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## **BRAIN BASED LEARNING USING AUGMENTED REALITY TECHNOLOGY AS AN ARABIC LEARNING MEDIA**

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### **Abstract**

*In the rapidly evolving educational landscape, recent technological advances have ushered in a new era of possibilities for innovative learning methodologies. This research integrates Brain-Based Learning principles with Augmented Reality (AR) technology as Arabic language teaching media. This research includes qualitative research with the type of literature. Data sources come from literature related to Augmented Reality and Brain-Based Learning. The data analysis method uses the content analysis method. The results of the study show: 1) optimisation of brain performance through the integration of Augmented Reality encourages the creation of innovative and fun learning experiences. 2) student engagement is significantly increased through active involvement of multiple senses and results in measurable improvement in learning outcomes. There are several challenges that need to be considered, namely: accessibility-related issues related to application design, the complexity of using AR systems, AR application development needs to go through iterative development cycles to accommodate diverse platform users, and the lack of pedagogical approaches when integrating AR applications into learning activities. The findings contribute to the discourse on technology integration in language education and offer practical insights for educators and policymakers who want to improve the overall effectiveness of Arabic language learning through innovative and brain-centred approaches.*

**Keywords:** Brain Based Learning, Augmented Reality, Arabic Learning Media

### **Abstrak**

*Dalam lanskap pendidikan yang berkembang pesat, kemajuan teknologi baru-baru ini telah mengantarkan era baru kemungkinan metodologi pembelajaran inovatif. Penelitian ini berfokus pada integrasi prinsip Pembelajaran Berbasis Otak dengan teknologi Augmented Reality (AR) sebagai media pengajaran bahasa Arab. Penelitian ini termasuk penelitian kualitatif dengan jenis kepustakaan. Sumber data bersumber dari literature terkait Augmented Reality dan Pembelajaran Berbasis Otak. Metode analisis data menggunakan metode analisis isi. Hasil penelitian menunjukkan: 1) optimalisasi kinerja otak melalui integrasi Augmented Reality mendorong terciptanya pengalaman belajar yang inovatif dan menyenangkan. 2) keterlibatan siswa meningkat secara signifikan melalui*

*keterlibatan aktif berbagai indera dan menghasilkan peningkatan yang terukur dalam hasil belajar. Ada beberapa tantangan yang perlu diperhatikan, yaitu: permasalahan terkait aksesibilitas berkaitan dengan perancangan aplikasi, kompleksitas penggunaan sistem AR, pengembangan aplikasi AR perlu melalui siklus pengembangan yang berulang untuk mengakomodasi pengguna platform yang beragam, dan kurangnya pendekatan pedagogi saat mengintegrasikan aplikasi AR ke dalam kegiatan pembelajaran. Temuan ini tidak hanya berkontribusi pada wacana tentang integrasi teknologi dalam pendidikan bahasa tetapi juga menawarkan wawasan praktis bagi para pendidik dan pembuat kebijakan yang ingin meningkatkan efektivitas pembelajaran bahasa Arab secara keseluruhan melalui pendekatan inovatif dan berpusat pada otak.*

**Kata Kunci:** Pembelajaran Berbasis Otak, Augmented Reality, Media Pembelajaran Bahasa Arab

## INTRODUCTION

Along with the development of technology globally, it has influenced all aspects of life, including in the fields of political economy, culture, arts and even education<sup>1</sup>. There are many innovative efforts that have been made in the world of education to improve the quality of student education, both related to curriculum, teaching materials, learning media, learning models<sup>2</sup>. This is a progress that will certainly have an impact on the civilization of student life<sup>3</sup>. One of them is through a brain-based learning model or brain based learning which provides an attractive offer in the application of Arabic learning.

Learning Arabic in essence provides opportunities for students to hone their brains in receiving and practicing the language skills being studied<sup>4</sup>. But what sometimes happens is the lack of use of learning techniques that can stimulate the brain, such as the use of images, videos or audio<sup>5</sup>. This brain based learning suggests that the learning process goes according to the way the brain functions<sup>6</sup>. The brain-

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<sup>1</sup> Ardiansyah Harahap, Adi Sucipto, and Jupriyadi Jupriyadi, "Pemanfaatan Augmented Reality (Ar) Pada Media Pembelajaran Pengenalan Komponen Elektronika Berbasis Android," *Jurnal Ilmiah Infrastruktur Teknologi Informasi* 1, no. 1 (2020): 20–25, <https://doi.org/10.33365/jiiti.v1i1.266>.

