Computerization of the Arabic Lexicon between Reality and Prospects: A Survey Study

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Abstract

The current study aimed at identifying the concept, importance, advantages and classifications of lexical computing and then a survey of the attempts and applications of the computing of Arabic lexicons and the prospects for developing the computing of the Arabic lexicon from the point of view of faculty members at Imam Abdul Rahman bin Faisal University and their attitudes towards the use of the computerized Arabic lexicon. The study used the descriptive survey approach. A questionnaire was prepared to develop the computerized Arabic lexicon and a scale for the attitude towards it. They were administered to a sample of (176) in colleges at Imam Abdul Rahman bin Faisal University. The study found out, to a great extent, the prospects and suggestions to develop the computerized Arabic lexicon; including the continuous modernization of the computerized lexicon to keep pace with the development of the Arabic language, and updating the automatic formation and proofreading system to add diacritical marks to texts automatically. There is also a high level of awareness of the computerized Arabic lexicon and the attitude towards its use among the faculty staff members. The study recommended the development of computerized lexicons specialized in the Arabic language continuously and any new developments, and the importance of expanding the use of artificial intelligence applications in computerized Arabic lexicons.

Keywords: Computerization, Computerization of the Arabic Lexicon.

1. Introduction

Today we live in a digital era where all the means around us depend on numbers and computer algorithms. Accordingly, Arab lexicographers faced a major challenge represented by the superiority of computing in all areas of research. The creation of computerized lexicon became a necessary and urgent requirement for the survival of any language; maintaining its existence and a standard for the extent of its circulation or its limited use.

Lexicon computing is one of the most prominent manifestations of the automated processing of natural languages. It is one of the most important media that manifests the national linguistic memory for us. It works to modernize and develop it to keep pace with the movement of the

massive information explosion and the accelerated flow of terminology in the society of knowledge (Beatam, 2021, 150).

Lexicon computing, in general, is one of the most important areas of knowledge that embodies the positive interaction between lexicography and computer science. Given the importance of this trend, it has gained increasing attention since the first attempts to computerize the Arabic lexicon; leading to the digitization of many lexicons in language banks and the achievement of pioneering initiatives in the manufacture of pure digital lexicons. (Darghoum, 2021, 392).

The existence of a computerized lexicon is considered an urgent requirement. Although there are several attempts that have sought to produce Arabic computerized lexicons, these attempts still need development in their material and methodology as building a computerized lexicon does not consist of converting a paper lexicon into a computerized one by entering the materials into the computer. Rather, the matter requires more. Therefore, the computerized lexicon, that we aspire to exist, is a lexicon that is essentially built on a database in which the conditions for a computerized lexicon are met as is the case in liberal Western computerized lexicons (Daqnati ,2022, 121). The use of computers in creating and classifying lexicons has also become an ideal phenomenon for linguistic processing. Linguistic studies have been able to achieve tangible progress, the results of which have appeared in the form of automated lexicons; capable of regular automated use by researchers and learners. Computerization of the Arabic lexicon helps facilitate the lexicography of the rich Arabic linguistic stock into portfolios ready for publication according to the desired lexical purposes in terms of statistics, description, and semantic pluralism and the phonetic, morphological, or grammatical linguistic distribution (Bayah, 2020, 230).

If the computerization of lexicons represents an urgent necessity, then the computerization of the Arabic lexicon, which carries an ancient heritage, cannot remain isolated from the radical transformations the world is witnessing in the world of communication and knowledge transfer. The beginning of automated processing of the Arabic language was in the seventies with the Second Conference on Arabic Computational Linguistics, which was held in Kuwait in 1989. It was preceded by the Fourth Forum for Arabic and Media Linguistics in Tunisia (Omar, 2009, 168).

From the previous overview, it is found out that investigating the computerization of the Arabic lexicon between reality and prospects is one of the important studies in light of an era characterized by unprecedented digital development. Our Arabic language must keep pace with that development. The problem of the current study is determined in the following questions:

- What is lexical computing: (concept, importance, advantages, and classifications)?
- What are the attempts and applications of computerizing Arabic lexicons?
- What are the prospects for developing the computerization of Arabic lexicons from the point of view of faculty staff members?
- What are the attitudes of faculty staff members towards the use of computerized Arabic lexicons?

