Tweetstorming in the Language Classroom: Impact on EFL Tertiary Students' Ideational Fluency and Syntactic Complexity

Abdullah Mahmoud Ismail Ammar

Assistant Professor of TEFL

Sohag Faculty of Education

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ABSTRACT

The last few years have witnessed a paradigm shift in educational settings where language educators and practitioners have turned their focus from traditional face-to-face classroom practices to more hybrid and virtual language teaching/learning methodologies. This paradigm shift gained momentum with the introduction of Web 2.00 tools and social media applications and the increased tendency in education and workplace towards more technology-driven practices and solutions. The current study reports on an experimental treatment to employ Tweetstorming in writing classes of tertiary students and studying the impact on their ideational fluency and syntactic complexity. Participants were EFL tertiary students enrolled in Writing I course of the English Study program of Abu Dhabi University. Results of the study indicate that using Tweetstorming in the writing classes of tertiary EFL students brought about significant gains in their ideational fluency and syntactic complexity. Details of the instructional treatment along with the tools used in measuring students' ideational fluency and syntactic complexity will be discussed. Recommendations for language education as well as suggestions for further research will be presented.

1. INTRODUCTION

In today's digital age and virtual environments, English constitutes the vessel of world knowledge since most online cultural and knowledge heritage is written in English. It is the medium through which people can communicate with one another world-wide, and thus transfer and share knowledge amongst different communities, cultural contexts, and academic settings. A need is felt in different educational settings particularly the higher education institutions to change into English-medium institutions, where English becomes the medium of instruction and communication within these settings.

Learning English, in turn, is heavily dependent on writing as an integral skill in foreign language learning settings (Fageeh, 2011). To perform well in foreign language educational settings, EFL students are expected to show sophisticated writing performance in terms of both content and language. This sophisticated performance in writing enhances not only the overall written language achievement but as well language proficiency and communicative competence (Youn, 2014; Kuiken & Vedder, 2012; Ortega, 2003).

Sophisticated writing performance, in turn, is characterized by many aspects, at the core of which are creativity of content and sophistication of language structures used. One of the core components of creativity is ideational fluency measured in terms of the number of ideas or themes a student can generate on a given topic (Carrol, 2013; Vannorsdall et al, 2012; Kaufman et al, 2011). Another feature pertains to sophisticated and varied writing performance. Sophistication and variety are core components of syntactic complexity. As defined by Lu (2011), syntactic complexity refers to "the range of syntactic structures that are produced and the degree of sophistication of such structures" (Lu, 2011: 36).

These two - ideational fluency and syntactic complexity - have received a revived interest in foreign language research lately, being the cornerstones of sophisticated writing performance (Housen et al, 2012; Housen & Fuiken, 2009; Hodger, 2004). Research literature relates syntactic complexity to overall language proficiency. Students who exhibit higher levels of syntactic complexity are more likely to have higher overall language proficiency not only in the written performance but in the spoken language as well (Youn, 2014; Kuiken & Vedder, 2012.). According to Karami and Salahshoor (2014), syntactic complexity is a good predictor of reading performance. Poor syntactic awareness has been linked to poor reading and writing performance (Apel & Apel, 2011). The same applies to ideational fluency, which is considered very instrumental in educational settings in general and foreign language contexts in particular (Vannorsdall et al, 2012; Paulus & Brown, 2007).

Yet, despite this significance of sophisticated writing performance of EFL tertiary students in terms of syntactic complexity and ideational fluency, research conclusions indicate that these two aspects have not received due attention in writing courses and foreign language education programs generally. In terms of syntactic complexity, for example, research conclusions indicate that EFL tertiary students in the Gulf area suffer from syntactic problems such as poor syntactic variety in terms of grammatical structures that they are able to deploy in foreign language writing situations as well as poor organizational skills (Ezza, 2010; Al-Hamzi, 2006; Zahid, 2006; Mohammad, 2005). The same applies to writing fluency in terms of the volume of content or the number of ideas students can produce on a given writing topic (Kaufman et al, 2011). Very often than not, students feel blocked, find it difficult to get started, feel blank in terms of what to write on a given topic, and lack motivation to engage in writing activities.

While teaching ADU students the writing courses of the English program, the researcher observed that they suffer from almost the same problems outlined above. The written language performance of FL students indicate that they are poor in variety and sophistication as well as inability to produce a rich pool of ideas of value in their writings. Similarly students feel blocked and have difficulty jogging down their ideas onto paper when asked to write in language classes. These in turn, affected their overall language performance and consequently their overall academic achievement as shown by their cumulative grades.

The introduction of social media applications in educational settings generally and in language classes in particular have bought about promises and chances for developing language performance of learners; writing is no exception. Ability to engage learners and enhance their cognitive processing mechanisms has been documented quite enough in the foreign language research literature (Fageeh, 2011; Kabilan et al, 2010; Matney & Borland, 2009; Mork, 2009; McArthur, 2009). The positive impact social media applications have on language students' performance is not limited to language-related aspects but extends to non-language factors such as motivation, engagement in language activities, and creativity (Al-Mukhaini et al, 2014; Marwick & Boyd, 2011; Ullrich et al., 2008)

As new applications and pedagogical techniques developed thereof are introduced on a constant basis, a need is felt to experiment with these new technological applications. One of the recent technological applications that has been turned into an educational platform is the Twitter Interface. The emergence of Twitter as an educational platform with potential capabilities to enhance learning practices in different contexts and the new forms of literacies ensuing thereof has necessitated that educators and researchers explore these potential possibilities and see how far they can make a difference in foreign language learning settings and practices therein.