<sup>2</sup> Chamidiyah, "Pembelajaran Melalui Brain Based Learning Dalam Pendidikan Anak Usia Dini," *Edukasia; Jurnal Penelitian Pendidikan Islam* 10, no. 2 (2015): 279.

<sup>3</sup> Muhaimin, *Model Pengembangan Kurikulum & Pembelajaran Dalam Pendidikan Islam Kontemporer Di Sekolah/Madrasah Dan Perguruan Tinggi*, Cetakan I (Malang: UIN MALIKI PRESS, 2016).

<sup>4</sup> Danial Hilmi, "Impact Of Arabic Online Learning In The Perspective Of How The Brain Learns," *Ijaz Arabi Journal of Arabic Learning* 4, no. 1 (2020): 59–73, <https://doi.org/10.18860/ijazarabi.v4i1.10442>.

<sup>5</sup> Muhammad Irwan, "Faktor-Faktor Yang Memengaruhi Peningkatan Belajar Bahasa Arab Pada Perguruan Tinggi Keagamaan Islam Di Indonesia," *JUPE: Jurnal Pendidikan Mandala* 7, no. 2 (2022): 365–69, <https://doi.org/10.58258/jupe.v7i2.3455>.

<sup>6</sup> Luk Luk Nur Mufidah, *Brain Based Teaching and Learning; Pembelajaran Berbasis Otak*,

based learning approach aims to optimize the five natural systems in the brain so that the cognitive, emotional, social, physical and reflective potentials develop optimally. The five learning systems interact and are interrelated, and cannot function separately from one another<sup>7</sup>. Similarly, the language proficiency of learners is somewhat influenced by the acquisition and learning they have undergone<sup>8</sup>. So, to accommodate brain-based learning models, it is necessary to use Augmented Reality (AR) technology.

The use of information technology in the learning process can effectively overcome problems and provide solutions to overcome obstacles in learning Arabic, especially in Indonesia. One way to do this is by utilizing Augmented Reality (AR) technology as a new breakthrough in learning media, especially as a supporting tool for Arabic language learning<sup>9</sup>. Augmented Reality is an application that combines the real world with the virtual world in two-dimensional and three-dimensional forms that are projected in a real environment at the same time<sup>10</sup>. Augmented This reality can turn information into visual form capable of displaying objects small, big, fast, slow and visible to the naked eye clearly without assistance, so students will receive learning in an easy visual form to understand<sup>11</sup>. According to Noorabeerah, et al, the presence of Augmented Reality (AR) technology has the potential to make it very useful for education through filling in content according to learning objects to help teachers attract students' attention<sup>12</sup>. In addition, integrating AR into education also offers opportunities to improve student performance<sup>13</sup>.

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Cetakan I (Yogyakarta: Teras, 2014).

<sup>7</sup> Barbara K Given, *Brain Based Teaching* (Bandung: Kafia, 2007).

<sup>8</sup> Panji Adipura Sumekar, Sunarto Sunarto, and Anisatu Thoyyibah, "Pembelajaran Bahasa Arab Di Program Pengembangan Bahasa Arab FAI UMM : Problematika Dan Upaya," *Tsaqofiya; Jurnal Pendidikan Bahasa Dan Sastra Arab* 6, no. 1 (2024): 226–39, <https://doi.org/10.21154/tsaqofiya.v6i1.423>.

<sup>9</sup> Annisa Hafitria and Imam Asyrofi, "PENGEMBANGAN MEDIA AUGMENTED REALITY DALAM PEMBELAJARAN MUFRADAT," *Tsaqofiya; Jurnal Pendidikan Bahasa Dan Sastra Arab* 6, no. 1 (2024): 34–51, <https://doi.org/10.21154/tsaqofiya.v6i1.253>.

<sup>10</sup> Ilmawan Mustaqim and Nanang Kurniawan, "PENGEMBANGAN MEDIA PEMBELAJARAN BERBASIS AUGMENTED REALITY," *Edukasi Elektro* 1, no. 1 (2017): 36–48, <https://doi.org/10.17977/um034v29i2p97-115>.

<sup>11</sup> Ahmad Burhanudin, "Pengembangan Media Pembelajaran Augmented Reality Pada Mata Pelajaran Dasar Elektronika Di Smk Hamong Putera 2 Pakem," *Pendidikan Teknik Mekatronika* 7, no. 3 (2017): hlm.267, <http://journal.student.uny.ac.id/ojs>.

<sup>12</sup> Saforrudin Norabeerah, Zaman Halimah Badioze, and Ahmad Azlina, "Pengajaran Masa Depan Menggunakan Teknologi Augmented Reality Dalam Pendidikan Bahasa Melayu: Tahap Kesedaran Guru," *Jurnal Pendidikan Bahasa Melayu* 2 (2012): 1–10, <https://doi.org/10.5539/ass.v9n11p1>.

