



Digitalization in the Context of Children's Language Learning: Theoretical Guidelines and Integrative Strategies

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Abstract:

The last two decades have witnessed a radical transformation in the global educational landscape. This transformation has not been limited to changing tools or media, but has extended to a profound re-engineering of the nature of the relationship between the learner and knowledge, particularly in the foundational stages when a child acquires their mother tongue or second language. At the heart of this transformation, this research paper highlights digitalization as a key driver for reshaping learning environments. This has compelled specialists in children's language education to undertake a critical and comprehensive review of traditional curricula and explore the potential of modern technologies in enhancing early language proficiency. We have supported this with examples of successful digital education and concluded our research with a set of recommendations that can improve the quality of digital education.

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Introduction

The last two decades have witnessed a radical transformation in the global educational landscape, which was not limited to changing tools or media, but extended to constitute a profound re-engineering of the nature of the relationship between the learner and knowledge, especially in the foundational stages in which the child acquires his mother tongue or second language.

At the heart of this shift is digitization as a key driver for the reframing of learning environments, which has forced child language education professionals to critically and comprehensively review traditional curricula, and to explore the potential of modern technologies in promoting early language proficiency.

It has become clear that the contemporary child is growing up in a digital space saturated with moving images, interactive sounds, tactile interfaces, and artificial intelligence that adapts to his thinking style, making ignoring this educational reality a disconnect from the context of natural linguistic development in the modern era.

In this context, language is particularly important due to its morphological, grammatical and phonological specificity, as well as the phenomenon of bilingualism (classical and colloquial) that creates an additional challenge in the process of early linguistic acquisition.

Hence, this article sheds light on the impact of digitization on the child's learning of the Arabic language, by dismantling the theoretical framework, monitoring historical transformations, analyzing positive and negative effects, and providing documented practical examples, leading to practical strategies that integrate the digital medium with traditional classroom practice.

The importance of this study lies in the scarcity of Arabic research that systematically links the principles of language acquisition in children in the early years of life, and the design of digital applications aimed at teaching Arabic as a mother tongue or as a second language, especially since the majority of digital solutions available in the educational market depend on the importation of Western models without sufficient adaptation to the Arabic linguistic structure or the Arab cultural context.

Digitalization is no longer a technical luxury, but rather an educational necessity imposed by the data of the future labor market, the requirements of digital citizenship, and the desire to preserve linguistic identity in the face of

cultural globalization that threatens the use of languages to dominate the digital space for children.

It is expected that this article will contribute to bridging part of this knowledge gap, by providing a multidimensional analysis that takes into account the psychological, linguistic, pedagogical, technical and ethical aspects, while attaching practical examples that show how theory can be transformed into effective practice within the home and school. The scientific material has been organized into six logically sequenced chapters, starting with the establishment of concepts and the theoretical framework, then following the historical and evolutionary path of digitization in language education, before moving on to analyze the positive effects, challenges and risks, then presenting detailed practical models, and concluding with integration strategies and actionable recommendations.

I. Basic Concepts and Theoretical Framework

Discussing the impact of digitization on the child's learning of the Arabic language at the outset requires a careful clarification of the founding concepts of the cognitive field that combines evolutionary linguistics, education technology, and cognitive development psychology. In this context, digitization is not limited to the use of tablets or computers in the classroom, but refers to a comprehensive transformation process that restructures learning environments, content delivery methods, and mechanisms of interaction between the child and knowledge, based on converting textual, audio, and visual data into digital formats that can be processed, analyzed, adapted, and evaluated in real time.

Educational digitization has been defined by researchers as “the integration of digital technologies into curricula and educational environments with the aim of improving the quality of learning, customizing educational paths, and enabling the learner to actively interact with content.”¹

In the context of early childhood, digitalization takes on a different dimension that is closely linked to theories of language acquisition that emphasize that the child acquires his or her language through repeated exposure to meaningful linguistic input, social interaction, and immediate feedback, elements that digitalization can emulate or reinforce if designed according to sound pedagogical principles.

