Research article

# The role of academic electronic books in undergraduate students' achievement in higher education

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ABSTRACT

The study objective was to seek the role of utilizing academic electronic books on Ajman University undergraduate students' achievement and faculty members viewpoints about their use. The study participants were 91 students, split into two groups the first group was empirical (46) and the other group was control (45) plus 220 members of the faculty. A performance test and a questionnaire were designed and implemented as tools of study. The results detected significant differences among both the empirical groups and the control groups, for the benefit of the empirical group; and faculty members exhibited highly favorable perspectives on the use of academic electronic books at their university. Faculty members' perceptions varied according to gender, college, and experience teaching, but the academic rank showed no influence.

## 1. Introduction

Digital technology is an essential component of contemporary culture and society. According to Simon and Garcia-Belmar (2016), rapid progress in technology has introduced innovations that might play an important part in the restructuring of learning and teaching methods. Weisberg (2011) point out that digital technology can be used for communication, social interaction, recreation, and learning and teaching in educational institutions. Education is one of the areas most influenced by modern technology, with the emergence of several modern learning methods, technologies, and forms of communication, that drove to the creation of an e-learning platform (Wu and Chen, 2011).

This strategy gradually became widespread, giving learners' flexibility with the time and the venue of learning and enabling them to rapidly obtain knowledge and understanding through the use of many teaching sources (Plangsorn and Poopan, 2017).

Many states and societies have included e-learning in their strategic plans and goals and use it in learning and teaching (Ebied and Rahman, 2015). E-learning is known as an educational system centered on digital information software that enhances learning quality by granting learners the ability to learn and acquire information with relative ease and in the least time (Lepik, 2015; Mizrachi, 2015; Marquès, 2006; Zare et al., 2016). Furthermore, Christie (2011) claim that online education is a

model of utilizing electronic books, will improve the undergraduates ' access to facts, data and knowledge compared with the old classical learning.

Textbooks' affordability is a growing concern in the world's higher education and school learning context, which led to several solutions that have been suggested to make textbooks more affordable for students. Electronic books have been touted as reducing costs and alleviating the need for students to carry heavy textbooks, in addition to their features like the Search feature, cheaper and lower cost, the ability to download easily, and multimedia styles (Johnson et al., 2010). According to Khalid et al. (2017) many educational institutions started to adapt and replaced the traditional textbook with electronic books as to be the cheaper and preferred style of the educational resource by several institutions learning around the world. Moreover, Santoso et al. (2018) pointed out that, today, might academic electronic books are regarded as acceptable as educational digital format tools that display on specialized reading devices or computers and other online tools. Also, Lee et al. (2013) propose that electronic book styles could possibly substitute current paper-based books in the higher education and schools curriculum. In the USA, Straumsheim (2016) noted that in 2009, Indiana University had agreed to offer textbooks in an electronic format to students. This model has been adopted by Unizin, a 22-member consortium of higher education institutions in the United States. Likewise, in the Philippine Wong

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et al. (2011) pointed out that electronic books can be effective in promoting teaching and learning, and that they have become increasingly accepted among academic communities, such as universities and schools. Dado et al. (2016) pointed out that students at the University of Science and Technology of Mindanao in the Philippines have a high degree of approval of the use of academic electronic books.

The development of the education sector is one of the most important goals of sustainable development in the United Arab Emirates (UAE). Providing modern education to all students in higher education is one of the key instruments for achieving that objective. UAE educational institutions like schools and universities have started to use and apply electronic books in education and teaching to achieve the goal of using digital learning to enhance learning and teaching processes and to increase student achievement. Ministry of Education in the UAE established a platform called the Al Diwan Application to improve the quality and efficiency of education. This application allows teachers and students from government schools to use their devices to view and interact with the learning curriculum electronically in a smooth and interesting manner and allows them to download electronic copies of the various books available for all subjects (Ministry of Education, 2020). Also, higher education in the UAE is increasingly adopting e-textbooks, considering it as modern interactive text resources for learning and teaching. Ajman University in UAE is considered one of the first universities in the UAE to begin to use and apply electronic books in education and teaching to achieve the goal of using digital learning to enhance learning and teaching processes and to increase student achievement.

### 1.1. Aim of the present study

This study tries to evaluate the role of using academic electronic books on the achievement of higher education students and the perspective of faculty members towards using them.

### 1.2. Research significance

The research will provide the institutions of higher education with insight into the effects of the implementation of academic electronic books rather than printed books on students' achievements, in addition to the perspective of faculty members on the experience of applying academic electronic books at the university. Thus into the feasibility of applying these electronic books more widely in higher education.

### 1.3. The study problem and its questions

Many universities in higher education institutions began experimenting with the use of academic electronic books as an alternative to traditional printed books, including universities in the United Arab Emirates, such as the University of Ajman. And given that the experience of using academic electronic books is new in education in the Middle East region in Arab universities, the researchers were interested in this study to explore the possibility of having a role for electronic books in increasing achievement among university students in higher education, and also exploring the view of faculty members from the level of employment of using academic electronic books as an alternative to traditional printed books. Thus, the current study aims to address the following questions:

RQ1: Does the use of academic electronic books in an Arabic communication skills course increase the achievement of higher education students?

RQ2: What is the level of implementation of academic electronic books, according to the view of faculty members?

RQ3: Do faculty members' perceptions of the degree of the employ of academic electronic books at Ajman University vary by gender, college, academic rank, and experience teaching?

## 2. Literature review

### 2.1. Electronic books

In the fifth century CE, conventional printed books emerged and have varied the world for nearly 600 years, affecting each part of the planet in all aspects, like society, physical science, learning, and social science. In contrast, electronic books first appeared at the beginning of the 70's, from the initial moves of the Gutenberg Project, a public domain digital book library. According to Armstrong et al. (2002), Michael Hart digitally converted, stored and disseminated cultural work by utilizing technology to archive, collect and seek for data and knowledge, based on digital versions of printed books. Nowadays, electronic books are no longer a novelty, and are used across the globe in many educational organizations such as higher education and pre-university learning. Electronic books are described as books published in a digitally, or changed to an electronic format from a physical paper printed form. It can be accessed and read on a mobile device such as a laptop, a smartphone, an e-Book reader, a tablet or a desktop computer (Armstrong et al., 2002; Chen et al., 2007; Saurie and Kaushik 2001).

