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PRELIMINARY RESEARCH OF DDD-E MODEL: A FRAMEWORK FOR DEVELOPING WEBSITE INFOGRAPHIC FOR ISLAMIC EDUCATION LITERACY

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Abstract:
Literacy is inextricably linked to successful learning outcomes. Research consistently demonstrates that students' literacy challenges encompass difficulties in comprehending specific types of learning materials. Infographics, characterized by their visual appeal, clarity, and concise presentation, have the potential to serve as an effective medium for facilitating students' understanding of educational content. The present study investigates the decision-making and design processes involved in developing website-based infographics as a tool for enhancing Islamic Education literacy. Framed within the initial stages of Research and Development (R&D), data collection encompassed interviews, observations, document analysis, and a comprehensive review of relevant literature. The subsequent qualitative analysis involved data reduction, presentation, and the formulation of conclusions. Findings indicated that the selection of media for development was predicated upon a thorough consideration of learning objectives, the scope of the media, prerequisite skills, and available resources. The design stage comprised a series of activities aimed at creating engaging and informative website infographics. These infographics are theoretically posited to capture students' attention, facilitate memory retention, and foster a deeper comprehension of the subject matter. It is anticipated that this research will serve as a valuable reference for the development of website infographics as literacy tools, employing systematic procedures and sound pedagogical assumptions.

Abstrak:
Literasi memiliki keterkaitan yang kuat dengan keberhasilan proses pembelajaran. Temuan di lapangan mengindikasikan adanya permasalahan literasi pada siswa, termasuk kesulitan dalam memahami jenis materi pembelajaran tertentu. Infografis, dengan karakteristiknya yang menarik, jelas, dan mudah dipahami, dapat menjadi media yang efektif dalam memfasilitasi pemahaman siswa terhadap materi pembelajaran. Penelitian ini bertujuan untuk menganalisis tahap penentuan (*decide*) dan perancangan (*design*) infografis berbasis website sebagai media literasi dalam pembelajaran Pendidikan Agama Islam (PAI). Penelitian ini merupakan bagian awal dari *Research and Development* (R&D). Pengumpulan data dilakukan melalui wawancara, observasi, dokumentasi, dan studi literatur, kemudian dianalisis secara kualitatif meliputi reduksi data, penyajian data, dan penarikan kesimpulan. Hasil penelitian menunjukkan bahwa penentuan media yang akan dikembangkan mempertimbangkan tujuan pembelajaran, cakupan media, kemampuan prasyarat siswa, dan sumber daya yang tersedia. Tahap perancangan meliputi serangkaian kegiatan untuk merancang infografis berbasis website. Secara teoritis, infografis website yang dikembangkan diharapkan mampu menarik perhatian siswa, serta memudahkan siswa dalam mengingat dan memahami materi ajar. Penelitian ini

diharapkan dapat menjadi acuan dalam pengembangan infografis website sebagai media literasi yang efektif, dengan prosedur yang sistematis dan asumsi yang logis.

Keywords:
Website Infographic, Literacy Media, Islamic Education Learning

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INTRODUCTION

Literacy is a fundamental life skill that significantly enhances human functioning within societal contexts. Through the acquisition of literacy, individuals cultivate critical thinking faculties, thereby enabling them to effectively address and resolve multifaceted life challenges (Darma & Astuti, 2021; Irianto & Febrianti, 2017). In its broadest conceptualization, literacy encompasses an individual's capacity to process and comprehend information through the modalities of reading and writing (Palupi, Widiastuti, Hidhayah, Utami, & Wana, 2020). Citing the National Literacy Act, Darma and Astuti (2021) propose that literacy comprises the ability to read, write, and engage in effective linguistic communication, in addition to problem-solving at a level commensurate with the demands of professional and social spheres (Mansur & Rafiudin, 2020). This definition is congruent with the Organization for Economic Co-operation and Development (OECD)'s conceptualization of reading literacy, articulated by Warnby (2024) as the capacity to "understand, utilize, reflect upon, and engage with written texts to achieve personal goals, develop one's knowledge and potential, and participate fully in society".

