IJORER : International Journal of Recent Educational Research
Homepage : https://journal.ia-education.com/index.php/ijorer
Email : ijorer@ia-education.com

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 4, July 2025
Page 1039-1058


# Development of an Augmented Reality Application for Learning Family Archive Management in Vocational Education

**Yuliansah[1]*, Umar Yeni Suyanto[2], and Yeni Nur Prilanita[3]**
[1,2]Universitas Negeri Yogyakarta, Yogyakarta, Indonesia
[2]Universiti Malaya, Malaysia

DOI: https://doi.org/10.46245/ijorer.v6i4.842

**Sections Info**

***Article history:***
Submitted: April 06, 2025
Final Revised: May 15, 2025
Accepted: May 17, 2025
Published: July 30, 2025

***Keywords:***
Augmented Reality; Learning Application; Family Archive Management; Vocational Education; ADDIE Model

**ABSTRACT**

**Objective:** This study aimed to develop an Augmented Reality (AR)-based learning program for family archive management in vocational education, addressing the limited use of AR in office administration subjects. In addition, the research sought to enhance students' understanding and skills in digital document management through interactive multimedia content, catering to the learning preferences of Generation Z students who are highly engaged with digital technology. **Method:** The study employed the ADDIE model, focusing only on the analysis and design of AR content (videos, audio, and text), and and development of the AR program using Unity software. The AR program was validated by experts for content and material and tested by 40 students in Faculty of Economics and Business through questionnaires assessing audio quality, video quality, visual appeal, and ease of use. **Results:** This research has completed the analysis, design, and development of an augmented reality for family archive management in vocational education. Evaluations by both of experts and prospective user show that the AR Program as very good for all aspects including usability, content quality, ease of use, visual appeal, video quality, and audio quality. The application was deemed suitable for broader implementation and further effectiveness testing in classroom settings. **Novelty:** This study contributes to the limited research on AR applications in office administration education and offering an innovative tool for vocational students in the learning family archive management. Integrating multimedia elements such as video, audio, and text in AR program provides an innovative and engaging learning experience, aligning with the digital literacy needs of Generation Z. **Future studies** should continue implementation and evaluation phases to demonstrate that The AR program effectively enhances teaching and learning process in vocational education.

## INTRODUCTION

Technology in education has rapidly evolved and significantly influenced teaching and learning processes in the classroom. The use of Augmented Reality (AR) in learning has transformed how students interact with technology (Liu et al., 2024). AR is a digital technology capable of integrating digital and physical information (Makhenyane, 2024). It enables virtual objects to be projected into the real world, giving the impression of real-life objects through the aid of computer and mobile phone technology (Arena et al., 2022; Kamińska et al., 2023). One of the earlier studies on virtual objects integrated with the real world was conducted by Ahlers et al. (1995), who noted that virtual graphic objects in their program were not yet capable of filling real-world design environments. They also emphasized that distributed AR application development becomes easier when interface, interaction, and distribution concerns are separated. With AI integration, AR can incorporate 3D holograms as well as auditory and sensory feedback in real-time environments (Ragnhildstveit et al., 2023).

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 4, July 2025
Page 1039-1058


AR is a promising technology in revolutionizing education, presenting a new model of teaching and learning suited for 21st-century needs (Elmqaddem, 2019). The rise of digital technology demands vocational education to adapt, including the consideration of AR integration in learning processes (Dobricki et al., 2020). The close relationship between vocational education and industry necessitates that stakeholders in education align with the technologies used in industry and integrate them into teaching and learning (Rosyadi et al., 2023). Lester & Hofmann (2020) highlighted that AR use in vocational training enhances learner control, collaboration, and decision-making. Lukman et al. (2021) added that students using AR tools perform well in learning, as shown by increased self-directed learning, better digital literacy, and stronger critical thinking skills. Furthermore, Stender et al. (2021) stated that the integration of AR in vocational education significantly supports skill acquisition. Vocational education is inherently skill-focused rather than solely knowledge-based (Sharov, 2020). However, Tobback et al. (2024) argue that vocational education is designed not only to impart skills but also to provide relevant knowledge in specific fields.

Learning that leverages digital resources is believed to improve both knowledge and skills and better align graduates' competencies with future industry needs (Astuti et al., 2021; Branca et al., 2020). Compared to the previous decade, the quality of vocational teaching has improved significantly (Uriarte-Portillo et al., 2023). However, in the 21st century, teaching must be understood as a form of andragogy—adult learning—rather than mere pedagogy or knowledge transfer (Schmid et al., 2021). This implies that educators serve not only as providers of learning resources but also as facilitators who encourage students to expand their own knowledge (Petrov & Atanasova, 2020; Marín et al., 2022). Ideally, students should be able to construct their knowledge independently, and AR can be a useful tool—especially when teaching abstract concepts. AR has been shown to enhance students' capabilities (Hughes & Maas, 2018; Harahap et al, 2020; Murniati et al. 2020). Likewise, Kholiq (2020) found that AR positively impacts learning outcomes.

Most students in vocational education are part of Generation Z, a generation that has grown up immersed in information technology (Mohr & Mohr, 2017; Tiyastuti, 2019). They are known as Digital-Natives who live their lives in a digital environment and are connected through social networks so that they naturally develop digital competence (Jones & Lea, 2008; Porat et al., 2018). One of the defining characteristics of Gen Z is their close attachment to smartphones (Ahmed, 2019; Rushda & Nawarathna, 2021). According to surveys, Gen Z spends an average of four hours a day on the internet via smartphones (Reza & Tinggogoy, 2022; Wijoyo et al., 2020), indicating how integral smartphones are to their lives. This situation calls for the development of learning media tailored to Gen Z's habits, especially in vocational education.

Ideal learning must be designed in accordance with learning students' needs and the intended learning objectives (Bates, 2015; Cahyono et al., 2022; Işman, 2011). Appropriate media can significantly improve the quality of learning (Kozma, 1991; Mayer, 2014). As emphasized by Ramadhani & Rosy (2023), the development of AR technology in office administration is still minimal and requires further exploration. Therefore, this study aims to develop an augmented reality (AR) program specifically designed for learning digital document management especially for topic Family Archive Management. It is hoped that the integration of AR in office administration learning will

IJORER : International Journal of Recent Educational Research
Homepage : https://journal.ia-education.com/index.php/ijorer
Email : ijorer@ia-education.com

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 4, July 2025
Page 1039-1058


enrich research on educational technology and contribute to improving the quality of vocational education.

## RESEARCH METHOD

This study employed a research and development (R&D) approach using the ADDIE model including Analysis, Design, Development, Implementation, and Evaluation (Deng et al., 2024; Liu & Fan, 2023). However, in this research, the researcher focused on the analysis, design, and development phase and did not proceed to the implementation and evaluation phase. The following are the phases in this research:

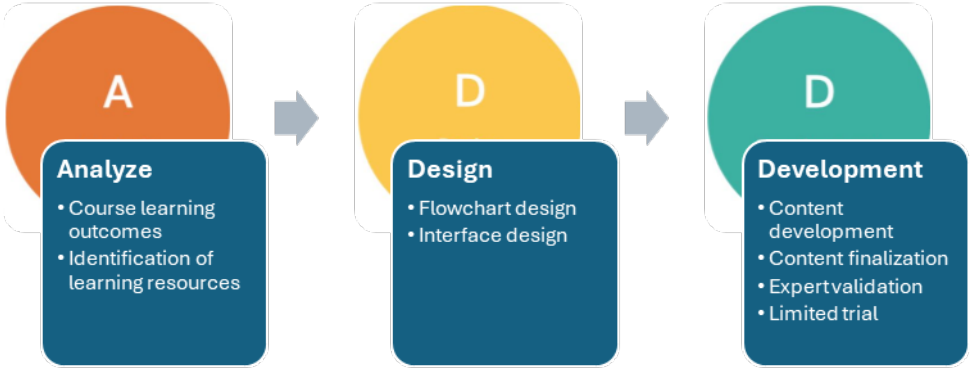


**Figure 1.** Research Procedure

The first phase, need analysis phase, is analyze course learning outcomes and identify the learning resource needs required for learning family archive management in the Office Administration undergraduate program. The design phase included designing the AR program by creating flowcharts and interface layouts (Cahyadi, 2019; Firmansyah et al., 2022). The development phase involved content development, creating content barcodes, which were then integrated into the AR program design, finalizing the content, validation and usability testing. The content developed in this AR program is learning video and audio. However, in this article, the researcher only focuses on the development of the AR program while the development of video and audio content has been carried out in the previous stages. The content that has been prepared is then combined in the AR program by creating barcodes to be accessed through the AR program via barcode scanning. This allowed the barcodes to be read and transformed into video and audio as learning media for students. The final product of this research and development is a new software product in the form of an Android learning application (.apk). Following development, a validation process was conducted to assess the feasibility of the AR program. Validation consisted of internal validation to assess the feasibility of the developed AR program based on expert input and external validation to gather user feedback.

Participants in this study consisted of students and lecturers consisting of 3 groups for the stages of needs analysis, validation, and limited trials. The needs analysis stage involved 108 students of office administration education, faculty of economics and business, Yogyakarta state university who took the Archives Management course. The validation process involved 2 lecturers who have expertise in the field of archiving and learning media as program validators. While the limited trial stage involved 40 students as prospective users of AR learning media in the next semester.

IJORER : International Journal of Recent Educational Research
Homepage : https://journal.ia-education.com/index.php/ijorer
Email : ijorer@ia-education.com

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 4, July 2025
Page 1039-1058


Data collection techniques and instruments included questionnaires covering both validation and limited tria, with a five-point scale namely Very Good (VG), Good (G), Fair (F), Poor (P), and Very Poor (VP). This activity is to assess whether the AR program that has been developed is feasible to use from the assessment of experts and prospective users. The assessment questionnaire for material and media experts includes aspects of usefulness, content and ease of use. While the assessment questionnaire by prospective users includes audio quality, video quality, visual appeal and ease of use.

**Tabel 1.** Validation Range

| No | Average Score Range | Category | Grade |
|---|---|---|---|
| 1 | 4,1 - 5 | Very Good | A |
| 2 | 3,1 - 4 | Good | B |
| 3 | 2,1 - 3 | Fair | C |
| 4 | 1,1 - 2 | Poor | D |
| 5 | 0 - 1 | Very Poor | E |

Data analysis for validation testing was conducted using descriptive statistics. The data interpretation utilized a modified trend category, as shown in table 1 Validation Range. The media must at least meet the "Good" (B) category during the validation and limited trial stages to be considered feasible (Hasibuan et al., 2018).

## RESULTS AND DISCUSSION

### *Results*

### Analysis Phase

The first stage carried out is to identify learning needs through analysis of learning outcomes and identification of learning resource needs required in learning archival management, especially on the topic of family archiving in the Office Administration S1 study program.

*Learning Outcomes Analysis*

In the learning achievement analysis stage, the researchers conducted an analysis of the implementation plan for Archives Management learning in the Office Administration Education study program, Faculty of Economics and Business, Yogyakarta State University. The description of the Archives Management course can be seen in Figure 2, while the topic of family archive management can be seen in Figure 3.

**A. Course Description**

This course is designed to equip students with the knowledge to manage archives both manually and digitally by leveraging technology and information. In its delivery, the course employs innovative, student-centered learning (SCL) models that actively engage students in all class activities. Beyond participation, students also contribute through hands-on practice in records management, storage, evaluation, and retention. To assess the achievement of these competencies, a variety of assessment methods both test and non-test are used. For example, students complete written exams in essay or objective formats, develop coursework assignments, and are evaluated through observation.

**Figure 2.** Course Description

IJORER : International Journal of Recent Educational Research
Homepage : https://journal.ia-education.com/index.php/ijorer
Email : ijorer@ia-education.com

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 4, July 2025
Page 1039-1058


| Pert ke | Kemampuan Akhir | Bahan Kajian | Metode | Pengalaman Belajar | Alokasi Waktu | Aspek Peneliaian | Indikator Peneliaian | Bobot Penilaian | Sumber |
|---|---|---|---|---|---|---|---|---|---|
| 12-14 | Mempraktikan pengelolaan arsip keluarga | 1. Konsep pengelolaan arsip keluarga<br>2. Penyimpanan arsip keluarga<br>3. Perawatan dan penyusutan arsip keluarga | *Project Based Learning*<br>Diskusi | 1. Mahasiswa penjelasan dosen tentang pengantar arsip keluarga, penyimpanan, perawatan dan penyustuan<br>2. Mahasiswa mempelajari materi melalui aplikasi pembelajaran yang telah disediakan<br>3. Mahasiswa membuat klasifikasi arsip keluarga berdasarkan kelompok yang telah ditentukan<br>4. Mahasiswa malakukan analisis proses penyimpanan dan penemuan kembali arsip keluarga<br>5. Mahasiswa mempraktikkan proses perawatan dan penyutan arsip keluarga | 3x50'<br>3x100' | 1. Kognitif<br>2. Psikomotorik | 1. Menjelaskan proses pengelolaan arsip keluarga<br>2. Mempraktikan pembuatan klasifikasi arsip keluarga.<br>3. Mempraktikan proses penyimpanan dan penemuan kembali arsip keluarga<br>4. Menganalisis proses perawatan dan penyusutan arsip keluarga | 15 | A.1<br>B.1<br>B.2<br>B.3 |

**Figure 3.** Lesson Plan for Family Archive Management (Sessions 12–14)

Based on information from the course description (Figure 2), it is known that this course aims to provide knowledge and skills to students so that they are able to manage archives manually or digitally using technology and information. Family archive management is one of the main topics in this course. Based on this information, it means that the learning materials that will be discussed in the topic of family archive management are 1) The concept of archive management, 2) The process of storing archives, 3) Maintenance and care of archives and 4) Archive reduction.

*Identification of Learning Resource Needs*

Based on learning outcomes, relevant content to be integrated into the AR application needs to be identified. To facilitate students in learning the sub-topics, researchers designed learning resources to be developed. The required content is presented in the following table.

**Table 2.** Content Design for AR application

| Topic | Subtopic | Type | Total |
|---|---|---|---|
| Record Management Concept | Family archive management | Text | 1 |
| | | Video | 1 |
| | | Audio | 1 |
| | Classification of record | Text | 1 |
| | | Video | 1 |
| | | Audio | 1 |
| Record storage process | Equipment on storage process | Text | 1 |
| | | Video | 1 |
| | | Audio | 1 |
| | Achaive storage | Text | 1 |
| | | Video | 1 |
| | | Audio | 1 |
| Record Maintenance | Equipment on maintenance process | Text | 1 |
| | | Video | 1 |
| | | Audio | 1 |
| | Family archive maintenance | Text | 1 |
| | | Video | 1 |
| | | Audio | 1 |
| Record Retention | | Text | 1 |

IJORER : International Journal of Recent Educational Research
Homepage : https://journal.ia-education.com/index.php/ijorer
Email : ijorer@ia-education.com

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 4, July 2025
Page 1039-1058


| Topic | Subtopic | Type | Total |
|---|---|---|---|
| | Retention of family record concept | Video | 1 |
| | | Audio | 1 |
| | Archive Retention Schedule | Text | 1 |
| | | Video | 1 |
| | | Audio | 1 |
| | Family record retention | Text | 1 |
| | | Video | 1 |
| | | Audio | 1 |

Based on the four topics that have been analyzed previously, the researcher developed it into 9 subtopics. To facilitate all student learning styles, each subtopic has features in the form of text, video, and audio. As an opening in this application, the researcher also added 1 opening text, 1 opening video, and 1 opening audio. For that, in this AR application there are 10 video contents, 10 text contents and 10 audio contents. This content requirement is to facilitate archiving learning with the sub-topic of family archive management.