This study may benefit specialists and those interested in the language in Arabic language academies in the Arab world and researchers, of all groups, in identifying the best computerized lexicons for use in scientific research in the era of the Fourth Industrial Revolution. Moreover, the study works on supporting and developing cadres of faculty staff members in business administration, applied studies and community service; major of administrative information systems, as well as in arts, sciences, computers, and information, to build a pioneering information structure for the activities and applications of computerized Arabic language lexicons.

2. Conceptual Framework:

2.1 Concept of Lexical Computing

- Computing Concept

It is the shift from traditional and manual procedures and services provided by institutions to the use of computers, which ensures high speed, accuracy, and comprehensiveness in dealing with information (Kandaliji, 2003, 103).

- Concept of Lexical Computing

Lexicon computing is considered one of the most important issues in computer linguistics, which is concerned with transforming the human language according to a database. The phonetic, morphological, grammatical, and semantic information is programmed according to limited software systems, and the human language is transformed into automated symbols characterized by extreme speed, accuracy, and comprehensiveness in dealing with the information.

Lexicon computing is defined as the use of advanced computing systems based on software algorithms that take advantage of lexical logic in processing Arabic words by extracting the basic elements of the word structure and determining its lexical features directly. This allows for the benefit of artificial intelligence techniques, and the automated lexicon deals with a specific word according to the user's choice and displays the most important roots available for that word in the encyclopedia, and the user is given the opportunity to choose the most appropriate root for the search process. (Arabiya, 2017, 102)

The computerized lexicon is also known as a modified computer version of the paper version. The computerized lexicon consists of a large number of entries, and each entry includes information that can be collected about the word or term. This information varies from one lexicon to another according to the aims for which it was built and the target groups of users. (Hamado, 2011, 289), (Khalifa W, 2017).

2.2 Importance of the Computerized Lexicon

- It is considered a crucial necessity for individuals in the information age and knowledge-based economy. It has become an essential means for students, professors, researchers, and translators, in addition to other social and professional groups.

- This importance becomes more obvious when the reality of creating lexicons in international languages is compared to the reality of creating Arabic computerized lexicons.

- It helps to attract the interest of students and pupils towards searching for information and presenting it using multimedia means.

- The speed of continuous updating of the computerized lexicon enables it to follow the development of the Arabic language at all levels, and helps in the process of building an ontology of the Arabic language, which enhances a better understanding and use of the language (Baccar et al., 2011).

- Providing a spell check feature for the entered word, which saves the possibility of error when the user enters the word (Beatam, 2021, 152).

- The computerized lexicon helps in the automatic processing of human voices, as it enables it to automatically recognize speech and convert text into spoken speech and vice versa (Dargum, 202, 392).

2.3 Advantages of the Computerized Lexicon

The computerized lexicon has many advantages that stem mainly from the technological progress that the world has witnessed in recent years, which has greatly influenced the improvement of the performance and effectiveness of computerized lexicons. These advantages can be summarized in the following points:

- It can provide various ways to search for information, whether via the root or stem (simple search) or via meaning (advanced search). Users can access information easily and effectively using these various methods.

- Constructing huge and comprehensive computerized lexicons that include ancient, modern and multilingual languages. These lexicons are characterized by accuracy and comprehensiveness and provide main and secondary meanings of words in addition to various examples and evidences.

- Generating some standard words based on derivation rules, which provides easy access to information without the need to represent it in detail.

- It includes important linguistic applications such as conjugation of verbs and nouns, searching for synonyms, phonetic processing to convert writing into spoken speech, and spell checking. These services make the computerized lexicon a comprehensive and useful linguistic tool.

- The computerized lexicon can easily be modified and updated by adding new entries or updating existing entries. However, this feature must be treated with caution to maintain the credibility and quality of the lexicon.

- It integrates multimedia such as text, sounds, still and moving images, and videos to present knowledge in a more interactive and satisfactory way.

These advantages make the computerized lexicon a valuable and versatile tool for individuals, learners, and researchers in the field of language and translation (Hamadou,2011, 293-294), (Ben Khalifa, 2018).

2.4 Classifications of Computerized Arabic Lexicon

An urgent need arose to find means of storing information with the development of the arts of writing and blogging, whether through printing, recordings or other means. With the advancement of the arts of electronic publishing and the emergence of computerized lexicons, databases witnessed great development alongside the development of software and computer hardware, and then the fundamental sources of Arabic lexicons appeared on CDs, which has led to a great diversity of Arabic lexicons, according to basic standards adopted by modern classifications of computerized lexicons, such as the arrangement of entries, the function of the lexicon, the quality of the content, and others. The following is a presentation of the classifications:

1. Comprehensive Linguistic Lexicons: These lexicons take a comprehensive approach in explaining and analyzing words in the language. The entries are arranged and comprehensive definitions of words are provided, with examples and evidence of their uses.

