language teaching is to be effective, it should focus on multiple exposures to conventional units (also referred to as linguistic constructions, multi-word expressions, and formulaic sequences) in meaningful real-life contexts. An L2 teaching approach that is built on DUB principles should therefore include not only a great deal of exposure and use of the target language but also build in as much repetition as possible, especially for beginners. For symbolic associations to be made, the target language should be offered in a clear meaningful context so that learners can deduce the meaning, perhaps with some scaffolding help of the
teacher. For syntagmatic associations to be made, phrases and longer utterances should be offered as a whole. Even though single words may need to be focused on sometimes, they should be offered within its meaningful context. For paradigmatic associations to be made, there should be a natural variety in the language utterances offered. And finally, for pragmatic associations to be made, the utterances should be offered within a meaningful, authentic context so that the learner can associate utterances with their sociocultural context.

To emphasize the fact that conventionalized form-meaning mappings – usually called constructions in the usage based literature – also include pragmatic associations, Verspoor (2017) has called these units form-use-meaning-mappings (FUMMs). FUMMs are conventionalized constructions that may be very schematic such as a conventionalized sentence pattern or a plural morpheme or very specific such as an idiom (storm in a teacup, sweep under the rug), a fixed phrase (in vitro, by and large, rock ’n roll), a noun compound (olive oil, laser printer), a compound verb (take a nap, bring about), or a conventionalized way of saying things (CWOSTs) such as If you know what I mean.

3. Principles of a DUB teaching approach

A DUB approach to second language teaching (Verspoor, 2017) takes a holistic approach in that it presents complete FUMMs with their symbolic, syntagmatic, paradigmatic, and pragmatic associations in meaningful and real-life contexts. There are several principles to this approach:

Competing attentional resources and exposure first

Taking a dynamic perspective on the mind, in which cognitive resources are limited and may compete early on and attention is selective (Skehan & Foster, 1997), the focus is first on exposure or input. There is no doubt that language input is essential in second language development (Gass, 2013; VanPatten, 2004). What has been stipulated is that L2 learners require extensive second language exposure as language input to build their internal linguistic systems and that input needs to be easily comprehensible and message-oriented in order to be processed effectively by learners. This view is very much in line with Krashen’s influential input hypothesis (1981), which claims that for second language acquisition (SLA) to take place, language learners have to have exposure to comprehensible language which is authentic, interesting and/or relevant, not grammatically sequenced, and includes language structures that are beyond their current level (i+1). However, Krashen, (1981) claims that comprehensible language input is “the only causative variable in
SLA” (p. 57). We believe this claim is too strong, as output in meaningful interaction will also be needed to become proficient, but we do suggest that a strong prerequisite for development is adequate amounts of input. First, the learner has to hear utterances frequently enough to be able to produce them him or herself.

Frequency of exposure through repetition

Repetition of similar utterances is another important aspect of a DUB approach and is in line with the importance of frequency of exposure for second language acquisition. Ellis claims that “(...) the acquisition of language is exemplar based. It is the piecemeal learning of many thousands of constructions and the frequency-biased abstraction of regularities within them” (2002, p. 143). According to Langacker (1987), abstraction of regularities happens through the process of “entrenchment” (p. 59). Langacker refers to entrenchment as being the result of repetitions of cognitive events, that is, by “cognitive occurrences of any degree of complexity” (p. 100). Thus, the degree of entrenchment of a cognitive or linguistic unit correlates with its frequency of use, and in instruction this means that units have to be heard often, which can be achieved by building in repetition.

Associative learning through real life exemplars

The FUMMs that are offered as input and that are repeated often should be as authentic as possible and reflect how real target language users use them meaningfully in real-life contexts so that all relevant associations can be made. Authentic materials are examples of oral and written language used by native speakers in daily situations for their own purpose (Rogers & Medley, 1988) and not language specifically produced and designed for language teaching. Tomlinson and Masuhara view authentic language as “designed not to transmit declarative knowledge about the target language but rather to provide an experience of the language in use” (2010, p. 400). Based on these definitions, sources from which authentic materials can be obtained for second language teaching are advertisements, newspapers, magazines, pictures, symbols, radio news, TV programmes, movies, songs, literature, and the internet (Hong, 2013). To be able to create an L2 instructional program that meets DUB needs, Verspoor and Hong (2013) decided to take a popular movie as the basis for the program. The main reason is that good movies usually emulate real life situations and provide good examples of target language utterances in a cultural, social, and pragmatic context, which the teacher can explain by asking leading or probing questions to extend or elaborate the knowledge the learner already possesses. The advantage of showing movie segments sequentially is not only that they establish ‘common ground’ needed to understand utterances in their context
but also work as a ‘soap opera’ in creating interest and curiosity about what happens next. The greatest advantage is that movie scenes can easily be repeated so that the learner can receive the needed repetition and opportunity to notice features that may be missed in single viewings.