To find out the readiness of students in owning adequate technology, the researcher conducted a survey on the learning facilities owned by students. The survey was conducted on 200 students but only 108 participants were willing to answer the questionnaire. The results of the questionnaire presented in figure 5 show that 100% of students have laptops and smartphones as devices used in the learning process. Therefore, the researcher's decision to develop an augmented reality (AR) application is right if it is based on the conditions of the students.

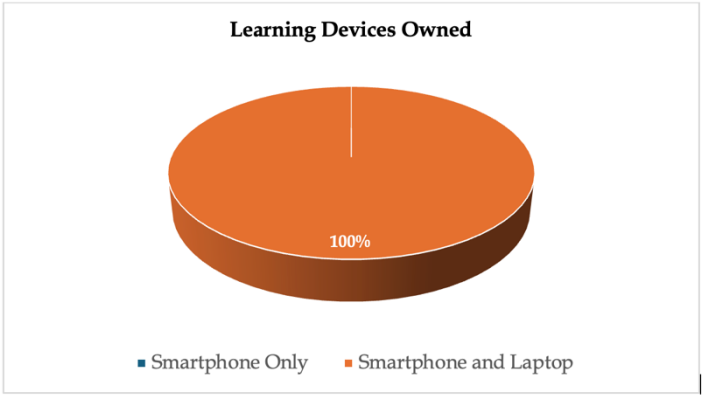


**Figure 4.** Student Learning Devices Survey Results

## Design Phase

The second phase is the AR program design. The AR design is made using a simple flow diagram, as in Figure 5. The phase of creating the AR program design is inspired by research conducted by Darmawiguna et al. (2014), with similar application, namely an AR application using physical book scanning techniques. The difference is this application uses physical books and e-books.

IJORER : International Journal of Recent Educational Research
Homepage : https://journal.ia-education.com/index.php/ijorer
Email : ijorer@ia-education.com

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 4, July 2025
Page 1039-1058


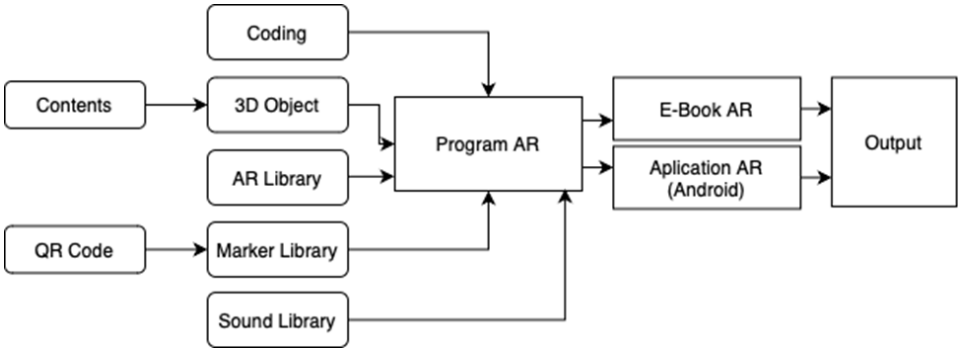


**Figure 5.** Object Input/Output &Module Design of the AR Book program

The researcher designed an AR program flowchart to facilitate the design of the program that will be carried out at the development stage. The AR program flowchart can be seen in Figure 6.

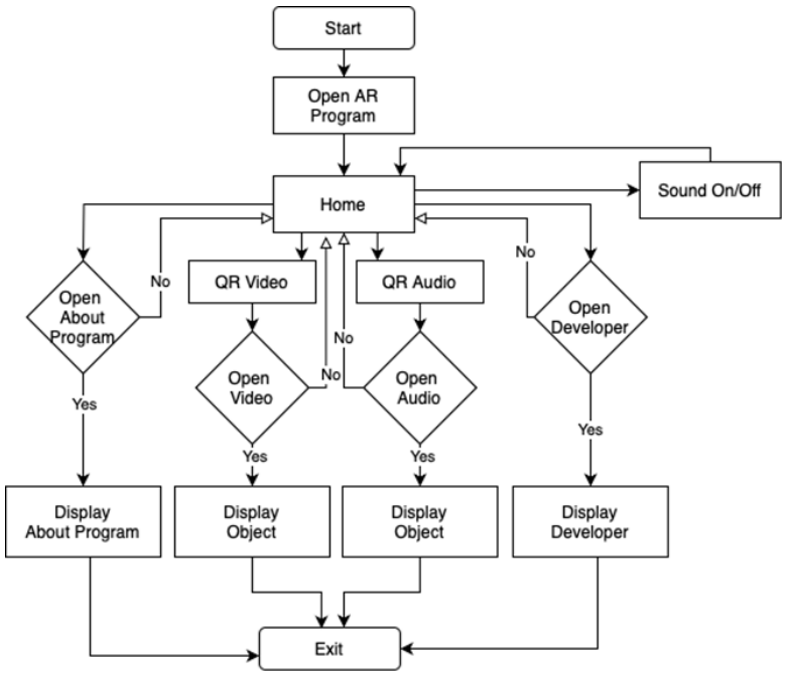


**Figure 7.** Augmented Reality (AR) Program Flowchart

Based on the flowchart, it can be seen that when operating the AR program, it will enter the home menu. In the home menu there is a menu about the program, QR video, QR audio, about the developer and voice control on/off. The next stage is the creation of the interface design for the AR program. The AR user interface is developed using PowerPoint to keep the design simple and avoid complications during the development phase. The interface design is shown in Figures 8 and 9.

IJORER : International Journal of Recent Educational Research
Homepage : https://journal.ia-education.com/index.php/ijorer
Email : ijorer@ia-education.com

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 4, July 2025
Page 1039-1058