<sup>13</sup> Sameer Mosa AlNajdi, "The Effectiveness of Using Augmented Reality (AR) to Enhance

Brain-based learning research using Augmented Reality (AR) technology argues that it can assist students in creating a more interactive and immersive Arabic learning experience for students. According to Ariesto et al, in a centralized virtual world, it helps children understand the world around how they work, so this will be a partner to help improve children's intelligence<sup>14</sup>. The findings of previous experts have also carried out research far in advance, so that the findings are as follows as stated by the findings of previous experts who have also carried out research far in advance, so that the findings are as follows as stated by Muhammad et al who stated that it shows the suitability of media with users for beginner level children, however this application is only helpful and cannot replace the role of the teacher and the interaction between the teacher and the real student<sup>15</sup>. Then another study conducted by Jaelani et al that the neurolinguistic approach as an alternative to learning Arabic increases the potential of students who rely on their brains<sup>16</sup>.

There have been no previous studies that have comprehensively discussed Brain Based Learning learning that uses AR innovations in learning Arabic. Therefore, this research is composed of three problem formulations, namely: 1) What is the essence of Brain Based Learning? 2) What is the concept of Augmented Reality (AR) technology? 3) What are the strength of learning Brain Based Learning by utilizing AR technology in learning Arabic? The three formulations of the problem are the focus of explanation in this study.

## METHOD

This study uses the literature review method, which is an approach that relies on various reading sources such as journals, research reports, scientific magazines, newspapers, relevant books, seminar results, interviews with informants, documents,

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Student Performance: Using Quick Response (QR) Codes in Student Textbooks in the Saudi Education System," *Educational Technology Research and Development* 70 (2022): 1105–24, <https://doi.org/10.1007/s11423-022-10100-4>.

<sup>14</sup> Ariesto Hadi Sutopo et al., *Pemikiran Pendidikan Prof. Dr. Conny R. Semiawan*, Cetakan Pe (Tangerang Selatan: TOPAZART, 2022).

<sup>15</sup> Mohammad Rozi Syifa'uddin et al., "Penerapan Teknologi Augmented Reality Pada Media Pembelajaran Rambu Rambu Lalu Lintas Berbahasa Arab Application Of Augmented Reality Technology In The Learning Media Of Traffic Signs In Arabic Language," in *Penerapan Teknologi Augmented Reality Pada Media Pembelajaran Rambu Rambu Lalu Lintas Berbahasa Arab*, 2022, 51–62.

<sup>16</sup> Mohammad Jailani et al., "Meneguhkan Pendekatan Neurolinguistik Dalam Pembelajaran: Studi Kasus Pada Pembelajaran Bahasa Arab Madrasah Aliyah," *Jurnal Pendidikan Agama Islam Al-Thariqah* 6, no. 1 (2021): 151–67, [https://doi.org/10.25299/al-thariqah.2021.vol6\(1\).6115](https://doi.org/10.25299/al-thariqah.2021.vol6(1).6115).

decrees, and other materials to collect data relating to the problem to be studied<sup>17</sup>. The data analysis technique uses descriptive analytics, which include: 1) Identifying research results from the newest to the oldest. 2) Assess the abstract part of the research to determine its relevance to the problem to be solved. 3) Record important parts of the reading source, as well as to avoid plagiarism. 4) Compile notes, quotes, or copies of information in an orderly and systematic way. In this study, data collection was carried out by obtaining articles, online journals, and digital books as well as through the assemblr website.

## RESULT AND DISCUSSION

### The Essence Of Brain Based Learning

Every learning activity that occurs in schools can be ascertained to have a relationship with student brain performance. Jansen revealed that Brain Based Learning (BBL) or brain-based learning is learning that is aligned with the way the brain is naturally designed to learn<sup>18</sup>. This learning considers how the brain learns optimally. The brain does not learn based on the demands of a rigid or inflexible school schedule, because the brain has its own rhythm. In this case learning should be designed according to the performance of the brain which is able to process knowledge in various ways, for example analyzing, comparing, differentiating, synthesizing, assessing, judging, making decisions and so on. Mufidah said we only need a learning environment to encourage the learning process to run optimally and have the impression that the brain is learning<sup>19</sup>.