The current study proposes an instructional framework for using Twitter as a brainstorming tool in writing classes. The resulting terms is "tweetstorming". Simply put, the term refers to using Twitter as a tool for brainstorming ideas for writing and manipulating generated content in a way that would enhance the writing performance of tertiary students. Since its conception in 2007, the technique has not been adequately explored especially in language settings and writing classes. In the current study, a framework for using Tweetstorming in generating ideas for writing, structuring ideas based on genre requirements, and sharing them with peers and other interested audience was proposed. Impact on EFL tertiary students' creativity and syntactic complexity was explored, as detailed below.

1.2 Statement of the Problem

It is clear from the brief introduction above that EFL tertiary students show incompetence in writing courses and poor writing performance therein. Poor writing styles in terms of inability to vary structures in their writing and deploy more sophisticated syntactic features affects negatively their language learning achievement. As well, the content of their writings reflects poor creative writing performance and incapability to dig deeper for creative ideas in terms of both quantity and quality. They seem less engaged with writing activities and less willing to persist and show perseverance in challenging writing tasks.

Being obsessed by new technological devices and applications thereof and almost addict to using different types of social media in their daily life situations, they spend hours using these social media tools. As these tools provide potential capabilities and more engaging aspects, a need is felt to experiment with new tools for improving students' performance in foreign language learning settings. Twitter is an example of such social media applications that can make a difference in foreign language writing classes. Although Twitter has been in existence for quite a while, it has not been fully exploited in educational settings

relative to its potential capabilities. Most research endeavors so far have been correlational and exploratory in nature. A few experimental research trials with instructional interventions have been proposed heretofore (Rinaldo et al., 2011; Junco et al., 2010).

The current study introduces Tweetstorming as an instructional technique that can be used in writing classes to improve the writing capabilities of EFL tertiary students. Despite the fact that Tweetstorming as a term has been in existence since it was first coined in 2007, it has not heretofore been employed in educational settings generally and language learning settings in particular. Surfing different search engines yielded no studies on using Tweetstorming for academic purposes, let alone writing in English as a foreign language. Tweetstorming here is used as a technique for brainstorming ideas and processing them in writing settings.

An instructional intervention for using Tweetstorming to enhance the writing performance of EFL tertiary students in terms of ideational fluency and syntactic complexity was proposed and field-tested on a group of EFL students in Abu Dhabi University, Emirates, in the second semester of the academic year 2014. Two questions were tackled including:

1. What is the effect of Tweetstorming in writing classes on tertiary EFL students' ideational fluency?

2. What is the effect of Tweetstorming in writing classes on tertiary EFL students' syntactic complexity?

1.3 Hypotheses of the study

Two hypotheses were tested to answer the two questions above, including:

1. There is no statistically significant difference in ideational fluency between mean scores of the experimental group students and their control peers as a result of the Tweetstorming intervention.

2. There is no statistically significant difference in syntactic complexity between mean scores of the experimental group students and their control peers as a result of the Tweetstorming intervention..

1.4 Significance of the Study

Significance of the study stems from a set of considerations. First, the study introduces a social media- based pedagogical technique that is likely to enhance foreign language classroom practices generally and writing practices in particular. Since its conception in 2007, Tweetstroming has not been given due attention in language classes. A survey of research papers available online in different search engines did not yield any study with sound scientific underpinnings that used Tweetstorming in teaching English as a foreign language. Lots of studies focused on using Twitter generally. Tweetstorming in the sense developed herein has been an under-researched area. The study proposes an instructional framework that can be utilized by those interested in adopting social media platforms especially Twitter in their foreign language learning settings.

Second, the study deals with a new form of literacy that has received heated interest in language research literature lately. This is online literacy. Using social media in language classes and the overall tendency to shift towards connectivist and personal learning environments have brought about new forms of literacy that have not been in existence before the emergence of social media and Web 2.0 tools. Twitteracy, Twitterature, and Tweetstorms have come into existence as new terms symbolizing new forms of literacy that students

generally and language learners in particular should be cognizant of when using Twitter in their language learning settings (Greenhow & Cleason, 2012).

Third, the study deals with creativity in college students' writing in terms of ideational fluency, which is considered a core component of creative performance and a cornerstone of cognition in different settings (Vannorsdall et al, 2012; Paulus & Brown, 2007). Creativity is considered one of the four core competencies of the 21st century, along with communication, collaboration, and critical thinking (Besancon et al., 2013; Kaufman & Beghetto, 2009). Creative minds can make a difference in different veins of life, and thus investment in enhancing creativity is an investment not only in the well-being and excellence in educational settings, but as well in other veins of life requiring creative minds (Jauk et al, 2014; Carrol, 2013)

Fourth, the study deals with syntactic complexity in foreign language writing settings. This variable has not been duly investigated. Pertinent research (Kuiken & Vedder, 2012; Ortega, 2003) indicates that syntactic complexity is a strong predictor of sophisticated writing performance as well as overall foreign language proficiency. Developing syntactic complexity of EFL students is likely to pay off in terms of more sophisticated writing performance as well as overall communicative competence (Youn, 2014). For these reasons, syntactic complexity has received a revived interest in language research lately (Pallotti, 2009; Larsen-Freeman, 2006).

1.5 Definition of terms

The following definitions of terms were adopted in the current study.

Syntactic complexity: Syntactic complexity refers to the range of syntactic structures that are produced and the degree of sophistication of such structures (Lu, 2011: 36).