2. Specialized Lexicons: These lexicons focus on specific fields of knowledge as terms and related words are collected, providing accurate definitions and explanations of the terms and words according to the context of their use in that field.

3. Individual Comprehensive Lexicons: These lexicons include the vocabulary of the Arabic language itself, and have been compiled from ancient and modern linguistic lexicons, and have been converted into electronic formats to facilitate access and use.

4. Bilateral Lexicons: These lexicons provide foreign equivalents of Arabic words and terms that allow searching for translations and equivalents in foreign languages, which facilitates the transfer of knowledge between different languages (Azouz& Maji, 2023, 318).

5. Visual Lexicons: They include a collection of images and videotapes classified according to the topics they address: plants, animals, toys, and means of transportation (Mohamed, 2022, 41)

These classifications reflect the importance of lexicons in documenting and understanding language and related concepts, and providing support to individuals in the society of knowledge and learning.

2.5 Attempts and Applications of Computerized Lexicon

Many Arab researchers have tried to enter the world of linguistic computing at various levels. The following is a survey of some of the efforts made, the most important of which are:

1. Writing books about Arabic and computers, as Nabil Ali wrote the first book on the basic rules of computational linguistics (Bashir, 2018, 89-90).

2. Dr. Abdel Qader Al-Fassi Al-Fihri prepared research on computerization of the Arabic lexicon.

3. Dr. Mohammed Al Hanash conducted studies on the electronic dictionary of the Arabic language and proposed a linguistic computer theory project in order to construct automatic dictionaries for the Arabic language and automate the Arabic lexicon using an automated morphological processor.

4. Dr. Abdul Rahman Al Haj Saleh presented research on the automatic treatment of Arabic texts, and developed a linguistic model for the automatic treatment of the Arabic language (Azouz& Maji, 2023, 315).

5. Marwan Al Bawab described the computerized lexicon by describing Arabic vocabulary in terms of morphology. He prepared tables that included verbs, nouns, and articles. Then the search screen was designed to include searching the entire dictionary, including entries, definitions, and examples; by entering the desired term and displaying its meaning (Al Bawab, 2008).

6. Ahmed Abu Saad from Lebanon published research on Arabic lexicons in their current reality and a plan for their development. He wrote three works that he prepared to be placed on the web, which are the Dictionary of Popular Terms and Expressions, the Old Dictionary of Arabic Idiomatic Structures and Expressions, Al-Mawlid, and the General Fasih Dictionary (Abu Haif, 2004, 96).

The introduction of the Arabic language into the field of automated processing has become an inevitable necessity. Hence, many attempts have appeared since the 1970s, and the following is a survey of some projects to computerize Arabic lexicons.

- Ibrahim Anis (1906-1978) is considered the first to use the computer to serve the Arabic language. He proposed the idea to the professor of physics: Ali Hilmi Musa in Kuwait. They prepared a project to count the original letters of Arabic language materials; starting in the year 1971, and from it the statistical study of the three- and non-three-letter roots of Al Jawhari's Al Sihah Lexicon was published.

- Another statistical work was completed in 1972, which was a census of the roots of Ibn Manzur's Lisan al-Arab Lexicon.

- Abdel Nasser Shaheen joined the work team in 1973 and participated in completing a census of the roots of Taj Al Arous Lexicon by Al Zubaidi.

- Helmy Musa (1974) researched the words of the Holy Qur'an and made a comparison between the words of Qur'an and the words of Sahih Lexicon, a comparison between the Meccan Surahs and the Medinan Surahs, and identifying the relationships between the letters and movements of the Qur'an (Ivic, 2000, 413).

- The Algerian researcher Bashir Helmy, working for ALIS Foundation, developed the Arabic DOS system similar to MS-DOS, which is produced by Microsoft, and after the merger that took place between the two aforementioned institutions, computers began to work in many languages; including Arabic (Bashir, 2018, 103).

It was noted that the previous stage focused mainly on the statistical aspect only. Finally, linguistic circles were fully convinced of the possibility of studying linguistic structure as a logical computational structure.