Then Solapur interprets Brain Based Learning as learning based on the structure and function of the brain. Each brain structure, both the right brain and left brain, has its own dominant function<sup>20</sup>. The right brain is more dominant on rhythm, color, shapes, maps, imagination, and daydreaming, while the left brain is more dominant on words, numbers, lines, lists, logic, and analysis<sup>21</sup>. From each of the

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<sup>17</sup> Sukardi, *Metodologi Penelitian Pendidikan; Kompetensi Dan Praktiknya* (Yogyakarta: Bumi Aksara, 2017).

<sup>18</sup> Jensen Eric, *Pembelajaran Berbasis Otak: Paradigma Pengajaran Baru*, Edisi Kedu (Jakarta: Indeks, 2011).

<sup>19</sup> Mufidah, *Brain Based Teaching and Learning; Pembelajaran Berbasis Otak*.

<sup>20</sup> Akkalot Solapur, "Teaching Methods – Brain Based Learning," *Electronic International Interdisciplinary Research Journal (EIIRJ)* i, no. li (2012): 94–100.

<sup>21</sup> Lucy Lucy, Rizky Rizky, and Ade Julius, *Dahsyatnya Brain Smart Teaching: Cara Super Jitu Optimalkan Kecerdasan Otak Dan Prestasi Belajar Anak* (Depok: Penebar Plus, 2012).

dominant abilities possessed by the brain, learning activities are needed that can optimize these abilities<sup>22</sup>.

**Table 1.1. The Role of Both Hemispheres in Learning**

No	Left Brain	Right Brain
1.	Think logically	Random thinking
2.	sequential	Intuitive
3.	Rational	Holistic
4.	Analytical	Perform synthesis, relational
5.	objective	subjective
6.	See section by section	Seeing holistically
7.	Convergent	Divergent
8.	Digital	Analog
9.	Abstract	Concrete
10.	Proportional	Imaginative
11.	Intellect	inspiration
12.	In order	Simultaneous

*Source: Understanding (2001) and Cave (2011)*

A brain-based learning approach to language learning is one that leverages an understanding of how the human brain learns and processes information to increase the effectiveness of language learning. Ilfan revealed that the process of learning Arabic can be integrated with a neuroscience approach by optimizing the function of the right brain and left brain<sup>23</sup>. This characteristic can be found in Brain-Based Learning (BBL) learning because BBL offers a learning concept that is aligned with the workings of the brain which is designed naturally for learning<sup>24</sup>

In implementing Brain Based Learning, there are three main strategies that need to be developed<sup>25</sup>: 1) creating a learning environment that challenges students' thinking skills. In packaging learning materials, teachers should be able to facilitate students' thinking skills so that students are accustomed to developing empowering brain potential. 2) create a fun learning environment. Students will learn with all their abilities if they feel happy to be involved in the learning process. 3) create an active

<sup>22</sup> Afib Rulyansah, Uswatun Hasana, and Ludfi Arya Wardana, *Model Pembelajaran Brain Based Learning Bermuatan Multiple Intelligences*, Cetakan Pe (Banyuwangi: LPPM Institut Agama Islam Ibrahimy Genteng Banyuwangi, 2017).

<sup>23</sup> Muhammad Ilfan Fauzi, "Pemanfaatan Neurosains Dalam Desain Pengembangan Kurikulum Bahasa Arab," *Arabiyatuna: Jurnal Bahasa Arab* 4, no. 1 (2020): 1, <https://doi.org/10.29240/jba.v4i1.1095>.

<sup>24</sup> Karunia Eka Lestari, "IMPLEMENTASI BRAIN-BASED LEARNING UNTUK MENINGKATKAN KEMAMPUAN KONEKSI DAN KEMAMPUAN BERPIKIR KRITIS SERTA MOTIVASI BELAJAR SISWA SMP," *JURNAL PENDIDIKAN UNSIKA 2* (2014): 36-46.

<sup>25</sup> Mufidah, *Brain Based Teaching and Learning; Pembelajaran Berbasis Otak*.

and meaningful learning situation for students. Of course, student success will be determined by how capable they are in building knowledge and understanding based on their own experiences.

### **The Concept of Augmented Reality**

In the current millennial era, technology always accompanies human life, it cannot be separated from everyday life. Technology is a new feature in the world of education. Like a multimedia-based teaching system. Mayangsari and Muhammad in their research stated that learning in schools is inseparable from learning media and learning resources that can be combined based on technology, some of which are audio media, visual media, audiovisual media, and various media<sup>26</sup>. Technology as a bridge in learning that has opened many opportunities and facilitated access to wider learning resources.

Based on the research results, multimedia has many benefits including: 1) learning can attract students' attention, so that it can foster learning motivation 2) learning material can be more clearly defined, so that it can be better understood by students. 3) learning methods can be more varied, not just verbal communication through the words of the teacher or educator. 4) students learn more activities because they not only listen to the teacher's description, but can also carry out other activities such as observing, doing, demonstrating, and so on<sup>27</sup>. In this case, namely the use of Augmented Reality (AR)-based technology in learning Arabic.