Tweetstorming: Tweetstorming is used to refer to brainstorming ideas over Twitter (Sie, 2012 :2)

Ideational Fluency: It is the ability to rapidly produce a series of ideas, words, or phrases related to a specific topic or object (Kaufman et al, 2011: 93)

2. <u>REVIEW OF LITERATURE</u>

2.1 Social Media in Educational Settings

Using social media in different veins of life has received spirited interest in recent years. As Elavsky et al (2011) argue, social media have changed the face of journalism and marketing. In educational settings, these technological applications have attracted the interest of educators and researchers interested in motivating learners and maximizing their learning gains (Moran et al, 2011; Schroeder et al, 2010; Hughes, 2009; Grosseck & Holotesc, 2008). They, as Huijser (2008) states, have altered the whole make-up of education and redefined the learning process in terms of time and space. They impacted the construction and distribution of knowledge (Siemens, 2008), and the selection and collaborative creation of information (Todd, 2008).

Increased adoption of these social media applications in educational settings has primarily been motivated by the emergence of connectivist pedagogies and collaborative educational practices in different schooling contexts. Connectivist pedagogies, as Siemens (2008) argues, see that learning is a social phenomenon that is best conducted in a social context. Sharing experiences and constructing knowledge are best practiced in collaboration through collective contributions by all involved in a given situation (Bereiter & Scardamalia, 2014). This requires that learning environments be extended outwards to included

practices across school and non-school settings (Leander, 2008). The adoption of social media, as Greenhow et al argue, is likely to impact constructs of learning, instruction, and paths for future research (Greenhow & Robelia, 2009)..

Empirical research conclusions carry evidence that using social media in educational settings brings about significant gains in learning performance and academic achievement. For example, Harris and Rea (2009) stressed the advantages of students becoming active agents in the learning process, the expansion of the learning environment outwards to include the whole world, cooperative learning and easily accessed knowledge. McRae (2007) reported increased levels of social and emotional engagement of learners who employed social media in their learning endeavors. Similar conclusions related the use of social media to higher gains in students' motivation in educational settings (McArthur, 2009), better communication skills (Lane, 2013), and more collaboration amongst students (Tay & Allen, 2011).

In language settings, the conclusions are consistent with those reported above. For example, Kabilan et al (2010) concluded that social media can be effective learning environments for learning English. Bowen (2005) concluded that using social media in writing classes brought about higher levels of student engagement in writing activities. In Buddle's study (2011), using social media was effective in promoting active learning and the subsequent development of a learning community and greater participation by students who were reluctant to engage in a lecture hall setting. Similar conclusions were reported by Fageeh (2011), Kabilan et al (2010), Matney & Borland (2009), Mork (2009), McArthur (2009) and Stockwell (2005).

2.2 The Twitter Interface

Twitter, compared to other types of social media such as Facebook and Blogs, is distinguished in terms of the follower structure, link sharing,

use of hashtag, and real-time searching (Vieweg et al, 2010; Boyd et al, 2010; Kwak et al, 2010). In terms of the follower structure, Twitter users can create groups in which members follow each other, tweet and retweet own and others' messages, and share expertise with whoever is using Twitter. They can share links to other online resources, both Twitter and non-Twitter. The use of hashtag is what really distinguishes Twitter. The hashtag is a link to an idea or theme written very concisely and prefixed with the number symbol (#). Pressing a given hashtag collects all relevant tweets written about the theme or idea. These tweets pop up instantly on the Twitter walls of their followers, once sent by the originator of the tweet. These features, as Bicen and Cavos (2012) and Lucky (2009) argue, make Twitter a viable professional platform and a social networking tool.

Although Twitter is relatively new compared to other social media tools, it has a profound impact in different fields of life and study such as journalism, marketing, and education. In educational settings Twitter has been used in different ways by different educators and researchers. Lewis and Rush (2013) used Twitter as a platform for creating learning communities and orchestrating activities in class. Ebner (2009) suggested using Twitter as a platform for creating a community of practice by connecting experts over a wide distance. Twitter was also used as a tool for enhancing motivation in learning settings (Minocha & Kerawalla, 2011) and connecting formal and informal learning environments (Dabbagh & Kitsantas, 2012). Junco et al (2010) studied the impact that Twitter had on student engagement and grades. Results showed that using Twitter resulted in engaging both faculty and students in ways that transcended traditional classroom activities. In Dunlap and Lowenthal's study (2009), using Twitter enhanced the social presence and social interaction in large classes. It provided students with an opportunity to engage expertise and knowledge from outside of the physical classroom.

In language settings, Twitter has been seen as a good alternative to improve students' communication, analytical skills, and collaboration (Mark, 2009). Mark (2009) summarized the uses of Twitter in educational settings in terms of communicating class content, sending out small timely pieces of information, encouraging collaboration and feedback, and encouraging concise writing. Ulrich et al (2008) used Twitter to improve oral communication of EFL students. Ebner et al (2010) argued that Twitter can facilitate process-oriented learning practices in language learning contexts.

Using Twitter in language learning contexts has, in turn, resulted in the emergence of new forms of literacy that are different in formalities and functions from the traditional forms of literacy. Terms such as "twiteracy" and "Twitterature" have recently emerged to refer to these types of literacy (Greenhow & Cleason, 2012). Davies (2012) referred to these forms of literacy as social literacy practices. Alverman (2008) sees this online literacy as a new paradigm in literacy studies. Regarding Twitter, Greenhow and Cleason (2012) considered tweeting a literary practice comprising both traditional and new literacies and impacting both formal and informal learning settings (P. 463).