Many scholars have already pointed out that using movie segments for language teaching can be beneficial in many ways: Pezdek, Lehrer, and Simon (1984) found that movie fragments help enhance memory and recovery of information in reading and listening. Abbs, Cook, and Underwood (1980) point out that the use of movies is very much in line with early communicative approaches. For example, in line with the natural approach (Krashen & Terrell, 1983), movies may provide authentic input with a focus on meaning and communication and in line with Roberts (1986), the use of authentic sounding dialogues may help develop pragmatic competence.

Comprehension and noticing through teacher scaffolding

Despite receiving visual cues in a meaningful context through the medium of for instance movies, an absolute beginner may not be able to understand the meaning of a real-life utterance without help, and leaving the learner to his or her own devices may be demotivating. Here, the teacher is essential. The teacher needs to scaffold for understanding, preferably but not exclusively in the target language. Dickson, Chard, and Simmons defined instructional scaffolding as “the systematic sequencing of prompted content, materials, tasks, and teacher and peer support to optimize learning” (1993, p.12). Herrell and Jordan (2015) stated that second language learners particularly benefit from so called visual scaffolding, which includes images and words that can be both seen and heard, thus creating a context for multi-modal learning. The image or key words can serve to make the input considerably more comprehensible. Teachers will have to anticipate where problems in understanding may occur and make sure the learners obtain as much help as needed. In the DUB programmes in the current study, where relevant, utterances are explained by means of both verbal (paraphrasing in the target language or L2 to L1 translation) and visual scaffolding. Also, non-salient forms in the utterances are written out in full to help learners notice them. For example, an utterance such as you'd better go in which the d sound is hardly audible and noticeable is written down not only as it is but also in its full form you had better go. The teacher may then point out that the d is short for had. Besides explaining what the utterances mean, the teacher can also point out the pragmatic effects of specific utterances and elaborate on interesting cultural implications. In short, movie segments provide authentic input that may be repeated as often as needed, but it is the teacher who makes it comprehensible.
4. Rationale for a DUB-CALL program

In a teacher-fronted DUB inspired class, it is the teacher who needs to decide whether learners need to hear an utterance again or not and especially in heterogeneous classes, the danger is that it is not repeated often enough for some students and too often for others, who may get bored. Therefore, the idea arose to build a CALL program based on a movie in which all the DUB principles – including scaffolding and repetition – were incorporated so that learners could pace themselves through the materials.

CALL tools and programs have greatly increased in popularity in the second language classroom in recent years. Bidlake (2009, p.94) argues that “with the advancement of multimedia technologies, such as interactive video and voice recognition software, self-instructed CALL is becoming a popular alternative to more traditional self-instruction materials”. Multimedia materials enable language learners to practise language through a multitude of modalities, at their own pace, choosing their own route through the learning materials. Reinders and Hubbard state that “Multimedia resources may also give learners more control over the way they access target language input. For example, a movie can be watched with or without subtitles. Individual learner preferences and learning styles can thus be accommodated more easily” (Reinders & Hubbard, 2013, p.8). Indeed, the control feature available in multimedia gives the learner the opportunity to choose the pace and path of the learning process. It is also reported that through adjustment of the “amount and difficulty of input”, working at one’s own pace, for instance, and through scaffolding, learners can avoid the danger of frustration they might otherwise have faced through “information overload” (Pennington, 1996, p.9; cf. Kao & Windeatt, 2014, p.4).

Research regarding the effectiveness of technology-based self-paced instruction reveals that “this type of instruction improves performance and that students master the learning objectives in significantly less time than students in group-paced instruction” (Dobrovolny, 2006, p.55). In addition, it promotes student-centred learning in which students assume greater responsibility for their learning. In self-paced learning, the learner has the advantage of determining the learning sequence, pace of learning, and possibly the media. For example, high-ability learners may take a non-linear path and may not follow the chronological pattern of lessons or a slower pace, thereby using the time spent in learning more efficiently (Soyemi, Ogunyinka, & Soyemi, 2011). However, despite the great advantages that CALL may have, the field has seen many CALL software applications which “do not incorporate research-based insights that informed SLA scholarship might have given them” (Lafford, Lafford, & Sykes, 2007, p.516).
Moreover, the research in L2 CALL instruction suffers from important limitations. Few, if any, CALL methods have been tested and compared for effectiveness on general proficiency gains (see Grgurović, Chapelle, & Shelley, 2013). Even in non-CALL studies, investigations into instructional effects are often limited to short-term interventions, and as such variables such as amount of exposure are not sufficiently controlled for and most importantly studies may not be ecologically valid in that they have not compared similar students in similar educational programs (Norris & Ortega, 2000).

The current study is an exception in that it is theoretically grounded and compares the effectiveness of an L2 English, CALL application (DUBc) to both a teacher-fronted method with the same materials in PowerPoint format (DUBp) and a traditional communicative language teaching method (tCLT) in a semester-long experiment.

5. The study

The problem at the Sri Lanka university where the current study took place is that there are students of very different levels of English proficiency in oversized groups, and there are not enough qualified teachers to teach them. The main question was whether a CALL environment could be developed that would be as effective as a teacher fronted group. An effective CALL program might alleviate some of the problems of oversized groups and lack of teaching staff.

