Using Infographics in the Teaching of Linguistics

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Abstract
Information graphics (infographics) are visualizations of ideas & information in a type of picture. Infographics combine data with design in order to communicate information to an audience in a comprehensible manner. This study is motivated by the lack of resources that directly study the influence of infographics on linguistics. It aims to investigate the impact of using information graphics in the teaching of linguistics on Saudi students. The researchers seek to answer the following questions: (i) What is the Saudi female EFL students' perception of using infographics as a tool for learning linguistics and semantics? (ii) What are the advantages & disadvantages of using infographics as a tool for learning linguistics and semantics? To this end, 186 Saudi female college students from the Department of Translation at the College of Languages in Princess Nourah bint Abdulrahman University (PNU) took part in this study. They designed infographics as a project in two linguistic courses: Introduction to Linguistics and Introduction to Semantics. They were provided a 26-item questionnaire. The questionnaire was analyzed by using the Statistical Package for Social Science (SPSS). The participants' responses were analyzed according to quantitative data analysis procedures. The findings show the students' positive attitude towards using infographics even though the majority were not familiar with them. While creating infographics, the participants found practicing various skills such as higher thinking skills beneficial. However, issues such as technical problems were perceived as a hindrance. A number of implications and suggestions are presented based on the results of this research.
*Keywords***:** computer-assisted language learning (CALL), English as a foreign language (EFL), infographics, linguistics, English teaching

1. Introduction

Whether or not the Internet should be used in teaching and communicating with students is no longer the issue in education. Instead, the emphasis nowadays is on the effective use of technology in order to create new learning opportunities and to promote students' achievements. Infographics are being used in academia. They provide their users with the necessary tools to improve their skills and knowledge. An infographic is a visualization of ideas and data in a type of picture that combines data with design to communicate information to an audience in a comprehensible manner. Throughout history, pictures, icons and graphs have been used to communicate information. The infographics creation process is known as data visualization, information design, or information architecture. (Smiciklas, 2012). Data visualization utilizes the human visual system's ability to see patterns and trends thus making data accessible and appealing to a diverse audience. (Heer, Bostock, & Ogievetskey, 2010). The earliest manifestation of data visualization was the making of maps by ancient Egyptians 200 BC to lay earthly and heavenly positions using something similar to latitude and longitude. (Friendly, 2007). In recent years, online communication and social media enhanced the shareability of data allowing infographics to spread outside academic areas and traditional media. (Smiciklas, 2012).

In an attempt to facilitate effective development, this research investigates using infographics as a tool for learning various areas of linguistics. As students are in a constant process of development, this research investigates the effect of using infographics to enhance student learning which will help them facilitate their own academic and professional growth.

The reason we want to study this area is that new technologies that are related to learning are being produced at an alarming rate. They are becoming more personalized (e.g. emails, social networks, discussion forums etc.), and as this is taking place there is an increasing need to ensure that those who are using such new technologies do so using the relevant and effective tools.

Classes that aim to teach linguistics to students normally use a variety of visual aids and assessment methods in order to help students understand the subject and overcome its complexity. Yet, many of them do not implement the use of infographics as a tool for learning linguistics. The goal of our research is to determine the effect of using infographics as a tool for learning linguistic concepts, focusing on the students' perception as well as the advantages and disadvantages of utilizing such a tool in their learning process. Hopefully, instructors will employ such tools to enhance the students' knowledge about infographics. Thus, students will be able to achieve higher learning goals.

2. Literature Review

Reviewing the literature on infographics, there are no resources that directly study the influence of infographics on linguistics. However, other literature proves the positive effect of using them in other fields.

Chong (2012) documents the contributions of Nicholas Felton who is described by Suzanne Laberre as an "Infographics Guru". The paper explores Felton's work which is a representative of how modern visualization techniques disrupt traditional approaches to teaching visual

communication. It examines Felton's graphic design work in order to demonstrate how it both challenges and enriches visual design pedagogy.