Within the Islamic faith, literacy occupies a position of paramount importance. The Qur'an has championed the spirit of literacy since its revelation. As evidenced by various verses within the Qur'an, literacy serves as a conduit for the transmission and advancement of knowledge (SPK Tulunggagung, 2020). In Surah al-Alaq verses 1-5, Allah SWT exhorts humanity to read while acknowledging Allah SWT as the Creator, emphasizing the noble nature of humans, and highlighting the use of the pen (writing) as a means of instruction and imparting knowledge previously unknown to humanity (Kementerian Agama RI, 2013). These verses contain two key terms related to literacy: iqra' and qalam. Iqra', derived from the root word qara'a, signifies reading, studying, and learning. Qalam refers to the pen or writing instrument (Kurniasih, 2022). Quraish Shihab elucidates that the term al-qalam can also denote the act of writing itself. From a linguistic perspective, al-qalam is a word signifying both a tool and a cause, often employed to

convey the meaning of effect or result (Shihab, 2005). Therefore, based on this verse, literacy encompasses the dual dimensions of reading and writing.

The dimensions of literacy extend beyond reading and writing activities, encompassing a broader spectrum of learning that empowers individuals to achieve their life goals, cultivate their knowledge and potential, and actively engage in societal life (Wahidin, 2018). Literacy is intrinsically linked to successful learning outcomes, a correlation supported by numerous research findings. Nugraha's (2022) study revealed a close association between science literacy skills and science learning outcomes in fifth-grade elementary school students. Similarly, research conducted by Suandewi, Putrayasa, & Gunatama (2019) identified a positive relationship between reading-writing literacy culture and Indonesian language learning outcomes among eleventh-grade high school students in Denpasar. Furthermore, Hanafi, Musthofa, & Safi'i (2023) found a strong and unidirectional relationship between religious literacy levels and seventh-grade junior high school students' understanding of Islamic Religious Education.

The learning process can be frequently impeded by learning problems or difficulties. Amma (2018) identified six key challenges within the learning process, encompassing teacher-related issues, student-related issues, problems stemming from the student's environment, issues with the material or subject matter, challenges associated with learning methods, and evaluation-related problems. Furthermore, Nusroh & Ahsani (2020) elucidated that the indiscriminate selection of learning methods and media can contribute to students' learning difficulties. Conversely, the judicious implementation of appropriate and diverse media and methods can serve as a viable solution for overcoming these challenges.

The challenges identified in the learning process align with findings from pre-research interviews conducted at As Sakinah Sidoarjo Islamic Junior High School. From the teacher's perspective, a significant challenge lies in tailoring learning methods to accommodate the diverse characteristics of the student body. Conversely, students expressed difficulties in memorizing content, grappling with differing scholarly opinions, and understanding historical timelines. These field-based issues underscore the need for research focused on developing website-based infographics as a literacy tool for Islamic Education at the junior high school level. This research aims to address the challenges faced by teachers in selecting appropriate learning methods and media, as well as the difficulties encountered by students in memorizing and analyzing historical timelines.

Infographics present a viable medium for enhancing literacy on a specific topic. Resnatika, Sukaesih, & Kurniasih (2018) found that infographics, through the use of color and imagery, effectively capture readers' attention. Furthermore, the clarity of infographics is achieved through the combination of text and relevant images. This clear and visually appealing presentation facilitates reader comprehension of the conveyed content. These findings suggest that infographics offer a literacy tool that is easily digestible and understandable for readers. Consequently, this research aims to develop infographic media that specifically aids students in comprehending, memorizing, and

analyzing the historical timeline of Islamic culture, which constitutes the learning content under investigation.

Several research findings on the development of infographics for Islamic Education learning have demonstrated the feasibility and effectiveness of this medium. Faizah, Ma'ruf, & Rusydiyah (2023) reported that infographic learning media significantly contributes to shaping students' interest in learning within the Madrasah Aliyah context. This is further corroborated by Saputra, Ratumbuysang, & Utama (2021) findings, which revealed that infographics are highly relevant as a learning tool for elementary school students. Their study specifically highlighted that the infographic "Ablution Procedure" was deemed very feasible based on assessments conducted by both media and material experts.

Faizah's research qualitatively examines the impact of infographics on student interest in learning, while Saputra focuses on developing infographics for wudu procedures using the 4D model. In contrast, the present study represents preliminary research within the DDD-E (Decide, Design, Develop, Evaluate) model, a procedural approach typically employed prior to the development of learning tools, as evidenced in previous studies (Mustika, Rahmi, & Miranti, 2023; Robert, Sarwanto, & Suparmi, 2018). This research specifically delineates the initial two stages of the DDD-E model – decide and design – as applied to the development of website-based infographics. Furthermore, these website infographics are interactive media, distinguishing them from the passive infographics employed in the aforementioned studies. Thus, the focus of this research, centered on interactive website infographics, represents a novel contribution to the existing body of literature, underscoring its significance and originality.