Augmented reality is a cutting-edge technology capable of blending virtual objects, whether two-dimensional or three-dimensional, seamlessly into the real-world environment. These virtual objects are projected in real-time, creating an interactive and immersive experience for users<sup>28</sup>. For AR to be possible five basic tasks must be accomplished and their products integrated effectively<sup>29</sup>

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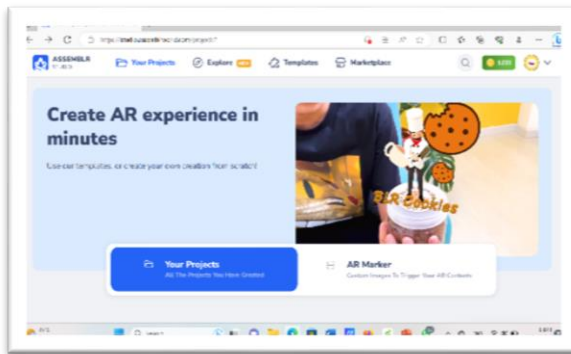
<sup>26</sup> Mayangsari Nikmatur Rahmi and M.Agus Samsudi, "Pemanfaatan Media Pembelajaran Berbasis Teknologi Sesuai Dengan Karakteristik Gaya Belajar," *Edumaspul: Jurnal Pendidikan* 4, no. 2 (2020): 355–63, <https://doi.org/10.33487/edumaspul.v4i2.439>.

<sup>27</sup> Muhammad Rusli, Dadang Hermawan, and Ni Nyoman Supuwingsih, *Memahami E-Learning: Konsep, Teknologi, Dan Arah Perkembangan* (Yogyakarta: Penerbit ANDI (Anggota IKAPI), 2020).

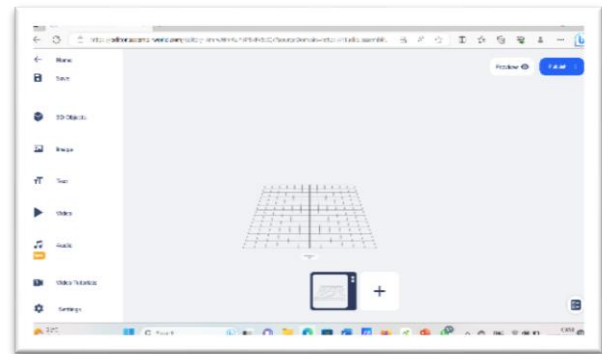
<sup>28</sup> Julio Cabero-Almenara et al., "Educational Uses of Augmented Reality (AR): Experiences in Educational Science," n.d., <https://doi.org/10.3390/su11184990>.

<sup>29</sup> Yu-Chien Chen, *Learning Protein Structure with Peers in an AR-Enhanced Learning Environment*, PH.D Thesi (USA: University of Washington, 2013).

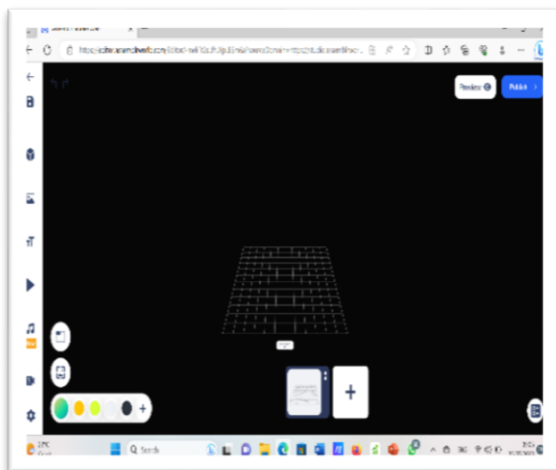
1. Image fragmentation: The process of separating the front direction of objects from their background, and the quality of the separation process determines the success of the process of extracting objects from the image.
2. Extraction: Means finding known elements on the image of lines, curves and shapes.
3. Mark detection: The real tag must be designed in a way that is easy to detect, identify and recognize among other markers.
4. Camera direction: This step comes after the mark is selected, where the mark is located in spatial space so that digital objects are embodied in the image, and their scope and direction must fit with the detected mark.
5. Embedding: At this stage, 3D objects are embodied within the scene and placed on the mark, taking into account the quality of embodiment and lighting