Davidson (2014) discusses using infographics in the science classroom. She mentions some strategies that she finds useful like showing examples of infographics and discussing them, and also tasking the students to find the best infographic on a particular topic. Davidson includes three investigations in which her environmental chemistry students have created infographics on recycling, water pollution, and air quality. She concludes that many of her students become intrigued with the blending of art with science in their infographics projects.

Kos and Sims (2014) discuss a five-week exploratory project deployed in an 8th grade classroom at Mountain Vista Middle School (MVMS) in the spring of 2014. The students in this project are required to research a STEM career in-depth, then report on their careers using infographics, instead of a standard five-paragraph essay. The study considers the project a success because of the positive effect on the students and concludes that infographics are better suited than traditional essays in areas that involve visual appeal and creativity, limited writing for ESL (English as a Second Language) students, fostering and appealing to student's interests, and overall student enjoyment.

Otten et al. (2015) tackle infographics and public policy, basically focusing on using data visualization to convey complex information. The various shapes and forms of infographics are mentioned with a description of the most and least effective. The article also discusses creating and designing effective infographics and provides specific examples of Food Systems Infographics.

In "21st Century World Language Classrooms: Technology to Support Cultural Competence", McKeeman and Oviedo examine the use of technology to support cultural competence. The writers focus on Visme as an important tool in creating infographics using an assignment given to students to gain an understanding of Spanish poetry and an introduction to the arts. Background knowledge about poetry is gained about "Las Jarchas", poems written in Arabic dating back to the 9th century. The students also view and discuss Francisco Goya's painting "Fusilamientos del tres de mayo" which depicts a war scenario during the French invasion. They demonstrate their understanding through the creation of an infographic via Visme. Their infographic is to describe the emotions of the people portrayed within the painting and the emotions experienced by someone viewing the painting (the student). McKeeman and Oviedo conclude that the Visme infographic is a good fit, allowing individual, unique responses to war and the emotions that the painting evokes.

Hassan (2016) explores the proper principles and rules for creating excellent infographics that communicate information successfully and effectively. His study also tries to test which format of infographics (Static or Animated) is most effective when used as a teaching-aid framework for complex science subjects. The results of this study suggest that using properly designed infographics will be of great help in teaching complex science subjects that involve spatial and temporal data. The results show that both infographic formats prove to be significantly effective in improving students' comprehension. In relation to comparing the two formats, the

static format proves to be more effective in communicating the subject and as a teaching-aid framework.

Because infographics have been proved as an effective tool to facilitate learning in the previous studies, this paper investigates the role of infographics in the area of linguistics.

3. Method
3.1. The Study: Participants
The participants of this study were 186 Saudi female college students from Princess Nourah bint Abdulrahman University (PNU). They were fourth level of a bachelor degree in the field of English Language and Translation at the Faculty of Languages. Arabic was their native language. The students in the sample were taking two linguistic courses: Introduction to Linguistics and Introduction to Semantics. Creating an infographic was their course project.

The researchers employed a non-probability sampling procedure. They selected Saudi college students of English as a Foreign Language (EFL) via a convenience sampling technique. Their level of English proficiency was basic (3.8%), intermediate (47.3%) and advanced (45.2%). When participants were asked about the amount of time they spend on a weekly basis to develop their skills, 5.4% of them spend over ten hours every week developing their skills on the Internet, whereas 12.4% spend five to ten hours, 53.8% spend one to four hours and 26.9% spend less than an hour on the Internet to develop their skills. This means that the subjects need to raise their awareness in using the Internet as a tool for self-development. In addition, the participants were also asked about their level of experience in using design software or websites. Almost half of the participants (45.2%) were somewhat experienced in using such software. 10.2% had a high level of experience and only 7% had no experience. 9.1% were somewhat experienced and 26.9% were unsure. Before starting the first phase of the study, the participants were able to choose whether they want to work on the infographics alone, in pairs, or in groups. Over 39% of the participants worked in groups, 34.4% worked in pairs, and only 24.7% preferred to work on their own. This shows that the participants, who are EFL students, prefer collaborative learning when it comes to course projects.

3.2. Data Collection: Questionnaire
3.2.1. Design of the Study
The researchers employed a quantitative method research paradigm to collect and analyze data. This method was used to construct a full and rich representation of students' experiences and beliefs towards the use of infographics as a tool for learning linguistics and semantics.

