DIGITAL MULTIMODAL COMPOSING VS. MOOC-BASED INSTRUCTION: EFFECTS ON IELTS CANDIDATES' SPEAKING FLUENCY AND COHERENCE

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ABSTRACT

Over the past decades, language teachers have utilized the advantages of technology in the language classroom, yet given the explosion of technological tools and applications in recent years, there is no consensus as to which technological advancement best serves the development of which language skills or components. The current investigation was designed to examine the potential impacts of digital multimodal composing (DMC) and massive online open courses (MOOC) on the speaking fluency and coherence of Iranian intermediate IELTS candidates. To this end, a pretest-treatment-posttest, quasi-experimental design was utilized and a sample of 93 male/female EFL learners at the intermediate level were selected based on volunteer sampling procedures. Subsequently, the participants were assigned to the three groups of DMC, MOOC, and control group (CG). The three groups were exposed to the same instructional materials, with the difference being that in DMC, the learners had to produce videos during the course and post them on the Flip platform for their peers and teacher to review and comment. They then could use the feedback to make corrections/revisions; in the MOOC condition, the learners signed up for the course on futurelearn.com and received video presentations, pdf articles, and quizzes, and they were made to leave comments or react to each other's' comments during the course. In the CG, the materials were presented in print and through powerpoint slides by the teacher. Comparisons of the speaking posttest scores of the learners in the three groups revealed that with regard to fluency and coherence, DMC learners significantly outperformed MOOC learners, who were in turn better than the CG learners. Based on these findings, this study presents a discussion of certain pedagogical implications.

Keywords: Coherence, DMC, fluency, IELTS, MOOCs, speaking.

INTRODUCTION

Currently, there is a growing interest in incorporating digital multimodal composing (DMC) into English Language Teaching (ELT) pedagogy. While there is ample evidence of DMC's effectiveness in fostering multi-literacies (Jiang, 2017; Zhang et al., 2021), there remains a significant knowledge gap regarding how DMC can enhance the process of learning English (Xu, 2023), especially in the English as a Foreign Language (EFL) setting of Iran (Maghsoudi et al., 2022).

DMC involves utilizing digital technologies to create written or spoken content by combining various modes of communication, including but not limited to images, words, and soundtracks. Contemporary English language learners frequently engage in DMC activities like video composition or audio podcasting. Within the field of ELT, researchers (such as Early et al., 2015 and Kress, 2003) have advocated for the integration of DMC into ELT pedagogy, emphasizing the need for language teachers to grasp its instructional potential for targeted learning objectives.

DMC has gained traction in language classrooms across diverse contexts, including secondary schools in the United States (Miller & McVee, 2012) and Australia (Mills, 2016), as well as university-based English programs in Hong Kong (Hafner, 2015). Despite this, our understanding of its pedagogical potential remains incomplete and limited. Previous research highlights how DMC can foster multi-literacies (Mills, 2016), motivation (Jiang & Luk, 2016), and identity formation (Hafner, 2015) in language classrooms. However, studies also underscore the challenges posed by DMC compared to traditional print-based learning and high-stakes exam preparation (Tan & McWilliam, 2009). This conceptual divide suggests that DMC-mediated literacy learning differs from conventional literacy learning. Furthermore, there is a lack of research on how DMC actively engages students in language learning, particularly in EFL contexts like Iran. Additionally, language teachers' adoption of DMC remains limited (Mills, 2016), and it remains on the periphery of mainstream ELT curricula (Early et al., 2015), leaving us with limited knowledge about whether and how DMC effectively enhances student engagement in English learning.

Another technological advancement that has served education in general and language learning in particular over the past decades is the application of massive online open course (MOOC) environments. These online courses offer free registration, publicly shared curricula, and flexible learning outcomes. MOOCs incorporate social networking features and provide accessible online resources, often facilitated by renowned educators. Importantly, MOOCs empower learners by allowing them to self-organize their participation based on their goals, existing knowledge, and interests (McAuley et al., 2010).

Using MOOCs as a learning tool creates a dynamic environment where students from diverse geographical locations can interact. This participatory, open approach enhances learning in virtual educational settings, leveraging the unique features of digital environments. MOOCs serve as a learning network enhanced by online student interactions, leveraging the unique features and possibilities offered by digital learning environments (Navio-Marco & Solorzano-Garcia, 2019).

Past research has focused on using MOOCs for different language skills and components. However, as Fang et al. (2022) mention in their review of journal publication studies from 2009 to 2018, in relation to language skills, MOOC studies conducted on speaking and vocabulary were less than the ones dealing with reading and writing. As learning to speak in a second language (L2) is one of the most demanding aspects of second language acquisition (SLA), and because fluency and coherence are determining factors in the success/failure of a speaker, the present study compared the effect of DMC and MOOC-based learning on speaking fluency and coherence of Iranian EFL learners.

Nation (2014) defined fluency as "the ability to process language receptively and productively at a reasonable speed" (p.11). Coherence is also defined by Merriam (2018, as cited in Phuong, 2018, p. 38) as "the property of unity in a text or a segment of spoken discourse that stems from the links among its underlying ideas and from the logical organization and development of its thematic content." In the IELTS speaking test, the criteria of fluency and coherence are combined and assessed as a single criterion known as fluency and coherence (FC). FC refers to the test taker's ability to speak with a natural flow, appropriate pacing, and linking ideas and language together to create coherent and connected speech. Several key indicators are used to evaluate fluency, including speech rate (ideally not too slow), speech continuity (minimizing interruptions like false starts, backtracking, unnecessary repetitions, or prolonged pauses while searching for words). Coherence

is assessed based on indicators such as logical sequencing of spoken sentences, clear structure and organization of discussions, narratives, or arguments with appropriate use of pausing, discourse markers, and fillers. Additionally, the relevance of spoken sentences to the overall purpose of a turn and the use of cohesive devices within and between spoken sentences are also considered in assessing coherence. (https://www.ielts.org/-/media/pdfs/ielts-speaking-key-assessment-criteria.ashx). To operationalize this construct, the IELTS speaking band score description was used as the rubric to assign FC scores to the participants of the present study.