To develop the CALL program, the authors based themselves on a dynamic usage based (DUB) approach centered on a movie previously developed by Verspoor and Hong (2013). In Vietnam, it was tested on false beginners, and the approach proved to be more effective than the CLT approach used traditionally at that university. The current study is in part a replication of Verspoor and Hong (2013) in that it compares the traditionally used CLT approach at the Sri Lanka university (called the tCLT condition in our study) to the newly developed DUB approach (called the DUBt condition in our study). In addition, the DUB approach was transferred to a CALL environment. The effectiveness of the three approaches was compared by means of an objective general English proficiency (GEP) test and a writing assignment. Both groups in the DUB movie approach condition were also asked to comment on their respective classes.

Thus, to investigate the effectiveness of two DUB inspired teaching programs, one CALL and one teacher-fronted, and a traditionally taught CLT course, the following research questions guided the study:
1. Is a DUB inspired program more effective than a traditionally taught CLT course?
2. Is a DUB inspired CALL program more effective than a teacher-fronted DUB program?

5.1 Subjects/participants

Seven classes of students, comprising in total 228 registered students of the Faculty of Management Studies and Commerce (FMSC), University of Sri Jayewardenepura participated in the current study, which took place in the second semester of the academic year 2011–2012. There were 135 women and 93 men and the students had a mean age of 20 (range: 20 to 22).

The seven intact classes were assigned randomly to three conditions:

1. one class of 55 students (29 females/26 males) to the CALL-based DUB condition (DUBc),
2. three classes of 100 students (62 females/38 males) to the teacher-fronted DUB condition (DUBp),
3. three classes of 73 students (44 females/29 males) to a traditional Communicative Language Teaching programme (tCLT).

However, at the data analysis stage, 10 participants from the DUBp condition and one each from the tCLT and DUBc conditions were excluded from the quantitative analyses of the general English test because they had either not written their names clearly on the test paper or had not taken one of the general English proficiency tests (either the pre-test or the post-test), resulting in 54 DUBc students, 90 DUBp students and 72 tCLT students.

5.2 Teacher participants

Nine female tutors and one male instructor/computer technician affiliated to FMSC participated. The nine tutors and the instructor whose average age was thirty years ($M=30$, $SD=1.05$) were all experienced in their respective areas of expertise, either in teaching English as a second language at tertiary level or in computer science.

Even though the researcher had originally planned to control for teachers in the sense of getting the same teacher to teach both a DUBp and a tCLT group, it proved impossible to do so due to practical reasons. Hence, six different tutors taught the three DUBp and the three tCLT groups.

Three teachers, the computer technician, and the researcher were present in the computer lab to assist the DUBc participants in case they needed any technical
assistance. Most students in Sri Lanka are quite knowledgeable about computers; nevertheless, the researcher sought the assistance of the teachers and the computer technician to avoid problems of a technical nature.

5.3 Instructional materials

5.3.1 DUBc and DUBp

The DUBc and DUBp instructional approaches were very similar in that they consisted of a pedagogical sequence based on the principles of a DUB approach to second language teaching as outlined in Section 3. They were both multimedia instructional approaches that provided authentic input with the movie The Pursuit of Happyness (Alper [Producer] & Muccino [Director], 2006). This movie was chosen because it dealt with business situations that would be of interest to the Management students and had an interesting and inspirational storyline.

The main difference between the two approaches was in the mode of delivery of the instructional materials. The DUBc materials were delivered through a self-instructional material-centred multimedia computer program. The DUBp was delivered by a teacher, using a face-to-face delivery mode in a PowerPoint-based multimedia format. For the DUBc condition, the PowerPoint-based multimedia instructions of the DUBp condition were transformed into 34 e-learning lessons (modules) through CourseLab developed by the Russian company WebSoft Ltd (© WebSoft Ltd., Russia), an e-learning authoring tool, and published on CD-ROMs for easy transferral to the university computers. In the DUBc condition, a computer was assigned to each participant who worked at her/his own pace in an individual learning environment.

Both instructional programmes (DUBp and DUBc) consisted of an introduction (the movie trailer) and 33 scenes of the film, and the design layout was consistent for each scene. Since the objective of a DUB approach to second language teaching is that learners should understand everything, for instance everything the characters say in a movie segment, including the intended meaning of the utterances, the movie segments were shown repeatedly to the students and all the utterances were explained in detail, the rationale being that upon each viewing the students could focus on different aspects. Each movie segment was taught in six steps that would help the learners understand everything:

Step 1: The learners were asked to watch the scene without sub-titles. The goal was to have students pay attention to the images and events in the scene to get the gist of what was happening. A very general question was asked such as Where are the son and father going? to activate thinking and deduction skills.
Step 2: The learners watched the same scene with English subtitles. The goal was to have students pay attention to what the characters said. This step could be repeated when needed.

Step 3: The learners saw and heard each utterance of the scene on separate slides with explanations. The goal was to help students understand each utterance through scaffolding by means of paraphrases, illustrations, or where needed an L1 translation (in Sinhala and Tamil). Where appropriate, not only the literal meaning but also the intended, pragmatic meaning was explained.