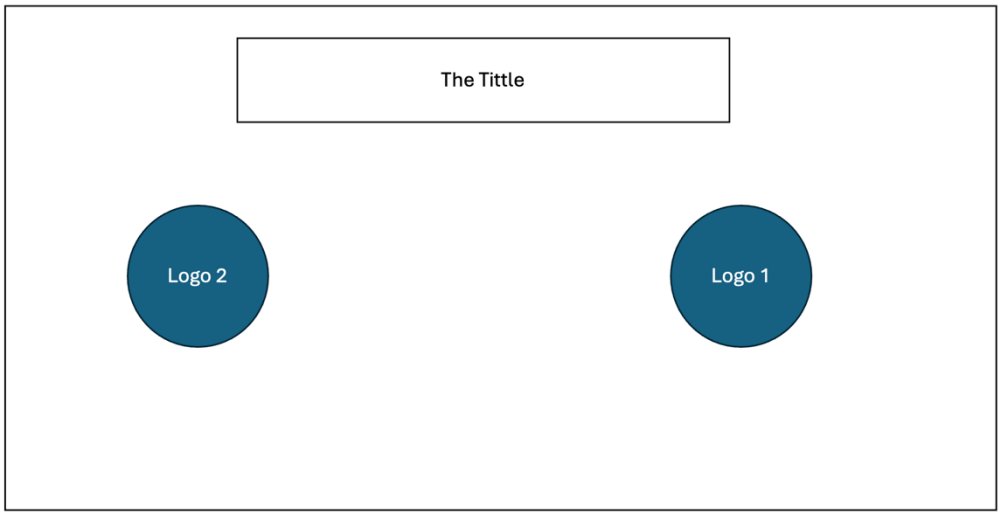


**Figure 9.** AR Program Opening Page Interface Design

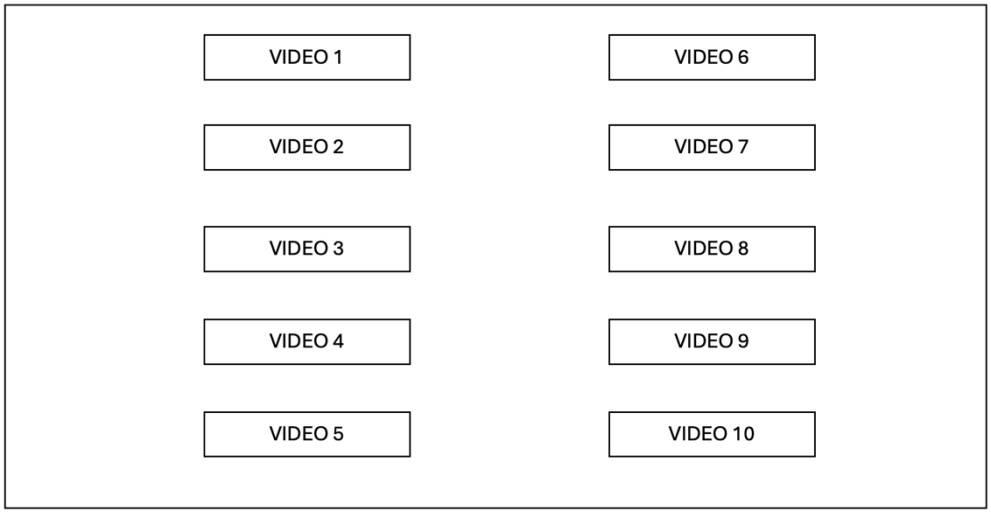


**Figure 10.** AR Program Video Reader Page Interface Design

**Development Phase**

In the content development phase for the AR program, all tasks have been completed. The developed content includes 10 instructional videos and audio materials aligned with the predetermined topics (see Table 2). The video development process involved script writing, video recording, editing, and exporting to MP4 format. A sample script for one of the videos is shown in Figure 11, while an example of the video recording process appears in Figure 12. Figure 13 presents an example of the exported video output. The finished exported video is then converted into audio, then all audio is uploaded to SoundCloud to be displayed in the AR program (Figure 14) . However, this article will focus on the discussion of AR program development, so the video and audio production processes are not described in detail.

IJORER : International Journal of Recent Educational Research
Homepage : https://journal.ia-education.com/index.php/ijorer
Email : ijorer@ia-education.com

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 4, July 2025
Page 1039-1058


**SCRIPT VIDEO KEARSIPAN**

**11. PENYUSUTAN ARSIP KELUARGA**

| Scene | Visual | Audio | Narasi/Voice Over | Durasi | Note |
|---|---|---|---|---|---|
| 1. | Presenter (big close up/CU) | 1. Narasi<br>2. Backsound bebas | Hai sobat pembelajar<br><br>Hari ini saya ingin bersih-bersih arsip keluarga nih. Sudah saatnya memisahkan mana yang masih bisa disimpan atau mana yang sudah saatnya untuk dimusnakan. Kira-kira bagaimana prosesnya ya, penasarankan, yuk lah gas. | 00:12 | - Lokasi lab simulasi perkantoran/tempat yang proporsional<br>- Background real shoot<br>- Peraga memegang document keeper dan gunting |
| 2. | Opening | Opening Sound | | 00:13 | Contoh video simple opening (syarat logo Kemendikbud, logo UNY, logo merdeka belajar, tulisan Prodi Pendidikan Administrasi Perkantoran) |
| 3. | Presenter (CU & Two Shoot) | 1. Voice Over<br>2. Backsound bebas | Untuk melakukan proses penyusutan arsip keluarga secara manual dapat dimulai dari langkah berikut ini yaitu<br>1. Ambil document keeper yang kita gunakan untuk menyimpan arsip keluarga<br>2. Cek dokumen mana yang sudah tidak digunakan atau terpakai. Misalnya kartu keluarga lama karena ada | 00:60 | - Lokasi lab simulasi perkantoran/tempat yang proporsional<br>- Background real shoot<br>- Aktivitas<br>1. Peraga mengambil document keeper<br>2. Peraga menyisir satu persatu lembaran di document keeper |

**Figure 11.** Video Script for AR Program Content

**Figure 12.** Shooting for Video Content


**Figure 13.** Example of The Video for AR Program

IJORER : International Journal of Recent Educational Research
Homepage : https://journal.ia-education.com/index.php/ijorer
Email : ijorer@ia-education.com

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 4, July 2025
Page 1039-1058


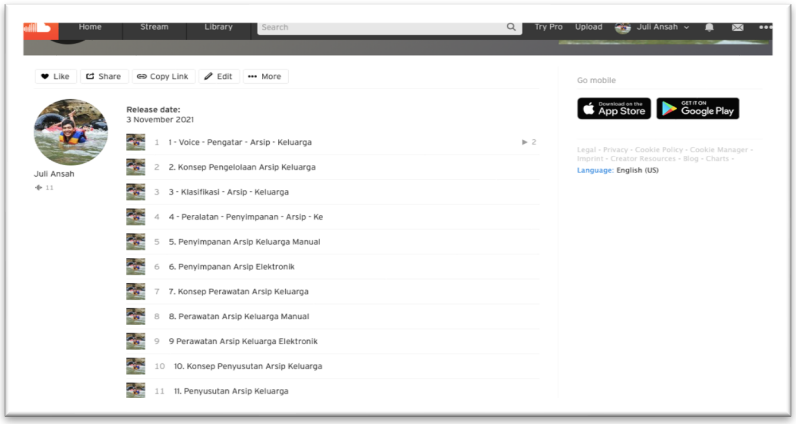


**Figure 14.** The Audio Content for AR Program

The next process is to combine all content so that it can be combined in the AR program, in this process the researcher uses Unity software. There are several stages that must be done, namely creating a QR code, combining objects and embedding the QR code in the e-book. This process begins by creating a QR code to recognize objects embedded in the Unity database, this QR code will be used to display output in the form of audio or video. An example of a QR code embedded in an e-book can be seen in Figure 8. The next process is the process of combining 3D objects and objects that have been licensed in Vuforia so that they can be recognized as videos, we use the Unity application. To recognize the AR objects that have been developed, the user is required to simply move the QR code to play the content. Here is the QR Code Video AR concept of family archive management and the concept of family archive maintenance.

**Figure 15.** QR Code Video AR on the Family Archive Program


**Figure 16.** Main Page Display of the Family Archive Program

IJORER : International Journal of Recent Educational Research
Homepage : https://journal.ia-education.com/index.php/ijorer
Email : ijorer@ia-education.com

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 4, July 2025
Page 1039-1058



**Figure 17.** The Main Page Display of the Family Archive Application

The final stage of the development process involves exporting the AR program so it can be installed on a smartphone. Once everything is connected, the program is built with a .apk extension (Android), enabling users to scan AR markers that trigger the embedded videos stored in the AR database. The Android application (.apk) can be downloaded from the following link: https://bit.ly/apkarsipkeluarga. The final display of the program can be seen in Figures 16 and 17. The barcode is then embedded in the e-book and textbook (figure 18), allowing students to show video and audio-based learning materials using the AR program on the Smartphone (figure20). To install the AR program, students should follow the instructions shown in Figure 19.