Yet, in spite of these advantages of using Twitter in educational settings generally and language learning contexts in particular, controversies still exist. For example, the 140 character limit has been seen by some educators and researchers as an impediment to enhancing learning practices and outcomes. Some of those studying student engagement in Twitter platforms concluded that engagement was primarily social and emotional but not cognitive (Baron & Corbin, 2012; Holley & Oliver, 2010). Cognitive engagement, as those researchers and educators argue, requires that students be involved in continuous and extended environment that would allow them to detail messages and provide more elaborated writing when communicating ideas to others. Other researcher (Buddle, 2011) saw the 140 character limit an

advantage as it requires that students state their questions concisely and direct to the point. Similarly, Mark (2009) considered the 140 character limit an advantage in terms of conciseness. Yet, both sides of the controversy deal with speculations rather than conclusions based on sound empirical research results. Consequently, this area that needs further investigation in empirical research.

2.3 Tweetstorming

In response to the issue of the 140 character limit of Twitter and the many controversies raised in this regard, Twitter specialists coined the term "Tweetstorm". It was coined by Marc Andreessen to refer to a series of tweets from a person that starts with a number and a hashtag (Almo, 2014). This series of posts, known as tweetstorm, is a way to share thoughts and comments that are too long for the 140 character limit.

Due to the recency of the term in educational settings and the paucity of research thereon, no scientific definition has been widely adopted yet. For example, in the Cambridge English Dictionary, a Tweetstorm is defined as "a series of tweets (messages on Twitter) sent out one after the other by one person. On the Technopedia Webpage, tweetstorming is defined as " a sudden spike in activity surrounding a certain topic on the Twitter social media site. Using a certain and often original hashtag, the tweet quickly spreads as people are notified of the message and then reuse the hashtag with subsequent tweets and These definitions share two aspects in common. The first is   retweets". that a tweetstorm is a way to share a number of tweets on a common thought or theme. The other is that a tweetstorm relates together scattered tweets that are hard to follow and might be lost amongst the flood of tweets one sends and receives. Cohesiveness of the message formulated through this series of tweets is critical here. In one's Twitter feed, this series of related successive posts look like a min-essay.

Tweetstorm, in turn, has given rise to "tweetstorming". Defined by Sie et al (2013), tweetstorming is "a technique for brainstorming ideas using Twitter (p.2). In this sense the term is similar to brainstorming in mechanism and principles, yet different in medium and structure. In principle and mechanism, both Tweetstorming and brainstorming are used for jogging down ideas quickly without stopping for censorship or evaluation. Idea evaluation is deferred until idea evaluation is over. People can brainstorm/tweetstorm individually and in groups. When used in groups, individuals build on one another's ideas and expand them to new horizons often impossible in individual brainstorming/tweetstorming sessions. In both cases, the quantity of the generated ideas is the criterion.

In terms of structure and medium, the tweetstorming workspace is different from that of the traditional brainstorming settings in the sense that individually generated posts (tweets) are instantly shared by all members at the same time once sent. The synchronous sharing of ideas, in turn, aggregates generated content on a continuous basis and thus accumulates group contributions without waiting for individual turns to take place the way used to in traditional brainstorming sessions. The aggregation of generated content can be further enhanced by the use of hashtags. Pressing a given hashtag will collect all details related to the hashtag theme and display them as a list on the Twitter wall of the respective Twitter group members. In this sense, tweetstorming is used as a technique for brainstorming ideas for writing, organizing these ideas in terms of relevance, and instantly sharing them with peers and other Twitter users; something that is very unlikely in traditional brainstorming settings.

As Tweetstorming is a new term, it has not heretofore been used in educational settings, let alone foreign language learning contexts. Surfing different online databases and search engines yielded no studies on using Tweetstorming for educational purposes. The only one

published paper on using tweetstorming was that of Sie et al (2013). The researchers used tweetstorming as a brainstorming tool during a workshop on using networked learning environments. As a pedagogical tool in educational settings and language learning environments, tweetstorming has not been explored yet.

The current study explored the term in the foreign language learning contexts as a tool for generating ideas for writing, organizing ideas in terms of relevance and significance, structuring content based on the requirements of the writing genre considered, and sharing writing with peers and other Twitter users. Impact on EFL tertiary students' creative writing measured in terms of ideational fluency was investigated. As well, the syntactic complexity of students' writings was examined to see if the limited workspace of Twitter and the 140 character limit of tweets would have any impact on the sophistication and variation of students' writing.

3. METHOD

3.1 Participants

Sixty two EFL students enrolled in the Writing-I course in the English program of ADU participated in this study. The course it taken as an open elective course or a major requirement. In Writing-I, EFL students study expository and descriptive modes of writing. As ADU is a multinational university, the cohort of participants involved students coming from different countries including Emirates, Syria, Jordan, Palestine, Iran, Pakistan, Spain, Egypt, Sudan, Somalia, Lebanon, Oman, and the Philippines. They all had at least one smart device and internet access both on-campus and at home.

3.2 Design of the Study

The quasi-experimental design was employed in the current study. The two-group post-assessment-only design was utilized, where participants

were assigned to an experimental condition or a control one. Those in the experimental group received the instructional intervention based on using Tweetstorming in writing activities and procedures, whereas those in the control group condition studied the writing course without using Tweetstorming. By the conclusion of the instructional intervention, the writing performance of students in both groups was assessed for any significant differences in their ideational fluency or syntactic complexity post-instructionally.

3.3 Instructional Procedures

The instructional treatment proceeded along the following steps:

1. The treatment started with guiding students into establishing Twitter accounts. Most of the participants were quite familiar with Twitter and already had used Twitter in some personal as well as academic activities. To make sure all had adequate entry-level familiarity with Twitter, an introductory session was dedicated to explanation of how to use Twitter, how to hashtag main ideas, and how to tweet and retweet own and peers' contributions.

2. Grouping ideas tweeted by others was further explained and emphasized for future use.

3. Students were then guided into the procedures and principles of brainstorming. Four principles were stressed including: the more the better, building on others' ideas, no censorship of ideas while brainstorming them, and mutual support in group brainstorming sessions (Wilson, 2013).