2.6 Computerized Arabic Lexicon Applications

- A data base designed to cover the verbal wealth of the Arabic language; presented by Mohammed Abdel Moneim Hashish from Egypt.

- Designing an automated technological method for Arabizing the computer (this project was known as Al-Amam - Sha'a; that is, the formed standard Arabic - the Arabic code); presented by Ahmed Al Akhdar Ghazal from Morocco.

- Designing a family computer that works with the Arabic alphabet in Kuwait, called (Sakhr); designed by Abdul Rahman Al Sharekh.

- A project to establish and develop an automated terminology bank, called (Basm), launched by the King Abdulaziz City for Science and Technology in Riyadh.

- A team of experts in informatics from Syria completed a dictionary whose material was drawn from Jamharat Al Arab by Ibn Duraid, Tahdheeb Al Lughah by Al-Azhari, Al Muhkam by Ibn Sayyidah, Lisan Al Arab by Ibn Manzur, and Al Qamoos Al Muhit by Al Fayrouzabadi (Bashir, 2018, 90-105).

- The Computerized Lexicon: Al Ghani is a school dictionary issued by Sakhr Company on CD-ROM and on its website. It is worth noting that Sakhr Company, at its beginning, was part of the "International Electronics" group in 1982, and one of its goals was to develop the Arabic language and support it to adapt to the new era of information technology (Abu Odeh,2014, 254). Al Ghani Dictionary combines the verse of imitation and renewal, as it presents the root of the word between two doubles before explaining it (Al-Bouchihi, 2004, 22). This table includes a large number of dictionaries, represented by:

Table (1) Names of Some Lexicons: (Number of Words, Derivatives, Articles)

Lexicon Name	Average items for the letter	Number of items in the lexicon	Number of derivatives in the lexicon	Number of words in the lexicon
Almuhit	1.429	40.000	40.000	810.000
Muhit Al Muhit	400	11.2000	84.965	1.300.000
Al Wasit	250	7000	30,000	450.000
Al Ghani	1.071	30.000	195.000	2.000.000
Alqamus	390	11.000	70.000	733.000
Lisan Al Arab	335	9.393	158.149	4.493.934
Nagah Al Raed	---	142	5.629	119.176

In addition, Al Ghani's Lexicon is directed to school students in the Arab environment. Therefore, its entries are selected from established poetic and prose literary works and texts, as well as free texts that have a circulation nature (Abu Al-Azm, 2013).

- The Contemporary Arabic Language Lexicon, which is a lexicon written by Ahmed Mukhtar Omar, and issued by Dar Alam Al Kutub. It issued two versions, one in paper and the

other electronic in the form of a CD (DVD), in a serious attempt to bring the Arabic lexicon to the world of digitization. The electronic version is distinguished by its enormous capabilities in recalling the required information quickly and with advanced search systems in all parts of the lexicon (Omar, 2008).

- Lexicon Search Engine: The lexical search engine was launched at the Faculty of Engineering and Technology at Birzeit University of Palestine under the supervision of Dr. Mustafa Jarrar on September 25, 2018. The lexical search engine allows the researcher to retrieve translations, synonyms, and meanings of a specific word. The lexical search engine also includes the largest linguistic database for the Arabic language.

➢ The project went through several phases:

1. It was launched in its first phase with a limited number of lexicons, and then it was agreed with the Arab League for Education, Culture and Science to provide this project with fifty lexicons available at the Arabization Coordination Office.

2. In the second phase, the research team worked on developing algorithms; to reshape the structure of the input and separate the definition, derivatives, inflections, translations and synonyms and store them in a single database; so that the computer can understand and deal with it, especially since the traditional lexicographic industry focuses on the paper use of lexicons.

3. The database currently includes various types of lexicons, such as traditional linguistic lexicons, both ancient and modern, bilingual and trilingual lexicons, lexicons of linguistic differences, and morphological and derivational databases. Furthermore, the database covers various fields such as natural sciences, engineering, medicine, economics, literature, humanities, philosophy, arts, and economics.

This engine is considered the first in the world, as there are no engines similar to it in other languages in terms of quantity, quality, and method of use. It is also considered the largest linguistic database that includes 150 multilingual Arabic lexicons. It took about eight years to compute it, within a long-term non-profit research project to serve the Arabic language (Murad&Yahya, 2021, 503-505), (Khalifa, W. B., 2020).