This study aims to identify and describe the findings of the preliminary research phase within the DDD-E model, specifically focusing on the development of website infographics as a medium for enhancing Islamic Religious Education literacy. The scope of this research is limited to an in-depth examination of the first two stages of the DDD-E model – decide and design – and includes a theoretical discussion on the potential benefits of website infographics as tools for promoting Islamic Education literacy. The research findings are anticipated to serve as a valuable reference for the development of website infographic media that can effectively facilitate the acquisition of Islamic Education literacy.

RESEARCH METHOD

This study is a preliminary investigation within the DDD-E (Decide, Design, Develop, Evaluate) model framework, aiming to identify and describe the decision-making and design phases of website infographic development as a literacy tool for Islamic Education in junior high schools. The research focuses specifically on the initial two stages of the four-stage DDD-E process: decide and design (Ferdiansyah Syamsunir, Kamal, & Anwar, 2022). This preliminary research is crucial to ensure that the developed website infographics align with the actual needs of the educational setting and are designed based on sound scientific principles. Employing a qualitative descriptive approach, data collection

involved interviews, observations, document analysis, and literature review. Structured interviews were conducted with Islamic Education teachers and all 40 students of class IX phase D at As Sakinah Sidoarjo Junior High School, both in person and online via Google Forms, to identify student learning challenges and needs. Teacher interviews explored teacher-related difficulties, student learning obstacles encountered during instruction, and student learning styles. Student interviews focused on their individual learning difficulties and preferred learning styles. Observations were made to assess the school's readiness to accommodate the proposed media, with a checklist instrument detailing indicators of the availability of electronic facilities for utilizing website infographics. Additionally, learning materials, including CP (Capaian Pembelajaran), ATP (Alur Tujuan Pembelajaran), KKTP (Kriteria Ketercapaian Tujuan Pembelajaran), and Islamic Education textbooks were documented. The research also included a comprehensive literature review, primarily drawing from books, SINTA-accredited national articles, and SCOPUS-accredited international articles published within the last 10 years, to complement and contextualize the field data.

The collected data underwent analysis using the remaining three stages of Miles, Huberman, and Saldana's four-stage qualitative data analysis framework: data condensation, data presentation, and conclusion drawing (Miles, Huberman, & Saldana, 2014). Data condensation involved summarizing, coding, and grouping data based on identified categories. Subsequently, the data was presented concisely, encompassing the overall findings. Finally, conclusions were drawn to directly address the research objectives (Kriyantono, 2022). It is important to note that this study has limitations due to the research sample being drawn from only one grade level within a single school. Therefore, the findings cannot be generalized to all grade levels or diverse educational institutions, as the identified problems may vary across contexts. Future researchers are encouraged to expand the sample to include multiple grade levels and schools with differing characteristics. This would enable the identification of potential discrepancies in the needs and possibilities for developing website infographics as literacy tools for Islamic Education.

RESULTS AND DISCUSSION

Website Infographic

Infographics have been widely developed as a learning medium to optimize their inherent benefits. For instance, Mansur & Rafiudin (2020) developed infographics using the ADDIE model, and their research concluded that the use of infographics can enhance student interest in learning. Similarly, Wulandari, Abidin, & Praherdhiono (2019) developed an infographic e-book to strengthen student cognition, and their study found that infographic e-books are effective in facilitating independent learning. Aldila, Musadad, & Susan (2019) also concluded that infographic media are feasible for use in learning environments. While these studies highlight the potential of infographics as learning media for improving various aspects of learning, including interest, cognitive ability, and other supportive factors, they lack a comprehensive examination of the

decision-making and design stages in infographic development. This gap in knowledge is particularly significant for teachers, who need to understand the initial stages of media development in order to determine the most appropriate learning media and design it effectively. Additionally, the theoretical basis for selecting infographics as a medium remains somewhat ambiguous.