4. Each week a topic was chosen for writing. Students were asked to tweet as many ideas as they can on the topic of selection.

5. Students were advised to divide into subgroups, each searching for ideas in a given source. Some surfed the internet and other online sources for ideas related to the topic of discussion. Others surveyed ideas of peers and friends on-campus through face-to-face discussions. Some went to the university library for books and magazine articles on the topic. Whatever their destination, students tweeted the ideas they collected and shared them with the whole group, thus creating a pool of ideas collected from different sources.

6. When tweeting main ideas they were asked to create new hashtags to signify these ideas. After finishing this round of tweetstorming, they collect ideas around themes using the hashtags they created. Using the number of ideas around a given theme as an indicator of the significance of the idea, they arranged ideas for later use.

7. Significant themes were then further elaborated on through a second round of Tweetstorming.

8. Rounds of tweetstorming continued until students had exhausted all possible details on considered themes.

9. Students were then asked to individually group final ideas, arrange them based on significance, and write an inclusive list of all tweeted details.

10. Lists were then shared in class with peers and the instructor for a further cycle of face-to-face discussion and expansion of ideas.

11. The routine processes of writing followed, including outlining, drafting, revising, and editing.

12. Final drafts were then shared amongst class members for feedback and further expansion, if needed.

13. The cycles continued and was carried over to other topics, one each week, for three months (the second semester of the academic year 2014)

3.4 Assessment Tasks & Scoring Procedures

The study aimed at investigating the impact of Tweetstorming in writing classes on EFL students' ideational fluency and syntactic complexity. Two tasks were used for assessing these two variables, including a brainstorming task and an expository essay writing task.

3.4.1 Ideational Fluency

As discussed in the introduction, ideational fluency refers to "the ability to rapidly produce a series of ideas, words, or phrases related to a specific topic or object" (Kaufman et al, 2011: 93). It is measured in terms of the number of ideas generated on a given task (Jauk et al, 2014). In assessing ideational fluency students are often asked to generate as many ideas as they can under restricted time condition (Carrol, 2013; Vannorsdall et al, 2012; Paulus & Brown, 2007).

In assessing the ideational fluency of participants in the current study, the researcher used a decontextualized task and a contextualized one. The decontextualized task was a brainstorming one, where they were asked to brainstorm their ideas without developing them into extended writing performance; just to create a list of ideas on the assigned topic. It was a timed one, wherein students were asked to write as many ideas as they can on "Differences between high school and university education". Scores obtained by individual students on this task were equivalent to the number of relevant ideas each generated in the allocated time (5 minutes).

In the essay writing task, they were asked to write an expository essay on "Uses of social media in different veins of life". The aim was to tap in their ideational fluency in extended writing performance. Ideational fluency here was measured in terms of the total number of T-units individual students generated in their essays. Again, the task is a timed one, wherein students were asked to write for one hour and were informed of the principle of generating writing as fast as they can. The number of T-units generated was automatically scored via the web-based version of the (L2SCA, 3.3.3) software Lu (2011,).

3.4.2 Syntactic Complexity

As stated in the literature surveyed above, syntactic complexity refers to "the range of syntactic structures that are produced and the degree of sophistication of such structures" (Lu, 2011: 36). It showcases how varied and sophisticated the production units or grammatical structures of an individual's second/foreign language writing are (Ortega 2003, cited in Lu, 2011)

In assessing the syntactic complexity of students' writing, the expository essays they wrote on the extended writing task (see previous section) were automatically scored using the L2 Syntactic Complexity Analyzer (L2SCA) software developed by Lu (2010, 2011). The software takes a written language sample as input and produces fourteen indices of syntactic complexity of the sample based on these measures. After Lu (2010, 2011) ten measures of syntactic complexity were included in the current study. Four measures including, CT/C, CT/T, C/S and, VP/T (see below), were not included because they were shown in the literature to be poor candidates for developmental indices (Lu, 2011). The software is designed with advanced second language proficiency research in mind and is therefore suitable for measuring college students' writing performance.

The Syntactic Complexity Analyzer (Version 3.3.3) allows researchers and educators to automatically analyze 14 different measures of syntactic complexity covering five different factors, including: (1) length of production units, (2) amount of coordination, (3) amount of subordination, (4) degree of phrasal sophistication and (5) overall sentence complexity. Details are shown in Table (1).

Table (1): Measures of syntactic complexity (Lu, 2011:36)

Syntactic Complexity Measure	Code	Definition
Type 1: Length of production unit		
Mean length of clause	MLC	# of words / # of clauses
Mean length of sentence	MLS	# of words / # of sentences
Mean length of T-unit	MLT	# of words / # of T-units
Type 2: Sentence complexity		
Sentence complexity ratio	C/S	# of clauses / # of sentences
Type 3: Subordination		
T-unit complexity ratio	C/T	# of clauses / # of T-units

Complex T-unit ratio	CT/T	# of complex T-units / # of T-units
Dependent clause ratio	DC/C	# of dependent clauses / # of clauses
Dependent clauses per T-unit	DC/T	# of dependent clauses / # of T-units

Type 4: Coordination

Coordinate phrases per clause	CP/C	# of coordinate phrases / # of clauses
Coordinate phrases per T-unit	CP/T	# of coordinate phrases / # of T-units
Sentence coordination ratio	T/S	# of T-units / # of sentences

Type 5: Particular structures

Complex nominals per clause	CN/C	# of complex nominals / # of clauses
Complex nominals per T-unit	CN/T	# of complex nominals / # of T-units
Verb phrases per T-unit	VP/T	# of verb phrases / # of T-units

4. RESULTS

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By the conclusion of the instructional intervention, the writing performance of students in both groups was post-assessed for ideational fluency and syntactic complexity. The Statistical Package for the Social Sciences (SPSS, v.19) was used in the statistical treatment of the results as shown below.

