LIMES PLUS Journal of Social Sciences and Humanities
ISSN: 1820-0869
E-ISSN: 2406-2871
Vol. 23 (2) 2026

The Future of the School Electronic Dictionary in Light of Digital Transformation: Prospects and Challenges

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Received: 22/02/2026, Accepted: 26-04-2026 Published: 26-08-2026

Abstract

The electronic school dictionary represents a qualitative shift in educational tools, having evolved from a mere silent reference book into an intelligent, interactive learning environment grounded in the applications of computer science and computational linguistics. This dictionary draws on a vocabulary stock derived from the pupil's actual language use, and is characterized by high search flexibility, immense storage capacity, and the deployment of multimedia (audio and image) to bring meanings closer to the learner. Digitization also opens broad horizons for developing language skills (both spoken and written) and for reinforcing learner autonomy. Nevertheless, this industry faces challenges such as weak computational structuring (limited to digitized copies), high costs, and the gap between linguistic content and modern curricula. The future success of this transformation depends on building genuine educational corpora and on combining the efforts of linguists and technicians to produce advanced educational software.

Keywords: The Electronic School Dictionary – Digital Transformation – Multimedia – Language Corpora – Lexical Competence – The Digital Generation – Natural Language Processing – Self-Directed Learning.

Introduction

Today's knowledge and educational arena is a stage for immense technological transformations that have touched every sphere of life, particularly in the field of communication and information technology, as methods of acquiring knowledge have shifted from traditional, classical approaches to modern digital media. Amid this technological acceleration, the computerization and automatic processing of the Arabic language has emerged as a necessary requirement for facilitating its learning and acquisition — especially given that the linguistic dictionary represents “the memory of peoples” and the cornerstone for enriching the learner's linguistic repertoire. The spread of computers and smartphones has given rise to what is known as the “digital generation” of schoolchildren, who possess high competence in dealing with screens, to the extent that these technical media have become their “primary medium,” in comparison with the printed book and pen.

Digital transformation in the sphere of education is no longer a mere option; it has become a strategy aimed at elevating pedagogical practice and making it more responsive to

contemporary scientific leaps. From here emerges the electronic school dictionary as a vital educational tool that seeks to transfer lexical material from its silent, static character into an interactive environment rich in multimedia (audio, image, video), thereby helping to capture the learner's attention and stimulate their motivation for independent inquiry. Nevertheless, this qualitative shift faces challenges related to the extent to which digital content aligns with modern pedagogical and linguistic standards, and its ability to meet the actual needs of learners across the various stages of schooling.

Research Problem

Despite the considerable importance of the electronic lexicographic industry, reality points to a significant gap between the technical capabilities available and their actual exploitation in compiling specialized Arabic school dictionaries. Many current attempts lack the fundamentals of genuine computational dictionaries, being content instead to serve as “digitized copies” of old printed dictionaries, without regard for linguistic gradation or the child's cognitive level. On this basis, the problem addressed in this article crystallizes around the following core question:

What is the future of the electronic school dictionary in light of digital transformation? And how can this dictionary move from being a mere repository of vocabulary to an intelligent learning environment that contributes to building lexical competence among the young, while overcoming current technical and educational challenges?

The following sub-questions branch from this problem:

1. What are the characteristics and features that distinguish the electronic school dictionary from its printed counterpart in the educational environment?
2. To what extent do linguistic applications in electronic dictionaries (such as the Almaany dictionary) contribute to developing the learner's language skills (listening, speaking, reading, writing)?
3. What are the most significant challenges (technical, financial, and pedagogical) hindering the flourishing of the electronic lexicographic industry directed at Arab schools?
4. What are the future prospects and scientific foundations (such as the modern Khalilian theory) that must be adopted to build a digital school dictionary that keeps pace with modern curricula?