Step 4: The learners saw the whole scene again with sub-titles in the DUBp condition and with the text with items that could be clicked on for explanation in the DUBc condition. The goal was to consolidate comprehension. In the DUBp condition, the students were able to ask the teacher for explanations of the utterances that the participants found difficult to understand.

Step 5: The scene was shown once more but now without sub-titles. The goal was to expose the learners once more to the scene and give them a sense of accomplishment in understanding the scene completely.

Step 6: The students took a brief comprehension quiz consisting of (1) True/False questions, (2) Ordering questions (learners were asked to listen and reorder a number of jumbled phrases/sentences), and (3) Fill in the blank questions. These questions ranged in difficulty from simple, general questions to very specific questions and tested different linguistic skills (reading, listening and writing). The questions were displayed on a power point slide for the DUBp participants while the DUBc attempted them on the question screen. The goal was to revisit the language utterances once more and give students a sense of accomplishment.

Although it is not possible to control for all variables in an ecologically valid environment, the DUBc and DUBp programmes were quite similar. The main difference was that students could determine their own rate of learning in the DUBc condition as they were able to repeat or skip steps where preferred. In the DUBp condition, the rate was determined by the teacher.

5.3.2 tCLT

The tCLT group took the Business Communication II course conducted by the Faculty for the first-year, second-semester students. As such, they used the course materials that were specially designed for the undergraduates of the Faculty, based broadly on the CLT approach.
The Business Communication II course is an integrated skills course which attempts to develop the learners’ skills in reading, writing, speaking, listening, grammar, and vocabulary. Each student was given a copy of the course manual which was divided into thematic units. Students were to work both individually and in groups on the exercises, and the teachers were advised to use cooperative learning as an instructional strategy.

5.4 Measures and procedures

The intervention lasted thirteen weeks, and improvement was assessed by means of a pre-test post-test design. All students met two days a week for two hours. However, some DUBc students finished their programme at different rates. Some took only 10 hours to complete the course and others 20 hours.

The same test battery was administered before and after the intervention: a general objective English proficiency test (GEP) and a writing component. The GEP was the same test that Hong (2013) used for her study and was pilot tested again in the current study. It consisted of 68 items tapping vocabulary, grammar, pronunciation, reading, cloze, dialogue matching, and listening. (See Appendix for the full test). Each correct answer was given a score of 1 and each wrong answer was given a 0. The maximum possible score was 68. Consistency of the GEP scores was good, with Cronbach’s alpha equal to 0.88 for both the pre-test and the post-test. The correlation between the pre-test scores and the post-test scores (i.e. the total score per participant on the test) was $r = .71$ ($p < .01$).

An informal writing task was administered after the GEP test. The aim was to measure how well a learner spontaneously wrote in the target language. In order to motivate the students to write as well as possible, they were given a choice of topics: *My best friend, The most unforgettable day in my life, My goals and dreams for the future, My hometown.* These topics were assumed to elicit similar genres and impose little or no constraints on the participants, and the open and free nature of the tasks allowed students with different levels of English proficiency to attempt the task, as they did not demand the use of specific grammatical or particular lexical items. No word limit was imposed as text length can also provide an indication of proficiency. However, the participants had to complete the general English proficiency test and the writing task within the stipulated time, which was 70 minutes for the whole test.

The written texts were rated and analyzed separately as follows: The 146 texts written by the 73 participants at the pre-test and the post-test, computer typed exactly as written by the participants, were rated all at the same time holistically by four independent raters. As in Verspoor, Schmid, and Xu, (2012), the texts were rated on a scale ranging from 1 (for the weakest papers among the samples) to
7 (for the strongest papers among the samples). That is, after training, the raters were requested to give a holistic overall score on each text. The four raters rated the texts independently. The raters (four females), who were unaware of the experimental set up, were experienced second language writing teachers from the Faculty of Management Studies and Commerce, University of Sri Jayewardenepura. The only information that was given to them was that the texts were produced by first-year undergraduates who were participants in the researcher’s PhD study. For the writing scores (of the four raters), consistency was acceptable (Cronbach’s alpha: 0.75 for the pre-test and 0.69 for the post-test). The correlation between the (average) pre-test scores and the post-test scores (averaged) was $r = .66 (p < .01)$.

Student participants were also asked to provide their written feedback anonymously at the end of the intervention – in either Sinhala, Tamil, or English – on the strengths and weaknesses of the intervention they had received and thus to evaluate their intervention programmes. This was only done for the two DUB conditions. Their responses will be briefly summarized in the discussion.

### 6. Analysis approach

R 3.2.3 (R Core Team, 2015) and the Statistical Package for Social Science (SPSS) Version 16.0 were used for the analyses. As a first step, Cronbach’s alpha reliability analyses were performed to ensure that the general English proficiency pre and post-test scores showed internal consistency. Next, a Pearson’s product-moment correlation was computed to assess the relationship between the pre-test and post-test scores of the general English proficiency and writing. Then, a one-way ANOVA was computed on the pre-test scores of the three conditions to examine if there were differences between the means of DUBp, tCLT, and DUBc conditions at the outset of the study.