The researchers contacted 200 students to take part in the study and only 186 agreed to participate. All participants were given questionnaires and were supervised by the researchers who clarified the goals and objectives of the study.

The study consisted of two phases where a quantitative tool was used to facilitate the development of the instrument. The first and dominant component of the study was a project assigned by the researchers: an infographic. The researchers evaluated the students' work after class presentations. The second component of the study consisted of a questionnaire filled by the

students at the end of the semester. The focus of the questionnaire was to obtain data from students after designing their infographics. It examined the conceptual changes of the students towards designing infographics to facilitate their learning experience. The quantitative domain helped the researchers achieve a high level of reliability.

3.3. Research Instruments

A combination of a questionnaire and infographics created by students were used as tools to collect data in the current study.

3.3.1. Infographics

Participants were asked to design their own infographics based on materials discussed in class in relation to linguistics and semantics. After they chose their topics, they started designing their infographics following the guidelines of the rubric they were given beforehand. Table 1 illustrates their chosen tools to design the infographics. Piktochart and Easily were among the top choices of the students because they offer free infographic templates that students can employ to build their own content. Some students used a combination of two different tools to create their infographics. This occurred when students were not able to add specific content like Arabic examples or certain pictures using one tool
.

Table 1. *Web tool/ program used to create infographics*

Tool or program	Frequency	Percent
Unspecified	65	34.9
Easily and Piktochart	2	1.1
Easily and Photoshop	4	2.2
Easily	39	21.0
Infochart	1	.5
Maker	1	.5
Photoshop and Piktochart	4	2.2
Photoshop	27	14.5
Piktochart	38	20.4
Smartdraw	1	.5
Website	3	1.6
Word	1	.5
Total	186	100.0

3.3.2. Questionnaire

Participants were given a questionnaire after submitting their infographics. The content of the 26-item questionnaire is divided into three sections. Items 1-4 in the first section contain general information closed-ended questions. The first section also includes a fifth item, which is an open-ended question in the form of a specific question, to indicate the tool or program used by the participants to create the infographic. Items 6-23 in the second section contain questions about the students' perception of using infographics as a tool for learning linguistics and semantics in the form of closed-ended Likert scales items. Finally, items 24-26 in the third section contain closed-ended multiple-choice questions on the advantages and disadvantages of using such a tool for their learning experience. The students skipped some items on the questionnaire but that did not affect the result.

3.4. Instrument Validity and Reliability

To ensure the reliability of the research instrument, Cronbach Alpha coefficients are used as a statistical measure of the internal consistency of the questionnaire. The Cronbach Alpha for the questionnaire scored a high level of internal consistency (α = .819).

Furthermore, the researchers pilot-tested the questionnaire on ten participants to maximize the validity and reliability of the data. The participants speak English as a foreign language. They requested to remove one repeated item in the second domain of the questionnaire.

3.5. Analysis Framework

Descriptive statistical analysis was used in this study. Descriptive data, collected throughout the study, was analyzed quantitatively by using the Statistical Package for Social Science (SPSS). Specifically, both frequencies and descriptives were the procedures employed by the researchers to obtain results. According to DÖrnyei (2007), this procedure includes all the scores, including extreme ones.

4. Results

The findings presented in this section, which address the impact of using infographics as a tool for learning linguistics and semantics, resulted from an analysis of participants' responses to the questionnaire. This data provides quantitative information pertaining to the efficacy of infographics as a tool for learning. To organize the presentation of these findings, the results will be discussed in the same order as the research questions.

4.1. What is the Saudi female EFL students' perception of using infographics as a tool for learning linguistics and semantics?

To help explain the results, the descriptive statistics and mean scores for items 6 – 23 answered by 183 participants are calculated. The mean is (*M=3.633*), and the standard deviation is (*SD: 0.44*). The mean corresponds to the "agree" response in the questionnaire because the average falls in the range (4.19 – 3.4), as shown in Table 2. With a standard deviation of 0.44, it means there is no variation among participants' responses. For further discussion on this question, the researchers have carried out an analysis of the participants' responses to items 6 – 23 in the questionnaire, as shown in Table 3.