Furthermore, the electronic book is also defined as a digital information medium that is produced by integrating the written text content and applications of the digital environment, to produce an electronic book that contains a set of advantages that exceed the traditional paper book (Tosun 2014; Wang 2015). Bozkurt and Bozkaya (2015) pointed that the electronic books are one of the sources of e-learning that provides the learner with the information and content knowledge required to complete the learning requirements and tasks. Van Steenbrugge et al. (2013) indicates that the electronic book represents a new vision for the printed paper book in an electronic form with the addition of multimedia elements, super texts, and the search feature, in a way that combines the features of the printed paper book and the features of multimedia to deal with information. A somewhat different description for the electronic book is that it is a document that is accessible in a digital form known as .doc,.txt, HTML or XM for MS Word supported with multimedia that included a group of elements, illustrations, graphics, and animations that are provided through networks and CDs through a computer or mobile phone (Ormes 2002; Vidana 2003).

Undergraduates' learners rely heavily on studying academic books during their studying at the university. Currently in our days now, the academic educational material is now increasingly available in electronic format. Many studies like (Alkadi and Johnson 2009; Harwood 2017; Singer and Alexander 2017; Nicholas and Lewis 2010; Usluel 2016) refer to the merits and demerits of using electronic books, which can summarize as in Table 1.

### 2.2. Learning theories that support electronic books

Several theories have contributed to and supported the acceptance of the use of electronic books like:

#### 2.2.1. Technology acceptance model (TAM)

This model considers one of the most established models for technology acceptance. It has emerged via Davis Jr (1986) which aimed to explain users' acceptance and use of technology. It defined the key reasons for the acceptance of the technology.

#### 2.2.2. Theory of planned behavior (TPB)

This theory made a significant change to the limitations of the original model in acknowledging behavior patterns that makes individuals have defective voluntary control. Additionally, it merged some main principles, concepts from social, and behavioral sciences.

#### 2.2.3. Combined technology acceptance model (TAM) and theory of planned behavior (TPB)

Taylor and Todd (1995) merged TAM and TPB to form a blended model called combined TAM and TPB (C-TAMTPB). This model

**Table 1.** Merits and Demerits of using electronic books.

| Merits | Demerits |
|---|---|
| The cost of the update is low. | Not comfortable for reading |
| Style Multimedia. | Charges of printing. |
| Search feature | The possibility of piracy. |
| There are no shipping charges | Many people prefer to carry traditional printed books rather than e-books. |
| Readers of electronic books may carry a library of various books. | Electronic books only operate when you having a computer or a device for them to utilize. |
| Cheaper and lower cost than printed books | The battery life of the reader device is finite and must be continuously charged |
| Easy to hold, lightweight | Technical problems with the reader device, that mostly leads to no access to the electronic book. |
| The possibility of reading it using PC, Mac, iPhone, iPad, and Android. | Eye fatigue after reading for extended periods of time. |
| The ability to download easily | Electronic books devices are costly. |
| Owning many books on your tablet computer and on at your disposal. | Economically costly for students |
| A free sample of a book can oftentimes be downloaded. | Programs must be appropriate with a reader device |
| Ability to highlight and capacity to write notes. | Electronic books have no stated lifespan. |
| More flexible than printed books | |
| Electronic books are easier to update than printed books that need to be reprinted | |

demonstrates the behavior of experienced and beginner IT users. Increased experience is more prominent in behavioral attitudes, perceived behavioral control, and relative advantage, except for personal standards.

### 2.2.4. Technology acceptance model 2 (TAM2)

It is a theoretical expansion and advanced from the TAM model made by Venkatesh and Davis (2000). Which has been evaluated with longitudinal data and shows the realized advantages and expectations of use with respect to social impact and cognitive instrumental processes.

### 2.2.5. Technology acceptance model 3 (TAM3)

Via an organizational point of view, the most important concern is the method by which managers make informed decisions about interventions that can contribute to the more efficient adoption and deployment of information technology (IT).

### 2.2.6. The unified theory of acceptance and use of technology (UTAUT)

Venkatesh et al. (2003) proposed that UTAUT is a technology adoption model in user Acceptance of Information Technology: Toward a Unified View. It aimed to demonstrate user intentions to use an information system and subsequent usage behavior. The theory assumes that there are four main components which are: Performance expectancy, effort expectancy, social influence, and facilitating conditions. The first three are direct determinants of use intention and behavior, and the fourth is a specific determinant of user behavior. Gender, age, experience, and voluntariness to use are designed to mitigate the effect of the four main constructs on the intent and actions of users.

### 2.2.7. Winston's theory of technology adoption in society

When we get to the social stage of implementation of techniques, would be possible to adopt a technology, with special regard to the 'supervening social imperative,' it is a mixture of factors that turns innovation into a marketable product. As a result of the technology, all aspects of the production, distribution, and use of books are affected. For example, in the case of electronic -books, the USA, the United Kingdom, and Australia could be identified as good adopters, while Sweden, on the basis of current data, could be regarded as Beginner. At least if we judge the situation with regard to e-book sales. Some places, overlapping social necessity can take various forms: like, in a number of developing countries, governments are taking steps to introduce e-textbook policies in schools and colleges around the country. This means that is the economic policy the relevant ministries of education identify the cost savings in providing e-textbooks instead of paper books and, thus, the supervening social necessity derives from the need to manage the national budget. Plymouth University In the UK due to the cost of the print textbooks has included printed textbooks within the course fees or to provide e-textbooks (Williams, 2014).

Additionally, due to the high cost of textbooks in Canada, the University of Manitoba launched an Open Textbooks initiative (Hoffelder, 2015; Lalonde, 2015). The same economic problem has led to the introduction of e-textbooks, mostly open access, in US states (Turner, 2015).
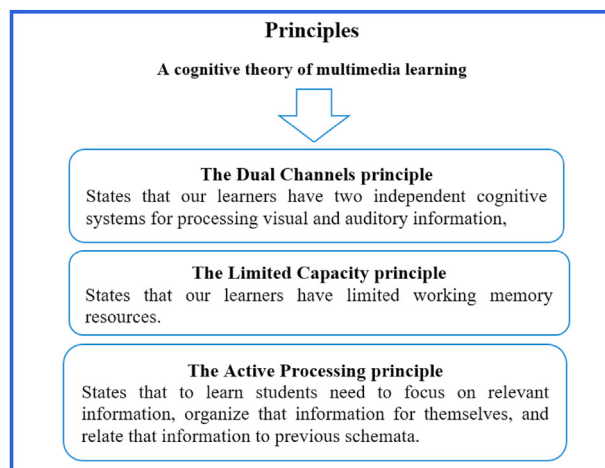
### 2.2.8. A cognitive theory of multimedia learning

This theory established by the early 2000s, according to three major presumptions: there are two separate channels (auditory and visual) for processing information; there is limited channel capacity; and that learning is an active process of filtering, selecting, organizing, and integrating information (Mayer and Moreno, 2003) See Figure 1.