First Axis: The Nature of the Electronic School Dictionary and Its Characteristics in the Digital Environment

1. The Concept of the Electronic School Dictionary

The electronic school dictionary is defined as: “a stock of linguistic vocabulary drawn from the pupil's actual language use, stored in computer memory and accompanied by definitions and information suited to the pupil's level and needs; it is the product of applying electronics and

computer science to the field of lexicography, whereby material is arranged and stored automatically in a manner that allows for extremely rapid retrieval."[1]

The electronic school dictionary is also defined as an advanced automated technical database, representing the direct fruit of applying electronics and computer science in the field of computational lexicography.[2] It is not merely a digitized copy of printed dictionaries, but rather an integrated linguistic environment whose material is drawn from "educational corpora" and the pupil's actual language use within their schooling environment, so as to ensure its alignment with what they receive in official textbooks and curricula.[3]

From this definition, we find that the electronic dictionary transcends the problems of the printed dictionary thanks to its immense storage capacity and its ability to present knowledge through multiple search modes (word, synonym, topic), thereby achieving learner autonomy.

2. Characteristics of the Electronic School Dictionary

The most prominent characteristics of the electronic school dictionary are as follows:

- Computational structuring and automated management: The electronic dictionary is built on a storage system with an immense-capacity memory that allows it to accommodate a virtually unlimited number of linguistic units, whereby letters are converted into encoded symbols processed by pre-designed programs. This system allows the learner to retrieve information at extremely high speed through intelligent search engines; as soon as a word is clicked, all related knowledge appears.
- Integrated linguistic content: The dictionary does not offer a mere linguistic definition; rather, it provides a comprehensive knowledge repertoire for each entry, including correct pronunciation (via audio media),[4] morphological roots, semantic bearings, idiomatic expressions, as well as synonyms and antonyms.
- Stage-appropriate pedagogical suitability: The school dictionary is built on scientific foundations that take into account the cognitive and mental level of the young,[5] such that definitions and explanations are simplified to suit the learner's age and their natural and acquired abilities. It is thus a "stage-based" dictionary that develops as the pupil's language and cognitive growth progress from one stage to another.

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[1]Ahmed Mouhoub, The Importance of the Electronic School Dictionary in the Presence of the Printed School Dictionary and Their Impact on the Educational Process, Rofouf Journal, Vol. 10, No. 2, University of Adrar, July 2022, p. 703.

[2]Ahmed Mouhoub, Ibid., p. 704.

[3]Ahmed Mouhoub, Ibid., p. 706.

[4]Shadniyah Sayed Mohammed Al-Sayed, Linguistic Applications in Electronic Dictionaries and the Development of Lexical Competence, International Journal of Humanities and Social Sciences, Umm Al-Qura University, Saudi Arabia, No. 63, December 2024, p. 65.

[5]Ahmed Qabour (Supervised by Bashir Ibrir), Foundations of Dictionary Compilation in Light of the Linguistic Thought of Abd al-Rahman al-Haj Saleh: The School Dictionary as a Model, University of Médéa, Vol. 5, No. 11, 2018, p. 174.

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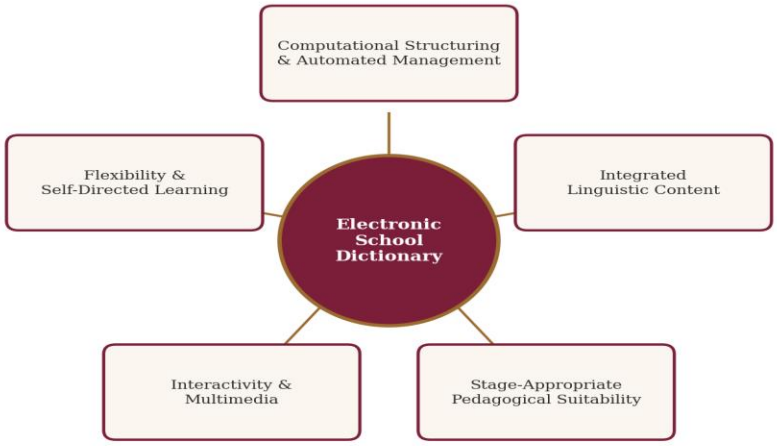
- Interactivity and multimedia: The electronic dictionary transcends the limitations of paper by deploying digital media (audio, image, illustrations, and video), which helps bring the sensory referent of the word closer to the learner's mind, dispels boredom, and achieves the principle of "proximity of grasp" in the educational process.[6] Here, digital media (audio, image, video) are employed to bring the sensory referent of the word closer to the learner's mind.
- Flexibility and self-directed learning: This dictionary grants the learner autonomy, allowing access to information at any time and place; in some of its interactive systems it also allows users to contribute new entries, making it a "living" dictionary that keeps pace with the accelerating scientific and cultural developments.