4.1 Impact of Tweetstorming on Ideational Fluency

To decide on the impact of using Tweetstorming in the writing classes of tertiary EFL students on their ideational fluency, scores of the experimental group students on the two writing tasks, --the brainstorming task as well as the expository essay writing task-- were compared to those of their control peers. t-test for independent samples was used to determine whether there is any statistically significant difference between mean scores of the two groups on their ideational fluency. Details are shown in Table (2).

Table (2): t-test analysis of tertiary EFL students' scores on ideational fluency

Ideational Fluency Task	Group		M	S		t-value	Sig. (2-tailed)

						)
Bra inst orm ing task	Ex per im ent al	14.588	1.2		6.9	.000
	Co ntr ol	11.964	1.71			
Exp osit ory essa y task	Ex per im ent al	24.5000	2.56		5.824	.000
	Co ntr ol	21.2144	1.475			

It is clear from data shown in Table (2) that using Tweetstorming in writing classes of EFL tertiary students enhanced their ideational fluency. A statistically significant difference between mean scores of the control group students and those of their control peers does exist. This applies to the brainstorming task as well as the expository essay writing task. In the brainstorming task, students in the experimental group outperformed their peers in the control group in terms of the mean number of ideas generated on the brainstorming prompt. Based on data shown in Table (2), a statistically significant difference between mean scores of the two groups in terms of the number of generated ideas, favoring the experimental group students ($F = 6.9$, $P \leq .01$).

Likewise, the experimental group students who used Tweetstorming in their writing activities outperformed their control peers in the expository essay writing performance in terms of the number of T-units they produced in their essays. Based on data on Table (2), a statistically significant difference does exist between mean scores of the two groups, favoring the experimental group students ($F = 5.824$, $df =$, $P \leq .01$). As the number of T-units is an indicator of ideational fluency in writing performance, it can be concluded that using Tweetstorming in writing activities enhanced the ideational fluency of EFL tertiary students.

4.2 Impact on Syntactic Complexity

To investigate the impact of using Tweetstorming in the writing classes on the syntactic complexity of EFL tertiary students, the writing performance of the experimental group students on the expository essay writing task was compared to that of their control peers post-instructionally. t-test for independent samples was used to determine whether there was any statistically significant difference between mean scores of the two groups on the different measures of syntactic complexity considered in this study . Details are shown in Table (3).

Table (3): t-test analyses of the EFL tertiary students' scores on syntactic complexity measures

Measure	Group	N	M	SD	t-value	df	Si (2-t
MLC	Experimental	28	8.5893	.90076	4.215	62	.0
	Control	34	7.6294	.88541			
MLS	Experimental	28	13.2500	1.26564	7.624	62	.0
	Control	34	10.3529	1.64929			
MLT	Experimental	28	12.9286	.94000	5.609	62	.0
	Control	34	11.2353	1.34972			
DC/C	Experimental	28	.3129	.06954	4.898	62	.0
	Control	34	.2350	.05566			
DC/T	Experimental	28	.5450	.08626	5.723	62	.0
	Control	34	.4291	.07321			
CP/C	Experimental	28	.2346	.01666	6.001	62	.0
	Control	34	.2118	.01336			
CP/T	Experimental	28	.3389	.03023	5.383	62	.0
	Control	34	.3021	.02371			
T/S	Experimental	28	1.2475	.20323	6.546	62	.0
	Control	34	.9550	.14817			
CN/C	Experimental	28	1.0875	.14204	4.381	62	.0
	Control	34	.9500	.10482			

CN/T	Experimental	28	1.5786	.18330	6.397	62	.0
	Control	34	1.3294	.12193			

As indicated by data in Table (3), statistically significant differences on the different measures of syntactic complexity do exist between mean scores of the experimental group students and those of their control peers. These differences are in favor of the experimental group students who received instruction in using Tweetstorming in their writing activities. Based on the scores generated by the L2 Syntactic Complexity Analyzer, the experimental group students outperformed their control peers on the ten measures of syntactic complexity considered in the current study. In terms of the length of production units, the experimental group students produced longer clauses, longer sentences, and longer T-units. The mean lengths of these three production units are 8.59, 13.25, and 12.93 for the experimental group students compared to 7.629, 10.354, and 11.235, respectively, for the control group students. This yielded t-values of 4.215, 7.624, and 5.609; all indicating statistically significant differences ($P \leq .01$) between mean scores of students in the two study groups favoring the experimental group students.

In terms of subordination, the experimental group students showed higher T-unit complexity ratio, higher dependent clause ratio, and more dependent clauses per T-units. The mean scores as shown in Table (3) are 0.313, 0.545, and 0.234 for the experimental group students compared to 0.235, 0.429, and 0.212, respectively, for the control group students. The corresponding t-values for the differences between pairs of mean scores are 4.898, 5.723, and 6.00 respectively, all indicating statistically significant differences ($P \leq .01$) favoring the experimental group students.

likewise, data in Table (3) indicates that the experimental group students outperformed their control peers in terms of coordination. They

produced more coordinate phrases per clauses and T-units, and a higher sentence coordination ratio. Their scores were 0.3389 and 1.248 for the experimental group students compared to 0.3021 and 0.955, respectively for the control group students. The corresponding t-values are 5. 383 and 6.546, both indicating statistically significant differences between mean scores of the experimental group students and those of their control peers (P ≤ .01) favoring the experimental group students.