Multimedia learning theory introduces results supporting instructional methodology being more important than instructional media. For example, adding chapters and headings to a presentation improved learning effectiveness for learners (Sung and Mayer, 2013). Moreover, the specific technology should be used to deliver an instructional message in order to improve the message, for example, if the classroom teacher harnesses the affordances of the iPad by guiding students to the e-textbook with its additional resources, to improve and enhance learning effectiveness as compared to the traditional printed textbook (Mayer, 2018).

### 2.3. Usage of academic electronic books in higher learning institutions

The general trend at present is towards the adoption of electronic books in teaching and learning processes, with their being the favorite



**Principles**

**A cognitive theory of multimedia learning**

**The Dual Channels principle**
States that our learners have two independent cognitive systems for processing visual and auditory information,

**The Limited Capacity principle**
States that our learners have limited working memory resources.

**The Active Processing principle**
States that to learn students need to focus on relevant information, organize that information for themselves, and relate that information to previous schemata.

**Figure 1.** A cognitive theory of multimedia learning.

choice of a resource for information in the curriculum, particularly in higher education institutions. Therefore, most university academic libraries are currently attempting to provide electronic books to their students because they play a significant role in teaching, learning, and research that helps them to improve access to up-to-date scholarly information and data (Beimers, 2014; Dobler 2015; Foster and Remy, 2009; Lokar, 2015; Reynolds, 2011).

Ministry of Higher Education in UAE gradually adopts electronic book, even considering making them key literary tools for teaching and learning. This focus on the part of the UAE government has made electronic books among the most widespread apps of modern IT in the learning and education systems, because electronic books are likely to be used in a short period of time in all higher education institutions in the United Arab Emirates. Khalid et al. (2017) report that electronic books' formats were quickly accepted as the favorite teaching and learning resource in many universities around the world.

## 2.4. Previous studies

Several earlier studies have shown that the utilize of academic electronic books in the system of pedagogy in a higher institution like universities still not enough to prove their efficiency in learning and education as a replacement for print books, especially in higher education.

So many of these researches centered on the usefulness and role of electronic books to improve and support the education operation, and the apps and features found in these electronic books (Embong et al., 2012; Gelderblom et al., 2019; Liaw and Huang 2014; Lim and Hew 2014; Letchumanan and Tarmizi 2011; Plangsorn and Poopan 2017; Yalman 2015). Findings showed that learners have positive attitudes towards using electronic books. Moreover, Hame & Heinze (2018) points out that the option of academic electronic books has a significant impact on student performance and that the option of academic electronic books is a relevant factor in educational practice because of its features, which encourage and motivate students to learn.

Hadar (2017) also found that learners using electronic books could have higher results if this books offers an opportunity to undertake activities involving higher levels of understanding.

The results also indicated that the learners enjoyed them because they gave them the capability to arrive at a digital transcribe of printed books; moreover, they benefited from the features included like search option, interactive elements, easily updates, create notes on the text...etc. Other research centered on the impact of using electronic books on the achievements of students (Brown 2016; Christie 2011; Ciampa, 2012; Hwang and Lai 2017; Jones and Brown, 2011; Phadung and Dueramae 2018; Slavin 2008; Turel and Sanal 2018; Wu et al., 2014). The findings from these studies confirmed significantly a statistically beneficial variation of learners who studied using electronic books compared to those who learned using printed books.

In comparison, a few other studies have shown that learners often do not like using electronic books rather than classical printed books (Bouck et al., 2016; Dundar and Akcayir, 2012; Ismail, 2013; Khalid et al., 2017; Millar and Schrier 2015; Sackstein et al., 2015; Young, 2010).

The findings of these studies indicated that learners still prefer to use printed books rather than electronic books, especially when intensive reading is required for lengthy periods of time, due to problems that learners may experience with e-books include eye strain, distractions, a lack of overview, inadequate navigation features, and insufficient annotation and highlighting functionality.

On the other side, several studies have shown acceptance and encouragement to use academic books in educational institutions like universities like studies carried by (Hoseth and Mclure, 2012; Jones and Brown, 2011; Plangsorn and Poopan, 2017; Walton, 2007; Yalman, 2015). The finding of these studies pointed out that faculty members and teachers encourage the use of academic electronic books instead of traditional printed books. At the same time, other studies have shown

unacceptance and encouragement to use academic electronic books compared to traditional books such as studies of Khalid et al. (2017).

## 3. Methodology

### 3.1. Study design

This study was conducted using two approaches, the first one was a Quasi-empirical approach in order to determine the role of using electronic books on the undergraduate students' achievement, and the other one was the descriptive approach in order to determine the viewpoints about the of using academic electronic books in the university. In the Quasi-empirical approach portion the students randomly divided into two empirical groups (n = 46), and a control group (n = 45) student. They have studied the same topics courses through the same instructor for 14 weeks throughout the spring term of the educational year 2019/2020. The students of the empirical group studied using the academic electronic book face to face with the support of online, but the students of the control group studied face to face only using the traditional printed academic books. Where students of the empirical group used the features and benefits of electronic academic books and benefited from them during their studies like: search feature, ability to highlight, the capacity to write notes, a table of contents that students can click to navigate to specific chapters or sections directly, putting bookmark pages, zoom in and out the texts, and click on links in the electronic book which open media such as videos or interactive media. Nevertheless, the students of the control group studied face to face only using the traditional printed academic books. In order to accomplish the objectives of the study, the researchers used a post-achievement exam for both the empirical and the control group.

In the descriptive approach portion, a questionnaire introduced to 220 faculty members from eight colleges in Ajman University, which were a stratified randomly selected, in order to explore their viewpoint about the using academic electronic books in the university Figure 2. Illustrates the study model.

### 3.2. Participants

#### 3.2.1. Quasi-empirical approach portion

The participants for the quasi-empirical approach portion of this study consisted of 91 students at the College of Humanities and Sciences. They were randomly divided into two empirical groups (n = 46), and a control group (n = 45) student. The study performed throughout the spring term of the educational year 2019/2020. Table 2 and Figure 3 displays the detailed data of individuals in the quasi-empirical approach.