To assess the influence of the type of intervention type on the general English proficiency (GEP) performance, we fitted a mixed-effects logistic regression model (Baayen, 2008, Ch. 7; Baayen, Davidson, & Bates, 2008) with the correctness (i.e. correct, 1, or incorrect, 0) of each answer as dependent variable. By using mixed-effects regression, we were able to take into account the variability per participant, class and question (i.e. these are the random-effect factors). We used logistic regression, as our dependent variable is binary (1: correct; 0: incorrect). Consequently, the estimates need to be interpreted with respect to the logit (i.e. the logarithm of the odds of observing a correct vs. an incorrect answer) scale. This means that positive estimates indicate a higher probability of observing a correct answer, whereas a negative estimate indicates the opposite. The total number of observations in our dataset was equal to 29,376 (216 participants × 68 questions × 2
tests). In our analysis, we assessed the influence of the fixed-effect factors “Condition” (the type of training program: DUBc, DUBp, and tCLT) and “Test” (either pre-test or post-test). To obtain the best model, both with respect to the optimal random-effects structure and the best fixed-effects structure, we used AIC comparisons (Akaike, 1974). A lower AIC indicates a better fitting model, while taking into account the complexity of the model. The AIC difference is related to the evidence ratio (i.e. how much more likely the more complex model is to fit the data than the simpler model). The relation between the evidence ratio and the AIC difference is $e^{^\text{AIC difference} / 2}$. A threshold of 2 as AIC difference was used to favour a more complex model (with lower AIC) over a simpler one (with higher AIC), and therefore indicates that the more complex model needs to be at least 2.7 times more likely to fit the data than the simpler model (with higher AIC). Fixed-effect predictors were considered to be significant in the final model summary if their two-tailed p-value was lower than .05.

To assess the influence on the students’ writing performance, a similar approach was followed as above, with the only difference being that instead of a mixed-effects logistic regression model, a mixed-effects linear regression model was fitted (as raters gave a numeric score between 1 and 7). Consequently, estimates directly reflected the influence on the actual score. Furthermore, as the individual scores of all four raters were included (i.e. the total number of observations was equal to 216 participants × 4 raters × 2 tests = 1728 observations), we assessed the inclusion of the random-effect factors participant, class and rater.

6.1 Results

GEP scores

The general English proficiency pre-test scores of the participants were inspected to determine if they were at the same level of English proficiency at the beginning of the study. For this purpose, a one-way ANOVA was conducted on the pre-test GEP and writing scores. Table 1 presents the GEP scores and writing performance (pre-test and post-test) measures separated by the type of training program.

The results of the one-way ANOVA indicated that there were no statistically significant a priori differences in the GEP pre-test variable between the means of the DUBc, DUBp, and tCLT conditions, $F(2, 213) = .232, p = .79$. However, with respect to the writing pre-test variable, there were statistically significant differences between the three conditions, $F(2, 213) = 5.5, p < .005$. A Bonferroni posthoc procedure revealed that the DUBc group scored significantly lower on the writing task in the pre-test than the DUBp group ($p = .004$). There was no difference between the tCLT group versus either the DUBp or DUBc conditions.
Table 1. Mean and standard deviation of GEP and writing performance (pre-test and post-test) measures by condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>Measure</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUBc (N=54)</td>
<td>GEP</td>
<td>Pre-test</td>
<td>43.31</td>
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<tr>
<td>DUBc (N=54)</td>
<td></td>
<td>Post-test</td>
<td>50</td>
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<tr>
<td>DUBc (N=54)</td>
<td>Writing</td>
<td>Pre-test</td>
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<td></td>
<td>Post-test</td>
<td>3.14</td>
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<tr>
<td>DUBp (N=90)</td>
<td>GEP</td>
<td>Pre-test</td>
<td>43.88</td>
</tr>
<tr>
<td>DUBp (N=90)</td>
<td></td>
<td>Post-test</td>
<td>49.18</td>
</tr>
<tr>
<td>DUBp (N=90)</td>
<td>Writing</td>
<td>Pre-test</td>
<td>3.25</td>
</tr>
<tr>
<td>DUBp (N=90)</td>
<td></td>
<td>Post-test</td>
<td>3.76</td>
</tr>
<tr>
<td>tCLT (N=72)</td>
<td>GEP</td>
<td>Pre-test</td>
<td>43</td>
</tr>
<tr>
<td>tCLT (N=72)</td>
<td></td>
<td>Post-test</td>
<td>47.38</td>
</tr>
<tr>
<td>tCLT (N=72)</td>
<td>Writing</td>
<td>Pre-test</td>
<td>3.02</td>
</tr>
<tr>
<td>tCLT (N=72)</td>
<td></td>
<td>Post-test</td>
<td>3.38</td>
</tr>
</tbody>
</table>