- Contemporary Lexicon: It is an electronic general lexicon produced by Sakhr Company. It includes the linguistic material needed by people of the language. It is modern because it applies the principles of modern lexicographic industry in defining its objectives, identifying its sources, selecting its material, arranging it, interpreting it, explaining it, and displaying it to the user. It consists of approximately 80,000 main entries. Each entry was compared to its English equivalent, and its meaning and one or more illustrative examples were given. It also presented for each entry the sub-entries that might fall under it. To further enrich the lexical content of a single entry, the dictionary linked it to other entries that are synonymous with it and contradictory to it (Azouz& Maji, 2023, 320-321).

- School Dictionary (Arabic-Arabic Lexicon): It is a computerized dictionary available for download. It includes more than 80 thousand words in the Arabic language. It consists of three dictionaries: (Al Wasit, Al Ghani, and Al Raed); collected without an Internet connection. The search can be expanded by connecting to the Internet. It suggests words that share the same

root as the entered word and indicates in its description that the target group for the dictionary is actually educational. The large number of advertisements constitutes an obstacle that may affect the search process in free applications that provide such services (Kabyli, Abbas& Aishoun, 2018,46).

- Al Maany Dictionary: It was designed as a website, and is also available as an application that can be downloaded from (Google Play) for use on smart devices. It is considered one of the leading websites in the field of computerized dictionaries. It contains rich linguistic resources and includes an important database based on a group of the most prominent Arabic lexicons. Among them are: Lisan Al Arab, Al Muhit fi Al Lughah, Al Wasit, the Lexicon of the Contemporary Arabic Language, Al Raed, Al Ghani, Lughat Alfuqaha', Almaghrib Fi Tartib Almuearib, Mukhtar Al Sahhah, the Words of the Qur'an Interpretation and Explanation, Al'aswat, and Taj Alarus, as well as a number of grammatical and rhetorical references specialize in the language of Dhaad. To benefit from the site's services, it is sufficient to write the word in the search box so that all results matching the search are shown, as well as those similar to or related to the search word in each reference. Perhaps what distinguishes this application is the inclusion of all definitions of the word according to its occurrence in all the lexicons mentioned and the most appropriate definition can be selected among them. There are scientific terms in all specializations, and this is what enriches it from a scientific standpoint, but on the other hand, there is a complete absence of illustrative images, which contradicts the components of the dictionary directed to the child. / https://www.almaany.com/ar/dict/ar-ar.

- The Digital Dictionary: It is a type of digital application in the field of lexicography. It is available for sale through the Digital Future website. It supports the Arabic and English languages, follows an alphabetical order, and deals in a modern style that includes about 65,000 words and 3,000 pictures, making it a tool rich in linguistic vocabulary. This application can be downloaded on mobile devices. It was developed and implemented using the latest leading technology, and offers the additional advantage that it only offers meanings of words, but also includes pictures to clarify the context or concept (Kabaili, AbbasZ & Aishoun, 2018, 44-45).

3. Study Methodology

The descriptive analytical method was used as it is suitable to the nature of the current study.

Study Sample

The study sample consisted of (176) faculty staff members (Business Administration and Applied Studies, Community Service, Specialization in Management Information Systems, Arts and Sciences, Computers and Information) at Imam Abdul Rahman bin Faisal University in Dammam, Kingdom of Saudi Arabia; divided into (110) males, with a percentage of (62.5%) and (66) females; approximately (37.5%).

Study Instruments:

To achieve the aims of the study, a questionnaire was designed in its initial form, consisting of (29) statements distributed over two pivots as follows: the first pivot: prospects for developing

the computerized Arabic lexicon, which includes (15) statements, and the second pivot: the attitude towards the computerized Arabic lexicon, which includes (14) statements. For each statement, there are five response levels according to the five-point Likert scale as follows: Strongly Agree (5 marks), Agree (4 marks), Neutral (3 marks), Strongly Disagree (1 mark).

Validity

- Face Validity (Jury Members' Validity): The validity of the questionnaire was verified by presenting it to a group of jury members in the field of study (Computers and Information, Arts and Sciences), who were (7) members. They recommended amending some of the wordings, and they were amended, and the agreement exceeded more than 85%.