#### 3.2.2. Descriptive approach portion

The participants in the descriptive model were all faculty members at eight colleges in the Ajman University. The participants of faculty members who participated in this study consisted of 220 faculty members. They were chosen using a stratified random method. Table 3 illustrated the basic information of participating faculty members.

### 3.3. Variables for research purposes

In the quasi-empirical approach section, independent variables were the two learning ways, but in the descriptive approach section, it is demographic factors:

a) Teaching using electronic books
b) Teaching using Printed books
c) Demographic information for participants (Gender, College, Academic rank, Experience teaching).
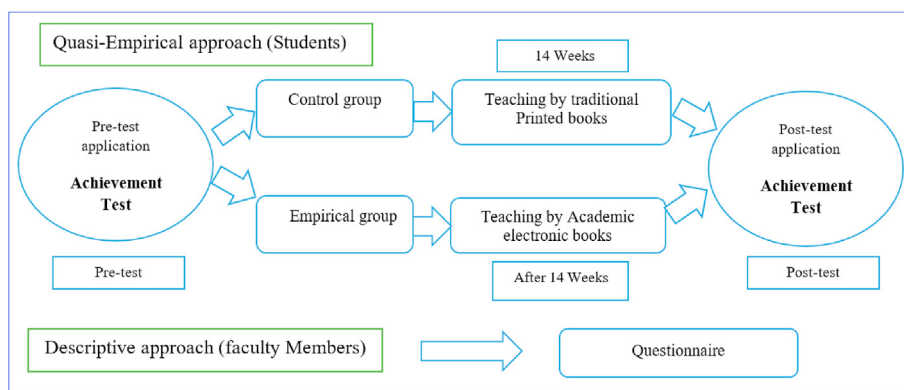
**Figure 2.** Study design (researcher's own design).

**Table 2.** Demographic information of participants in the quasi-empirical approach.

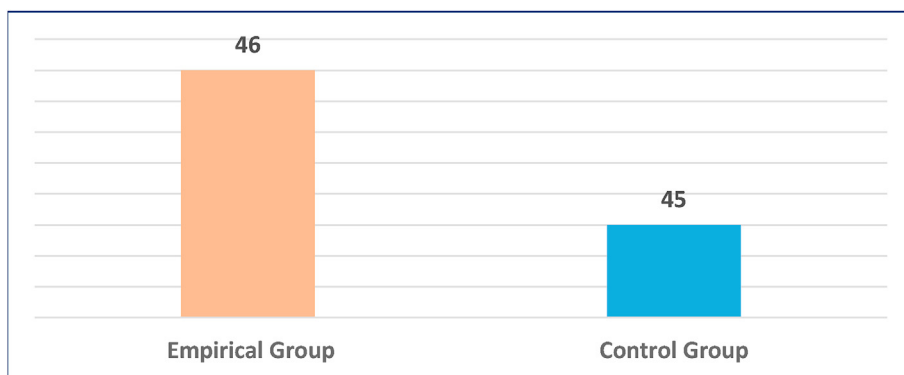| Group | N | Learning Method |
|---|---|---|
| Empirical | 46 | Using Academic electronic book |
| Control | 45 | Using Traditional Printed book |
| Total Students' Participants | 91 | |



**Figure 3.** Participants Students for the quasi- empirical component.

Dependent variables were, for the quasi- empirical model, achievement marks of learners in the empirical and the control group as measured on the pre-test and post-test; and for the descriptive approach section, responses of the faculty members on the questionnaire.

### 3.4. Study tools

#### 3.4.1. The performance academic exam

Performance academic exam designed and written according to Bloom's taxonomy of cognitive domains (Adams, 2015), to determine the impact of academic electronic books on increasing student academic performance. The exam composed of twenty multiple-choice questions and the examination duration was one hour. Furthermore, the researchers have written a specification table for this exam see Table 4.

#### 3.4.2. Validity and reliability of performance academic exam

Performance academic exam was verified via a face validity (logical validity) method by introducing it to a number of specialists and professionals in the area of the Arabic language, its teaching methods, curricula, and teaching methods. Their views and recommendations were adopted, some questions were reformulated and amended. To verify the reliability of the academic exam, the researchers used the Kuder-Richardson 20 formula through Spss software, where the reliability

coefficient was 0.68. The researchers also confirmed the reliability of the academic exam via the test-retest method where the Pearson coefficient of correlation between the two testing times (2 weeks) was 0.84. Further, the item Difficulty index was calculated for each of the items of the academic exam by using the Difficulty Index Formula (1):

The formula: $p = c \div s$ (1)

c: the number of students who answer a question correctly,
s: the total number of students in the class who answered the question.where 5 items were excluded from the exam whose number of items in its initial form reached 25 items and thus the exam in final form became 20 items, and the Item difficulty index ranged between (30%–76%), and the Item discrimination index was calculated which It reached between (0.41–1), via using the Item Discrimination Index formula (2):

Item discrimination $= (hc - lc) \div t$ (2)

hc: number of students in the lower that scoring group who answered the question correctly lc: number of students in the higher that scoring group who answered the question correctly.

#### 3.4.3. Research questionnaire

In order to estimate the level of implementation of academic electronic books, according to the viewpoint of faculty members, a Likert-

**Table 3.** Basic information of participating faculty members.

| Variables | Variable levels | Frequency (f) | Percentage (%) |
|---|---|---|---|
| Gender | Female | 113 | 51.4% |
| | Male | 107 | 48.6% |
| | **Total** | **220** | **100%** |
| College | Dentistry | 31 | 14.1% |
| | Pharmacy & Health Sciences | 21 | 9.5% |
| | Engineering and Information Technology | 44 | 20.0% |
| | Business Administration | 18 | 8.2% |
| | Architecture, art and design | 23 | 10.5% |
| | Mass communication | 19 | 8.6% |
| | Humanities and sciences | 52 | 23.6% |
| | Medicine | 12 | 5.5% |
| | **Total** | **220** | **100.0%** |
| Academic rank | Professor | 29 | 13% |
| | Associate Professor | 44 | 20% |
| | Assistant Professor | 95 | 43% |
| | Lecturer | 52 | 24% |
| | **Total** | **220** | **100%** |
| Experience Teaching | <5 years | 55 | 25.0% |
| | 5–10 years | 74 | 33.6% |
| | >10 years | 91 | 41.4% |
| | **Total** | **220** | **100%** |