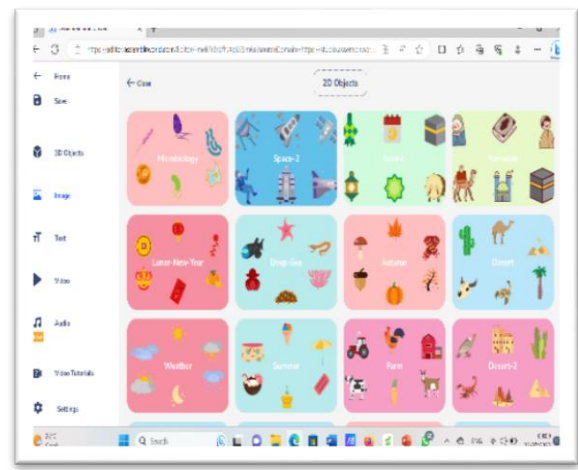
Step 1



Step 2



Step 3



Step 4





Step 5

Figure 1. Steps to Apply Learning Content

The above features explain the simple steps in creating an AR application as follows: 1) access assemblr in a browser, for example via a laptop 2) create a postcard through the work space to present a content or design to be made 3) select the color desired by the nuances of the learning content 4) add 3D elements to make it look more alive through 3D objects that have a variety of characters related to education, if you don't find the 3D that the user wants, you can upload it individually via 3D trigger, TurboSquid or other marketplaces 5) After Once done, it can be published, then the project link can be taken by the web link player which can be accessed by anyone. And finally do a scan to get AR. Meanwhile, the steps for using it are as follows: 1) download AR from either the Google Play Store or the Apple App Store. 2) open the downloaded AR application on a smartphone with a functioning camera. 3) point the camera at the object you want to display on the AR 4) wait for the AR object to appear on the smartphone layer. 5) interact with AR objects that appear allowing the user to rotate, enlarge or reduce objects.

The use of AR technology is suitable for use as learning media, namely learning media for children in projecting a subject matter<sup>30</sup>. Among them can be projected in learning language and culture. One of them is that along with the development of AR technology, a new breakthrough is needed in Arabic subjects. This is in line with the findings of research conducted by Ady et al which revealed that AR technology is expected to enrich Arabic learning media, especially UNIDA Gontor and can be useful

<sup>30</sup> Eri Sasmita Susanto et al., "Pengembangan Aplikasi Smart-Book Sebagai Media Pembelajaran Bahasa Inggris Anak Berbasis Ar (Augmented Reality)," *Jurnal Mnemonic* 5, no. 1 (2022): 64–71, <https://doi.org/10.36040/mnemonic.v5i1.4438>.

for the development of Arabic learning media in Islamic boarding schools and the general public<sup>31</sup>.

Augmented Reality (AR) technology can be an effective medium for introducing cultural heritage objects to the public<sup>32</sup>. So that in the application of learning Arabic can be done by students to visit historic sites virtually. Students can see 3D reconstructions of historical buildings, artifacts or other important objects so that through AR technology students can reconstruct knowledge through information read or seen from the presentation of content contained in AR. Besides that, the learning that occurs is also interactive, there is direct involvement from students to interact directly with objects of direct cultural heritage. Of course, this can enrich the learning experience and help improve understanding of Arabic besides helping students also enrich vocabulary. So with the presence of this technology, learning becomes more interesting and challenging.

AR technology is designed to be as easy as possible for students so that it can increase student interest such as (1) increasing interest in learning, (2) students get new learning media at school<sup>33</sup>. This can make students increase their interest when learning Arabic with an AR display that presents digital elements in a real environment. In addition to the use of technology that tends to be innovative, it will really help students to be enthusiastic about learning Arabic. This is in line with the findings of Hasyim et al that by using AR technology, teachers and students can understand Arabic easily and happily<sup>34</sup>. With a wealth of visual and engaging elements, it also helps in strengthening visual associations with the meaning and context of the Arabic language. This is in line with Tumini and Ahmad's research

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<sup>31</sup> Ady. Dihin Muriyatmoko. Shoffin Nahwa Fauzan, "PENERAPAN TEKNOLOGI AUGMENTED REALITY PADA MEDIA PEMBELAJARAN BAHASA ARAB: DURUS AL-LUGHAH JILID 1," *ELSE (Elementary School Education Journal)* 4 (2020): 63–78.

<sup>32</sup> Prita Haryani and Joko Triyono, "Augmented Reality (AR) Sebagai Teknologi Interaktif Dalam Pengenalan Benda Cagar Budaya Kepada Masyarakat," *Simetris: Jurnal Teknik Mesin, Elektro Dan Ilmu Komputer* 8, no. 2 (2017): 807, <https://doi.org/10.24176/simet.v8i2.1614>.