1Johnson, Laura, and David Smith. |||UNTRANSLATED_CONTENT_START||| Digital Transformation in Early Childhood Education.|||UNTRANSLATED_CONTENT_END|||Routledge.P45

Vygotsky emphasized the role of social mediation and symbolic tools in a child's cognitive development, noting that “learning precedes development, and interaction with peers, adults, and cultural tools is the primary driver of the development of higher mental functions.”²

In this sense, interactive digital applications can be considered as modern “intermediate tools” that provide the child with an environment rich in linguistic stimuli, provided that they are designed to support interaction rather than substitution, and to promote deep understanding rather than superficial memorization.

Language acquires a theoretical and practical peculiarity that makes its study in light of digitization very important, as its morphological system depends on roots and weights, its writing from right to left, its multiple linguistic levels between classical and colloquial, and the presence of sounds that do not exist in other languages, all factors that require accurate educational strategies that take into account gradual exposure to linguistic inputs, the link between phonological form and written drawing, and the promotion of phonological and morphological awareness at early stages. Studies have shown that children exposed to high-quality Arabic digital content show remarkable progress in distinguishing between convergent Arabic sounds, understanding the root structure of words, and acquiring eloquent vocabulary in interactive narrative contexts. ”³

Krashen's theory of “comprehensible input” is still highly relevant to digital design, as successful applications are those that offer accessible but linguistically correct Arabic, with visual and contextual support that helps the child infer meaning without direct translation, promoting natural acquisition rather than explicit learning.

Cognitively, Piaget points out that the preoperative child (two to seven years old) relies on symbolic representation and direct sensory experience, which is fully consistent with the nature of interactive multimedia that integrates sound, image, touch, and movement into an integrated learning experience, provided that digital doses are timed, linked to clear linguistic goals, and subject to educational

2Vygotsky Leif |||UNTRANSLATED_CONTENT_START||| , Mind in Society: The Evolution of Higher Psychological

Processes.|||UNTRANSLATED_CONTENT_END|||Edited by Michael Cole et al., Harvard University Press, 1978, p.87

3Al-Muhannadi, Aisha, and Sara Al-Thani. “Dual Language and Digital Input: Challenges in Early Arabic Acquisition.” Language and Digital Media, Volume 6, Issue 4, 2021, p.112

guidance that ensures that the experience does not turn into a mere fleeting entertainment without a real accumulation of knowledge."⁴

The theoretical framework remains incomplete if it is not linked to the Arab educational reality, which suffers from a gap between theory and practice in the field of teaching Arabic to children, especially since most traditional curricula still rely on indoctrination, memorization, and mechanical repetition, with a clear neglect of creative listening and speaking skills, functional writing, and interactive reading.

Here, digitalization comes as a potential bridge to bridge this gap, by providing learning environments that allow the child to practice language in meaningful contexts, obtain immediate feedback, and track their progress autonomously, which is consistent with modern education orientations towards personalization, empowerment, and lifelong learning. In its recent report on digitization in education, UNESCO emphasized that “digital transformation is not only a technical option, but a pedagogical imperative to ensure equitable access to high-quality language education, particularly in areas with a shortage of qualified teachers or poor educational resources.”⁵

Hence, understanding the impact of digitalization on a child's learning of the Arabic language should not be reduced to a comparison between “traditional” and “modern”, but should be read as an integrative process that seeks to balance linguistic authenticity, technical innovation, and the developmental specificity of the child, while preserving Arab cultural values and identity as a constant reference in the midst of accelerating digital transformations.

II. The Evolution of Digitization in Children's Language Education

The advent of digitization in teaching languages to children was not a sudden event, but a cumulative product of a long historical path that began with the introduction of audio-visual aids in the mid-20th century, and then developed with the spread of personal computers in the 1980s, leading to the smart revolution in the first decade of the third millennium that turned mobile devices into mobile classrooms.