Infographics can be further developed to enhance engagement and effectiveness in learning. For instance, Tsai, Huang, & Chang (2020) developed motion infographics, demonstrating their effectiveness in improving student academic achievement and understanding of image shapes compared to a control group without the media. Firdaus, Maryuni, & Nurhasanah (2021) developed Android-based infographics, highlighting their feasibility as a history learning medium due to ease of use, offline accessibility, affordability, and attractive design. Permatasakti, Salsabila, & Rupa (2023) created an illustration-based infographic book that received positive feedback in testing, indicating its effectiveness in increasing elementary school students' interest in traditional Betawi games. These studies collectively showcase the potential of upgraded infographics. Tsai, Huang, and Chang's and Permatasakti, Salsabila, and Rupa's research indicates that the advantages of infographics can be amplified by incorporating features like motion and illustrations. In contrast to Firdaus, Maryuni, and Nurhasanah's approach, the present study opts for website-based infographics to ensure accessibility across various devices, thereby facilitating student access. However, the underlying rationale remains consistent: to enhance student engagement and learning outcomes through innovative infographic design.

The infographic to be developed in this study is web-based, representing a fusion of visual media (infographics) and digital media (websites). The concept for this website infographic was inspired by an Indonesian landmark building map infographic encountered during the author's initial research phase (https://www.houseofinfographics.com/hoilab/indonesia-building-landmark.html).

Notably, the referenced infographic is presented on a single page, minimizing narrative text through the use of pop-ups. Readers simply click on image icons to reveal pop-ups containing descriptions of each icon. This interactive element enhances user engagement and enables the concise and efficient presentation of extensive information.

The website infographic under development will incorporate graphics and interactive buttons that, when clicked, reveal pop-up descriptions of the material. Three primary benefits are anticipated from the utilization of this website infographic: 1) mitigating information overload by organizing content into smaller, digestible sub-sections; 2) enhancing visual appeal through engaging graphics and design; and 3) providing students with an interactive learning experience. This third benefit aligns with the tendencies of the Alpha generation, born between 2010 and 2025 AD (Mendoza & Cruz, 2024). The Alpha generation is characterized by its unparalleled familiarity with the internet, and McCrindle has even predicted that this generation will be inseparable from digital devices (Hafilda, Lestari, & Ratnasari, 2022). Given this propensity, providing

infographic media accessible through gadgets is hypothesized to be particularly appealing to students, catering to the digital preferences of the Alpha generation.

Decide and Design Stage of Website Infographic Development

Various research and development models exist within the academic landscape. Fatirul & Winarto (2021), in their comprehensive review, outline six prominent models: Dick & Carey, ADDIE, ASSURE, Gerlach & Elly, Banathy, and Jerold E. Kemp. Wardani (2022) provides a slightly different perspective, including the Hannafin & Peck, Borg & Gall, DDD-E, Bergman & Moore, and Isman models alongside the ADDIE and Dick & Carey models. Anwar (2023) further contributes to this discourse by highlighting three models: the ADDIE model by Reiser and Mollanda, the 4-D model by Thiagajaran, and his own 4S TMD (Four Steps Teaching Materials Development) model. Among these diverse models, the present study adopts the DDD-E model as proposed by Ivers Barron (Saragih, 2019).

In discussing the decide and design stages within the DDD-E development model, variations in presentation and terminology are evident among different authors. Farida Yusuf (2022) describes the decide stage as encompassing the establishment of program goals and materials, encompassing four activities: setting learning objectives, determining the multimedia theme/scope, developing prerequisite skills, and assessing resources. The design stage, according to Yusuf, involves creating a content outline, flowchart, display, and storyboard. In contrast, Sudikan, Indarti, & Faizin (2023) provide a more granular approach, detailing teacher and student activities within each stage. Their framework outlines distinct actions for both educators and learners in the decision and design phases. Meanwhile, Sary & Jahro (2022) employ the term "define" for the decision stage, encompassing front-end analysis, student analysis, concept analysis, task analysis, and the formulation of learning objectives. Their design stage is streamlined, comprising media selection, format selection, and initial design. These variations highlight the adaptability of the DDD-E model to different contexts and research objectives. While the core principles of decision-making and design remain consistent, the specific activities and terminology may be tailored to suit the unique requirements of each project.

The decide and design stages employed in this research are based on the framework presented by Farida Yusuf in her book entitled "*Paradigma Filsafat Pendidikan Vokasi Pada Bidang Keilmuan Sistem Informasi (Tinjauan Filsafat Ilmu dan Rekonstruksi Teori).*"

How to Decide?