<sup>33</sup> Robby Yuli Endra, Ahmad Cucus, and Michael Ciomas, "Penerapan Teknologi Augmented Reality Bagi Siswa Untuk Meningkatkan Minat Belajar Bahasa Mandarin Di Sekolah," *Jurnal Pengabdian Kepada Masyarakat (JPKM) TABIKPUN* 1, no. 1 (2020): 19–30, <https://doi.org/10.23960/jpkmt.v1i1.9>.

<sup>34</sup> Mochamad Hasyim et al., "Implementasi Teknologi Augmented Reality Sebagai Pembelajaran Bahasa Arab Menggunakan Metode Markerless Tracking," *Explore IT: Jurnal Keilmuan Dan Aplikasi Teknik Informatika* 5, no. 36 (2017): 28–34, [http://eprints.uty.ac.id/693/%0Ahttp://eprints.uty.ac.id/693/1/Naskah Laporan PTA 2 fix.docx](http://eprints.uty.ac.id/693/%0Ahttp://eprints.uty.ac.id/693/1/Naskah%20Laporan%20PTA%202017%20fix.docx).

which states that the presence of Augmented Reality (AR) that has been made helps teachers convey material and students become more interested in learning Arabic<sup>35</sup>

In addition, the presence of AR also trains students in Arabic speaking skills to help students appear confident in the real world. This is in line with Muhammad's research findings that Augmented Reality (AR) technology is able to make students interested in learning to speak Arabic effectively and efficiently and this is considered to be applicable and developed in educational activities at all levels<sup>36</sup>. Of course this is an interest for students to take part in learning Arabic. As revealed by Siti and Septi that the use of AR menincrease students' motivation to learn Arabic and increase students' enthusiasm to learn Arabic until they are fluent<sup>37</sup>

### **Brain-Based Learning Using Augmented Reality Technology as an Opportunity for Arabic Learning Media**

Brain-Based Learning by utilizing Augmented Reality (AR) Technology as an opportunity for Arabic learning media offers various advantages and benefits that can enhance students' learning experiences. This is in line with KMA 347 of 2022 which prioritizes 4C skills namely critical thinking, creative, collaboration, and communication in today's digital era learning. Here are some of the opportunities offered by the use of AR in learning Arabic:

1. **Better Brain Stimulation:** The use of AR in learning allows students to experience lesson content in a visual and interactive form. This provides greater stimulation to students' brains, helping to trigger various brain regions involved in understanding and processing Arabic.
2. **More Engaging Learning:** AR creates an engaging and fun learning experience. Students can interact with Arabic objects, words or situations directly, which increases their interest and motivation in learning the language.
3. **Real World Context:**The use of AR allows students to experience the use of Arabic in real-world contexts. They can practice communicating in a realistic

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<sup>35</sup> Tumini Tumini and Ahmad Fatoni Romadhon, "Implementasi Augmented Reality Untuk Pengenalan Kata Benda Berbahasa Arab (Mufrodlat) Di TPQ An-Nahdliyah At-Taqwa," *Informatics and Digital Expert (INDEX)* 3, no. 2 (2021): 46-54, <https://doi.org/10.36423/index.v3i2.760>.

<sup>36</sup> Muhammad Adi Setiawan, "Pengembangan Materi Ajar Secara 3D Augmented Reality Untuk Pengajaran Berbicara Bahasa Arab," *Tarling : Journal of Language Education* 3, no. 1 (2019): 25-39, <https://doi.org/10.24090/tarling.v3i1.3357>.

<sup>37</sup> Siti Nurmaena and Septi Gumindari, "Efektivitas Penggunaan Augmented Reality Untuk Meningkatkan Penguasaan Kosakata," *Jurnal Edukasia Nonformal* 2, no. 2 (2022): 189-96.

environment, helping to improve their language skills and confidence in speaking Arabic. Of course this becomes a student experiment in building and enriching an insight.

4. **Multisensory Experience:** AR utilizes visual and auditory sensory to present learning content. This helps improve students' information retention and understanding because they can learn through more than one sense.
5. **Personalized Learning:** AR technology can be adapted to the individual needs and ability levels of students. Learning can be personalized to meet the learning needs of each student, thus increasing the effectiveness and efficiency of learning.
6. **Interactive Feedback:** In an AR experience, students can receive instant feedback. This helps them identify and correct mistakes quickly, leading to an increase in the quality of learning Arabic.
7. **Reducing Fear and Failure:** AR creates a safe and risk-free learning environment. Students can practice speaking Arabic without fear of error or failure, which encourages further exploration and experimentation.
8. **Flexibility and Accessibility:** AR technology can be used in a variety of devices, including smartphones or tablets, thus enabling flexible and accessible learning anywhere and anytime.