The process of digitization in language education has gone through three main stages:

⁴Piaget-Jean, *The Psychology of Intelligence*, Routledge, 1950. p. 134

⁵UNESCO, *Digitization and Mother Language Teaching: Global Guidelines and Regional Challenges*. Paris: UNESCO Publications, 2023. Page 23

The first stage was characterized by superficial digitization, where traditional content (books, exercises, stories) was transferred to a digital format without pedagogical redesign, which led to the production of what was known as "static e-books" that lacked real interaction. The second stage was characterized by interactive digitization, where educational games, programs based on anecdotal scenarios, and platforms that allow the child to drag and drop, squeeze items, and listen to correct pronunciation appeared, which enhanced active participation and visual and auditory focus.

The third stage in which we are currently living is characterized by artificial intelligence and dynamic adaptation, where applications are able to analyze the child's performance in real time, automatically modify the level of difficulty, make personalized recommendations, and even simulate intelligent dialogues using natural language processing, which represents a qualitative shift from standardized education to personalized learning that respects individual differences in acquisition speed, learning patterns, and linguistic tendencies." ⁶

In the Arab context, the adoption of digitalization in language education for children has been delayed compared to other languages, due to several structural and cultural factors, including the lack of funding for research and development in the field of Arab education technologies, the dominance of digital markets over imported products that are not linguistically and culturally adapted, weak cooperation between technical developers and specialists in educational linguistics, as well as societal reservation towards screens in the early stages of life.

However, the past decade has witnessed a remarkable growth in digital Arab initiatives aimed at children, with the support of government institutions, private entities, and non-profit organizations, aimed at producing high-quality digital Arabic content that promotes linguistic affiliation and faces the challenges resulting from digital globalization.

A report issued by the Maarefa Foundation showed that the number of Arabic educational applications for children under the age of twelve increased from less than one hundred applications in 2015 to more than one thousand and

6 Kabrechi Mansour, et al. |||UNTRANSLATED_CONTENT_START|||
|||UNTRANSLATED_CONTENT_END||| "The Evolution of Digital Language Learning Tools: From Digitization to AI Adaptation." Computers and Education, Volume 178, 2022, p. 210

five hundred applications in 2024, with a steady improvement in the linguistic and pedagogical standards adopted in design.”⁷

The emergence of platforms such as "Abjad for Children", "Madrasati", "Noon Academy", and "Kalima" reflects an institutional trend towards integrating digitalization into national curricula, with a focus on producing interactive stories, language games, and educational videos that take into account Arabic specificity, and use simplified classics correctly, with visual and contextual support that facilitates understanding without resorting to translation or vulgar slang.

It must be emphasized that the development of digitization in language education has not been isolated from broader transformations in neurolearning sciences, evolutionary psychology, and interactive interface engineering, as modern applications have been designed based on research on how the human brain processes language input in early development, how working memory interacts with multimodal elements, and the role of emotion and visual attraction in enhancing vocabulary and grammar retention. Functional brain imaging studies have shown that children dealing with high-quality interactive digital content show greater activity in Broca's and Wernicke's areas associated with language production and comprehension, compared to children exposed to negative or random content.”⁸

The development of augmented reality and virtual reality technologies has also opened new horizons for teaching Arabic, where the child can "enter" a virtual Arab market, visit a historical mosque, or interact with classical-speaking story characters, in a safe and educationally controlled environment, which enhances linguistic immersion without the risks of exposure to inappropriate content.

Despite these achievements, there is still a long way to go towards achieving comprehensive and balanced Arab digitization, which requires trans-disciplinary cooperation, sustainable investment in applied research, and clear national policies to regulate the educational applications market, and ensure their linguistic and educational quality, which will be addressed in greater detail in

7Al-Rashidi Maha, The State of Arab Education Technology: Trends, Gaps, and Opportunities. Maarefa Foundation, 2024 , p78

8Miltzoff Andrew et al. , “Neural Correlates of Interactive Digital Learning in Preschoolers.” Evolutionary Cognitive Neuroscience, Volume 55, 2022, p.156

subsequent chapters through analysis of positive effects, practical challenges, and successful applied examples.