In this stage, the chosen design application is Figma for desktop. This online design tool is preferred due to its cloud-based file storage (Al-Faruq, Nur'aini, & Aufan, 2022). Figma offers robust drawing features with vector export capabilities, enabling seamless integration of design elements into website development. Additionally, the application facilitates the creation of interactive prototypes, serving as valuable references for website developers in constructing the website infographic.

Determine Learning Objectives

At this stage, an analysis of CP (Capaian Pembelajaran), ATP (Alur Tujuan Pembelajaran), and KKTP (Kriteria Ketercapaian Tujuan Pembelajaran) documents is conducted to identify the Learning Outcomes (CP) scheduled to align with the research timeline. Given that the target population for this media development is ninth-grade students during the latter half of the academic year, the final CP for grade IX was selected. This CP states: "Students can appreciate the application of noble morals from important stories of the Umayyad, Abbasid, Ottoman, Safavid, and Mughal dynasties as an introduction to understanding the historical flow of Islam's entry into Indonesia."

The identification of Learning Outcomes (CP) progresses with an analysis of ATP documents to determine the Learning Objectives formulated based on these outcomes. The specified learning objectives are: 1) Students will be able to describe the historical establishment of the Safavid and Mughal governments; 2) Students will be able to construct a timeline of significant events in the history of the Safavid and Mughal Empires; 3) Students will comprehend and appreciate that Islam is the religion of Rahmatan Lil Alamin; 4) Students will be able to apply the positive values demonstrated by the rulers of the Safavid and Mughal Kingdoms.

The infographic will present a timeline of the Shafawi and Mughal Empires, from their establishment to their decline. This media aims to support the achievement of the second learning objective: "students can create a historical timeline of the Shafawi and Mughal Empires."

Define the Media Theme/Scope

The developed infographic, encompassing part of the subject matter "History of Islamic Civilization during the Shafawi Dynasty in Persia and the Mughal Dynasty in India," presents a timeline of both dynasties, from their inception to their decline. This specific content focus, as determined in the learning objective setting process, aims to enhance the infographic's effectiveness as a learning literacy support tool.

In terms of media classification, infographics can be considered silent visual media, as they primarily utilize images or graphics to convey information (Fadhillah, 2021). This aligns with Christopher Lee's definition of infographics as a visual representation of information, data, or knowledge (Lee, 2014). However, when presented on a website, infographics can also be categorized as interactive digital media. Panggabean, citing Hasan, notes that websites incorporating interactive elements like forms, buttons, or animations fall under this category (Panggabean, Januaripin, Husnita, Wulandari, Pureka, Arsyati, Mardiawati, Kmurawak, Supriatna, Dharmayanti, & Judijanto, 2024).

Website-based infographic media, incorporating interactive elements, not only stimulate visual responses but also engage kinesthetic learners through active participation. This multi-sensory approach aligns with the findings of Elaldı & Çifçi meta-analysis (2021), which demonstrated a significant positive correlation between the use of infographics in education and academic achievement. The integration of interactive

features within the infographic format may thus be a promising avenue for enhancing educational outcomes across diverse learning styles.

Develop Prerequisite Abilities

Every instructional plan must incorporate prerequisite skills. At the outset of instruction, teachers must ensure that students possess a solid understanding of the fundamental concepts related to the material to be learned, thereby enabling them to effectively engage in the learning process (Usman & Kristiawati., 2022). For this study, which examines the history of Islamic culture during the Safavid and Mughal periods, the prerequisite skills required of students include: 1) Understanding the timeline of Islamic cultural history during other periods, such as the Umayyad and Abbasid Empires; 2) Identifying the positive values exhibited during the Umayyad and Abbasid periods. Mastery of these prerequisite skills is crucial for students to grasp the instructional patterns in historical subjects. Teachers can evaluate these skills through diagnostic assessments. According to Budiono and Hatip, diagnostic assessments function to identify students' competencies, strengths, and weaknesses, thereby facilitating the design of instruction that aligns with students' initial competencies and individual conditions (Budiono & Hatip, 2023).

Assessing Resources

Resource assessment involved both teachers and students. Interviews revealed that the Islamic Education teacher at SMP Islam As Sakinah possesses Technological Pedagogical Content Knowledge (TPACK) competence, enabling collaboration in developing the website infographic media as a subject matter expert and integrating it into the learning design as a literacy support tool.