To answer our main research question (i.e. the influence of the type of instruction on performance), we fitted a mixed-effects logistic regression model with the correctness of the answer as dependent variable. That is, whether a GEP item was correct (1) or incorrect (0). We considered the significance of the predictors relating to the type of test (pre and post) and the type of training (i.e. the condition). Our initial analysis (including the predictors Test and Condition and their interaction, together with random intercepts for participant, class and question) revealed that the improvement on the post-test was higher for DUBc as compared to DUBp and tCLT. DUBp and tCLT did not differ significantly in terms of how much they improved between the pre-test and post-test. Consequently, we created a contrast distinguishing DUBc from the other two training types. Our final model, including the optimal random effect structure (which consisted of random intercepts for participant, class and question, as well as a by-participant random slope for test, and by-question random slopes for test, the DUBc vs. other training programs contrast, and their interaction) showed that while all training programs resulted in a significant improvement in the probability of answering a question correctly from the pre-test to the post-test, the improvement for the DUBc training was largest. Table 2 shows the coefficients of the logistic regression analysis, including their significance levels.
Table 2. Fixed-effects structure of the logistic mixed-effects regression model predicting the probability (in terms of logits) that a participant answers a question correctly in the GEP test

| Fixed effects                                      | Estimate | Std. Error | z value | Pr(>|z|) |
|----------------------------------------------------|----------|------------|---------|----------|
| (Intercept)                                        | 0.73     | 0.25       | 2.90    | < .01    |
| Post-test vs. pre-test                             | 0.58     | 0.07       | 8.57    | < .01    |
| Contrast between DUBc vs. DUBp and tCLT for pre-test? | 0.07     | 0.45       | 0.15    | .88      |
| Post-test vs. pre-test increase for DUBc as opposed to DUBp and tCLT | 0.37     | 0.15       | 2.53    | .01      |

Figure 1 below illustrates the significant improvement of the DUBc participants on the general English proficiency post-test in comparison to the DUBp and tCLT participants. Note that the logits have been converted to probabilities for this graph. It is clear that while the increase in probability of answering a GEP question correctly for the DUBp and tCLT participants from the pre-test to the post-test is about 11%, it is 16% for the DUBc participants.

Figure 1. General English proficiency performance (i.e. the probability of answering a question correctly) of the pre-test and post-test for the DUBc participants vs. the DUBp and tCLT participants
Writing scores

With respect to the writing component of the pre-test and post-test, the optimal linear mixed-effects model indicated only a significant difference between the scores on the pre-test and post-test (with the latter being about 0.45 points higher), but no significant differences in the effect of the type of training program on this improvement. In other words, all students in all three conditions produced better writing products in the post as opposed to the pre-test, but no one group outperformed the others. Table 3 therefore presents the improvement scores for all groups collectively. The optimal random-effects structure consisted of random intercepts for participant, class and rater, as well as a by-class random slope for test.

Table 3. Fixed-effects structure of the linear mixed-effects regression model predicting the writing score of a participant (for each rater)

| Fixed effects          | Estimate | Std. Error | t-value | Pr(>|t|) |
|------------------------|----------|------------|---------|---------|
| (Intercept)            | 3.04     | 0.18       | 16.55   | <.01    |
| Post-test vs. pre-test | 0.45     | 0.13       | 3.47    | <.01    |

7. Discussion and conclusion

The goal of the current study was to see if a solution could be found for the large, heterogeneous groups of university students in the Sri Lankan context who need to improve their English language proficiency in order to be able to do well in their academic courses all taught in English. These students are traditionally taught in communicatively oriented programs with a focus on the four skills and grammar practice. In these classes, the emphasis is more on practice and output than on input. The classes also require a lot of work from the teachers who need to grade and give feedback on many assignments.

A new approach based on dynamic usage based principles – with frequency of exposure to authentic language within a meaningful and a multimodal environment in the form of movies – was tried out, one in a teacher fronted setting and one in a CALL setting where learning could be self-paced.

Thus, the study investigated the effect of three different types of instruction on the general English language proficiency of 216 undergraduates in Sri Lanka. One group received a traditional communicative treatment taught by a teacher (tCLT). One group received instruction based on a movie with DUB principles taught by a teacher (DUBp). One group (DUBc) received a CALL treatment based on DUB principles in which students could work at their own pace. The results showed that the DUBc students improved more over the course of the training program than
their DUBp and tCLT peers on general English language proficiency. The DUBp and tCLT groups also showed notable gains during their intervention course, but significantly less than the DUBc group. The results of the writing tests showed that all groups performed significantly better at the post-test than at the pre-test, but there was no difference in improvement between the three groups.

This study showed that instruction in all three conditions is effective, but a DUB-CALL approach with the main emphasis on input is more effective in terms of general English proficiency than a teacher-fronted DUB approach and a traditional course inspired by CLT with explicit focus on grammar and writing practice. We must admit that at this point we cannot tease apart whether it was the CALL condition itself or CALL combined with the DUB approach that was of benefit.