LITERATURE REVIEW

With the increasing availability of digital technologies in educational settings, the practice of digital multimodal composing (DMC) has become prevalent in classrooms. DMC involves the creation of digital texts that incorporate multiple modes of communication, including written language, images, videos, voice recordings, audio elements, and more. Examples of DMC activities include digital storytelling, creating digital book reviews, and composing digital poems.

The existing body of research on DMC in ELT primarily focuses on evaluating and applying this technology in EFL classrooms, while experimental studies investigating its effectiveness in practice remain limited. Hanfer (2020) addresses the significance of incorporating DMC in ELT and emphasizes the influential role of digital media in contemporary communication, enabling new forms of multimodal representation. Hanfer argues that ELT pedagogy often overlooks the systematic integration of multimodal aspects of communication. To bridge this gap, the pedagogical approach of DMC has been developed to meet the needs of English language learners in the digital era. It involves engaging with various forms of communication within digital media, alongside traditional reading and writing activities in his article, Hanfer provides an overview of scholarly work that has contributed to the development of this approach. In a case study involving English language learners in Hong Kong, the pedagogical approach of DMC was demonstrated in practical implementation. The study suggests that this approach could be effectively applied in other contexts, achieving a balance between multimodal communication within digital media and the fundamental requirements of the English language curriculum.

A framework by Liang and Lim (2020) integrates DMC into English classrooms. This framework, inspired by Systemic Functional Theory and Design Thinking, categorizes DMC knowledge and skills into critical thinking, creativity, and technical areas. Their four-lesson package, informed by this framework, was implemented in a Singaporean secondary school English class. The study's findings highlight the importance of a pedagogical framework for guiding students' development and demonstration of DMC skills, rather than assuming they are innate.

Jiang's (2017) research explored the benefits of DMC for EFL learning. The study revealed that integrating DMC offers students a multitude of technological, educational, and social advantages, impacting their EFL learning in various interconnected ways. It also unearthed the potential to link DMC with print-based literacy learning within EFL classrooms. Based on these findings, Jiang proposed a framework demonstrating how DMC's affordances can enhance student engagement with English learning.

Hanfer and Ho's (2020) study examined DMC use in L2 writing and proposed a process-based assessment model. Focusing on a university English for science course and a digital video scientific documentary assignment, the researchers interviewed teachers to gain insights into their perceptions of the multimodal assessment task's practicalities and challenges. Their findings led to a process-based assessment model for DMC, illustrating the interplay between instructional processes, design activities, and assessment. The results emphasized planning assessments at various design stages, incorporating both formative and summative strategies. Additionally, the model stressed the importance of considering the orchestration of multimodal affordances during assessment. Overall, the study provides valuable insights for educators on effectively assessing DMC in L2 writing.

Jiang's (2018) study investigated the effects of DMC on investment in writing among EFL learners at a university in China. The research employed a combination of observation, interviews, and analysis of student-created multimodal texts. The findings revealed three distinct patterns of investment change, each illustrated by a student's experience. One student transitioned from being a reluctant writer to an active participant through DMC activities. Another student transformed from prioritizing exams and textbooks to becoming

a designer through DMC tasks. However, a third case showed minimal change in the student's investment in writing. These findings suggest that while DMC broadened the range of potential identities for EFL learners, individual responses varied, impacting their investment in writing. The study also highlighted that these responses were influenced by students' commitment to specific identities and external factors associated with high-stakes testing. Overall, the research underscores the importance of considering individual learners' identities, motivations, and external influences when exploring the effects of DMC on investment and writing in the EFL context.

Jiang and Ren's (2020) study focused on the experiences of teachers and students involved in a university English course in China that incorporated a DMC video production program. Their findings, based on data from various sources, revealed contrasting ideologies between teachers and students regarding language, teacher roles, and valid evidence of learning in the context of DMC. These divergent ideologies, according to the researchers, unintentionally created barriers to students' investment in English learning at both individual and systemic levels.

Jiang et al.'s (2021) longitudinal case study investigated the impact of a DMC project on a Chinese ethnic minority student's investment in EFL learning. Data collection included interviews, classroom observations, informal conversations, written reflections, and student-created multimodal videos. The findings suggest that integrating DMC into mainstream English classrooms can be an empowering and culturally sustaining approach to enhance the investment of ethnic minority students in English learning. The student in the study not only received peer support and participated in a collaborative learning environment, often underemphasized in traditional classes, but also learned to leverage their cultural knowledge as valuable capital for active participation.

Zhang et al.'s (2022) exploratory study investigated the effects of creating voice and video blogs (v-logs) on the speaking performance of EFL learners. The study involved 67 middle school students from China. Data analysis included pre-test and post-test speaking scores, two recorded vlogs, a questionnaire, and a semi-structured interview. The results revealed that vlog-based DMC had a positive impact on students' speaking fluency, with improvements evident in their second vlogs compared to the first. Interestingly, video blog creators outperformed voice blog creators in terms of accuracy but exhibited lower fluency.

Maghsoudi et al.'s (2022) study examined the differential effects of multimodal and monomodal writing on the writing ability of EFL learners. The study involved 59 university students in Iran, divided into two groups: a multimodal group that composed five digital essays using various modes, and a monomodal group that used only text for their essays. The researchers assessed writing ability five times throughout the semester. The findings revealed that both groups improved their writing ability over time, with the multimodal group exhibiting stronger writing skills compared to the monomodal group.

All the studies cited above on the topic of DMC indicate that language skills in general and speaking in particular have not been subject to much scrutiny under the influence of DMC. That is why the present study seeks to find out the effects of DMC on the oral abilities of Iranian EFL learners, and compare the effect with that of MOOC-based instruction.