**Figure 18.** e-book of the Family Archive Management


**Figure 19.** The Guide to Using the AR Program

IJORER : International Journal of Recent Educational Research
Homepage : https://journal.ia-education.com/index.php/ijorer
Email : ijorer@ia-education.com

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 4, July 2025
Page 1039-1058



**Figure 20.** The AR Program Video Output Display

*Validity Stage*

The validation test process is carried out to ensure that the development process and results of the AR program are in accordance with the learning objectives. The validation test process involves 2 experts consisting of an expert in archive management to provide validation of the material content and an expert in learning media to provide validation related to media content. The validation results can be seen in Figure 12 below.

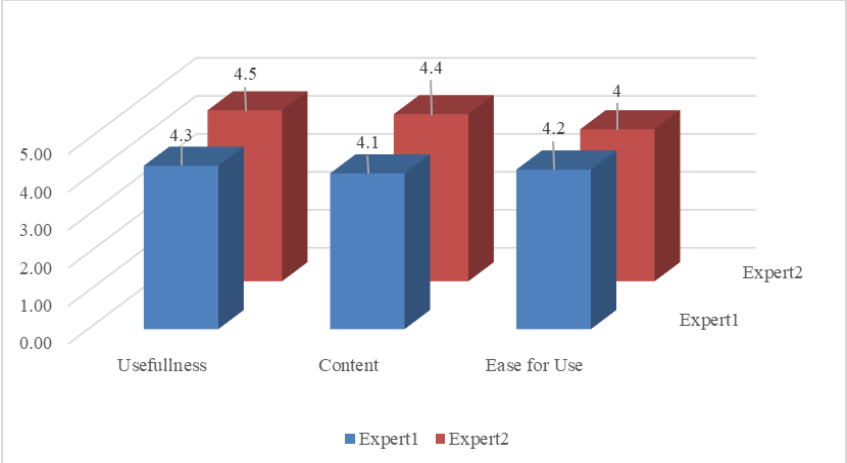


**Figure 21**. Summary Results of Validity Test

Based on table 1 and figure 12, the average validation score obtained from the experts shows that all validation results obtained a very good score (A). This indicates that the development of AR-based media is highly aligned with scientific principles, learning objectives, and ease of use. However, there are some inputs from experts for improving the AR program in several parts. Based on expert feedback, the video menu should display video titles only, instead of using labels such as "Video 1," "Video 2," and so on (Figure 8). This change is intended to make it easier for users to select videos based on the desired title. Therefore, the revision involved replacing the numbered video labels with the corresponding video content titles. Another suggestion was to change the QR code format in the e-book—from a standard barcode format to a uniquely patterned QR

IJORER : International Journal of Recent Educational Research
Homepage : https://journal.ia-education.com/index.php/ijorer
Email : ijorer@ia-education.com

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 4, July 2025
Page 1039-1058


code, as shown in Figure 13. This aims to provide a distinctive characteristic that allows for faster QR code scanning compared to the standard format.

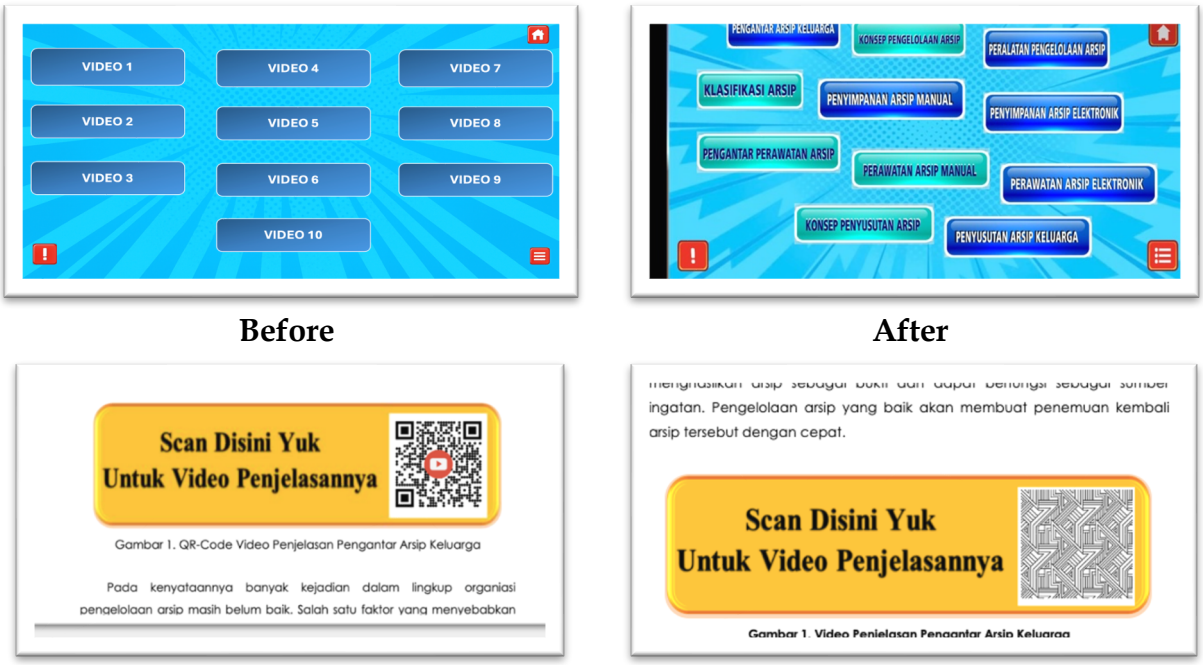


**Figure 22.** Revision from Experts

*Limited Trial*

The next process is a limited trial to 40 students as prospective users of the AR program in the future. This limited trial stage is carried out to obtain input related to audio quality, video quality, visual appeal and ease. The following is descriptive data about the limited trial.

**Table 3.** Desriptive Statistic of The Feasibility Test

| | Audio Quality | Video Quality | Visual Appeal | Ease to use |
|---|---|---|---|---|
| Mean | 4,55 | 4,575 | 4,475 | 4,275 |
| SD | 0,749 | 0,747 | 0,861 | 1,320 |
| Minimum | 1 | 1 | 1 | 1 |
| Maximum | 5 | 5 | 5 | 5 |
| Count | 40 | 40 | 40 | 40 |

The results of the feasibility test on 40 students showed that the quality of video content was the highest with a score of 4.575, then audio quality 4.55. While the visual aspect scored 4.475 followed by ease of use 4.275. The average usability test score was 4.468 (very good). Therefore, the AR program developed is worthy of being implemented in further research.

***Discussion***

Technology has become an important part of the education field because it can have a positive impact on the quality of learning and teaching (Teoh et al., 2022). Trends show that students have shifted from conventional learning methods to computers and internet-based digital media (Anggrawan et al., 2021; Nickl et al., 2022). Based on the evaluation of student behavior in class, it shows that the level of student focus in reading

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 4, July 2025
Page 1039-1058


books is only within the range of 11-15 minutes, after which they tend to get bored which is indicated by shaking their heads, looking at their handphone, yawning, getting angry, and even crying (Zhao et al., 2025). Zhao et al. (2025) added that most students expressed their boredom in studying by shaking their heads and looking at their phones. On the other hand, manual reading books only accommodate certain learning styles. Instruction tailored to a person's preferred learning style will result in much better learning or retention than providing the same instruction in a person's non-preferred learning style (Hattie & O'Leary, 2025; Rogowsky et al., 2015). So, digital media is believed to be superior to being the answer to academic problems in the learning process in the current era (Grossman et al., 2009; Kang & van Es, 2019).