Student assessment aimed to identify learning difficulties and styles. Interviews with teachers and students regarding learning styles resulted in a mapping of learning styles for ninth-grade students at As Sakinah Junior High School in Sidoarjo, as illustrated in the following diagram:

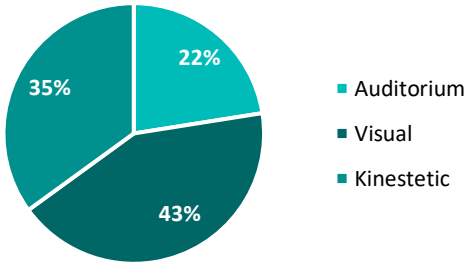


Figure 1. Learning Style Diagram of Grade IX Students of As Sakinah Islamic Junior High School

The diagram above illustrates the distribution of learning styles among ninth-grade students at As Sakinah Islamic Junior High School. The visual learning style is predominant, encompassing 45% of the student population. The kinesthetic learning style follows,

representing 33% of students, while the auditory learning style constitutes a smaller proportion, comprising 22% of the total. This distribution underscores the importance of incorporating diverse instructional strategies to cater to the varied learning preferences within the classroom.

Regarding learning challenges, interviews with students revealed difficulties in three key areas: memorization, understanding scholarly disagreements (khilafiyah), and comprehending the timeline of Islamic cultural history. Given these challenges and the predominance of visual and kinesthetic learning styles among students, a website infographic with a pop-up feature offering detailed explanations is hypothesized to address these difficulties while catering to individual learning preferences.

Visual learners tend to gravitate towards visual aids (Jabari, 2020), while kinesthetic learners prefer to learn through movement and tactile engagement (Ridwan, 2017). Observations suggest that ninth-grade students at As Sakinah Islamic Junior High School could effectively utilize website infographics for learning due to the availability of WiFi and the school's policy permitting the use of devices for educational purposes.

The selection of learning media necessitates a careful consideration of available school resources. Observations indicate that As Sakinah Islamic Junior High School mandates each student to possess a laptop for academic use and provides WiFi access to facilitate internet-based learning. Although the school policy prohibits cell phone usage, website infographics can be accessed through laptops. Taking into account the challenges faced by students, their learning styles, teacher readiness, and available resources, infographic media demonstrates significant potential to enhance student learning literacy.

How to Design?

Create Content Outlines

The content presented within the infographic is organized into two primary sections, namely the history of the Shafawi Empire in Persia and the Mughal Empire in India. The infographic will visually communicate information regarding the origins of each dynasty, their respective periods of governance, and notable rulers along with their significant contributions.

Table 1. Infographic Content Outline

Daulah Shafawi in Persia			**Daulah Mughal in India**		
The beginning of its establishment			The beginning of its establishment		
Standing Period			**Standing Period**		
King 1			King 1		
Flourishing Period			**Flourishing Period**		
King 2	King 3	King 4	King 2		
Glory Period			**Glory Period**		
King 5			King 3	King 5	King 7
			King 4	King 6	
Period of Decline			**Period of Decline**		

King 6	King 8	King	King 8	King 12	King 15
King 7	King 9	10	King 9	King 13	King 16
			King 10	King 14	King 17
			King 11		
Period of Collapse			**Period of Collapse**		
King 11			King 18		

The content outlined above pertains to Chapter X of the textbook *"Pendidikan Agama Islam dan Budi Pekerti untuk SMP/MTs Kelas IX."* During the material analysis process, a discrepancy was identified between the infographic depicting the historical timeline of the Shafawi and Mughal dynasties at the beginning of Chapter X and the timeline described within the accompanying text. The infographic lists Azam Shah as one of the reigning kings in the Mughal dynasty's history. However, the textual description omits Azam Shah from the list of rulers, citing his defeat in the civil war against Bahadur Shah (Suryatini & Asy'ari, 2022). To avoid confusion, the list of kings in the infographic will be revised to align with the information provided in the textual description.