Figure (1) illustrates the fundamental characteristics of the electronic school dictionary, distributed across five main dimensions aimed at developing the educational process: computational structuring and automated management, which ensures the technical organization and processing of data; flexibility and self-directed learning, which supports the student's autonomy in acquiring knowledge; in addition to integrated linguistic content, which provides comprehensive scientific material. The diagram also highlights the importance of stage-appropriate pedagogical suitability to ensure content matches the age group and curricula, all of which rests on interactivity and multimedia to enhance the appeal of learning and facilitate the assimilation of linguistic concepts.

Figure 1. Characteristics of the Electronic School Dictionary



[6]Shadniyah Sayed Mohammed Al-Sayed, Ibid., p. 65.

Based on the foregoing, the electronic school dictionary is an intelligent pedagogical tool that aims to build the pupil's linguistic competence through a technical medium combining scientific accuracy with ease of digital use.

Second Axis: Future Prospects for Deploying the Electronic Dictionary in the Educational Process

Digitization opens broad horizons for developing the school dictionary, transforming it from a mere "silent reference book" into an "intelligent learning environment," that transcends the limits of traditional linguistic explanation to become a fully interactive tool. Among the most important of these prospects are the following:

1. Developing Integrated Language Skills

The electronic dictionary contributes effectively to developing listening and pronunciation skills, by providing an audio-pronunciation feature for lexical entries, which helps the pupil master the correct pronunciation of words, especially those whose pronunciation conflicts with their spelling. The spell-checker technology also plays a decisive pedagogical role;[7] as soon as the pupil begins typing the first letters of a word, a list of probable correct words appears, which instills in them the skill of precise linguistic selection and reinforces the correct symbolic image of the word in their mind.

2. Continuous Self-Directed Learning and Autonomy

The electronic dictionary provides a stimulating environment for independent inquiry, allowing the student to access information "at any time and place" and with extreme speed, which fosters in them a spirit of investigation and frees them from total dependence on the teacher.[8] This kind of "flexible learning" makes the learner responsible for building their own lexical competence, as they can retrieve information related to a linguistic unit (its root, morphology, meaning) with a single click, thereby expanding their intellectual horizons beyond the boundaries of the classroom.[9]

3. Cultural and Encyclopedic Enrichment

Modern educational dictionaries go beyond the function of pure linguistic explanation to provide encyclopedic information that connects the pupil to their cultural reality and to scientific developments.[10] A successful electronic school dictionary is one that integrates its material within educational corpora drawn from the actual use of the language, and supports entries with live examples from the Noble Qur'an, the Prophetic hadith, and poetry, in addition to illustrative

[7]Nassira Ben Mansour, The Educational Dimension of the Electronic School Dictionary: A Study of Its Features and Content, Journal of Applied Linguistics, Vol. 7, No. 1, University of Laghouat, 2023, pp. 192-193.
[8]Ahmed Mouhoub, Ibid., p. 704.
[9]Amal Mohammed Abdullah Al-Badw, The Role of Digital Learning in Addressing Educational Challenges under Emergency Circumstances, in Proceedings of the International Conference: Digital Education in the Context of the COVID-19 Pandemic, Al-Iraqia University Journal, Vol. 15, No. 2, 2020, p. 15.
[10]Ahmed Qabour, Ibid., p. 174.