According to Radosavljevic et al. (2018), the use of AR in mobile learning can shorten the time students take to complete assignments and improve the quality of their work in vocational education settings. Moreover, the use of AR in vocational learning has been found effective in enhancing learner control, collaboration, and decision-making abilities relevant to workplace satisfaction (Lester & Hofmann, 2020). Belani & Parnami (2020) also stated that AR can be well integrated and add value to training and development processes for workers with special abilities in the industry. Therefore, AR development can be an innovative solution for improving the quality of learning in vocational education (Sabitri et al., 2024). AR technology offers a more vivid and realistic learning experience, allowing students to actively engage with the material and develop skills through realistic virtual simulations and practices (Supriyanto et al., 2023).

The AR development process shows that content must be aligned with the characteristics of learners. Most students in vocational education are members of Generation Z. Generation Z is distinct from previous generations as they have grown up immersed in the development of information technology. One defining feature of Generation Z is their close connection to smartphone technology (Ahmed, 2019; Rushda & Nawarathna, 2021). This is further confirmed by the fact that all prospective users own smartphones that support learning through applications. The selection of video and audio content is not only tailored to users' needs but is also a fundamental concept in AR system integration. As stated by Weng et al. (2013), AR is an example of ICT that satisfies users by integrating various content such as videos, 2D/3D images, text, audio, and even animations with audiovisuals in an augmented environment.

Validity test results show that the developed AR program functions as expected. The development of AR program as learning media almost always yields positive results in validity testing. Previous studies such as those by Anggrawan et al. (2023), Hughes & Maas (2018), Ramadhani & Rosy (2023), and Suhaizal et al. (2023) concluded that validity or alpha test results show good to excellent outcomes. The usability test results reinforce that the AR program meets the expectations of its target users—Generation Z. This is evident from the positive responses toward the quality and attractiveness of the audio, video, and AR user interface. These results further emphasize that AR-based learning media are well-suited for Generation Z students, who prefer digital technology in their daily lives (Ismail et al., 2021; Kibat et al., 2023). Using content such as video and audio enriches the AR program and accommodates the learning needs of Generation Z, who are more interested in visual media compared to conventional learning methods like reading textbooks or listening to lectures (Lai & Cheong, 2022; Mahmud et al., 2024). Therefore, the integration of AR as a learning aid in vocational education is not only relevant but also essential in addressing the needs and learning characteristics of this

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 4, July 2025
Page 1039-1058


generation. AR technology offers a more vivid and realistic learning experience, enabling students to actively engage with the subject matter and develop skills through realistic simulations and virtual practice (Supriyanto et al., 2023).

With successful testing in the early stages, this AR program can now be used in the learning process or tested empirically in real classroom settings. According to Anggrawan et al. (2023), a validated AR program can serve as an alternative to replace traditional face-to-face teaching while ensuring good learning outcomes. Although AR holds great potential and a positive impact in learning processes, its adoption in education, marketing, healthcare, entertainment, and industry still requires significant effort due to the many complex challenges it faces (Villagran-Vizcarra et al., 2023). Therefore, future research should focus on testing the effectiveness of the developed AR program in real educational environments.

## CONCLUSION

**Fundamental Finding**: The Augmented Reality (AR) program for the Family Archive Management course as one of an innovative solution in digital era learning due to a solution to vocational student problems. This research has completed the analysis, design, and development of an augmented reality for family archive management in vocational education. Evaluations by both of experts and prospective user show that the AR Program as very good for all aspects including usability, content quality, ease of use, visual appeal, video quality, and audio quality. **Implication**: This AR-Based program plays a pivotal role for accommodate students to learning family archive management with flexibility. Moreover, the module can serve as a model for other disciplines to adopt similar innovative approaches to enhance the quality of digital learning in vocational education especially for administration education field. **Limitation**: This study has limitations because it focuses solely on the development of the AR program and does not detail the processes of creating video, audio, and text content. Additionally, the study is confined to the analysis, design, and development phases, without covering implementation or evaluation. **Future Research**: Future studies should continue implementation and evaluation phases to demonstrate that The AR program effectively enhances teaching and learning process in vocational education.

## ACKNOWLEDGEMENTS

The author would like to express gratitude for the support from the Ministry of Education, Culture, Research, and Technology for providing funding assistance for the development of this AR program, which is part of the digital module innovation grant. In writing this article, the author utilized AI assistance (ChatGPT) to check grammar and suggest appropriate words or structures.

## REFERENCES

Ahlers, K. H., Kramer, A., Breen, D. E., Chevalier, P. -Y, Crampton, C., Rose, E., Tuceryan, M., Whitaker, R. T., & Greer, D. (1995). Distributed Augmented Reality for Collaborative Design Applications. Computer Graphics Forum, 14(3), 3-14. https://doi.org/10.1111/j.1467-8659.1995.cgf143_0003.x

Anggrawan, A., Syafitri, C. S. D., & Satria, C. (2023). Developing Augmented Reality Learning and Measuring Its Effect on Independent Learning Compared to

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 4, July 2025
Page 1039-1058


Traditional Learning. TEM Journal, 12(2), 975-987. https://doi.org/10.18421/TEM122-44

Arena, F., Collotta, M., Pau, G., & Termine, F. (2022). An Overview of Augmented Reality. In Computers, 11(2), 1-15. https://doi.org/10.3390/computers11020028

Astuti, M., Arifin, Z., Mutohhari, F., & Nurtanto, M. (2021). Competency of Digital Technology: The Maturity Levels of Teachers and Students in Vocational Education in Indonesia. Journal of Education Technology, 5(2), 254–262. https://doi.org/10.23887/jet.v5i3.35108

Bates, AW (Tony), Teaching in a Digital Age : Guidelines for Designing Teaching and Learning (Tony Bates Associates Ltd., 3rd edition., 2022)

Belani, M and Parnami, A. Augmented Reality for Vocational Education Training in K12 Classrooms, 2020 IEEE International Symposium on Mixed and Augmented Reality Adjunct (ISMAR-Adjunct), Recife, Brazil, 2020, 317-320, https://doi.org/10.1109/ISMAR-Adjunct51615.2020.00090

Branca, T. A., Fornai, B., Colla, V., Murri, M. M., Streppa, E., & Schröder, A. J. (2020). The challenge of digitalization in the steel sector. In Metals. 10(2), 1-23. https://doi.org/10.3390/met10020288

Cahyadi, R. A. H. (2019). Pengembangan Bahan Ajar Berbasis Addie Model. Halaqa: Islamic Education Journal, 3(1), 35-42. https://doi.org/10.21070/halaqa.v3i1.2124

Cahyono, D. D, Hamda, M.K & Prahastiwi, E.D. (2022). Pemikiran Abraham Maslow Tentang Motivasi dalam Belajar. Tajdid Jurnal Pemikiran Keislaman Dan Kemanusiaan, 6(1). 37-48. https://doi.org/https://doi.org/10.52266/

Deng, Y., Liu, P., & Xu, C. (2023). Research on application mode of ADDIE model in programming course. In Proceedings of the 2023 4th International Conference on Big Data and Informatization Education (ICBDIE 2023) (pp. 765–774). Atlantis Press. https://doi.org/10.2991/978-94-6463-238-5_100

Dobricki, M., Evi-Colombo, A., & Cattaneo, A. (2020). Situating vocational learning and teaching using digital technologies - A mapping review of current research literature. International Journal for Research in Vocational Education and Training, 7(3), 344–360. https://doi.org/10.13152/IJRVET.7.3.5