Designing a Flowchart

A flowchart visually represents the sequential steps within a program's workflow, as elaborated by Huda, Ardi & Mubai (2021). It serves to illuminate the flow of a system, highlighting both advantages and disadvantages across various processes (Murad & Wahyuddin 2022). Below is a depiction of the flowchart for the website infographic under development:

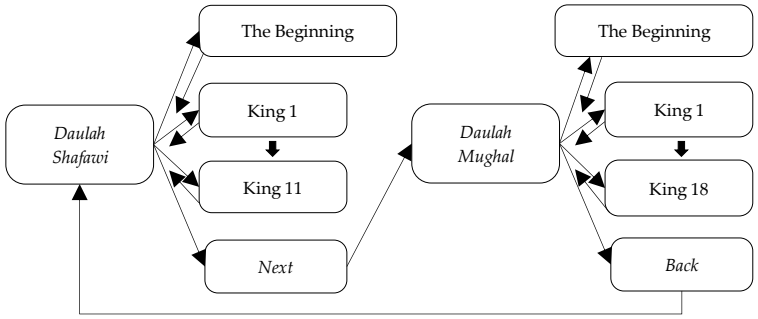


Figure 2. Flowchart Website Infographic Android Version

The flowchart is designed in two versions: Android and PC. The Android version of the website comprises two pages, each displaying two infographics related to the dynasties within the scope of the material. This version is intended for students to access the infographics on their mobile devices while at home. Conversely, the PC version is designed for use during in-school learning and consists of a single page that displays all infographics simultaneously.

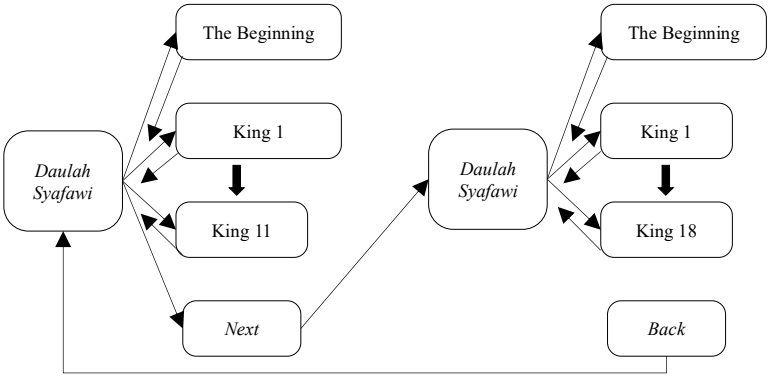


Figure 3. Flowchart Website Infografis Versi PC

Design Display

The visual design of the website infographic is based on the infographic presented in Chapter X of the 2022 Islamic Education and Ethics textbook for grade IX Junior High School/MTs (Suryatini & Asy'ari, 2022). However, modifications and additional graphics have been incorporated to enhance visual appeal and improve retention in students' memories. This aesthetic enhancement is achieved through a well-structured layout design. As Cholil & Susanto (2024) explain, layout encompasses the strategic placement and organization of elements (text, images, buttons, and other visual components) to create a visually coherent and user-friendly display. Below is a preview of the website infographic's main page:

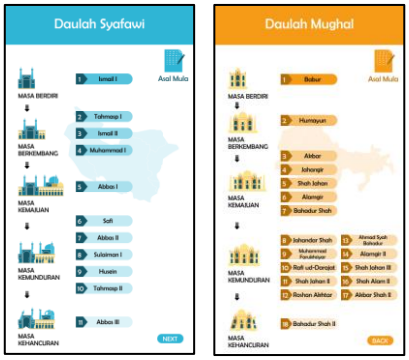


Figure 4. Home Page of Android Version Website Infographic

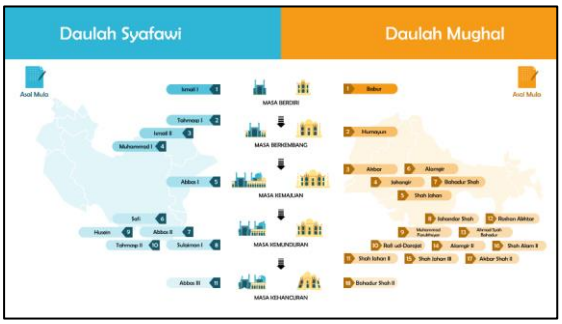


Figure 5. Home Website Infographic PC Version

The detailed material descriptions are presented in pop-up windows that appear when the corresponding buttons are clicked. As per the flowchart design, there are three categories of clickable buttons: "The Beginning," "Kings," and "Next" and "Back" (exclusively for the Android version). The PC version does not include the navigation buttons "Next" and "Back." The following illustrates the design of the pop-up display:

Figure 6. Left: PC version of Pop-Up; Right: Android version of Pop-Up

Additional details enriching the website infographic include background maps and a periodization graph of governance. The background of the historical infographic for each kingdom features a map illustrating their respective territorial extent at the height of their power. Meanwhile, the periodization section incorporates detailed palace icons for each dynasty, symbolizing their evolution from their founding to their eventual decline. This visual representation enhances the informational depth and contextual understanding provided by the infographic, allowing students to grasp the spatial and temporal dimensions of each empire's history.