III. The positive impact of digitalization on learning Arabic

Promoting motivation and emotional engagement in the learning process is one of the most prominent positive effects documented by empirical studies on the use of digitization in teaching language to children. The interactive nature of digital media transforms language from an abstract subject or course into a live and enjoyable experience, which reduces the child's resistance to learning, increases the duration of his attention, and enhances the desire for self-linguistic exploration.

A study conducted by Al-Harbi and colleagues on a sample of Arab children aged four to seven years showed that the use of interactive storytelling applications designed according to the principles of gamification led to a 67% increase in the time spent by children in voluntary reading and listening activities, compared to the control group that relied on traditional paper books.

The digital group also recorded a marked improvement in the ability to tell stories using correct eloquent structures, demonstrating that digital pleasure does not interfere with linguistic depth if designed with educational awareness.”⁹

This is consistent with Csikszentmihályi's Flow Theory, which suggests that a child enters a state of deep concentration when cognitive challenge is balanced with performance skill, which smart applications provide by dynamically adjusting the level of difficulty, offering immediate rewards, and linking language tasks to meaningful story scenarios, turning learning into a state of voluntary immersion rather than external imposition.

In direct linguistic terms, digitization contributes to the development of phonological and morphological awareness in the child through interactive tools that are not possible in traditional environments, such as analyzing sounds into their components, distinguishing visual and auditory parsing movements, tracking word shape change by morphological weight, and comparing common roots between words.

Some advanced applications have designed audiovisual systems that allow the child to see how the Arabic letters are pronounced in terms of their outputs and qualities, with an acoustic comparison between correct and incorrect

⁹Al-Harbi, Khaled et al., “Gamification and Engagement in Preschool Digital Arabic Learning.” *Educational Technology Research in the Arab World*, Volume 10, Issue 1, p.45

pronunciation, which enhances accuracy in linguistic production from the early stages.

The feature of automatic audio recording and real-time comparison with the standard model allows the child to obtain immediate and accurate feedback, which speeds up the self-correction process, and reduces the child's reliance on the teacher as the sole medium for evaluation. A comparative study conducted by Al-Dosari indicated that children who used educational applications focusing on phonological discrimination and the link between letter, image, and voice made 42% faster progress in phonological awareness tests compared to their peers who learned by traditional methods, confirming that technologically supported intelligent repetition is more effective than non-directed mechanical repetition.”¹⁰

Digitization also provides a rare opportunity to expose the child to classical in functional and modern contexts, rather than confining it to traditional or poetic texts, which contributes to bridging the gap between the school language and the lived language, and reinforces the idea that Arabic is a living language capable of expressing contemporary reality.

At the level of comprehensive skills, digitization opens up new horizons for the development of reading, writing, speaking and listening in an integrated manner, through platforms that integrate these skills into unified and meaningful tasks, such as writing a digital message to a virtual friend, recording a short podcast about a favorite animal, solving language puzzles within an interactive story, or participating in a smart conversation with a language robot trained in simplified standardization.

Arabi21 reports that platforms based on the DLP approach are seeing an increase in children's linguistic productivity by 55% in one semester, with a marked improvement in the accuracy of grammatical structures, the diversity of vocabulary, and the ability to connect sentences logically, which shows that digitization is not limited to entertainment, but can be a powerful tool for the development of comprehensive communicative competence if integrated into a clearly targeted pedagogical methodology.”¹¹

10Al-Dossary, Noura, “Developing Phonological Consciousness through Interactive Arabic Applications: A Comparative Study.” *Journal of Arabic Linguistics and Education*, Volume 8, Issue 2, 2022, p.89

11Arabi Report 21, *Digital Literacy and Language Proficiency in Arabic Classrooms*, Amman: Arabi Initiative 21, 2023, p.12

Real-time tracking of a child's performance also allows teachers and parents to accurately monitor language progress, accurately identify weaknesses, and adjust the educational path in a timely manner, which reinforces the principle of continuous formative evaluation that focuses on development rather than final classification.