- Internal Consistency Validity: The validity of the internal consistency of the questionnaire was confirmed by calculating the correlation coefficients between each pivot and the total score of the questionnaire by applying the questionnaire to a pilot sample of faculty stuff members consisting of (40 members). The SPSS program was used to calculate the correlation coefficients between each pivot and the total score of the questionnaire, which is high and statistically significant at (0.01) significance level. the first pivot: prospects for developing the computerized Arabic lexicon obtained a correlation coefficient (** 0.90), and the second pivot: the trend towards computerizing the Arabic lexicon obtained (** 0.75) which indicates the validity of the internal consistency.

Reliability

The reliability of the questionnaire was calculated using Cronbach's alpha coefficient, and it is clear that the questionnaire's pivos are characterized by a statistically significant degree of reliability of (0.83) and (0.92), respectively, and the reliability coefficient of the questionnaire as a whole reached (0.85), which confirms the reliability of the questionnaire results.

4. Results:

To answer the question: (What are the prospects for developing the computerized Arabic lexicon among faculty staff members at Imam Abdul Rahman bin Faisal University?); means and standard deviations were used for the responses of the study sample participants, and the following table shows:

Table (2) Arithmetic Means and Standard Deviations of the Responses of the Study Sample participants Regarding the Prospects for Developing the Computerized Arabic Lexicon

No.	Statement	Mean	Standard Deviation	Rank
1	Creating a new program in the faculties of arts for the Arabic language related to computerized lexicon applications.	3.82	0.90	5
2	Providing the ability to add new entries or update existing ones.	3.65	1.07	9
3	Harmonizing work between software systems and the nature of the Arabic language and linguistic academies.	3.86	1.08	4

4	The use of artificial intelligence in developing computerized Arabic lexicons.	3.68	1.38	8
5	Strengthening computerized Arabic lexicons through automated and simultaneous translation from and into the Arabic language.	3.95	1.05	3
6	Evaluation of the computerized lexicon according to the ISO LMF scale.	3.75	1.19	7
7	Enable the computerized lexicon to automatically generate some standard words.	3.51	1.13	13
8	Continuous updating of the computerized lexicon to keep pace with the development of the Arabic language.	3.99	0.97	1
9	Employing computerized lexicons in developing systems for teaching the Arabic language to native or non-native speakers.	3.56	1.18	10
10	The computerized lexicon distinguishes the eloquent from the colloquial and suggests the correct phrases that correspond to the learners' mother tongue.	3.79	1.09	6
11	Updating the automatic formation and proofreading system with the computerized lexicon to add diacritical marks to the texts automatically.	3.98	0.97	2
12	The computerized lexicon allows information to be entered by scanning.	3.54	1.35	11
13	The computerized lexicon allows automated indexing and summarization.	3.53	1.18	12

Based on the previous table, it is obvious that the pivot of the importance of the electronic lexicon includes (13) statements. The responses of the sample participants varied regarding the statements of this pivot. The statement No. (8) came in first place: "Continuous updating of the computerized lexicon to keep pace with the development of the Arabic language." with an arithmetic mean of (3.99) and a standard deviation of (0.97). The second ranked statement was No. (11) "Updating the automatic formation and proofreading system with the computerized lexicon to add diacritical marks to the texts automatically." with an arithmetic mean of (3.98) and a standard deviation of (0.97). The third ranked statement was No. (5) "Strengthening computerized Arabic lexicons through automated and simultaneous translation from and into the Arabic language." with an arithmetic mean of (3.95) and a standard deviation of (1.05). This is consistent with the studies of: Mohammed (2021), Al Rudaini (2006), and Bitam (2021), as following up and updating the lexicon makes it keep up with the developments of the age, as well as the Arabic language in its various branches. It also encourages to learn different languages and translate them. Statement No. (12): "The computerized lexicon allows information to be entered by scanning." was with an arithmetic mean of (3.54) and a standard deviation of (1.35). Statement No. (7) came in last place, "Enable the computerized lexicon to automatically generate some standard words." with an arithmetic mean of (3.51) and a standard deviation of (1.13). All statements of the pivot for developing the computerized Arabic lexicon obtained an arithmetic mean between (3.51-3.82), which indicates that the average score of response to this pivot exceeded the average score of agreement, which is (3.4), which indicates all statements of the pivot received a high arithmetic mean, which confirms the sample participants' conviction on the importance of developing the computerized Arabic lexicon to keep pace with the changes of the age, due to the richness of the Arabic language and the abundance of its content and branches. It requires an effective and developed Arabic computer system that works to manage and store this abundant material, which makes the use of the computer in processing linguistics

is not a matter of luxury, but rather a basic requirement and necessity imposed by the complex nature of the lexicon, the massive information explosion, and the accelerating flow of terminology in the society of knowledge, in addition to the flourishing of computational linguistics. This is what previous studies have confirmed, such as the study of (Ahmed, & Ahmed, 2023; Baya, 2020).