MOOCs, as a recent development in online education, were first created by George Siemens and Stephen Downes at the University of Manitoba (Mellati & Khademi, 2018). MOOCs are based on the idea of "Connectivism," which emphasizes the importance of connections in learning. This theory suggests that people learn by making connections between what they already know and the knowledge of others (Waks, 2016). According to Connectivism, learning occurs as students establish connections between their existing knowledge and the collective knowledge of the community (Anderson & Dron, 2011). These connections can happen in many ways, including through biological, neural, and social interactions (Siemens, 2008).

MOOCs have become popular quickly because they are a new way to learn (Dhawal, 2013). One of their biggest advantages is their focus on social learning. MOOCs offer learners flexible materials and let them learn at their own pace, while also creating a sense of community (Ventura & Martin-Monje, 2016). Additionally, MOOCs allow students from all over the world to participate, creating a diverse learning environment.

Li (2017) described MOOCs as "open courses based on the network platform, which extend the scope of the traditional teaching mode" (p. 1273). They are a powerful tool for distance learning, especially when it

comes to integrating technology into teaching and learning (Khalid, 2017). MOOCs typically have three main features: (a) they are delivered online and use audio and video materials, (b) they are often free, and (c) they can accommodate a large number of students without needing a teacher for each person (Chacon-Beltran, 2017).

Several studies have examined how effective MOOCs are for learning. Ventura and Martin-Monje (2016) looked at how adding Facebook to a MOOC for learning a second language affected students' ability to learn specialized vocabulary. Their research used a mix of quantitative methods, like tracking students within the MOOC, and qualitative methods, like surveys. They found that using Facebook groups helped students feel more motivated to learn new vocabulary and improved their progress in the MOOC.

Another study by Mellati and Khademi (2018) investigated how a MOOC-based program affected the English proficiency of Iranian EFL learners. The research used a mixed-method approach and involved 38 participants at Baqer al-Olum University in Iran. Half the participants used the MOOC program, while the other half took a traditional English language class. The researchers collected data through pre-tests, post-tests, and interviews. The results showed that the participants who used the MOOC program performed better than those in the traditional class. The qualitative data analysis also revealed two main challenges associated with MOOCs: technical challenges (related to technology access and skills, control over learning materials, and assessment) and emotional challenges (including motivation, cultural differences, and individual learning styles).

Sahli and Bouhass Benaissi (2018) conducted a study to explore how MOOCs can be used to teach writing skills. The researchers selected 15 students from the University of Ibn Khaldoun–Tiaret, Algeria, and enrolled them in an online writing course. After completing the course, the students filled out a questionnaire about their expectations and experiences. The findings indicated that the students had positive attitudes towards using online instruction for learning writing skills.

Alanazi and Walker-Gleaves (2019) conducted a study to investigate students' attitudes towards using a blended learning approach that combined MOOCs with flipped classrooms, compared to traditional teaching methods. The research used a mixed-method approach, utilizing surveys and interviews. The findings revealed that students had positive attitudes towards the blended learning approach. Participants also reported that this approach significantly helped their English learning both inside and outside of the traditional classroom setting.

Hashemifardnia et al. (2021) conducted a study to assess the effects of a MOOC on the speaking skills of Iranian EFL learners. The study involved 130 learners who initially took an English placement test. From this group, 60 intermediate learners were chosen and divided into an experimental group (using the MOOC) and a control group (using traditional classroom instruction). Both groups took a speaking test before and after the study. After the treatment, the experimental group also completed a questionnaire to assess their attitudes towards MOOC instruction. The results indicated that the students who used the MOOC performed better on the speaking test after the study. The findings also revealed that Iranian EFL learners had significantly positive attitudes towards using MOOC instruction for speaking classes, as evidenced by the results of the one-sample t-test.

Many people start MOOCs but don't finish them. Tamjidyamcholo et al. (2020) investigated this issue by looking at factors that influence whether someone completes a MOOC. They based their research on a theory by Triandis and analyzed data from 234 people who were enrolled in Coursera courses. The researchers found that people were more likely to complete a MOOC if they believed it would help them learn new things, allow them to interact with others, and fit in with their interests. Interestingly, social pressure from friends or family did not seem to influence completion rates. Additionally, the study found that if people had the resources, they needed to take the MOOC (like reliable internet access) and were already planning to finish it, they were more likely to actually follow through.

The studies reviewed above show that no research study to date, to the researcher's best knowledge, has compared the effects of DMC and MOOC-based learning on the speaking fluency and coherence of Iranian EFL learners. The present study, therefore, aims to fill this gap in the literature and contribute to the existing body of knowledge in this domain.

Hence, the following research questions were posed to be investigated in the present study: Do conventional, DMC, and MOOC-based instruction have significant effects on L2 speaking of Iranian EFL learners in terms of their fluency and coherence? If so, which one is likely to be more conducive to the development of speaking fluency and coherence?

METHODS

What follows presents the description of the methodology that was used in this study.

Design of the Study

The present study had a quasi-experimental design because in such as design there are often experimental group(s), control group(s), treatment, placebo, pretest, and posttest, but random selection of the participants is not feasible. In the present study, all the components of a quasi-experimental design were in place, and randomization was missing (to be elaborated on in the following section).

Participants

The participants of the study were selected from EFL learners and enthusiasts who responded to an ad for free IELTS classes. Their level of proficiency was checked through the administration of an Oxford Quick Placement Test (OQPT) that was given to them at the beginning of the study. They were assigned to the three groups of DMC and MOOC and control group (CG), consisting of 31, 29, and 33 learners, respectively. They were roughly homogeneous in terms of age (M = 29.82) and mother language background (i.e., Persian) in addition to their language proficiency level (i.e., intermediate). The available learners who met these criteria were recruited as the participants in the study. The characteristics of the participants of the study are also shown in Table 1:

Table 1. Characteristics of the participants of the study

Groups	N	Proficiency Level	Mother Tongue	Age	Academic Qualification
DMC	31	Intermediate	Persian	25-37	Bachelor's and above
MOOC	29				
CG	33				
Total	93				

To further make sure that the three groups of participants were homogeneous in terms of their proficiency, a one-way between-groups ANOVA was conducted and the comparison of the DMC (M = 38.90), MOOC (M = 39.62), and CG (M = 39.51) learners' mean scores revealed no significant difference among these three groups of learners, $F(2, 90) = .25$, $p > .05$.