Elmqaddem, N. (2019). Augmented Reality and Virtual Reality in education. Myth or reality? International Journal of Emerging Technologies in Learning, 14(3), 234–242. https://doi.org/10.3991/ijet.v14i03.9289

Grossman, P., Compton, C., Igra, D., Ronfeldt, M., Shahan, E., & Williamson, P. W. (2009). Teaching practice: A cross-professional perspective. Teachers College Record, 111(9), 2055-2100. https://doi.org/10.1177/016146810911100905

Harahap, A., Sucipto, A., & Jupriyadi, J. (2020). Pemanfaatan Augmented Reality (AR) Pada Media Pembelajaran Pengenalan Komponen Elektronika Berbasis Android. Jurnal Ilmiah Infrastruktur Teknologi Informasi, 1(1), 20-25. https://doi.org/10.33365/jiiti.v1i1.266

Hasibuan, A. M., Saragih, S., & Amry, Z. (2018). Development of Learning Materials Based on Realistic Mathematics Education to Improve Problem Solving Ability and Student Learning Independence. International Electronic Journal of Mathematics Education, 14(1), 243-252. https://doi.org/10.29333/iejme/4000

Hattie, J., & O'Leary, T. (2025). Learning Styles, Preferences, or Strategies? An Explanation for the Resurgence of Styles Across Many Meta-analyses. Educational Psychology Review, 37(2), 1-26. https://doi.org/10.1007/s10648-025-10002-w

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 4, July 2025
Page 1039-1058


Hughes, J., & Maas, M. (2018). Developing 21st Century Competencies of Marginalized Students Through the Use of Augmented Reality (AR). LEARNing Landscapes, 11(1), 153-169. https://doi.org/10.36510/learnland.v11i1.929

Ismail, I., Iksan, N., Subramaniam, S. K., Abdulbaqie, A. S., Pillai, S. K., & Panessai, I. Y. (2021). Usefulness of Augmented Reality as a Tool to Support Online Learning. Jurnal Ilmiah Teknik Elektro Komputer Dan Informatika, 7(2), 277–285. https://doi.org/10.26555/jiteki.v7i2.21133

Işman, A. (2011). Instructional design in education: New model. Turkish Online Journal of Educational Technology, 10(1), 136–142. https://www.tojet.net/articles/v4i4/447.pdf

Jones, S., & Lea, M. R. (2008). Digital literacies in the lives of undergraduate students: exploring personal and curricular spheres of practice. The Electronic Journal of E-Learning, 6(3), 207 – 216. https://academic-publishing.org/index.php/ejel/article/view/1546

Kamińska, D., Zwoliński, G., Laska-Leśniewicz, A., Raposo, R., Vairinhos, M., Pereira, E., Urem, F., Ljubić Hinić, M., Haamer, R. E., & Anbarjafari, G. (2023). Augmented Reality: Current and New Trends in Education. In Electronics (Switzerland), 12(16), 1-32. https://doi.org/10.3390/electronics12163531

Kang, H., & van Es, E. A. (2018). Articulating Design Principles for Productive Use of Video in Preservice Education. Journal of Teacher Education, 70(3), 237-250. https://doi.org/10.1177/0022487118778549

Kholiq, Abd. (2020). Development of B D F-AR 2 (Physics Digital Book Based Augmented Reality) to train students' scientific literacy on Global Warming Material. Berkala Ilmiah Pendidikan Fisika, 8(1), 50-58. https://doi.org/10.20527/bipf.v8i1.7881

Kibat, S., Ngelambong, A., & Scott, N. (2023). The Potential of Augmented Reality in Education: A Scoping Review. International Journal of Academic Research in Business and Social Sciences, 13(5), 635-647. https://doi.org/10.6007/ijarbss/v13-i5/17072

Kozma, R. B. (1991). Learning with Media. Review of Educational Research, 61(2), 179-211. https://doi.org/10.3102/00346543061002179

Lai, J. W., & Cheong, K. H. (2022). Adoption of Virtual and Augmented Reality for Mathematics Education: A Scoping Review. in IEEE Access, 10, 13693-13703, 2022, https://doi.org/10.1109/ACCESS.2022.3145991

Lester, S. and Hofmann, J. (2020), Some pedagogical observations on using augmented reality in a vocational practicum. Br J Educ Technol, 51, 645-656. https://doi.org/10.1111/bjet.12901

Liu, C., Tang, D., Zhu, H., Nie, Q., Chen, W., & Zhao, Z. (2024). An augmented reality-assisted interaction approach using deep reinforcement learning and cloud-edge orchestration for user-friendly robot teaching. Robotics and Computer-Integrated Manufacturing, 85 (2024). https://doi.org/10.1016/j.rcim.2023.102638

Liu, Y., & Fan, L. (2023). Research on hybrid teaching of curriculums based on the ADDIE model. In Proceedings of the 2nd International Conference on Culture, Design and Social Development (CDSD 2022) (pp. 220–232). Atlantis Press. https://doi.org/10.2991/978-2-38476-018-3_23

Lukman, M. I., Handoyo, B., & Utomo, D. H. (2021). Pengembangan Sumber Belajar Geografi Berbasis Spasial dengan Augmented Reality untuk Meningkatkan Kemampuan Berpikir Tingkat Tinggi. Jurnal Pendidikan: Teori, Penelitian, Dan

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 4, July 2025
Page 1039-1058


Pengembangan, 6(12), 1869—1875. https://doi.org/10.17977/jptpp.v6i12.15161
Mahmud, M., Sari, D. C. R., Sari, D., Arfian, N., & Zucha, M. A. (2024). The application of augmented reality for improving clinical skills: a scoping review. In Korean Journal of Medical Education, 36(1), 65-79. https://doi.org/10.3946/kjme.2024.285
Makhenyane, L. E. (2024). The Use of Augmented Reality in the Teaching and Learning of isiXhosa Poetry. Journal of the Digital Humanities Association of Southern Africa (DHASA), 5(1), 1-7. https://doi.org/10.55492/dhasa.v5i1.5023
Marín, V., Sampedro, B. E., Muñoz González, J. M., & Vega, E. M. (2022). Primary Education and Augmented Reality. Other Form to Learn. Cogent Education, 9(1), 1-19. https://doi.org/10.1080/2331186X.2022.2082082
Mayer, R. E. (2014). The Cambridge handbook of multimedia learning, second edition. In The Cambridge Handbook of Multimedia Learning, Second Edition. https://doi.org/10.1017/CBO9781139547369
Mohr, K. A. J., & Mohr, E. S. (2016). Understanding Generation Z Students to Promote a Contemporary Learning Environment. Journal on Empowering Teaching Excellence, 1(1), 84 – 94. https://doi.org/10.15142/T3M05T.
Murniati, T., Tentama, F., & Santosa, B. (2020). Vocational Skills Education to Grow the Junior High School Students' Work Intention. Journal of Vocational Education Studies, 3(1), 39-48. https://doi.org/10.12928/joves.v3i1.1817
Ahmed, Niaz. (2019). Generation Z's Smartphone and Social Media Usage: A Survey. Journalism and Mass Communication, 9(3), 101-122 https://doi.org/10.17265/2160-6579/2019.03.001
Nickl, M., Huber, S. A., Sommerhoff, D., Codreanu, E., Ufer, S., & Seidel, T. (2022). Video-based simulations in teacher education: the role of learner characteristics as capacities for positive learning experiences and high performance. International Journal of Educational Technology in Higher Education, 19, 45(2022), 1-24. https://doi.org/10.1186/s41239-022-00351-9
Petrov, P. D., & Atanasova, T. V. (2020). The Effect of augmented reality on students' learning performance in stem education. Information (Switzerland), 11(4), 1-11. https://doi.org/10.3390/INFO11040209
Porat, E., Blau, I., & Barak, A. (2018). Measuring digital literacies: Junior high-school students' perceived competencies versus actual performance. Computers and Education, 126, 23-36. https://doi.org/10.1016/j.compedu.2018.06.030
Radosavljevic, S., Radosavljevic, V., & Grgurovic, B. (2018). The potential of implementing augmented reality into vocational higher education through mobile learning. Interactive Learning Environments, 28(4), 404–418. https://doi.org/10.1080/10494820.2018.1528286
Ragnhildstveit, A., Li, C., Zimmerman, M. H., Mamalakis, M., Curry, V. N., Holle, W., Baig, N., Uğuralp, A. K., Alkhani, L., Oğuz-Uğuralp, Z., Romero-Garcia, R., & Suckling, J. (2023). Intra-operative applications of augmented reality in glioma surgery: a systematic review. In Frontiers in Surgery. 10, 1-13. https://doi.org/10.3389/fsurg.2023.1245851
Ramadhani, I. K., & Rosy, B. (2023). The Development of Augmented Reality (AR) Based Learning Modules in Office Technology and Correspondence Subjects. Jurnal Pendidikan Administrasi Perkantoran (JPAP), 11(2), 99-108. https://doi.org/10.26740/jpap.v11n2.p99-108
Reza, F., & Tinggogoy, F. L. (2022). Konflik Generasi Z Di Bidang Pendidikan Di Era