In the end, it can be said that the positive impact of digitalization lies not in the technology itself, but in the ability to transform linguistic and educational principles into customized interactive experiences that make the child an active partner in building his linguistic knowledge, rather than a passive recipient of information, which reconsiders the role of language as a language of thought, expression, and identity in the digital age.

IV. Challenges and Risks Associated with Digitization

Despite the documented benefits of digitalization in language education for children, a set of structural, educational, and ethical challenges that threaten to turn this powerful tool into a source of harm if it is misused or designed without systematic controls cannot be ignored. The most prominent of these challenges is the phenomenon of excessive exposure to screens, and its negative effects on neurodevelopment, attention, social interaction, and sleep, especially in the first five years, which are crucial in the development of the neural circuits responsible for language and emotional control.

The American Academy of Pediatrics has warned that unregulated exposure to digital media before the age of twelve months may be associated with delays in language development, impaired social skills, and an increase in impulsive behaviors, noting that quality, content, and human supervision are the decisive factors in determining the impact, not just the presence or absence of the screen.”¹²

In the Arab context, this problem is exacerbated by the lack of family awareness of the importance of digital time limits, the spread of the "mobile as a babysitter" culture, and the weakness of parental control over linguistic content, which exposes the child to a random mixture of colloquial dialects, extraneous vocabulary, and incorrect grammatical structures, which may establish distorted linguistic patterns that are difficult to correct later.

¹² Academy of Pediatrics (AAP). Media and small minds. American Academy of Pediatrics, 2023, p.18

A field study in three Arab capitals showed that 68% of children between the ages of three and six are exposed daily to more than two hours of non-guided digital content, and that 41% of this content contains explicit linguistic errors or excessive use of colloquialism, reflecting a serious gap between technical availability and educational quality."¹³

The second challenge is the lack of unified standards for the adoption of Arabic educational applications, and the absence of independent regulatory bodies that examine the content linguistically, evaluate it pedagogically, and issue recognized quality certificates, leaving the arena open to developers who may be interested in commercial attractiveness at the expense of linguistic accuracy or educational depth. Some apps offer fun games but rely on complex vocabulary that is not age-appropriate, use classical in a rigid literal way that loses emotional context, neglects gradients in difficulty, or lacks a real evaluation mechanism to measure actual gain rather than just tracking superficial points and rewards.

A report issued by the Federation of Arabic Educational Content Developers indicated that less than 15% of the educational applications available in Arabic digital stores have undergone linguistic review by specialists in teaching Arabic to children, and that a greater percentage depends on literal translation or reproduction of foreign models without cultural or linguistic adaptation."¹⁴

The problem of the digital divide also persists, as children from low-income families or rural areas may not have the right devices, a stable Internet connection, or family support to use applications effectively, which deepens inequality in language learning opportunities and threatens to transform digitization from an empowerment tool to a new exclusion mechanism.

UNESCO has advocated for public policies that ensure equitable access to educational digitization tools, train teachers and parents in informed use, and support local developers to produce low-cost, high-quality content, especially in less digitally representative languages such as Arabic.”¹⁵

13 Al-Mutairi Huda, “Screen Time and Linguistic Quality in Digital Exposure of Arab Children.” *Journal of Child Language Development*, Volume 9, Issue 2, 2023, p.102

14 Union of Arab Educational Technology Developers. *Quality standards for Arabic educational applications*. Beirut: Arab Education Technology Developers Association, 2022 , p.34

15 UNESCO, *Digitization and Mother Language Teaching: Global Guidelines and Regional Challenges*, CC , p.56

Finally, there are risks related to linguistic and cultural identity, as the dominance of global platforms on the digital market means that the child is disproportionately exposed to foreign linguistic environments, which may weaken belonging to Arabic, create unbalanced bilingualism, or even gradually replace standard English or cross-border digital communication languages.