Before the commencement of the experiment, the learners were also given a consent form to fill, in which the researchers had mentioned that the learners' participation was part of an experiment, ensured the privacy of the data obtained through the study, and asked the participants to attend all the sessions (to avoid attrition). Once the participants' consent was obtained, the researchers proceeded with data elicitation and intervention.

Instruments and Materials

The instruments that were used in the study included an OQPT, speaking pretest, and speaking posttest. The OQPT is a standardized English proficiency test that has been widely used by researchers around the world. It consists of 60 vocabularies, grammar, and reading comprehension questions, and can place language learners in the right level of proficiency. Based on the scoring rubric of the OQPT, learners who receive a

score between 30 and 47 on this test could be labeled intermediate. The reliability and validity of this test had already been established by previous researchers, but for good measure, its reliability was once again calculated through the Cronbach's alpha formula (.87).

The speaking pretest that was used in the current study was a sample IELTS speaking test taken from one of Cambridge IELTS book series. In Part 1 of the test, the learners were asked basic questions about familiar topics like hometown, job, likes and dislikes, etc. In Part 2, they were required to express their ideas on a topic chosen by the examiner, and in Part 3, there was a discussion of abstract/general questions related to the topic in Part 2. The whole interview lasted between 11 and 14 minutes. The inter-rater reliability of the test scores was checked through the Pearson correlation formula (r = .91) and its validity was further verified by three experts in the field.

The speaking posttest also resembled the pretest in that it was a sample IELTS speaking test, also taken from one of the Cambridge IELTS book series. It was identical to the pretest in terms of test format and timing. The inter-rater reliability of this speaking posttest (r = .89) and its validity were checked the same way the reliability and validity of the speaking pretest were checked.

In addition, the materials that were used in this experiment included information on the speaking section of the IELTS test, the test format, timing, speaking assessment criteria, and practice in the three parts of the IELTS speaking test followed by tutor feedback. The instructional materials were collected from the books and resources provided by British Council and Cambridge Assessment English. In fact, in the DMC group, resources were made available to the learners so that they composed videos of themselves, answering Part 1, 2, and 3 questions of the IELTS test (using the guideline provided for them by the researcher) in the platform of Flip (flip.com), which is a simple, free, and accessible video discussion experience for learners. On Flip, a teacher can define a community of learners, create a conversation starter, share it with his/her learning community, and the learners can view and share their video responses.

On the other hand, the materials that were used in the MOOC course were similar instructional materials intended for the three parts of the IELTS test, uploaded to futurelearn.com by British Council through the course *Understanding IELTS: Speaking.* The materials consist of videos and articles of British Council IELTS tutors, followed by tasks to be done individually and a comments section where the participants can reflect and comments on the lesson and/or on what they did, or on other participants' responses. The same materials were also used for the learners in the CG, though in a conventional face-to-face setting by the teacher.

Data Collection Procedure

In the first place, over 120 Iranian EFL learners expressed their willingness to participate in this study; they were then given an OQPT and those who qualified to serve as the participants in this study (i.e., whose scores fell between 30 and 47) were recruited as the participants. They were assigned into the three groups of DMC (M = 31), MOOC (M = 29), and CG (M = 33). A speaking pretest was administrated to them at the outset of the experiment. In the DMC condition, the teacher taught IELTS speaking lessons and included all the information on task types, test structure, and speaking guidelines, and after each lesson, she asked the learners to create a video in response to the task assigned to them, and post it on their Flip learning community. There, all the group members could watch each other's videos and could receive feedback from their peers and the teacher as well.

In the MOOC group, however, the participants were led to register for the IELTS speaking course delivered by British Council in www.futurelearn.com, where they could be taught IELTS speaking for free. In this MOOC course, the lessons were delivered using a variety of ways such as videos and articles. The participants were exposed to the lesson and were asked to share their comments and respond to each other's comments underneath the lesson. Some comments were liked or recommended by the course leaders. The participants were also asked to do some speaking exercises and provide/receive feedback. The first researcher of the present study also signed up for the course and followed the participants throughout the course to ensure they were actively involved in the course.

In the CG, the same instructional materials were used. The instructor modelled the different skills and strategies of the IELTS test (i.e., expanding an answer by providing a reason or an example), and then they attempted a few IELTS sample tests related to that strategy. The learners were then given extra practice materials to work on in class (under the supervision of the teacher) and at home. Attempts were made to ensure the control groupers were provided with whatever the learners in the experimental groups received so the only difference between the groups could be the mode of instruction.

The treatment sessions (which lasted for three weeks) were followed by a speaking posttest. The speaking interviews collected on the pretest and posttest were used to calculate fluency and coherence scores based on the IELTS speaking assessment criteria by two trained IELTS raters and the inter-rater reliability of the test scores was ensured afterwards. In order to analyze the data collected from the speaking pretest and posttest, a one-way ANCOVA was conducted. Before running the above-mentioned test, its underlying assumptions (e.g., linearity, homogeneity of regression slopes, and equality of error variances) were checked and reported.