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ISSN: 1820-0869
E-ISSN: 2406-2871
Vol. 23 (2) 2026

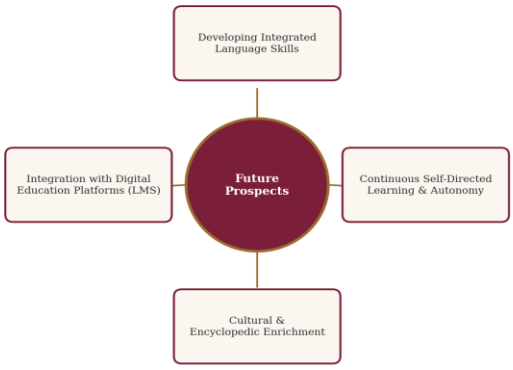
images and diagrams that remove ambiguity from abstract concepts and bring the sensory referent closer to the child's mind.[11]

4. Integration with Digital Education Platforms

The future of the lexicographic industry is moving toward the full integration of these dictionaries within digital Learning Management Systems (LMS) such as Moodle, and smartphone applications, so that the dictionary becomes a permanent "linguistic companion" for the learner.[12] This integration allows for the regular updating of lexical material to keep pace with rapid scientific developments, and ensures content quality through review by linguistic and technical experts, thereby transforming the dictionary from a static tool into a smart educational system compatible with the needs of the "digital generation."[13]

Figure (2) illustrates the prospects for deploying the electronic dictionary in the educational process, embodied in four main dimensions that contribute to enhancing the effectiveness of learning: it contributes to developing learners' integrated language skills, supports continuous self-directed learning and autonomy in acquiring knowledge, achieves cultural and encyclopedic enrichment by expanding the learner's knowledge and linguistic repertoire, and integrates with digital education platforms in line with the requirements of digital transformation in education. Together, these dimensions confirm the growing role of the electronic dictionary as a modern educational tool contributing to improving the quality of the educational process.

Figure 2. Prospects for Deploying the Electronic Dictionary in the Educational Process



[11]Jomoui Tarash & Boujmeline Leboukh, "The Educational Dictionary: Its Concept, Stages of Compilation, and the Information It Provides," Al-Athar Journal, No. 23, University of Ouargla, December 2015, p. 161.
[12]Sarah Farouk Dhanawi, The Arabic Electronic and Educational Dictionary: Studies and Theories, Middle East Journal of Humanities and Cultural Sciences, Vol. 5, No. 4, Tripoli, Lebanon, 2025, p. 262.
[13]Sarah Farouk Dhanawi, Ibid., p. 264.

Third Axis: Challenges Facing the Arabic Electronic School Dictionary

The Arabic electronic dictionary industry faces a set of fundamental challenges that hinder its development and its ability to compete with global dictionaries. The following are some of these challenges:

1. Weak Computational Structuring

Most Arabic attempts lack the fundamentals of genuine computational dictionaries; they remain trapped in the first stage, content merely to transfer material from paper to screen in static formats such as Doc or HTML — what is described as "digitized copies."[14] This structural weakness deprives the user of the actual exploitation of natural language processing capabilities, such as advanced search,[15] contextual linking, and the automatic generation of derivatives[16] that characterize the Arabic language.

2. Technological Illiteracy and High Cost

Technological illiteracy among some teachers and learners constitutes an obstacle to the optimal deployment of digital dictionaries, as this requires ongoing training and qualification to keep pace with these technologies.[17] Financial challenges also emerge as a decisive factor in this respect; alongside the high costs of purchasing and maintaining equipment, there are infrastructure costs for internet access and specialized software, which makes their spread relatively limited and confined to circles with favorable living conditions.[18]

3. The Gap between Lexical Material and the School Curriculum

Available electronic dictionaries suffer from a lack of stage-specific specialization; the pupil finds themselves facing a "crowded general dictionary" containing loose definitions and obsolete terms that neither suit their cognitive level nor serve their actual need to understand the school textbook.[19] The absence of genuine educational corpora that draw material from the pupil's contemporary language makes these dictionaries remote from the cultural and technical reality of the young, as they lack terms for the machines and modern technologies that mark their daily lives.[20]