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 4, July 2025
Page 1039-1058


Revolusi Industri 4.0 Tantangan dan Solusinya. PARADIGMA : Jurnal Administrasi Publik, 1(2), 142–155. https://doi.org/10.55100/paradigma.v1i2.51

Rogowsky, B. A., Calhoun, B. M., & Tallal, P. (2015). Matching learning style to instructional method: Effects on comprehension. Journal of Educational Psychology, 107(1), 64–78. https://doi.org/10.1037/a0037478

Rosyadi, M. I., Kustiawan, I., Tetehfio, E. O., & Joshua, Q. (2023). The Role of AI In Vocational Education: A Systematic. Joves, 6(2), 244-263. https://doi.org/10.12928/joves.v6i2.9032

Rushda, M. U. F., & Nawarathna, L. S. (2021). The impact and usage of smartphone among Generation Z: A study based on data mining techniques. In U. Lathif & A. K. Bhoi (Eds.), Explainable artificial intelligence for smart cities (1st ed., p. 17). CRC Press. https://doi.org/10.1201/9781003172772-4

Sabitri, Z., Rahayu, S., & Meirawan, D. (2024). The implementation of augmented reality-based flipbook learning media in improving vocational school students' critical thinking skills in the era of society 5.0. Jurnal Pendidikan Teknologi Kejuruan, 7(1),. 22-31. https://doi.org/10.24036/jptk.v7i1.35223

Schmid, M., Brianza, E., & Petko, D. (2021). Self-reported technological pedagogical content knowledge (TPACK) of pre-service teachers in relation to digital technology use in lesson plans. Computers in Human Behavior, 115 (2021), 1-15. https://doi.org/10.1016/j.chb.2020.106586

Sharov, A. S. (2020). Vocational Education As Gaining Experience. Review of Omsk State Pedagogical University. Humanitarian Research, 29(2020), 133-136 https://doi.org/10.36809/2309-9380-2020-29-133-136

Stender, B., Paehr, J., & Jambor, T. N. (2021). Using AR/VR for technical subjects in vocational training - Of substancial benefit or just another technical gimmick?, 2021 IEEE Global Engineering Education Conference (EDUCON), Vienna, Austria, 2021, 557-561, https://doi.org/10.1109/EDUCON46332.2021.9453928

Suhaizal, H., Abdul Rahman, K. A. ., Khamis , N. ., Shukor, U. H. ., Che Lah, N. H. ., & Zulkifli, N. N. (2023). The Design and Development of Augmented Reality (AR) Application for Internet Evolution Learning Topics. International Journal of Interactive Mobile Technologies (iJIM), 17(05), 162–181. https://doi.org/10.3991/ijim.v17i05.36483

Supriyanto, S., Joshua, Q., Abdullah, A. G., Tettehfio, E. O., & Ramdani, S. D. (2023). Application of Augmented Reality (AR) in vocational education: A systematic literature review. Jurnal Pendidikan Vokasi, 13(2), 205–213. https://doi.org/10.21831/jpv.v13i2.54280

Tiyastuti, B. A. (2019, October 30). Pola pendidikan yang tepat bagi generasi Z dan generasi Alfa. Tirto.id. https://tirto.id/pola-pendidikan-yang-tepat-bagi-generasi-z-dan-generasi-alfa-ekQw

Tobback, I., Verhaest, D., Baert, S., & De Witte, K. (2024). Vocational education, general education, and on-the-job learning over the life cycle. European Sociological Review, 40(2), 189–207. https://doi.org/10.1093/esr/jcad015

Uriarte-Portillo, A., Zatarain-Cabada, R., Barrón-Estrada, M. L., Ibáñez, M. B., & González-Barrón, L. M. (2023). Intelligent Augmented Reality for Learning Geometry. Information (Switzerland), 14(4), 1-18. https://doi.org/10.3390/info14040245

Villagran-Vizcarra, D. C., Luviano-Cruz, D., Pérez-Domínguez, L. A., Méndez-González,

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 4, July 2025
Page 1039-1058


L. C., & Garcia-Luna, F. (2023). Applications Analyses, Challenges and Development of Augmented Reality in Education, Industry, Marketing, Medicine, and Entertainment. In Applied Sciences (Switzerland). 13(5), 1-30. https://doi.org/10.3390/app13052766

Firmansyah, M. A., Ratnasari, D., Mahrawi, M., & Wahyuni, I. (2022). Pengembangan AR (Augmented Reality) Mangrove Berbasis Website Pada Materi Keanekaragaman Hayati. Jurnal Inovasi Pendidikan Dan Sains, 3(1), 1-8. https://doi.org/10.51673/jips.v3i2.915

Weng, E. N. G., Abdullah-Al-Jubair, Md., Adruce, S. A. Z., & Bee, O. Y. (2013). Graphics, Audio-visuals and Interaction (GAI) based Handheld Augmented Reality System. Procedia - Social and Behavioral Sciences, 97, 745-752, https://doi.org/10.1016/j.sbspro.2013.10.296

Wijoyo, H., Indrawan, I., Handoko, A. L., & Cahyono, Y. (2020). Generasi Z & revolusi industri 4.0 (First Edition). CV. Pena Persada. https://www.researchgate.net/publication/343100872

Zhao, X.M, F. D. Yusop, H. C. Liu, Y. Nur Prilanita and Y. Xuan Chang, "Classroom Student Behavior Recognition Using an Intelligent Sensing Framework," in IEEE Access, 13, 49767-49776, 2025, https://doi.org/10.1109/ACCESS.2025.3550921

*Yuliansah
Department of Office Administration, Faculty of Economics and Business
Universitas Negeri Yogyakarta
Jl. Colombo 1, Special Region of Yogyakarta, 55281, Indonesia
Email: yuliansah@uny.ac.id

**Umar Yeni Suyanto**
Department of Office Administration, Faculty of Economics and Business
Universitas Negeri Yogyakarta
Jl. Colombo 1, Special Region of Yogyakarta, 55281, Indonesia
Email: umaryenisuyanto@uny.ac.id

**Yeni Nur Aprilita**
Curriculum and Instructional Technology, Faculty of education
Universiti Malaya
50603 Kuala Lumpur, Malaysia
Email: s2152054@siswa.um.edu.my