RESULTS

To test the null hypothesis of the study and answer the research question, the fluency and coherence (FC) posttests of the learners in the three groups had to be compared. One-way ANCOVA was conducted for this purpose because this statistical test could control for any possible pre-existing differences among the three groups in their FC pretest, and compare their posttest scores accordingly. Table 2 shows the results of the descriptive statistics for this ANCOVA analysis:

Table 2. Descriptive statistics for FC posttest scores of the learners

Groups	Mean	Std. Deviation	N
DMC	7.31	.469	31
MOOC	6.44	.687	29
CG	5.54	.577	33
Total	6.41	.936	93

The highest FC mean score belonged to the DMC learners (M = 7.31), and this was followed by MOOC (M = 6.44) and CG (M = 5.54). To investigate whether these differences reached statistical significance, the results of the one-way ANCOVA should be consulted, but prior to that, a few underlying assumptions have to be checked. Table 3 shows the results for the assumption of homogeneity of variances:

Table 3. Levene's test of equality of error variances for the FC scores of the learners

Dependent Variable: Posttest			
F	*df1*	*df2*	Sig.
1.910	2	90	.090

The p value under the Sig. column is showing a non-significant result ($p > .05$), which means that the assumption of homogeneity of variances is not violated. The following figure shows the results for the assumptions of linearity and homogeneity of regression slopes:

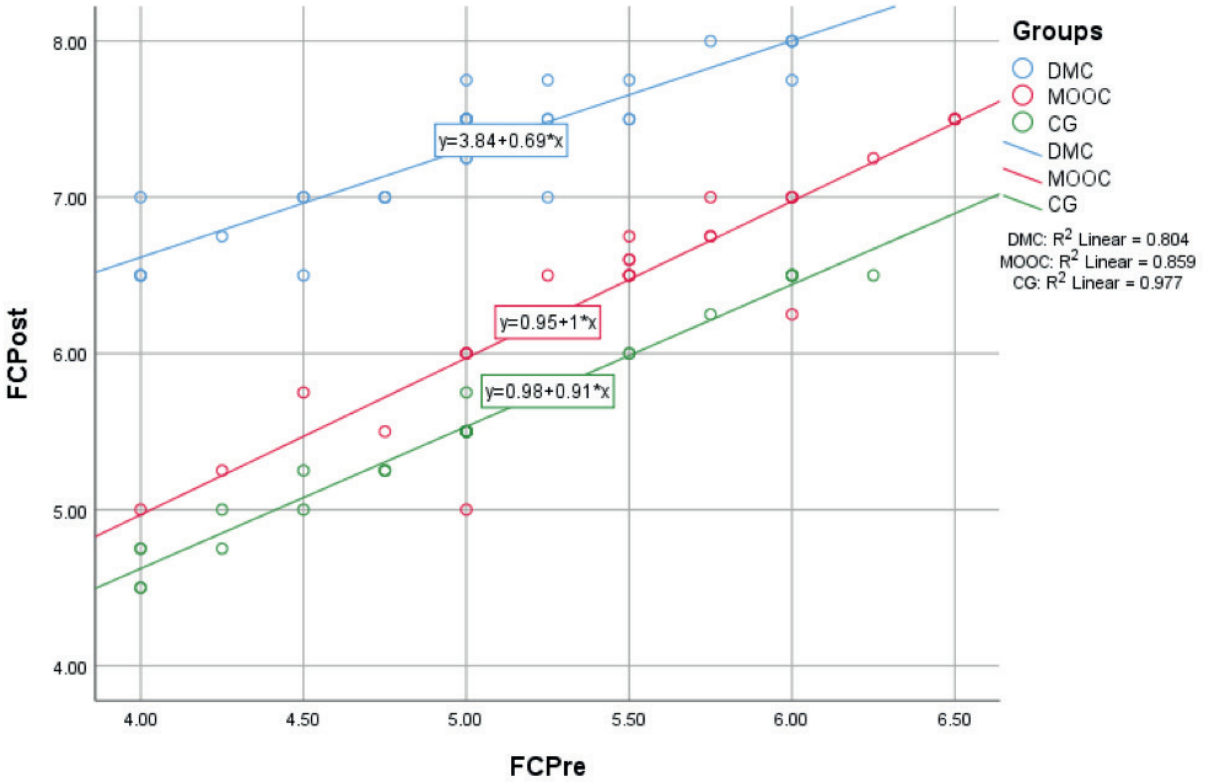

Figure 1. Scatterplot for the assumptions of linearity and homogeneity of regression slopes for the FC scores of the learners

It could be seen in the scatterplot in Figure 1 that there is a linear relationship for each group, indicating that the assumption of linearity is not violated. Moreover, it could be seen that the three lines in the scatterplot corresponding to the three groups are pretty similar in their slopes, so the assumption of the homogeneity of regression slopes is not violated either. In addition to the scatterplot, the assumption of the homogeneity of regression slopes was assessed statistically and no significant interaction was found between the treatment and the covariate (p = .23 > .05). The results of the one-way ANCOVA for the FC scores of the three groups are provided in the following table (Table 4):

Table 4. One-way ANCOVA for the FC posttest scores of the DMC, MOOC, and CG learners

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	76.63	3	25.54	571.16	.000	.95
Intercept	4.82	1	4.82	107.91	.000	.54
Pretest	26.57	1	26.57	594.12	.000	.87
Groups	52.63	2	26.31	588.37	.000	.93
Error	3.98	89	.04			
Total	3909.12	93				
Corrected Total	80.61	92				

In Table 4, to find the relevant p value, if you take a glance at the row labeled Groups in the leftmost column, and read across this row, under the Sig. column, you can see the p value, which should be compared with the alpha level of significance (i.e., .05). This p value turned out to be lower than the alpha level of significance, which indicates that the difference between the FC posttest scores of the learners in the DMC, MOOC, and CG reached statistical significance, $F(2, 92) = 588.37$, $p < .05$.