Table 2. *Descriptive statistics for the range of responses in the questionnaire*

Response	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Range	5-4.2	4.19- 3.4	3.39- 2.6	2.59-1.8	.79-1

The participants' prior knowledge about infographics is shown in Table 3. The responses reveal that they are not familiar with infographics. Item 6 on the questionnaire shows that an average of 34.1% disagree with the statement. This is the only statement that received an average range of 2.59 – 1.8 which corresponds with the response 'disagree'. Item 7 shows that 36.8% of the participants have read and viewed infographics in the past whereas 24.9% haven't seen infographics before participating in the project. In addition to experience, the participants were asked about their opinion regarding the role of infographic-based projects in introducing them to

the concept of data visualization which can motivate them in using it in the future. As shown in Item 8, 54.1% of the participants agreed they were intrigued to search for more information about infographics. In Item 9, 55.4% wanted to explore and read infographics and 19.4% were highly motivated to do so. Concerning participants' views regarding the availability and flexibility of infographic generators, Item 10 reveals that 40% of the participants agreed and 25.9% strongly agreed that online websites for creating infographics were user-friendly, 18.4% were undecided on the matter, and 13% believed that such websites were not easy to use. In addition, their views on using photo editing software as a tool for creating infographics were almost similar (Item 11). 36.2% agreed and 24.9% strongly agreed that photo-editing software can be used to generate infographics, 25.4% were undecided and 10.8% disagreed.

The participants' perception can also be viewed in their intention, or lack of it, in incorporating infographics into their continuing academic work as well as their careers. In Item 12, 22.3% strongly agreed and 37.5% agreed to add the skill of making infographics to their curriculum vitae (CV) but 29.3% were still undecided. The participants' points of view on using infographics as a tool for learning other courses were indicated in Item 13 where 42.2% agreed to use infographics to visualize data in future courses and 4.9% disagreed. Item 14 revealed that 21.6% intend to make infographics for fun, and 21.1% disagreed. Furthermore, in Item 15, 26.9% of the participants preferred to create infographics on their own rather than in a group. On the other hand, 26.3% preferred collaborative learning and working in groups. After that, participants were asked about their insights on the effect of project-based learning particularly the use of infographics as their course project. In Item 16, 40.9% strongly agreed that infographics helped them outline the main ideas of the studied material, 38.7% agreed as well, and 5.4% disagreed. Item 17 on the questionnaire received the highest average score of 4.16 where 43.8% strongly agreed that infographics helped them classify and sort pieces of information into categories. 40% of the participants agreed with the statement whereas 5.9% of the participants disagreed. Furthermore, Item 18 manifests that 49.2% believed that infographics helped them classify and sort information into categories. In Item 19, over half of the participants, specifically 51.1%, credited infographics for helping them visualize abstract concepts and relations, but 12.9% were undecided. Additionally, in Item 20, 23.4% participants strongly agreed that reading other classmates' infographics clarified some vague points.

Infographics can contain personalized information, specifically examples from the participants' native language. In Item 21, adding classical and slang Arabic examples helped 44.1% of the participants in their project, and 36.0% strongly agreed as well. Personalized information can also be demonstrated through the use of cultural references. As presented in Item 22, 36.4% strongly agreed that adding pictures, iconic places, famous people, animals, etc. to their infographics gave them a sense of involvement. 41.8% also concurred. Finally, half of the participants agreed that infographics made seemingly dull and lifeless content become vivid as indicated in Item 23.