In terms of writing skills improvement, the DUB-based CALL program was found to be as effective as the other two methods of instruction. This is an important finding given the current situation in Sri Lanka, where large groups are taught in a teacher-fronted and often structural manner. In neither DUB condition writing was practiced nor given feedback on, but students improved as much as in the traditional condition.

The findings are not quite in line with Verspoor and Hong (2013), who found that the teacher-fronted DUB approach was more effective than the traditional teacher-fronted approach. This may be due to various reasons. For one thing, the Sri Lanka students were more advanced than the Vietnamese students. Another point is that class sizes were bigger. However, in the current study the two teacher-fronted groups did equally well, suggesting that a DUB inspired method with a great deal of input is equally effective as a more traditional method with explicit attention to grammar and writing practice.

Just as Verspoor and Hong (2013), no differences were found between the groups in writing scores. Considering the fact that in the traditional classes writing was practiced regularly and in the DUB classes it was not, we may conclude that a high input approach is just as effective as a traditional approach in improving writing skills.

Based on the written feedback the students gave, the DUBc students were more positive than the DUBp students about their training program. The self-instructional computer program was perceived as more pleasant and interesting than the teacher-fronted alternative. Because both conditions used the exact same materials, we may conclude this was due to the mode of delivery. In the DUBc mode, students could work at their own pace. In the DUBp mode, teachers had to address a large heterogeneous group, and some students may have needed less exposure than others.
As far as we know, this is the first study that has compared a CALL program with a teacher-fronted program using the same materials and a DUB approach in a long-term intervention. Both were based on a movie, cut in segments, with the same steps involving repetition and scaffolding for understanding. The emphasis was on lexis and input. We believe the students improved more in the CALL program because they could pay attention to what they felt they needed to pay attention to and therefore work at their own pace, which was evident from the fact that some finished the program within 10 hours whereas others finished in 20 hours, but took less time than their group-taught counterparts who took forty-four hours (11 weeks × 4 hours per week). This is in line with Dobrovolny (2006) who claim that self-paced students may master the learning objectives faster than students in group-paced instruction. It is also in line with Soyemi et al. (2011) who argue that students like to work at their own pace. The reason may be that the group-taught students experience information overload (Pennington, 1996, p.9; cf. Kao & Windeatt, 2014, p.4) or get bored and distracted, which might also explain the more positive responses from the DUBc students.

Our main result was that the DUB-inspired CALL program was more effective in increasing students’ general proficiency than the DUB inspired and CLT teacher-taught programs. The question is whether this would hold for all CALL programs. We do not believe so, as the current program was carefully designed on the basis of DUB principles with interesting content in the form of a movie, a great deal of exposure, repetition, and careful scaffolding using visual material where appropriate for understanding the meaning and its pragmatic and cultural implications. There was no explicit focus on form or forms in the traditional sense, but there was a focus on form in a non-traditional sense, in that the focus was on the whole expression, its words, phrases, and formulaic sequences. We illustrate this with an example from the DUB programs (both CALL and teacher fronted).

In one scene, the main character had parked his car illegally outside his wife’s workplace. When he walked back to his car, he found that it had a wheel clamp on, and he says That’s what happens when you’re in a rush. The program (or PPP slide) shows the whole utterance in red. A part that may not be understood is also highlighted, and all that is on the screen is read out in a clearly articulated voice.

The results of the study have practical pedagogical implications. They confirm the belief held by experts in the field of second language education that CALL programs can be as effective or more effective than a teacher-fronted program. However, as mentioned earlier, the program needs to be carefully put together, preferably using the DUB principles mentioned in Section 3 and the steps as outlined in Section 5.3.1. Such a CALL program would allow meaningful exposure with enough repetition built in for the learner to form all the associations (symbolic, syntagmatic, paradigmatic and pragmatic) needed to slowly but surely automatize
and schematize. Teachers then have more time to spend on other skills such as giving feedback on speaking or writing tasks. If the students are advanced enough and class-size allows, there could also be real meaningful conversations or tasks related to the movie content.

Naturally, this study is limited in scope, interpretability, and generalizability. First, the study was a quasi-experimental one in that randomized assignment of participants to conditions was not possible, as groups of participants were chosen and assigned to different conditions from intact classrooms comprising learners with different levels of language proficiency. Hence, the researcher had to face constraints in controlling for confounding variables such as teachers, attitude, and motivation of learners. Second, these students were of intermediate proficiency. From Hong (2013), we knew that lower level students would benefit from this approach, but we did not know the effect on more advanced students.

We now know that the DUBc program is more effective than the two teacher-fronted approaches in general English proficiency, but we do not know why it is more effective. Is it the control of the learning environment, the frequency of exposure, the scaffolding in understanding the expressions in a holistic manner, or merely listening enough to authentic input? As there are so many variables that dynamically interact over time, we may never be able to disentangle them and
point to single causes, but it would definitely be worth investigating further based on the promising results that this study yielded.

References


Appendix. De leestekst

General English proficiency and writing test

PART 1. Read the sentences about going camping. Circle the most suitable underlined word for each sentence.
1. They decided / thought / felt to go camping for their holiday.
2. They wanted to stand / put / stay somewhere near the sea.
3. It had / took / got three hours to bike to the campsite.
4. They put their tent in a center / corner / back of the field.
5. They bought / chose / sent some postcards to their friends.