**Table 4.** Specifications table for the performance academic exam.

| Topics | Number of lectures | Relative weight of topics | LOT Questions | HOT Questions | Total of Questions |
|---|---|---|---|---|---|
| Communication (concept, importance, types, elements, and levels). | 2 | 7.14% | 1 | - | 1 |
| Languages features in general, and Arabic in particular. | 6 | 21.43% | 4 | 2 | 6 |
| Listening and speaking skills. | 2 | 7.14% | 2 | - | 2 |
| Reading Skills | 6 | 21.43% | 4 | 2 | 6 |
| Written skills | 4 | 14.29% | 1 | 1 | 2 |
| Text analysis | 4 | 14.29% | 1 | 1 | 2 |
| Presentation: definition, the 4Ps, skills, stages, media and tools, Arabic for presentation characteristics of a good presentation/presenter | 4 | 14.29 5 | 0 | 1 | 1 |
| **Total** | **28** | **100%** | **13 (65%)** | **7 (35%)** | **20 (100%)** |

- **LOT** = lower order thinking: Remembering, Understanding, and Applying.
- **HOT** = higher order thinking: Analysing, Evaluating, and Creating.

scale based questionnaire was designed and introducing it to gather information from 220 faculty members in the Ajman University. Likert level adopted by the researchers of this study: very high, high, moderate, little and very little. The choices used to test the measuring and calculating periods as presented in Table 5:

The questionnaire comprised of two sections: the first section gathered details demographic and other related data for faculty members, and the other consisted of thirty elements that concentrated on the objective of the tool. Due to the quantitative aim for which the researchers utilized this data, the closed Likert scale was to be applied. To assess it for

reliability and validity, the questionnaire was sent to specialists from diverse academic institutions, who granted written notes about the elements of the questionnaire that researchers can improve and amend to ensure that the study goal is achieved.

The internal consistency (reliability) of the questionnaire was tested using the Split-half method, which measures the extent to which all parts of the test contribute equally to what is being measured (Beck et al., 1996). The questionnaire was applied to a Pilot study sample from outside the study sample and from the study population of (30) faculty members, the questionnaire items have been divided into two

**Table 5.** The choices of scale and score periods of Likert scale.

| Choices | Evaluation | Evaluation periods |
|---|---|---|
| Very little | 1 | 1.00–1.80 |
| Little | 2 | 1.81–2.60 |
| Moderate | 3 | 2.61–3.40 |
| High | 4 | 3.41–4.20 |
| Very high | 5 | 4.21–5.00 |

parts, the first part represents individual items and the second part represents marital items. The researchers then calculated the correlation coefficient (r) between degrees of individual items and the marital items degrees, and then the correlation coefficient with the Spearman-Brown equation was corrected by using the following formula (3):

$$\text{Reliability Coefficient} = \frac{2\,r}{1\,+\,r} \qquad (3)$$

The value of the Cronbach's alpha coefficient for the individual items was (0.942), and the value of the Cronbach alpha coefficient for the marital items (0.952), and value of the correlation coefficient between the individual and marital items (0.919), which is an acceptable value for the purposes of the current study. Table 6 shows the values of the reliability coefficients of the study tool using the split-half method.

### 3.5. Equivalence of empirical and control groups

In order to examine the equivalence of the participants in the two groups' of study, the participants completed a pretest of the topics of communication skills in Arabic prior to implementing academic electronic books to the empirical group. A t-test was then used to compare the findings to ensure equivalence. The findings are presented in Table 7.

As presented in Table 7, given that the p (0.246) extracted is larger than 0.05, the test is not significant at a scale of 0.05. This confirms that there is no significant difference between the two study groups (empirical group and control group). This detects that the empiric and control groups have been equal (equivalent) before the empiric method was applied.

### 3.6. Compilation of data and statistical analysis

The data gathered from performance academic exam and the questionnaires were quantitatively analyzed and displayed in tables and charts. The study utilized SPSS software to perform the descriptive analysis like frequency, mean, and standard deviation, further to an independent sample test (t-test) and one-way ANOVA, and the Scheffe test.

### 3.7. Ethical considerations

This study was approved by the Research Ethics Committee/Deanship of Graduate Studies and Research of Ajman University (Reference number: H-F-H-2018-Nov-28) on 16 December 2018.

## 4. Findings

### 4.1. Findings of the study attributed to question 1

RQ1 is: Does the use of academic electronic books in an Arabic communication skills course increase the achievement of higher education students?

The difference between the mean student scores in the empiric group and the control group in the post-test of performance academic exam was calculated. In addition, a t-test was used for two independent samples as presented in Table 8.

The students who were taught through academic electronic books, appear in Table 8 were different (M = 16.46, SD = 2.13652) from those taught through traditional academic printed books (M = 13.93, SD = 0.81526). Also, as appear in Table 8, given that the p-value (0.000) is lower than 0.05, this confirms there are significant differences at the significance level of 0.05, which implies that there is a substantial difference between the two groups of participants. In respect to their comprehension of the topics discussed by Arabic communication skills course during the lectures. Taking this in conjunction with the findings, it may be indicated that using academic electronic books had a significant impact on students' acquisition of the target content.

### 4.2. Findings of the study attributed to question 2

RQ2: What is the level of implementation of academic electronic books, according to the view of faculty members?

Average scores and SD have been computed to address the second research question. Responses of faculty members to elements 1–23 of the questionnaire related to the implementation of academic electronic books, as presented in Table 9.

The results in Table 9 show that the generic arithmetic mean for all elements (1–23) was 3.43 with SD 1.13. As a result, faculty members believe according to their view that the degree of academic electronic books implementation in undergraduate programs at Ajman University was at a high level. Table 9 also shows that the Faculty Members ' answer to element 23 (Academic electronic books help to make the learning and teaching process more exciting, motivating and willing to learn for undergraduate students.) had the highest overall agreement level 4.51 and at a very high level. Further, the reactions of the faculty members to element 7 (The academic performance of undergraduate learners is improving due to the existence of interactive content in academic electronic books.) that this element was graded as having a second order in

**Table 6.** Reliability coefficients values for the study tool using the split-half method.

| Items | N of Items | Reliability coefficient value |
|---|---|---|
| Individual items | 11 | 0.876 |
| Marital items | 12 | 0.874 |
| Total reliability coefficient | 23 | 0.779 |

**Table 7.** T-test of pretest results: empirical and control groups.

| Group | N | Mean | Std. Deviation (SD) | df | t | P-value |
|---|---|---|---|---|---|---|
| Empirical | 46 | 14.22 | 1.41 | 89 | 1.154 | 0.246 |
| Control | 45 | 13.93 | 0.86 | | | |