Table 3. *Descriptive statistics for items 6 - 23 of the questionnaire*

Item	Strongly disagree	Disagree	Undecided	Agree	Strongly agree	Mean	Std. Deviation
6	30.3	34.1	10.8	14.6	9.7	2.40	1.330
7	17.3	24.9	9.7	36.8	11.4	3.00	1.322
8	1.1	10.3	16.2	54.1	18.4	3.79	.898
9	1.6	8.6	14.5	55.4	19.4	3.81	.919
10	2.7	13.0	18.4	40.0	25.9	3.73	1.070
11	2.7	10.8	25.4	36.2	24.9	3.68	1.079
12	3.3	7.6	29.3	37.5	22.3	3.67	1.054
13	3.8	4.9	28.6	42.2	20.5	3.71	.977
14	10.8	21.1	36.2	21.6	10.3	3.00	1.134
15	7.6	26.3	14.0	24.7	26.9	3.36	1.355
16	2.7	5.4	11.8	38.7	40.9	4.10	1.012
17	2.2	5.9	8.1	40.0	43.8	4.16	.985
18	7.6	2.7	18.4	49.2	22.2	3.72	1.179
19	4.8	2.2	12.9	51.1	28.5	3.93	1.046
20	3.8	8.2	22.3	42.4	23.4	3.70	1.111
21	4.4	4.8	9.7	44.1	36.0	4.01	1.117
22	2.7	7.6	11.4	41.8	36.4	3.99	1.089
23	4.8	2.2	27.7	50.0	15.2	3.64	1.049
Mean	3.633						
Std. Deviation	0.44						

4.2. What are the advantages of using infographics as a tool for learning linguistics and semantics?

To answer this question, the participants were given multiple-choice items and identified the advantages of using infographics as a tool for learning. Generally speaking, and as shown in the literature review, the use of technology inside or outside the classroom tends to make the class more interesting. However, certain design issues affect how interesting a particular tool is and to what extent it creates motivation. The participants' responses are summarized in Table 4. 59.7% of them suggested that saving and revisiting their data at their convenience is the most important advantage of using infographic-creating software as well as websites. 51.6% of the participants agreed that working on infographics gave them an opportunity to have interactive and dynamic discussions with the members of their group. A further discussion of the advantages is addressed in items 6 – 12 in Table 4, where participants chose the higher thinking skills that were practiced through making infographics. 76.9% agreed that infographics helped them analyze information, and 68.8% of them believed that infographics helped them summarize the material efficiently.

Table 4. *Descriptive statistics for item 24-25 of the questionnaire*

	Statement	Response	Frequency	Percent
1	Working on the infographic gives me the opportunity to have interactive and dynamic discussions with the members of my group.	No	88	47.3
		Yes	96	51.6
2	While working on the infographic, I can maintain positive channels of communication with the members of the group	No	126	67.7
		Yes	58	31.2
3	With infographics, I can participate at the time that works best in my schedule	No	118	63.4
		Yes	66	35.5
4	With online Infographic websites/ software, I have the ability to save and revisit the data I need.	No	73	39.2
		Yes	111	59.7
5	Analyze information	No	41	22.0
		Yes	143	76.9
6	Evaluate the material I'm reading	No	79	42.5
		Yes	105	56.5
7	Synthesize the material of the whole course	No	155	83.3
		Yes	29	15.6
8	Create new knowledge	No	84	45.2
		Yes	100	53.8
9	Develop my critical thinking and problem solving skills	No	98	52.7
		Yes	86	46.2
10	Exercise my explaining skills	No	79	42.5
		Yes	104	55.9
11	Argue for & against ideas	No	109	58.6
		Yes	74	39.8
12	Paraphrase new concepts and ideas adequately	No	89	47.8
		Yes	94	50.5
13	Summarize the material efficiently	No	55	29.6
		Yes	128	68.8

4.3. What are the factors that lead Saudi female EFL students to devalue using infographics as a tool for learning linguistics and semantics?

The answer to this question is evident in the participants' responses to multiple-choice items where they identified the disadvantages of using infographics as a tool for learning. Their responses are shown in Table 5. 45.2% believed that infographic design software and websites might have technical problems such as broken links and inaccessible websites. On a final note, 36% faced problems with collaborative group work where they were unable to communicate efficiently with other members of the group.