PART 2. Read the sentences below. Circle the best underlined word(s) for each sentence.
6. Some writers can describe things when / that / if / who they have never seen.
7. Nothing changes / was changing / has changed / changed in this town since I first visited it.
8. Hurry up! They’ve got only a little / much / a few / little seats left.
9. Who is going to take care up / of / after / for the children while you’re away?
10. A meeting will be run / taken / held / done to discuss the matter.
PART 3.  Read the description of some jobs. Write the word for each one. The first answer has been given as an example.

<table>
<thead>
<tr>
<th>Job Description</th>
<th>Word for the job</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example: I help people to learn things.</td>
<td>T_ _ _ _ _</td>
<td>Teacher</td>
</tr>
<tr>
<td>11. I show customers the menu and bring them their food.</td>
<td>W _ _ _ _</td>
<td></td>
</tr>
<tr>
<td>12. People come to me when they are sick.</td>
<td>D _ _ _ _</td>
<td></td>
</tr>
<tr>
<td>13. I will repair your car for you.</td>
<td>M _ _ _ _</td>
<td></td>
</tr>
<tr>
<td>14. If you want to change the colour of your room, I will do it for you.</td>
<td>P _ _ _ _ _</td>
<td></td>
</tr>
<tr>
<td>15. I help my boss by answering the phone, making appointments, and writing letters.</td>
<td>S _ _ _ _ _</td>
<td></td>
</tr>
</tbody>
</table>

PART 4. Circle the word with the underlined part pronounced DIFFERENTLY from that of the other words in each set.

16. A. high  B. hour  C. house  D. home
   A. nation  B. patience  C. cancer  D. basic
18. A. loves  B. practices  C. changes  D. watches
19. A. heavy  B. easy  C. weather  D. head
20. A. choose  B. Christmas  C. architect  D. chemistry

PART 5. There is one WRONG word in each sentence. Circle the word. Then correct it.

21. Ranil is a nice guy. He always say “hi” to everyone..............................
22. My younger brother has worked in a bank since a long time...........................
23. How was your holiday? – Great! We take a lot of photos..............................
24. I go to watch a movie with some of my friends last weekend..........................
25. She's staying with her family at the summer.................................


26. What did Swarnamali say about her mother’s wedding ring?
   a. Her mother lost her own wedding ring.
   b. As a child, she exchanged the ring for a toy.
   c. Someone stole the ring from her mother’s car.

---

Trade Secrets
When I was little, my friends and I always traded things. So, one day, I traded this ‘treasure’ I had found in my mother’s car for a plastic necklace, but it turned out that the ‘treasure’ was my mother’s wedding ring! My mother has thought for years that someone stole her ring out of her car and has no idea that it was me! I’ve been keeping this secret ever since, and even though I’m grown up now, I still can't tell her the truth.

Swarnamali
Dear Ranjith,
I'm sitting on the beach at the moment. Soon, I'm 27_________ to have a swim. I arrived here three days 28_________ with my family. We 29_________ be on holiday together here for two weeks. It 30_________ a beautiful place. The beach is very near 31_________ hotel. The sea isn't cold and 32_________ are many interesting places to visit. Yesterday we walked 33_________ a village in the mountains. I took lots 34_________ photographs. It's 35_________ pity that you didn't come 36_________ us.
Love,
Sheela

PART 8. What does Kim say to Anita? Complete the conversation. Write the word (A, B, C, D, E, or F) in each space.

Anita: Hello, how are you doing?
Kim: Pretty good, and you?
Anita: I'm doing great.
Kim: 37_________.
Anita: So, how long have you been going to this University?
Kim: 38_________.
Anita: This is my first year.
Kim: 39_________.
Anita: It's OK, but not great.
Kim: 40_________.
Anita: I'll like it better once I finish my General Education.
Kim: 41_________.

PART 9 – LISTENING. Read the passage carefully for two minutes. Listen and fill in the spaces with words you hear. There is one word for each space. You will listen 3 times.

I LOVE YOU
Love makes the world 42_________ 43_________ not money. I agree with the centuries-old quote that says, 'Love conquers all'. It's true when you 44_________ 45_________ 46_________. So much has been written about love. It must be 47_________ 48_________ 49_________ most written and talked about topics ever. How many songs and poems 50_________ 51_________ 52_________ love? Millions. Billions, perhaps. Love is everywhere. You can't 53_________ 54_________ day without hearing someone say 'love'. It is one 55_________ 56_________ 57_________ 58_________ beautiful words in any language. Your heart can melt
when someone says 'I love you.' It's also very important ______ you love them. You should do it every day. There are many different kinds of love and they are all important. Except perhaps when you love pizza or burgers. That's ______.

PART 10 – Choose ONE of the following topics. Write about that topic as much as possible.

1. My best friend
2. The most unforgettable day in my life
3. My goals and dreams for the future
4. My hometown

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