**Table 8.** Means, SD and the independent sample t-test of post-test results.

| Group | N | Mean | Mean Differences | SD | df | t | P-value |
|---|---|---|---|---|---|---|---|
| Empirical | 46 | 16.46 | 2.53 | 2.13652 | 89 | 6.367 | 0.000 |
| Control | 45 | 13.93 | | 0.81526 | | | |

**Table 9.** Statistics of the level of implementation of academic electronic books findings arranged in descending order for the responses of faculty members.

| No. | Items | Mean | SD | Order | App. L* |
|---|---|---|---|---|---|
| 23 | Academic electronic books help to make the learning and teaching process more exciting, motivating and willing to learn for undergraduate students. | 4.51 | .62 | 1 | V. High |
| 7 | The academic performance of undergraduate learners is improving due to the existence of interactive content in academic electronic books. | 4.25 | .65 | 2 | V. High |
| 1 | Undergraduate students interact so much with academic electronic books than conventional printed books. | 4.24 | .94 | 3 | V. High |
| 3 | Undergraduate students rely on academic electronic books throughout their studying and tests. | 4.22 | .94 | 4 | V. High |
| 19 | Academic electronic book types are appropriate for all students, even those with special needs. | 3.92 | .95 | 5 | High |
| 10 | Using academic electronic books makes undergraduates students more interested and lets them focus on learning. | 3.90 | .80 | 6 | High |
| 12 | Academic electronic books are suitable resources for the subjects that students learn at university. | 3.64 | .99 | 7 | High |
| 20 | Academic electronic books are considered environmentally friendly by reducing pollution and paper waste. | 3.63 | 1.06 | 8 | High |
| 2 | Undergraduates can easily read the electronic version of academic printed books via a particular device. | 3.62 | 1.42 | 9 | High |
| 6 | It is easy for undergraduate students to arrive and interacts with the contents of academic electronic books. | 3.50 | .97 | 10 | High |
| 9 | Academic electronic books give students a real chance of interacting with the course's information content. | 3.49 | 1.51 | 11 | High |
| 21 | Merging academic electronic books into teaching will help teachers are becoming more elastic and increase the engagement of students. | 3.49 | 1.28 | 11 | High |
| 18 | Academic electronic books provide undergraduate students with the ability to easily search and access any text for particular content, word, part of the text or some pages. | 3.46 | 1.30 | 12 | High |
| 8 | The university library provides access to academic electronic books easily for students. | 3.41 | 1.15 | 13 | High |
| 11 | Transfer and downloading of academic electronic books to various devices are simple for undergraduate students. | 3.14 | 1.38 | 14 | Moderate |
| 22 | Undergraduate students consider academic electronic books lower costs than traditional printed books. | 3.08 | 1.50 | 15 | Moderate |
| 16 | In the event of harm or damage, undergraduate students can save and back up academic electronic books. | 3.03 | 1.54 | 16 | Moderate |
| 14 | Academic electronic books are saving undergraduate students time and effort. | 2.88 | 1.30 | 17 | Moderate |
| 4 | Undergraduates having the ability to write notes on academic electronic books. | 2.82 | .89 | 18 | Moderate |
| 15 | I urge the university to proceed to be using academic electronic books in the coming academic semesters. | 2.81 | 1.18 | 19 | Moderate |
| 5 | Undergraduate students face challenges and problems in utilizing academic electronic books because of the lack of inexperienced and preparation. | 2.80 | .98 | 20 | Moderate |
| 17 | Undergraduate students like to learn by using academic electronic books since they believe that they adapt to modern technologies. | 2.75 | 1.40 | 21 | Moderate |
| 13 | I tend to use printed traditional paper books rather than electronic ones to teach undergraduate students. | 2.37 | 1.24 | 22 | Little |
| **Total** | | **3.43** | **1.13** | | **High** |

* Application Level (Description).

**Table 10.** Means and SD of the student answers based on gender.

| Gender | N | Mean | SD | T. Value | P-value |
|---|---|---|---|---|---|
| Female | 113 | 3.61 | 0.48 | 3.143 | 0.002* |
| Male | 107 | 3.41 | 0.45 | | |

terms of an average agreement level of 4.25, and also at a very high level. Element 1 (Undergraduate students interact so much with academic electronic books as with conventional printed books) came the third order and at a very high level, with an average of 4.24. In addition, Element 3 (Undergraduate students rely on academic electronic books throughout their studies and tests) also came in fourth order, with a very high level and an average of 4.22. Elements 19, 10, 12, 20, 2, 6, 9, 21, 18 and 8 also had a "high" ranking with the corresponding mean for each of them being 3.92, 3.90, 3.64, 3.63, 3.62, 3.50, 3.49, 3.49, 3.46 and 3.41. Likewise, a "Moderate" level was also found for elements 11, 22, 16, 14, 4, 15, 5, and 17, with the corresponding Mean for each it 3.14, 3.08, 3.03, 2.88, 2.82, 2.81, 2.80, and 2.75. However, Element 13 received the

lowest mean (2.37) (I tend to use printed traditional paper books rather than electronic ones to teach undergraduate students.).

### 4.3. Findings of the study attributed to question 3

RQ3 is: Do faculty members' perceptions of the degree of the employ of academic electronic books at Ajman University vary by gender, college, academic rank, and Experience teaching?

Average scores and standard deviations have been computed to the relevant questionnaire items for the relevant details variables under consideration. T-test, one-way ANOVA tests, and Scheffe tests were performed to determine the significance of average differences. The

**Table 11.** One-way ANOVA test for college variable among faculty members'

| | | Sum of squares | df | Mean square | F | Sig (tailed) | Sig. level |
|---|---|---|---|---|---|---|---|
| College | Between Groups | 6.695 | 7 | 0.956 | 4.717 | 0.000* | Significant |
| | Within Groups | 42.985 | 212 | 0.203 | | | |
| | Total | 49.680 | 219 | | | | |

findings linked to the answers to the questions are outlined below, based on the research variables.

#### 4.3.1. Gender variable among faculty members'

T-test was utilized to assess the significance of the differences between gender according to perceptions of the degree of the employ of academic electronic books at Ajman University, as appearing in Table 10.

The findings recorded in Table 10 illustrate that the observed p (0.002) is less than 0.05. Thus, the test in 0.05 scale is significant, suggesting that there is a significant difference in perceptions of the degree of employment of academic electronic books at Ajman University based on the gender variable (males and females) in favor of females.