The magnitude of this difference was very large, based on the guidelines put forward by Cohen (1988), as represented by the partial eta squared statistic (.93) displayed in the rightmost column of the table. In order to pinpoint the exact location of the difference(s), i.e., to see whether there was a significant difference between DMC and MOOC, between DMC and CG, between MOOC and CG, or among all the three groups, pair-wise comparisons in the Bonferroni post hoc test table should be checked:

Table 5. Post hoc test results for the FC posttest scores of the DMC, MOOC, and CG learners

(I) Groups	(J) Groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
DMC	MOOC	1.274*	.057	.000	1.135	1.414
	CG	1.775*	.053	.000	1.646	1.904
MOOC	DMC	-1.274*	.057	.000	-1.414	-1.135
	CG	.501*	.056	.000	.364	.638
CG	DMC	-1.775*	.053	.000	-1.904	-1.646
	MOOC	-.501*	.056	.000	-.638	-.364

The results in Table 5 reveal that there was a significant difference between DMC (M = 7.31) and MOOC (M = 6.44), p < .05; similarly, the difference between DMC and CG (M = 5.54) was of statistical significance. Finally, there was also a significant difference between MOOC and CG. Figure 2 also shows the fact that there were considerable differences among the mean scores of the three groups of learners on the FC posttest:

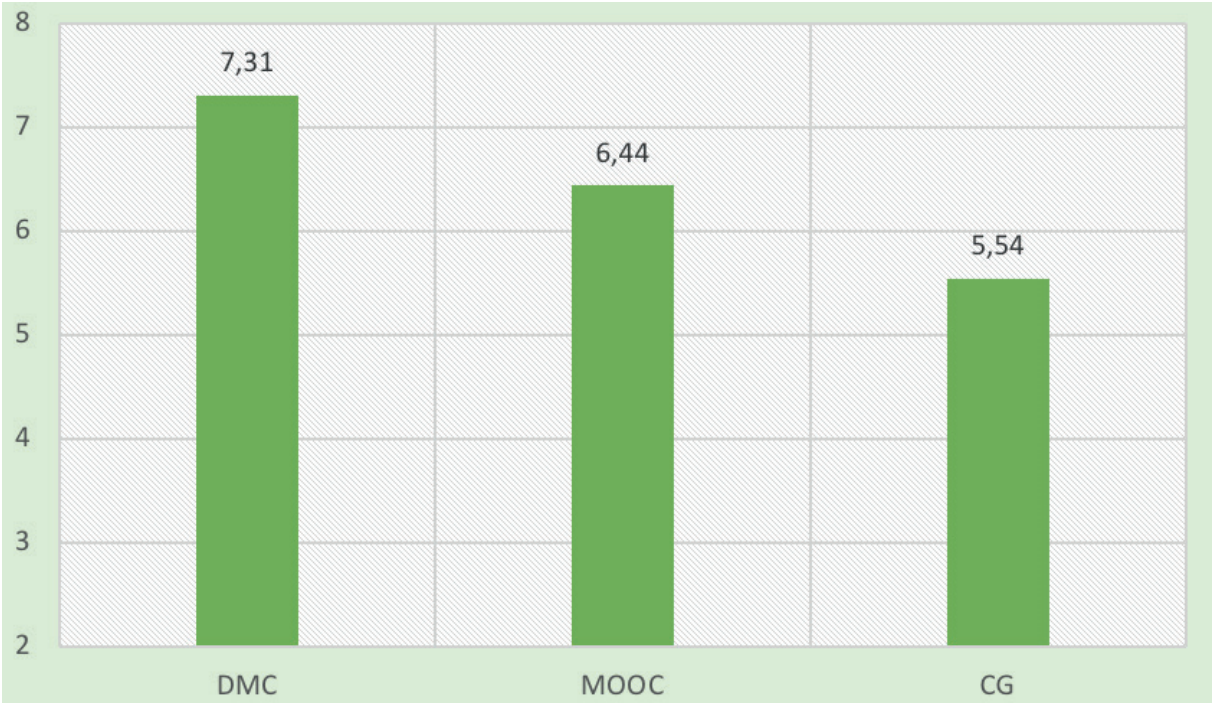

Figure 2. FC posttest mean scores of the DMC, MOOC, and CG learners

In Figure 2, it could be noticed that the differences among the FC posttest scores of the DMC, MOOC, and CG learners were considerable, with the DMC learners significantly outperforming the MOOC learners, who in turn excelled their CG counterpart significantly. This indicates that the null hypothesis of the study is rejected.

DISCUSSION

To answer the research questions of the study, the fluency and coherence (FC) posttest scores of the learners in the DMC, MOOC, and CG groups were compared using a one-way ANCOVA. The statistical analysis of the results revealed that there were significant differences among these three groups, with DMC learners significantly outperforming the MOOC learners, who in turn, had a significantly better performance than their counterparts in the CG. Differently put, the results indicated that DMC-based instruction, which provides systematic scaffolding and peer feedback, aligns with the hypothesis that interactive and structured environments promote greater gains in fluency and coherence compared to less guided MOOC settings. Similarly, multimedia-enhanced environments such as DMC and MOOC, given the variety of input modes they provide, are more fruitful than traditional classes with minimal exposer to multimodal input.

Fluency and coherence, which refer to the ability to speak with normal levels of continuity, rate, and effort and to link ideas and words to make coherent, connected discourse, account for 25% of the speaking section of the IELTS score. Speech rate and speech continuity are the main measures of fluency. The employment of cohesive devices (such as connectors, pronouns, and conjunctions) within and between sentences, as well as their logical sequencing, are the main markers of coherence. Clear marking of the stages in a discussion, narration, or argument is among the other indicators of coherence.

In other words, Coherence is being able to develop topics and connect ideas in an orderly fashion without repeating oneself. Fluency is the ability to talk for an extended period of time without pausing or stuttering. To put it in a different way, in order to receive a perfect band score for fluency, the speaker should not pause to recall words or mentally go over grammatical structures. The speaker should concentrate on the idea they want to get across rather than the words necessary to deliver it. Coherence refers to how well a speaker's ideas make sense together. A person who achieves a high coherence band score is able to use a range of cohesive features, discourse markers, and prompt phrases with ease to express ideas in a logical and straightforward manner.

Different techniques have been employed by past researchers to see their effects on fluency and/or coherence: Diyyab et al. (2014) in the research they conducted found multimedia-based programs effective for developing student teachers' fluency skills. Although it is not exactly clear what type of multimedia programs Diyyab et al. (2014) used in their study, their results are in line with the results of the present study in that using multimedia through DMC and MOOC did enable the participants to boost their flouncy and coherence. One reason for such a finding could lie in the fact that, as per Dual Process Model (Stanovich, 2009), the combination if auditory, visual, and textual input supports cognitive processing and enhances learning and retention.