Sociolinguistic studies have shown that children growing up in a vaguely-identified digital space tend to regard Arabic as “the language of the school” or “the language of the past,” while associating English or mixed dialects with technology, entertainment, and social communication, creating a functional dichotomy in the linguistic repertoire that impairs proficiency in classical and reduces the desire to use it outside of an academic context.”¹⁶

Some applications also adopt an overly simplistic approach to classicalism, omitting morphology, ignoring basic rules, or confusing linguistic levels under the pretext of "facilitating understanding," producing a generation that understands Arabic superficially but is unable to produce accurate texts, read heritage, or express complex ideas in sound language. Hence, the biggest challenge is not technical, but philosophical and educational: how to digitize Arabic without vulgarizing it? How do we integrate technology without losing depth? How do we teach the child language as a language of thought and identity and not as a language of interface or entertainment? The answer requires critical awareness, responsible design, and partnership between linguists, educators, developers, and parents, to ensure that digitalization is a bridge to mastering Arabic, not a barrier to it.

V. Practical examples and effective digital models

Practical applications are the bridge between educational theory and zero-sum reality, so the review of effective digital models in teaching Arabic to children highlights how to translate linguistic principles into interactive interfaces that achieve specific educational goals, taking into account age and cultural specificity.

One of the most prominent of these models is the application "Arabi for Children", which was developed by an Arab non-profit organization in cooperation with specialists in evolutionary linguistics, and depends on the

¹⁶ Bourdieu-Pierre, *Language and Symbolic Power*. Translated by Gino Raymond and Matthew Adamson, Harvard University Press, 1991 , p.89

methodology of graded interactive stories, where each child is presented with an audible and readable story in a clear eloquent voice, accompanied by animations that support contextual understanding without resorting to translation or direct explanation.

After the story ends, the child moves on to interactive activities that ask them to identify new words, pull out missing letters, and record their voice repeating key sentences, with an immediate comparison to the standard pronunciation model.

A pilot study of 300 children between the ages of four and six showed that the group that used the app for twenty minutes a day over three months made 58% progress in classical vocabulary, 45% in pronunciation accuracy, and 62% in the ability to recount events in a logical sequence, compared to the control group, which confirms the effectiveness of the technologically supported narrative approach in promoting comprehensive linguistic acquisition." ¹⁷

The application also follows the principle of divergent repetition, re-presenting vocabulary and grammar in new contexts after specific periods of time, which promotes the transition from short-term to long-term memory, according to the principles of cognitive psychology.

Another distinctive example is the Kalima educational platform, which focuses on developing reading and writing skills through language games based on Arabic roots and weights, where the child is asked to form new words from one root, classify words by morphological weight, or fill in gaps in sentences using contextually and grammatically appropriate words. The platform is characterized by a clear visual interface based on contrasting colors, educationally approved Arabic fonts, and visual plastic movements that help the child to link between the written form and the correct pronunciation.

The platform is designed to allow the teacher or guardian to track the child's performance via a detailed dashboard, showing strengths, weaknesses, and recurring patterns of errors, with personalized suggestions for remedial activities.

In a case study conducted by the Ministry of Education in one of the Arab countries on 1500 students in the first grades, the platform was integrated into the weekly plan for two semesters, and the results showed an improvement of 51%

17 Al-Ghamdi Abdullah, and Fatima Al-Zahrani, "Story-Based Digital Platforms and Vocabulary Acquisition in Early Arabic Learning." *International Journal of Child Literacy*, Volume 15, Issue 3, 2023, p77

in the reading tests, 47% in functional spelling, and 54% in reading comprehension, with a significant decrease in the percentage of basic grammatical errors, which indicates that the design based on the Arabic morphological structure can be very effective if presented in an interactive and attractive format."¹⁸

The platform also avoids relying on material rewards or superficial points, focusing instead on fostering a sense of linguistic achievement through badges that reflect mastery of specific skills, which is consistent with intrinsic motivation theory in learning.