#### 4.3.2. College variable among faculty members'

The findings of the one-way ANOVA test of faculty members' answers to this variable are appearing in Table 11.

As presented in Table 11, the findings clearly illustrated that there are statistically significant differences in faculty members' answers based on the variable of college, given that p is 0.000, That it is less than the statistical significance level needed (0.05). Therefore, in order to identify the origin of the differences, Scheffe test was used for the following comparisons and the findings are appeared (See Appendix A. which to Identify the Source of Differences of the Faculty Members' Responses According to College Variable).

Findings displayed in as seen in Appendix A, emphasize that the origin of the variation in the faculty members' responses based on the variable of college arose from the faculty members of the Medicine College. This means that faculty members of Medicine college are having a more positive perceptions degree of the employ of academic electronic books at Ajman University.

#### 4.3.3. Academic rank variable among faculty members'

The findings of the one-way ANOVA test of faculty members' answers to this variable are appearing in Table 12.

As presented in Table 12, the findings clearly illustrated that there are no statistically significant differences in faculty members' answers based on the variable of academic Rank, given that p is 0.121, which is greater than the statistical significance level needed (0.05).

#### 4.3.4. Experience teaching variable among faculty members'

The findings of the one-way ANOVA test of faculty members' answers according to the Experience teaching variable as appearing in Table 13.

As presented in Table 13, the findings clearly illustrated that there are statistically significant differences in faculty members' answers based on Experience teaching variable, given that p is 0.004, That it is less than the statistical significance level needed (0.05). Therefore, in order to identify the origin of the differences, the Scheffe test was used for the following comparisons and the findings are appeared in Table 14 below.

Findings displayed in Table 14 emphasize that the origin of the variation in the faculty members' responses based on the variable of

Experience teaching arose from the faculty members with experience teaching >10 years. This finding means that the faculty members' who having Experience teaching more than 10 years having more positive perceptions degree of the employ of academic electronic books at Ajman University.

#### 4.3.5. Explore the interaction between academic rank variable and experience teaching variable

The two-way ANOVA test was used to examine the interaction between the teaching experience variable and the academic rank variable as seen in Table 15.

As presented in Table 15, the findings clearly illustrated that there are no statistically significant differences in faculty members' answers about the using of academic electronic books in the Ajman University attributable to the interaction, academic rank, and experience teaching, given that p is 0.330, which is greater than the statistical significance level needed (0.05). This means that faculty members accept the use of academic electronic books at Ajman University regardless of the difference in their academic rank and teaching experience. Researchers may attribute the reason to the fact that the university has implemented training courses for faculty members at the university on how to use electronic books and their characteristics and advantages. Moreover, the policy of the university to appoint a faculty member at the university is that he must have skills in the use of computers, the Internet and the use of multimedia.

### 5. Discussion

The findings achieved relating the first research question, regarding the role of the use of academic electronic books in an Arabic communication skills course increase the achievement of higher education students, stated that there was a significant variation among learners in the empiric and control groups in the benefit of learners in the empiric group. The average score of students in the empirical group who were taught by academic electronic books was 16.46, compared to 13.93 for the control group, which were taught by conventional printed academic books (Table 8). These means that the academic achievement for the students of the empirical group who studied by using academic electronic books better than students of the control group who studied by using the printed books.

Additionally, as seen in Table 8, since the acquired p-value (0.000) is less than 0.05, this implies there are significant differences at the significance level of 0.05, which confirmed that there is a significant difference between the two groups of learners in their comprehension of Arabic communication skills course topics. This indicates that academic electronic books had a positive effect on increasing the achievement of undergraduate students in the Arabic communication skills course. This may point out that academic electronic books have had a positive impact on increasing the achievement of higher education students due to they gave them the capability to arrive at a digital transcribe of printed books,

**Table 12.** One-way ANOVA test according to academic rank.

|  |  | Sum of Squares | df | Mean Square | F | P-value |
|---|---|---|---|---|---|---|
| Academic Rank | Between Groups | 1.317 | 3 | 0.439 | 1.960 | 0.121 |
|  | Within Groups | 48.363 | 216 | 0.224 |  |  |
|  | Total | 49.680 | 219 |  |  |  |

**Table 13.** One-Way ANOVA Test of Experience teaching Variable.

|  |  | Sum of squares | df | Mean square | F | P-value |
|---|---|---|---|---|---|---|
| College | Between Groups | 2.468 | 2 | 1.234 | 5.672 | 0.004* |
|  | Within Groups | 47.212 | 217 | 0.218 |  |  |
|  | Total | 49.680 | 219 |  |  |  |

**Table 14.** Scheffe test findings for the variable Experience teaching.

| (I) Experience | (J) Experience | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| <5 years | 5–10 years | 0.14035 | 0.08304 | 0.242 | -0.0643 | 0.3450 |
| | >10 years | -0.10553 | 0.07967 | 0.417 | -0.3019 | 0.0908 |
| 5–10 years | <5 years | -0.14035 | 0.08304 | 0.242 | -0.3450 | 0.0643 |
| | >10 years | -0.24588* | 0.07301 | 0.004 | -0.4258 | -0.0659 |
| >10 years | <5 years | 0.10553 | 0.07967 | 0.417 | -0.0908 | 0.3019 |
| | 5–10 years | 0.24588* | 0.07301 | 0.004 | 0.0659 | 0.4258 |

**Table 15.** Tests of between-subjects effects.

| Source | df | Mean Square | F | Sig. |
|---|---|---|---|---|
| Corrected Model | 11 | .461 | 2.148 | .019 |
| Intercept | 1 | 2020.071 | 9418.302 | .000 |
| Academic Rank | 3 | .503 | 2.343 | .074 |
| Experience Teaching | 2 | .902 | 4.204 | .016 |
| Academic Rank * Experience Teaching | 6 | .249 | 1.159 | .330 |
| Error | 208 | .214 | | |
| Total | 220 | | | |
| Corrected Total | 219 | | | |

R Squared = .102 (Adjusted R Squared = .055).

and maybe also they benefited from the features included like search option, interactive elements, easily updates, create notes on the text...etc. This result is consistent with previous studies (Brown (2016), Christie 2011; Ciampa, 2012; Hwang and Lai 2017; Jones and Brown, 2011; Lokar, 2015; Prasad et al. 2016; Phadung and Dueramae 2018; Slavin 2008; Turel and Sanal 2018; Wu et al., 2014). Where the results of these studies referred that students have positive attitudes towards using academic electronic books, and they enjoyed them because they gave them the capability to arrive at a digital transcribe of printed books; moreover, they benefited from the features included which led to improve and increase their academic performance.