Faculty staff members' attitudes toward using the computerized Arabic lexicon: The following table shows the means and standard deviations regarding faculty staff members' attitudes toward computerizing the Arabic lexicon.

Table (3) Arithmetic Means and Standard Deviations Regarding Faculty Staff Members' Attitudes toward Using the Computerized Arabic Lexicon

No.	Statement	Mean	Standard Deviation	Rank
1	I get a large storage capacity for vocabulary and structures.	4.23	0.81	3
2	I use important linguistic applications such as verb conjugation, nouns, and synonyms.	4.02	0.79	9
3	There are various methods for searching for information (entries, roots, derivatives,……..).	3.99	0.81	10
4	It helps to show misspelling and display correct possibilities.	4.36	0.73	2
5	Its use emphasizes keeping pace with the rapid developments in means of communication and information technology.	4.14	0.81	5
6	It helps in deriving some standard words according to the rules.	3.98	0.88	12
7	It supports learning different languages and translations.	3.94	0.81	13
8	It is characterized by clarity, accuracy, and automated language processing.	4.03	0.83	8
9	It includes all the lexical units of the language.	3.99	0.82	11
10	It facilitates access to files anytime and anywhere.	4.05	0.89	7
11	It develops students' self-learning skills.	4.20	0.86	4
12	It saves time and effort.	4.37	0.73	1
13	It helps to study morphological structures and grammatical relationships.	4.07	0.93	6
14	It does not offer any new addition to learning.	2.63	1.38	14

The responses of the study sample participants varied regarding the statements of this pivot. Statement No. (12): "Using the electronic lexicon saves time and effort" came in first place, with an arithmetic mean of (4.37) and a standard deviation of (0.37). This indicates the sample's conviction and attitudes to a high score on this statement. Statement No. (4) came in second place: "It helps to show misspelling and display correct possibilities." with an arithmetic mean of (4.36) and a standard deviation of (0.73). This confirms the sample participants' attitude towards this statement to a high score. Statement No. (1) came in third place: "I get a large storage capacity for vocabulary and structures." with a mean of (4.23) and a standard deviation of (0.81). Statement No. (11) came in the fourth place: "Using cloud computing in education develops self-learning skills among students." with a mean of (4.20) and a standard deviation of (0.86). The previous statements reflect the presence of positive attitudes among the participants of the study sample towards the electronic lexicon, as it keeps pace with developments and technologies of the modern age and helps to access information faster and with the least effort and time possible. While the penultimate ranking was statement No. (7): "It helps me learn different languages and translations," with an arithmetic mean (3.94) and a standard deviation of (0.82); indicating that the sample participants are convinced of the importance of this to a high score. Statement No. (14) came in the last rank: "Using the electronic lexicon does not offer any

new addition to learning" has an arithmetic mean of (2.63), which is a low score, and a standard deviation of (1.38). This confirms the sample participants' conviction of the importance of the computerized lexicon in learning and not the other way around. The results of the previous statements confirm the presence of positive attitudes among the sample participants towards the use and development of the computerized Arabic lexicon.

5. Recommendations

- Directing and encouraging graduate students to conduct research and practical applications in computing various Arabic lexicons.
- Creating a scientific certificate and a new specialization to work in the field of computing Arabic lexicons of all kinds.
- Joint efforts between experts in the field of linguistics and research centers related to the Arabic language and lexicographic composition in the Arab world.
- Supporting higher education institutions to establish linguistic research centers that have websites through which linguistic and lexical projects are presented and seriously discussed to meet the aspirations of the Arabic language.
- Continuously developing computerized lexicons specialized in the Arabic language and any new developments.
- The importance of expanding the use of artificial intelligence applications in computerized Arabic lexicons.
- Providing the infrastructure, material and human requirements to increase the uses of computer applications and artificial intelligence to support and develop computerized Arabic lexicons.
- Developing a framework for information technology based on the nature of the Arabic language and its various lexicons and in accordance with the rapid changes of the era.

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