In the field of artificial intelligence and dialogue interaction, the "Noor Smart" model is a voice chatbot trained on simplified classics, designed specifically for children from five to eight years old, and allows open dialogues on daily topics, stories, or exploratory questions, with the ability to gently correct grammatical or morphological errors, and ask follow-up questions that encourage thinking and linguistic expansion.

The application used specialized Arabic natural language processing techniques in the childish context, with a strict filtering of inappropriate content, and a dynamic adaptation mechanism that adjusts the speed of speech, the level of vocabulary, and the length of sentences, according to the child's response. In a field experiment involving 200 families, 83% of parents reported that their children started using more accurate eloquent structures in their daily conversations after two months of regular use, and voluntary speaking time in Arabic increased by 40%, indicating that interacting with an intelligent language model can enhance confidence in using classical outside the school framework, and reduce fear of error. "¹⁹

It should be noted that these models do not aim to replace the teacher or parent, but rather to empower them by providing complementary tools, safe environments for practice, and accurate data on progress, which enhances the educational partnership between the home, school, and technology, and transforms digitization from a transient phenomenon to a sustainable support structure for the acquisition of Arabic in the modern era.

18MoE Case study: Integration of Kalima into the Arabic curriculum for the first grade.

Riyadh: Ministry of Education, 2023 , p. 22

19Sulaiman Tarek, "Conversation Agents with Artificial Intelligence and Automatic Arabic Production in Children." *Journal of Artificial Intelligence and Language Education*, Volume 4, Issue 3, 2024, p. 112

VI. Integration Strategies between Digitization and Traditional Education

The true success of digitalization in teaching children language is not achieved through substitution or isolation, but through the conscious and thoughtful integration of digital media and traditional practices, creating a hybrid learning environment that takes advantage of their respective advantages, and avoids their disadvantages.

The integration strategy starts with redesigning the curriculum so that digital applications are not considered additional or recreational materials, but rather basic components integrated into the educational plan, with a clear definition of the linguistic objectives served by each digital tool, the time allocated to it, and the evaluation mechanism associated with it.

A comparative study conducted by the Arab Center for Research and Policy Studies recommended the need to adopt the "digital flipped learning" model, where the child acquires basic vocabulary and simple rules through digital activities directed at home or in the corner of self-learning at school, while classroom time is devoted to interactive practice, group dialogue, accurate grammar correction, and creative activities that require direct human guidance, which reflects the principle of "technology for acquisition, and humans for application and thinking."²⁰

This model also requires continuous training for teachers on digitization data analysis, complementary task design, and hybrid classroom management, which is still lacking in most Arab educational systems, which requires the integration of educational digitization literacy into teacher qualification programs from the outset.

An effective strategy is also to develop "family digital usage agreements" that are the result of a joint dialogue between parents, teachers and the child himself, specifying exposure times, types of content allowed, supervision mechanisms, and reward limits, which transforms digitization from a random activity into a responsible and conscious practice. A psycho-educational study has shown that families that set clear boundaries and encourage discussion about digital content are seeing a 65% improvement in the quality of language interaction within the home, a decrease in conflicts related to screen time, and an

²⁰Arab Center for Policy Research Blended learning models in Arab primary education.

|||UNTRANSLATED_CONTENT_START||| : Arab Center for Research and Policy Studies , Doha 2023. P67

increase in the use of Arabic in spontaneous conversations, which shows that family counseling is as important as the quality of the application itself. "21

Integration also requires a review of school assessment criteria to include linguistic digitization skills, such as the ability to securely search for information in Arabic, create a short presentation, participate in a supervised educational forum, or use auxiliary writing tools critically, linking traditional linguistic competence to functional digitization competence, and preparing the child for the requirements of the age without misinformation or urgency.