Table 5. *Descriptive statistics for item 26 of the questionnaire*

	Statement	Response	Frequency	Percent
1	While working on my infographic, some members of my group do not respond immediately	No	117	62.9
		Yes	67	36.0
2	While working on my infographic, some members are passive. (i.e. there are members who do not work with the rest of the group).	No	142	76.3
		Yes	42	22.6
3	While working on my infographic, some members lack the capacity of adequate information-seeking skills and therefore share unnecessary or unrelated information	No	141	75.8
		Yes	43	23.1
4	Infographic design software or websites might have technical problems. There may exist broken links and inaccessible websites	No	100	53.8
		Yes	84	45.2
5	Internet connectivity problems inhibit me from working effectively on my infographic.	No	114	61.3
		Yes	70	37.6

5. Recommendations

Based on the findings from this study, future studies could explore the effect of using infographics in relation to other disciplines such as literature and translation. Further studies could compare the attitudes of using infographics by native speakers to those of EFL students. Language instructors should be encouraged to use infographics professionally in class to teach linguistics and other courses as well. Researchers could also compare students' first infographics to those created by them after gaining some experience. EFL teachers could meet regularly, in workshop or conference settings, to compare and share experiences and data about using infographics in relation to teaching linguistics. Similar studies could be conducted on students of different nationalities as well as gender-specific studies on the effectiveness of using infographics to teach various linguistic courses. Teachers' attitudes towards using infographics could be measured as well in future studies.

6. Conclusion

The aim of the current study was to examine using infographics in the learning of several areas of linguistics and the influence it has on enhancing student learning and aiding their academic and personal growth. The study was conducted via a questionnaire and infographics assigned to students as a course project. Results revealed that the majority of the students were not familiar with infographics before participating in the project. Yet, the majority were motivated to utilize them in their future academic and professional careers. The participants benefited from practicing various skills through creating infographics such as higher thinking skills, collaborative learning,

and information analysis. The analysis revealed that the technical problems and communication problems in group work led students to devalue using infographics as a tool for learning linguistics and semantics.

In light of the above, teachers need to be encouraged to use infographics in class to teach linguistics and other courses as well and share their experiences with other teachers.

The study paves the way for more comprehensive studies exploring the effect of using infographics in the learning of other disciplines. Moreover, it serves as a foundation for comparative studies since similar studies can be conducted on other nationalities or native speakers for example.

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العلم الذى يهتم بدراسة اللغات الإنسانية ودراسة خصائصها
وتراكيبها ودرجات التشابه والتباين فيما بينها.

Linguistics is the scientific study of language.

ماهُو
علم اللغويات؟
What is
Linguistics?

Studying it systematically without prejudice.

1) By forming hypothesis:
In Arabic, verbs precede nouns.
e.g. غرس الفلاح شجرة

2) Searching for rules contradict our hypothesise:
If the subject comes first, the verb and the object are regarded as
predicate.
e.g. الفلاح غرس شجرة

3) A careful study of the language would produce further samples.
4) Draw a conclusion.

١) يسبق الفعل الفاعل في الجمل الفعلية.

٢) يجوز أن يتقدم الفاعل على فعله في حالة أن يكون الفاعل مبتدأ والفعل والمفعول به جملة فعلية في محل رفع خبر.

is a set of signals by which we communicate.

Language
اللغة

But

When did language start?

However, Allah say,

{وَعَلَّمَ آدَمَ الأَسْمَاءَ كُلَّهَا}
(البقرة:٣١)

Scholars say, "we simply don't know how language originated."

Mediums of Language

Language is both arbitrary and systematic.

| Speech | = | Writing |
| الحديث | | الكتابة |

Man
رجل

There's no relationship
between the words and
its concrete meaning.

I'm 20 years old
عمري ٢٠ سنة.

The same idea is
expressed in similar
ways.

Composed of sounds
Makes use of intonation
Produced effortlessly
Transitory
Perceived by the ear
Addressee present
Immediate feedback
Meaning helped by
  the context & gesture
Spontaneous
Associative

Coposed of letters/signs
Makes use of punctuation
Produced with effort
Permanent
Perceived by the eye
Addressee absent
Feedback delayed
Meaning must be made
  clear within the context
Not spontaneous
Logical

Language's Components
مكونـــات اللغـــة

Phonology
علم الأصوات

Morphology
علم الصرف

Lexis
علم المعاجم

Syntax
علم النحو

Semantics
علم المعاني

the systematic organization of
sounds in languages.

easel.ly infographic maker