4. Challenges of Language and Translation

The problem of language and translation is clearly manifest in software interfaces, which are often in foreign languages, making them difficult for Arab youth to use. In addition, reliance on instant machine translations taken from Western electronic programs produces inaccurate

[14]Mohammed Faham Ghalib & Mona Al-Qurtubi, Methodologies Used in the Compilation of Arabic Electronic Dictionaries, Journal of Linguistic and Literary Studies, No. 2, Year 13, December 2021, p. 59.
[15]Amal Nizar Qabayli, Asma Ben Abbas, & Khira Aichoun, Electronic Dictionaries Designed for Primary School Learners: A Study of Their Content, Madad: The Arab Journal, No. 4, December 2018, p. 41.
[16]Nassira Ben Mansour, Ibid., p. 183.
[17]Amal Mohammed Abdullah Al-Badw, Ibid., p. 30.
[18]Ahmed Qabour, Ibid., p. 178.
[19]Amal Nizar Qabayli, Asma Ben Abbas, & Khira Aichoun, Ibid., p. 42.
[20]Ahmed Qabour, Ibid., p. 180.

results far removed from correct Arabic linguistic reality, which may mislead the learner and weaken their confidence in the accuracy of the lexical information provided.[21]

The Arabic electronic dictionary industry faces compound challenges that hinder its development, beginning with weak computational structuring, which renders most of these dictionaries mere "digitized copies" lacking genuine automatic language processing such as contextual linking and advanced search. Added to this are technical and financial obstacles represented by widespread technological illiteracy and the high cost of equipment and infrastructure, which limits their spread. A sharp pedagogical gap also emerges as a result of the absence of stage-specific specialization and of educational corpora that keep pace with modern curricula, leaving lexical material saturated with obsolete terms that lack contemporary vocabulary. Finally, the problem of language and translation emerges in software interfaces and reliance on inaccurate instant machine translation, which misleads the learner and weakens their confidence in the content provided.

Fourth Axis: Foundations for Building an Electronic School Dictionary to Keep Pace with Digital Transformation

The electronic school dictionary industry must be grounded in an integrative vision combining linguistic authenticity with technical modernity, in order to ensure its future success and its transformation into an intelligent learning environment. The following are the most important scientific and technical foundations required for this digital transformation:

1. Reliance on Language Corpora

Lexical material must be drawn from genuine educational corpora that reflect the real use of the language in the pupil's environment,[22] rather than being confined to copying from old dictionaries that may contain obsolete terms.[23] Here the importance emerges of the "Linguistic Treasury" (al-Dhakhira al-Lughawiyya) project called for by Professor Abd al-Rahman al-Hajj Salih, which is based on building an automated corpus that catalogues words as actually pronounced and used by Arabic speakers in school texts, media, and modern educational books.[24] This foundation ensures that the dictionary deals with a "living language" and captures the functional structures that the pupil needs to express their contemporary reality.[25]

2. Continuous Updating and Instant Actualization

Electronic dictionaries are distinguished by their exceptional capacity for "actualization" — that is, adding new entries and keeping pace with rapid scientific developments as soon as they emerge, without waiting years for new printed editions to be issued, which may become outdated even before publication. Digital design allows for the modification of computerized

[21]Malik Jawadi, What Future for Arabic Lexicography in Light of Modern Technology?, Al-Nass Journal, University of El Oued, No. 12, December 2012, p. 223.
[22]Amal Nizar Qabayli, Asma Ben Abbas, & Khira Aichoun, Ibid., p. 40.
[23]Ahmed Qabour, Ibid., pp. 166-167.
[24]Ahmed Qabour, Ibid., p. 177.
[25]Ahmed Qabour, Ibid., p. 180.

stored material and the deletion of terms that are no longer in use,[26] making the lexicographic industry "a living field of interaction" and knowledge development.[27]