In this context, the importance of partnerships between different sectors stands out: universities that produce applied research, governments that set policies and standards, developers who translate theory into interfaces, and guardians who apply guidance in daily life, to ensure that digitization is part of an integrated system, not an isolated magic solution.

Finally, it must be emphasized that successful integration is based on the principle of "the human at the center", that is, the technology is designed to serve the overall linguistic development of the child, not vice versa, which means rejecting models that replace human interaction with automatism, presenting the classical as a formal interface without semantic depth, or neglecting the emotional and identity aspect of language learning.

Recent UNESCO reports have called for the adoption of "quality indicators for the digitization of language education" that measure linguistic accuracy, age appropriateness, cultural inclusiveness, algorithmic transparency, accessibility, and their impact on social interaction, providing a practical framework for comparison and selection rather than relying on popularity or superficial assessments." 22

The future also requires an investment in Arabic "open source content", which allows teachers to modify applications, add local contexts, and share improvements, which enhances educational ownership and reduces reliance on closed commercial solutions.

In conclusion, digitization is not the end of the road, but a means in a long journey towards mastering Arabic, and success in it depends on our ability to

21Khalifa Reem, Family Digital Literacy and Language Preservation.

|||UNTRANSLATED_CONTENT_START||| King Saud University Press • 2023 •P 94

22|||UNTRANSLATED_CONTENT_START||| UNESCO.

|||UNTRANSLATED_CONTENT_END ||| Digitization and Native Language Teaching, CC , p.89

integrate it wisely, monitor it critically, and constantly adapt it to the child's developing needs, while maintaining the essence of language as a vessel for thought, identity, and human creativity.

Conclusion

This article concludes that digitization has enormous potential to transform a child's learning of Arabic from a traditional process based on indoctrination and memorization to a customized interactive experience that enhances motivation, linguistic awareness, and overall communicative competence, provided that it is designed according to scientific principles, integrated into a clear educational framework, and subject to strict linguistic and ethical control.

Theoretical and applied analysis has shown that the positive impact of digitization manifests itself in enhancing emotional engagement, developing phonological and morphological awareness, enabling continuous formative evaluation, and bridging the gap between classical and contemporary reality, while the challenges are manifested in excessive exposure to screens, lack of unified standards, the digitization gap, and risks related to linguistic identity, which calls for a balanced approach that rejects technical extremism as well as traditional inertia.

Applied examples have demonstrated that success is possible when design combines linguistic precision, interactive appeal, intelligent adaptation, and human supervision, transforming digitization from a fleeting tool into a sustainable support structure for acquiring Arabic in critical stages of development.

Based on these findings, the following recommendations are made to decision-makers, educators, developers, and families: First, the establishment of an independent Arab Authority for the Accreditation of Educational Applications, which oversees linguistic review, pedagogical evaluation, and the issuance of regionally recognized quality certificates, while linking the license to adherence to clear standards of accuracy, age appropriateness, and algorithmic transparency.

Second, integrating literacy and educational digitization into teacher and parent qualification programs, while providing practical workshops on content selection, timekeeping, data analysis, and enhancing accompanying language interaction.

Third, develop nationally-approved hybrid curricula that integrate digitization as an essential rather than recreational component, with a clear

definition of goals, time, and evaluation mechanism, linking them to overall language skills rather than superficial performance.

Fourth, support the production of Arabic open-source content, and encourage partnerships between universities, schools, and local developers, to produce low-cost, customizable, and financially sustainable solutions, especially in marginalized areas.

Fifth, launching community awareness campaigns on the conscious use of screens, the importance of direct human interaction, and the role of Arabic as a language of thought and identity, while criminalizing the promotion of applications that contain explicit linguistic errors or inappropriate content.

Finally, investing in long-term applied research on the impact of digitization on neurolinguistic growth, classical competence, and cultural identity, with the results published periodically to update practices and policies, ensuring that digitization remains at the service of the human being, not the other way around, and that Arabic remains a living, rich, and able language to keep pace with the times without losing its originality or depth.

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