Santos and Ramirez-Avila (2022) employed the 4/3/2 technique and self-assessment to see their effects on speaking fluency, and found that the experimental groupers in their study significantly outperformed the control groupers in terms of speaking fluency. Using the 4/3/2 technique, L3 learners were encouraged to think on their feet, articulate thoughts clearly, and gain confidence in their speaking abilities. Mohammadi and Enayati (2018) investigated the effects of teaching lexical chunks on EFL learners' speaking fluency, and found that exposing the learners to lexical chunks had significant effects on the learners' fluency. Namaziandost et al. (2020) investigated the effects of cooperative learning (through numbered heads and think-pair-share approaches) on speaking fluency of EFL learners and found considerable effects for this treatment. Namaziandost et al. (2019) also examined the effects of different types of tasks (i.e., opinion-gap, reasoning-gap, and information-gap tasks) on EFL learners' speaking fluency. In their study, all the three kinds of tasks turned out to have significant effects on speaking fluency, with the information-gap task having the most profound effect. The effects of vocabulary breadth and depth to second language speaking competency and its two aspects of fluency and lexical resources were examined by Janebi Enayat and Derakhshan in 2021. The findings showed that vocabulary was a significant predictor of speaking, fluency, and lexical resource; receptive vocabulary size was a predictor of speaking proficiency; receptive vocabulary depth could not predict any of the dependent variables; productive vocabulary knowledge could only predict the lexical dimension of L2 speaking. Moradi and Talebi (2014) found that pre-speaking strategies instruction had substantial effects on strategic planning as well as speaking fluency and lexical resources. Nasri et al. (2019) examined the effect of pictorial cues on speaking fluency and accuracy of Iranian EFL learners. They found

that the students in the control group had significantly higher fluency and accuracy scores than those in the control group. All these studies were conducted to see the effects of different independent variables on fluency and/or coherence, and that is what they have in common with the current study. The present study also found that DMC and MOOC-based learning could have significant effects on EFL learners' fluency and coherence.

Here is another study which utilized technology for the purpose of improving speaking (fluency): Saed et al. (2021) examined the effects YouTube videos on speaking skills of Jordanian EFL university students. They exposed the experimental groupers to instructional videos followed by certain tasks over a period of four months, starting from the simple to the more complex and from yes/no to wh-questions. In addition, the students were taught summary activities and techniques and how to summarize the video content. The results of their study revealed that the speaking skills of the students improved significantly, and among the four speaking dimensions of fluency and coherence, lexical resource, grammatical range and accuracy, and pronunciation, the improvements were substantial in fluency and coherence as well as pronunciation. The multimedia nature of the videos, exposing the students to a variety of input modes, accompanied by the tasks were probably the reasons why the students could develop their fluency and coherence, not unlike what happened in the current experiment.

When it comes to coherence, Phuong (2018) applied picture description tasks in EFL classes and found out that they had a significant effect on the learners' coherence in speaking. In another study, Albino (2017) used TBLT and looked into the effect of this kind of treatment on EFL learners' speaking fluency, accuracy, and vocabulary development. He found that TBLT improved the three aforementioned speaking subskills significantly. These techniques, thus could be claimed to have far-reaching effects on coherence in speaking, pretty much the same as DMC and MOOC courses. In TBLT, the students engage in carrying out a task, which often necessitates communication and collaboration. Similarly, in DMC, the learners had to engage in communication by video creation and sharing, and in MOOC, the learners needed to react to the videos and articles provided by the course trainers, and to the comments left by fellow learners. These activities bear significance for the development of coherence (and fluency).

The current study corroborates the results obtained by Rahimi and Fathi (2022), who used the Tandem application to examine its effects on the speaking skills of Iranian EFL learners and found that the learners in both control and experimental groups improved from pretest to posttest, but those in the experimental group significantly outperformed their control group counterparts in all the four speaking subskills of fluency and coherence, lexical resource, grammatical range and accuracy, and pronunciation. In the same vein, Koroglu and Cakir (2017) designed an 8-week experiment in which they used flipped instruction implemented through Edmondo for pre-service English language teachers and found that the treatment significantly improved the participants' speaking skills in terms of fluency and coherence, lexical resource, grammatical range and accuracy, and pronunciation. Sherine et al. (2020) also investigated the effects of interactions and informal learning in a WhatsApp group on L2 learners' speaking in terms of fluency and coherence, lexical resource, grammatical range and accuracy, and pronunciation. They used a mixed methods approach elicit data from the learners with pre- and post-speaking assessments and pre- and post-surveys. The participants were given collaborative learning activities and problem-solving tasks at regular intervals for over two semesters. The researchers found significant effects on the learners' speaking (and its aforementioned dimensions) and reported positive perceptions on the part of the learners about their speaking improvements.

A study by McAuley et al. (2010) found that learners who self-organize their involvement based on learning goals, prior knowledge and abilities, and shared interests are more likely to be engaged in MOOCs. MOOCs offer a novel way to learn and take exams. The usage of videos and the option to download resources make this method of online communication interesting to people. Their participation and contribution are made easier via the discussion section. Additionally, they talk about their interactions with the teacher and other students. Being anonymous will give them the confidence to express themselves without worrying that other participants will judge them. The course provides them with useful tips that apply to other modules and they appreciate the assigned activities and quizzes at the end of each stage. Hence, due to the merits of MOOCs, it is quite logical that the performance of participants on the fluency and coherence dimension of L2 speaking was significantly improved.

A survey of the studies cited above reveals that the techniques that were utilized to boost fluency and coherence could fall into two broad categories: non-technology-based and technology-based techniques. When it comes to technology-based education, a few factors interplay and exert effects on learners' fluency and coherence (as well as other skills/subskills): first of all, the learners benefit from multimedia input, i.e., input that is delivered not just through texts, but also through pictures, audio recordings, videos, and so forth. According to Dual Process Model (Stanovich, 2009), information that is received in more than one mode is likely to be processed faster and retained longer in the brain. This is what takes place in both DMC and MOOC-based environments where the learners were provided with mind maps, visual input, and text input (to name but a few).