The findings of the second study question related to the level of implementation of academic electronic books, according to the view of faculty members, showed that the level of implementation of academic electronic books was at a high level (Table 9). The mean for all questionnaire items (1–23) was 3.43, with an SD of 1.13. These findings may lead to the conclusion that most of the faculty members at Ajman University support further use of academic electronic books and thus do not hesitate to continue to use them as a substitute for traditional printed academic books. The outputs of this study are compatible together with many research whose results confirm that academic electronic books are accepted, adopted and used in Learning Organizations. In addition, the results also confirmed the positive impact and effectiveness of employing academic electronic books in education institutions. Additionally, interactive academic electronic books led to enhanced learners' learning efficiency, improving their achievements and having positive effects on their behaviors and interests. Students consider using academic electronic books rather than printed books, and the teaching process becomes more interesting, attractive and encouraging for them. Furthermore, they tend to utilize electronic books rather than traditional paper books and the teaching process is more interesting, enticing and inspiring for them to learn and to teach. In addition to that, the electronic books supporting the faculty staff members in their teaching of the students in the university (Brown 2016; Christie 2011; Ciampa 2012; Embong et al., 2012; Gelderblom et al., 2019; Hwang and Lai, 2017; Jones and Brown, 2011; Liaw and Huang 2014; Lim and Hew 2014; Letchumanan and Tarmizi 2011; Prasad et al. 2016; Plangsorn and Poopan 2017; Phadung and Dueramae 2018; Slavin 2008; Turel and Sanal 2018; Wu et al., 2014; Yalman 2015).

The third research question centered on determining whether the faculty members' perceptions of the degree of the employ of academic electronic books at Ajman University vary by gender, college, academic rank, and Experience teaching. Our findings indicate that the perspectives of faculty members vary according to gender (in favor of female) as appearing in Table 10, and college (in favor of the faculty members' of Medicine College) as appear in Table 11, appendix A, and experience teaching (in favor of the faculty members' with experience teaching >10 years) as illustrated in Tables 13 and 14. There is no statistically significant difference in the perspectives of faculty members according to the variable academic rank as illustrated in Table 12. This result is consistent with previous studies like (Hoseth and Mclure, 2012; Jones and Brown, 2011; Plangsorn and Poopan, 2017; Walton, 2007; Yalman, 2015).

In comparison, some other studies have shown that learners, faculty members, and teachers still did not encourage or accept to use electronic books, instead of conventional printed books, and they still prefer the use of traditional printed electronic books, especially when intensive reading is required for lengthy periods of time (Bouck et al., 2016; Dundar and Akcayir, 2012; Ismail, 2013; Khalid et al., 2017; Millar and Schrier 2015; Sackstein et al., 2015; Young, 2010).

Finally, it is observed from the above results that faculty staff members' largely realize the significance of the application of academic electronic books in teaching their students in Ajman University, which could achieve better academic results for them.

The researcher refers according to their view of some implications of using academic electronic books:

- The interest of higher education institutions in teaching through academic electronic books, and the creation of platforms for academic electronic books instead of traditional methods, may solve the problem of not enough print books or similar resources.
- It may be continued training for faculty members and undergraduate students on the use of academic electronic books and their design methods positive effect to replace electronic books instead of traditional books in the universities.
- The academic electronic book may be good further-reaching implications through increases potential access to wider student populations with various disabilities like related to reading.

- These implications may extend to include use of electronic books into schools to be instead of traditional printed books.
- These implications may extend to the necessity for academic libraries in universities to provide better access and training to faculty and students about the academic electronic books related to courses.
- It may be Carry out more studies on the application and using academic electronic books in other higher education establishments.

## 6. Conclusion

This research paper seeks to investigate the impact of the employ of academic electronic books on the achievement of undergraduate learners in higher education and the view of faculty members utilize them. The findings of this research paper show that the employ of academic electronic books improves the academic performance of students in their study Arabic communication skills. There is a statistical variation among the empirical and the control groups found, for the benefit of the empirical group, who were learned utilizing academic electronic books. Results showed also that the level of the implementation of academic electronic books, at Ajman University from faculty members' views came at a high level of employ. Our findings indicate that the perspectives of faculty members vary according to gender (in favor of female) and college (in favor of the faculty members' of Medicine College), and Experience teaching (in favor of the faculty members' with experience teaching >10 years). There is no statistically significant difference in the perspectives of faculty members according to the variable academic rank.

## 7. Limitations of study

- The most important differences in versions of printed books and electronic books are that print books have static layouts that once printed do not change, whereas electronic books have dynamic layouts. This is because most electronic books are formatted with reflowable text. From the other side, some people see that print books have the feel of a book that many readers love. You can hold it, turn the pages, and feel the paper. Printed books are easier on the eyes since there's no eyestrain that comes with an electronic device or e-reader. While some other people feeling that reading on an electronic book reader is easy and great. Most of them provide a one-hand experience. Most of the time, you won't need to use two hands. Furthermore, there is another difference between printed books and electronic books is that printed books no need for electric power, so you don't need to charge printed books. Since it needs no electric power. You can carry them anywhere without the worry of charging comparing to electronic books.
- The inability to increase student participation in both control and empirical groups due to the fact that only 91 students were enrolled in the Arabic communication skills course.
- Data for this age variable were missing or incomplete in most of the responses of female faculty members, which forced us not to take it into account in this study.

## 8. Delimitations of study

We would like to call attention to some limitations in our investigation:

- *Subject limits:* The study was limited to the all topics of Arabic communication skills course, which were taught to the students in spring term of the academic year 2019/2020.
- Human limits: The study was limited to Students at Ajman University in United Arab Emirates (UAE) who registered the Arabic communication skills course.
- *Spatial limits:* Ajman University in the United Arab Emirates.
- *Time limits: Spring semester of* academic year (2019/2020) - second semester.

## Declarations

### Author contribution statement

N. R. Alsalhi: Conceived and designed the experiments; Performed the experiments; Wrote the paper.

S. Al-Qatawneh, K. Aljarrah: Analyzed and interpreted the data; Wrote the paper.

M. Eltahir: Conceived and designed the experiments; Contributed reagents, materials, analysis tools or data.

F. Althunibat: Contributed reagents, materials, analysis tools or data.

### Data availability statement

Data included in article/supplementary material/referenced in article.

### Declaration of interests statement

The authors declare no conflict of interest.

### Additional information

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