The use of Augmented Reality technology has the potential to create a better contemporary educational environment and enrich learning opportunities for students<sup>38</sup>. In this context, as a learning tool for Arabic language, it offers intriguing possibilities to enhance learning and provide a more engaging and effective learning experience for students. By harnessing the potential of AR in stimulating the brain, interactive learning experiences, and personalizing learning, teachers can create a more engaging learning environment and success for students in mastering Arabic. In this case, here are some examples of Arabic learning materials that can be presented in AR content to build interesting insights and experiences: 1) *al-Hadrah al-Islamiyyah* 2) *al-Rihlat wa al-Tsaqafah al-Islamiyah* 3) *mu'alim al-Siyahah wa at-Thabi'iyah*

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<sup>38</sup> Nouredine Elmqaddem, "Augmented Reality and Virtual Reality in Education. Myth or Reality?," *International Journal of Emerging Technologies in Learning* 14, no. 3 (2019): 234-42, <https://doi.org/10.3991/ijet.v14i03.9289>.

In addition to the utilization of AR technology, there are challenges that need to be addressed for the effective use of AR. *Firstly*, issues related to accessibility pertain to designing applications in such a way that they can be used by everyone, regardless of their specific needs, often experienced by individuals with certain disabilities<sup>39</sup>. Despite some efforts and proven benefits of AR for special education, most AR applications for education still lack accessibility features<sup>40</sup>. *Secondly*, the most commonly reported challenges of AR in education refer to the complexity of using AR systems<sup>41</sup>. Various situations can influence the quality of the user experience when interacting with AR applications. As indicated by Akcayir and Akcayir, AR involves multiple senses and requires simultaneous tasks from students, which may burden their attention, thus affecting the usability of AR systems<sup>42</sup>. *Thirdly*, the development of AR applications needs to go through repetitive development cycles to accommodate diverse platform users, thereby increasing the time and production costs<sup>43</sup>. *Fourthly*, there is a lack of pedagogical approach when integrating AR applications into learning activities. This issue has been identified by various studies, indicating that in most cases, teachers use AR applications without considering pedagogical aspects, thereby reducing the effectiveness of the intervention<sup>44</sup>.

## CONCLUSION

The Brain Based Learning model with the use of Augmented Reality (AR) technology is to create a more meaningful learning experience and make it easy for students to understand and internalize Arabic material contained in textbooks. By

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<sup>39</sup> Ahmed Al-Azawei, Fabio Serenelli, and Karsten Lundqvist, "Universal Design for Learning (UDL): A Content Analysis of Peer Reviewed Journals from 2012 to 2015," *Journal of the Scholarship of Teaching and Learning* 16, no. 3 (2016): 39–56, <https://doi.org/10.14434/josotl.v16i3.19295>.

<sup>40</sup> Juan Garzón, Juan Pavón, and Silvia Baldiris, "Systematic Review and Meta-Analysis of Augmented Reality in Educational Settings," *Virtual Reality* 23, no. 4 (2019): 447–59, <https://doi.org/10.1007/s10055-019-00379-9>.

<sup>41</sup> Arindam Dey et al., "A Systematic Review of 10 Years of Augmented Reality Usability Studies: 2005 to 2014," *Frontiers Robotics AI* 5, no. APR (2018), <https://doi.org/10.3389/frobt.2018.00037>.

<sup>42</sup> Murat Akcayir and Gokcye Akcayir, "Advantages and Challenges Associated with Augmented Reality for Education: A Systematic Review of the Literature," *Educational Research Review* 20 (2017): 1–11.

<sup>43</sup> Xiuquan Qiao et al., "Web AR: A Promising Future for Mobile Augmented Reality-State of the Art, Challenges, and Insights," *Proceedings of the IEEE* 107, no. 4 (2019): 651–66, <https://doi.org/10.1109/JPROC.2019.2895105>.

<sup>44</sup> Tien-Chi Huang, Mu-Yen Chen, and Wen-Pao Hsu, "Do Learning Styles Matter? Motivating Learners in an Augmented Geopark," *Journal of Educational Technology & Society* 22, no. 1 (February 5, 2019): 70–81, <https://www.jstor.org/stable/26558829>.

integrating these two approaches, it is hoped that it can encourage further research development in presenting Arabic content using AR which can build students' insights by strengthening students' imagination and creativity through interactive and immersive learning experiences so that exploring virtual environments can help students who have not yet had a more inclusive and effective learning experience.

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