In terms of syntactic sophistication in writing performance as measured by complexity of nominals produced by tertiary EFL students, results of the study as shown in Table (3) indicate that this was positively impacted by using Tweetstorming in their writing activities and procedures. The experimental group students who used Tweetstorming outperformed their control peers in the number of complex nominals per clause and the number of complex nominals per T-units. Their mean scores were 1.088 and 1.579 for the experimental group students compared to 0.95 and 1.329 for the control group students. The corresponding t-values are 4.381 and 6.397, both indicating statistically significant differences (P ≤ .01) between pairs of mean scores on those two measures.

5. DISCUSSION

Drawn together, it seems that using Tweetstorming in the writing activities and procedures of tertiary EFL students impacted positively their writing performance in terms of both content and language aspects. Regarding the content of students' writings, they exhibited increased creativity in content as measured by the number of ideas they generated in both ideational fluency tasks. In terms of language and writing styles, they exhibited more sophisticated writing performance measured in terms of syntactic complexity. On the ten measures of syntactic complexity outlined above, the experimental group students who used Tweetstorming in their writing activities outperformed their control peers.

These statistically significant differences in the writing performance of the two groups can be attributed to a number of features that Tweetstorming availed in a way that was very unlikely to exist in traditional writing classes and activities therein. The first of these features is collaborative creation of ideas and writing content. Through Tweetstorming, student can instantly and simultaneously share content, build on each other's ideas, and collectively contribute to the development and advancement of ideas. Consistent with the description of Coiro et al (2008), Twitter contents are dynamically updated, situationally specific, and socially mediated. Hakkarainen (2003) referred to such practices as "progressive-inquiry culture"(P.99), wherein students continuously search for information, update it through collaboration with others, and fine-tune it based on the requirements of the writing situation. Bereiter and Scardmalia (2014) used the term "knowledge building" to refer to this collaborative work and collective advancement of ideas. In knowledge building contexts, such as the one at hand, the collective contributions of learners are more than the sum of individual contributions, which in turn, makes these collaborative writing environments more productive and creative.

The second feature that Tweetstorming availed in a way that was not possible in traditional writing environments is the possibility of expanding and extending the learning environment to include formal and informal settings. Students could tweet their ideas during formal class time as well as outside the classroom walls. Likewise, they can benefit from tweets of their classmates as well as of those interested in the topic, though not part of the formal writing situation. This is consistent with conclusions of Sie et al (2013) regarding the effectiveness of integrating formal and informal learning contexts through social media tools such as Twitter. As stated by Johnson et al (2012) and Greenhow and Gleason (2012), social media such as Twitter are likely to enhance learning in-between, across, and beyond workspace boundaries. In language settings, as Greenhow and Gleason (2012) argue, Twitter can be used as a

backchannel for communication within, between, and beyond language classes.

A third feature that raised a number of controversies in the pertinent literature is the 140 character limit of the Twitter interface. A number of researchers saw the 140 character limit an impediment to enhancing learning practices and outcomes (Cohen & Duchan, 2012; Marinez et al, 2011). Others saw the feature an advantage in terms of enhancing students' capability to write concisely and precisely (Greenhow & Gleason, 2012; Elavsky et al, 2011). Both controversies were just speculations with no research evidence to support either side. The results of the current study support and carry empirical evidence to the latter stance. It seems, based on the results of the current study, that this feature has the advantage of making students and those using Twitter to intensify their messages, write with precision and economy, and thus enhance their syntactic complexity. Instead of writing a multitude of simple sentences, the students learned how to condense their ideas in compound and complex sentences, increase the mean lengths of production units, and thus exhibit higher levels of language sophistication in writing settings. These constitute core aspects of syntactic complexity as explained by Ai and Lu (Ai & Lu, 2013).

Furthermore, a feature that might explain the effectiveness of Tweetstorming in enhancing students' writing in terms of sophistication of both content and language is the ability to engage students in the writing situation. Tweetstorming, compared to other ways Twitter is used, is more structured in the sense that students' tweets and retweets are focused on the writing topic at hand, more calibrated and oriented towards process-genre practices, and monitored by the instructor and other peers in the writing situations. This, in turn, is more likely to engage students cognitively, in addition to engaging them socially and emotionally. Pertinent literature on student engagement in social media settings indicates that students are often engaged socially and

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emotionally but not cognitively (Bicen & Cavos, 2012; Dunlap & Lowenthal, 2009). When students are fully engaged the way reported here in the Tweetstorming settings, they are likely to exhibit better learning performance and higher learning gains (Mahmoud & Hussein, 2013; Greenhow & Gleason, 2012; Marwick & Boyd, 20; Kuh, 2009; Parry, 2008).

Finally, Tweetstorming is more likely to support process-genre writing practices. Basically, process-oriented approaches were meant to separate idea generation from idea evaluation -- as was the case of product approaches (Ebner et al., 2010; Hedge, 2005; Ellis & Yuan, 2004; Brown, 2001). When idea generation is separated from idea evaluation in writing settings, both are emphasized but at different times. Evaluation is deferred until idea generation is over, which in turn enhances the likelihood that students produce more ideas and generate more content for writing. In line with conclusions of Sie et al (2013), Tweetstorming can help students generate ideas for writing whether individually or in groups, organize and categorize these ideas using the hashtags and thus aggregate content easily and quickly, and share ideas with real audience in authentic communication settings (Mark, 2009). The end result is that both writing processes and products are enhanced due to using Tweetstorming in the writing classroom.