Additionally, the interventions used in this study brough about engagement and motivation through interactive content (e.g., videos and interactive quizzes) and a variety of formats. Authentic materials involving real-world language were also used in the videos, articles, and feedback used in both DMC and MOOC. These visual aids provided context and supported comprehension and interaction. Furthermore, the learners in both these environments had role models (i.e., course trainers and fellow learners) to imitate and had the opportunity to shadow others, improving their fluency and confidence.

In addition, the support and feedback that the learners received from each other and from the teacher/trainers helped them adjust their speaking techniques and the possibility of recording and reviewing videos by DMC group learners enabled them to conduct self-assessment and identify areas of improvement. The support could take the form of scaffolding, which is arguably a key factor in the success of the learners.

In the present study, DMC provided opportunities for the participants to speak, share their speaking videos, comment on each other's work, and learn from each other. This activity, being led by the teacher, enabled the participants to learn and improve in a systematic way. The collaborative nature of the activities the learners did in both MOOC and DMC environments made it possible for them to practice speaking together and enhance their communication skills.

Learners were also provided with mentor texts or exemplars to enhance high-quality student-authored cohesive and coherent examples. Interactive word walls, large, thematic or graphic organizers filled with rich vocabulary and visually supported with graphics and real objects were co-created with students. Use was also made of mentor sentences and model speaking activities to expose learners to samples of cohesive and coherent speaking. All the mentioned processes were implemented in DMC- and MOOC-based environments which were more convenient to the learners leading to the improvement of cohesion and coherence in their speaking performance.

In a nutshell, much of the research conducted on DMC in the past is about learners' attitudes, and studies carried out on the effects of DMC on different skills, subskills, and components of language are still embryonic. Furthermore, no study has, to date, compared the effectiveness of DMC and MOOC in relation to developing speaking fluency and accuracy. The present study, hence, was conducted to fill this gap in the literature and extend the boundaries of existing knowledge regarding technology-enhanced language instruction. The results revealed that DMC was superior to MOOC, which was in turn more effective than conventional instruction in helping L2 learners develop their speaking fluency and coherence.

CONCLUSION AND IMPLICATIONS

This study aimed at comparing speaking fluency and coherence of three groups of IELTS test takers in the three conditions of DMC, MOOC-based, and control environments. The data analysis results pointed to the effectiveness of both DMC and MOOC environments, with the former showing a more pronounced effect.

Many people struggle with the IELTS exam preparation; it is well-known for being tough, and will test anyone's language abilities to the limit. For a lot of people in an EFL context, the speaking part of the test can be the most stressful one. They are required to understand the question, prepare quickly, keep the idea simple and straightforward, consider and observe cohesion and coherence, lexical resource, grammatical range and accuracy, pronunciation, and many other factors involved in speaking. This study's findings suggest that both DMC and MOOCs offer advantages that address these challenges. DMC provides learners with opportunities to use a variety of media—such as text, audio, and video—to express their ideas in the target

language. This multimodal approach encourages learners to communicate more fluently and confidently, allowing them to choose the mode of expression that best suits their linguistic and creative needs. For example, learners in the DMC group could create videos, which provided them with real-time practice in organizing and presenting ideas coherently. The ability to express ideas across different modes helps build learners' confidence in communicating, enhancing both fluency and coherence.

Similarly, MOOCs offer an interactive and flexible platform for language learning. While MOOCs have general advantages—such as providing a wide array of resources, allowing learners to set their own pace, and enabling peer interactions—this study specifically showed how MOOCs can foster speaking fluency and coherence. The MOOC-based group benefited from structured yet flexible learning experiences, including interactive video lectures and online discussions. These activities facilitated active speaking and listening practice, important for building fluency. For instance, in MOOCs, learners were able to engage with course materials, respond to questions in discussion forums, and participate in language exchange activities, all of which encouraged active speaking and listening practice. This variety of engaging tasks provided them with the opportunity to practice language skills in a real-world context, thereby improving their fluency and coherence.

While the results indicate that DMC and MOOCs are more effective than conventional instruction for enhancing speaking skills, it is important to recognize some limitations of the study. The sample was limited to Iranian EFL learners, which may restrict the generalizability of the findings to other learner populations or cultural contexts. Additionally, the sampling procedure utilized in this study was non-random, volunteer sampling, which could at times render a sample which is not thoroughly representative of the population. Furthermore, the study focused primarily on fluency and coherence, without addressing other important speaking sub-skills, such as pronunciation, lexical resource, and grammatical range and accuracy, which would provide a more comprehensive understanding of speaking proficiency. Moreover, the three-week intervention could be another limitation of the study, which makes the readers approach the results with caution. Sometimes an intervention takes time to take effects and a three-week experiment might not be a long enough interval to capture all the effects.

The implications of this study are twofold: they are relevant for both language instructors and researchers. For educators, the study underscores the potential of DMC and MOOCs as effective platforms for enhancing speaking skills, particularly fluency and coherence. DMC, with its multimodal approach, allows learners to experiment with different media to express their ideas, fostering creativity and linguistic confidence. MOOCs, with their wide range of interactive features, encourage learners to practice speaking in diverse contexts and at their own pace, contributing to more flexible and personalized language learning.

For future research, it would be valuable to explore the long-term effects of DMC and MOOC-based learning on speaking proficiency and to investigate the impact of these platforms on other language skills, such as pronunciation and lexical resource. Further studies could also consider diverse learner populations to examine whether the findings are applicable across different cultural contexts and language backgrounds. Additionally, research could explore how combining DMC and MOOCs with other instructional methods (e.g., task-based learning) might further enhance learners' speaking abilities.

In conclusion, this study contributes to the growing body of research on digital and multimodal learning environments, highlighting the effectiveness of DMC and MOOCs in improving speaking fluency and coherence. By offering flexible, interactive, and multimodal learning experiences, these platforms provide learners with opportunities to engage in meaningful language practice, ultimately enhancing their speaking skills for success in high-stakes exams such as the IELTS.

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