3. Simplicity of Definition and Precision of Explanation (Multimedia)

It is essential to take into account the child's cognitive level through the extreme simplification of definitions and the use of short, clear sentences.[28] It is also necessary to move beyond the "silent text" and to employ multimedia (audio, image, illustrations, and video) to bring the sensory referent of the word closer to the learner's mind;[29] the image allows the dimensions of meaning to be grasped without effort, while sound reinforces the symbolic image and correct pronunciation in memory,[30] dispelling boredom and achieving the principle of "proximity of grasp."[31]

4. Collaborative Joint Work (Combining Efforts)

Building a successful electronic dictionary is not an individual task; it requires an integrated team comprising linguists (to establish the scientific material), lexicographers (to set methodologies and definitions), IT and programming experts (to structure databases and design search interfaces), and educators (to ensure pedagogical suitability).[32] This collaboration ensures the production of high-quality software capable of advanced automatic language processing, such as root-based search and the automatic generation of derivatives.[33]

To ensure the future success of the electronic school dictionary and its transformation into an intelligent learning environment, its construction must rest on reliance on educational language corpora that reflect the actual, living use of the language within the pupil's environment. This industry also requires continuous updating and instant actualization to keep pace with rapid scientific developments and to overcome the rigidity of printed editions. It is likewise essential to simplify definitions and deploy multimedia (audio, image, and video) to bring the sensory referent of the word closer to the learner's mind, in a manner that respects their cognitive level and achieves the principle of "proximity of grasp." Finally, this transformation requires combined collaborative efforts among an integrated team comprising linguists, lexicographers, IT experts, and educators, to ensure the production of high-quality software capable of advanced automatic language processing.

Conclusion

The electronic school dictionary represents the future of language education in the digital age. While the printed dictionary will retain its authenticity and historical value, the shift toward

[26]Malik Jawadi, Ibid., pp. 208-209.
[27]Malik Jawadi, Ibid., pp. 205, 208-209.
[28]Nassira Ben Mansour, Ibid., p. 185.
[29]Nassira Ben Mansour, Ibid., p. 191.
[30]Nassira Ben Mansour, Ibid., p. 192.
[31]Amal Nizar Qabayli, Asma Ben Abbas, & Khira Aichoun, Ibid., p. 41.
[32]Mohammed Faham Ghalib & Mona Al-Qurtubi, Ibid., pp. 66-67.
[33]Sarah Farouk Dhanawi, Ibid., p. 282.

digitization is an inevitable necessity for protecting the Arabic language and developing the linguistic faculty of the young. The success of this project depends on our ability to overcome technical and financial challenges, and to build interactive educational dictionaries that meet the needs of the digital generation and open new horizons of knowledge for them. On this basis, it can be said that the electronic school dictionary is no longer a mere technical option, but has become a strategic pillar for building the linguistic competence of the "digital generation," for whom smart media have become the "primary medium" compared with the printed book. It also represents the transformation from the "silent reference book" to an "intelligent, interactive learning environment" that breaks the routine of traditional education and develops listening, pronunciation, and writing skills in an integrated manner.

Although the printed dictionary will remain the repository of authenticity and value — the nourishment and primary source from which the electronic dictionary has drawn its scientific material — the demands of the digital age impose a move toward digitization to ensure rapid access to information and to achieve learner autonomy. This transformation is an inevitable necessity for protecting and computerizing the Arabic language, ensuring that it remains a living language capable of absorbing modern scientific and technical terminology and keeping pace with global development. Nevertheless, envisioning a flourishing future for this lexicographic industry depends on our ability to overcome current challenges, foremost among them the weak computational structuring that has made most Arab attempts mere "digitized copies" lacking genuine automatic processing. The pedagogical gap must also be bridged by building dictionaries committed to "stage-based specialization" and drawing their material from genuine educational corpora that reflect the pupil's reality and contemporary needs.

In conclusion, the success of the electronic school dictionary project requires an integrative vision based on combining the efforts of linguists, lexicographers, and IT experts to produce high-quality software that supports continuous updating and deploys multimedia (audio, image, video) to bring meanings closer to the learner. In this way, the dictionary is transformed from a mere repository of words into an intelligent linguistic companion that opens broad horizons of knowledge for the young and reinforces their positive immersion in their Arabic language and civilizational heritage.

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