6. IMPLICATIONS

The results of the study reported herewith carry a number of implications for using social media applications in general and Tweetstorming in language classes in particular. First, social media applications have potential capabilities to enhance language learning performance in different settings, provided that they be wisely used and incorporated in language learning practices. For example, Twitter is second only to Facebook as a social media platform, yet it has not been duly explored in language settings. The limited space on Twitter interface discourages instructors to use it in their instructional settings. Yet, based on the

results of the current study, this 140 character limit has the potential to enhance writing sophistication in terms of precision and conciseness. When used for brainstorming ideas for writing, Tweetstorming can be a more productive tool for instant, simultaneous, and collective exchange of ideas, and thus can be a better alternative to traditional brainstorming in terms of enhancing students' ideational fluency.

Second, using social media such as Twitter can revolutionize foreign language learning environments and impact learning outcomes. Yet, this would not pay off until these learning environments are restructured in a way that maximizes benefits and facilitates functioning. For example, social media can extend the learning environments to include both formal and informal settings. This is particularly important in foreign language learning settings, where language practice is often confined to walled-classroom settings. Extending formal learning into informal settings is likely to maximize students' exposure to foreign language use situations and enhance language learning performance and outcomes accordingly.

In turn, expansion of the learning environments into informal learning settings through social media applications such as Twitter requires that traditional environments be reframed in terms of activities, studied content, roles of teachers and learners, and structuredness of the learning environment. For example, in social media workspaces, students are likely to learn from both curricular activities and no-curricular ones. Balancing curricular activities with extra-curricular and co-curricular ones is a key to successful functioning in social media settings. As well, teachers are no longer the only source on knowledge students can resort to. Rather, students have access to a wider circle of knowledge sources, are in contact with other professionals and experts in the field, and have a bigger and more diverse community of learners. As well, tight structuredness in the traditional learning settings is not transferrable to social media learning interfaces. Success of instructional practices in

these environments requires that teachers strike a balance between structuredness and flexibility. Flexibility here relates to multiplicity of sources to attain information, flexibility in time and space boundaries, and acceptance to divergence and multiplicity in views and perspectives.

Finally, the emergence of Twitter (and now Tweetstorming) has resulted in the emergence of other types of literacy. Terms such as twitteracy, twitterature, online literacy, and social literacy practices have been used to refer to these new literacies (Greenhow & Gleason, 2012; Davies, 2012; Alverman, 2008; Lankshear & Knobel, 2007). As these new literacies are different in form, function, and technicalities from the traditional types of literacy, they need to be researched, on the one hand, and included in foreign language learning settings on the other. Teacher education programs and teaching pedagogy theorists need to address these in detail and advise practioners, teachers and educators on how to handle them in language learning settings.

7. SUGGESTIONS FOR FURTHER RESEARCH

As indicated by the results of the current study, Tweetstorming has inherent potentials to bring about positive changes in the foreign language learning settings. This seems encouraging for researchers and educators to experiment with the new technique in other areas of foreign language study. A number of suggestions for further research can be proposed in this regard. In terms of oral language performance, for example, future research can investigate the impact of Tweetstorming on the oral communicative competence of EFL learners and their debating skills. Written language is also a rich area for future research in this regards. For example, research needs to investigate the impact of using Tweetstorming with other forms of writing such as narrative writing, argumentative writing, poetry writing,...etc. Collaborative work in Twitter interfaces is another area that needs further investigation. In this regard, studies can examine the effectiveness of using Tweetstorming in collaborative story writing, collaborative writing of poems, collaborative

reflection on classroom practices -- both pedagogical and language-specific. Future research can also target the impact of Tweetstorming on non-language factors such as motivation, self-efficacy, autonomy, tolerance of ambiguity in language settings, intercultural communication; to mention just a few.

In addition to the above-mentioned suggestions, a number of issues stem from the delimitations of the current study and need further investigation in future research endeavors. The first of these issues is that the current study focused on syntactic complexity of tertiary students. Those have a richer background knowledge base of the language system, are able to function more communicatively in language situations, and have more sophisticated language skills that would help them better benefit from instruction when compared to pre-tertiary EFL students. Pertinent literature (Ai & Lu, 2013; Lu, 2011; Lu, 2010) indicates that syntactic complexity is a developmental phenomenon and thus might change as a result of student progression along the educational system. Replicating the instructional treatment on pre-university EFL learners is needed before generalizing current conclusions to these settings.

Second, the current study was interested in expository writing. Pertinent research literature shows that syntactic complexity may vary considerably according to the writing genres. For example, Yoon and Polio (2014) and Beers and Nagy (2009) concluded that syntactic complexity differed in students' writing from one genre to another and from one writing mode to another. Again replicating the instructional treatment on other writing genres (descriptive, narrative, argumentative, poetry, technical writing...etc.) is needed before generalizing conclusions of the current study to these genres.

Third, the current study is delimited to syntactic complexity in foreign language settings. Second language as well as first language learning contexts are different from the current context. Pertinent research literature indicates that differences in syntactic complexity do

exist among L1, L2 and FL learners (Ai & Lu, 2013; Kuiken et al., 2010; Stockwell, 2005; Hinkle, 2003; Chenoweth & Hayes, 2001). This in turn necessitates that generalizing the results and conclusions of the current study to those learners be taken with care. Comparative investigations are needed in this regard to study potential differences in syntactic complexity in online literacies between first language and foreign language users.

Finally, task complexity has not been taken into account here. Pertinent research on task complexity and the cognitive requirements of challenging tasks indicates that cognitively demanding tasks are likely to induce more complex language. For example, Bonzo (2008) found out that task complexity had a direct bearing on syntactic complexity in writing settings. Ong and Zhang (2010) concluded that task complexity had an impact on fluency as well as syntactic complexity in students' writings. Future research on syntactic complexity and ideational fluency in EFL students' writing performance should consider the impact of task complexity on syntactic sophistication before generalizing the current results and conclusions.

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