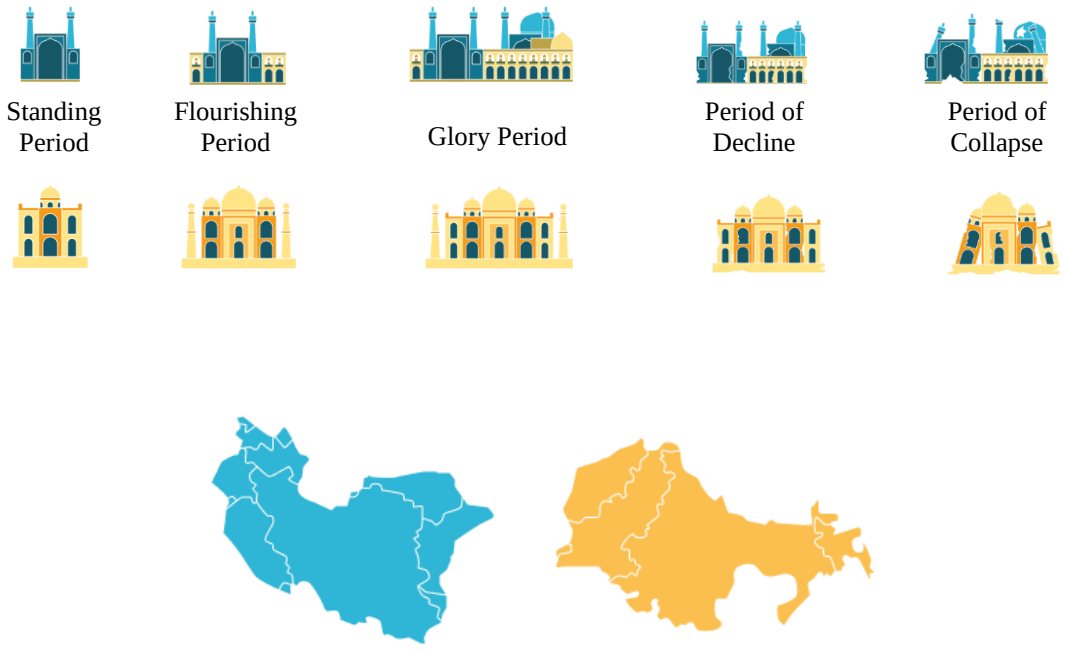


Figure 7. Icons of Government Development and Maps of the Shafawi and Mughal Territories

Create a Storyboard

A storyboard serves as a visual representation of the script, outlining the structure and flow of a program. It provides a comprehensive overview of the app's intended functionality (Prajatama, Rusli, & Deriani, 2015). Below is the storyboard for the Android version of the historical website infographic of the Shafawi and Mughal Empires:

Table 2. Storyboard Website Infographic Android Version

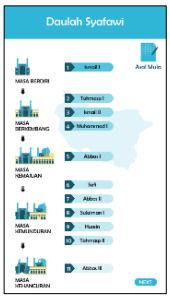
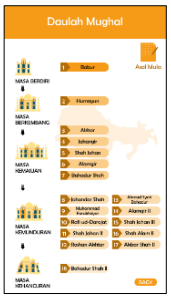
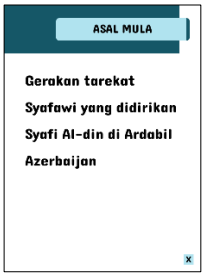
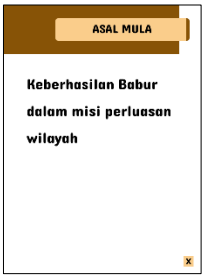
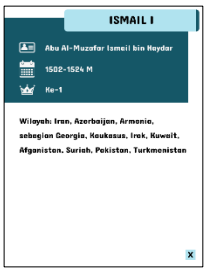
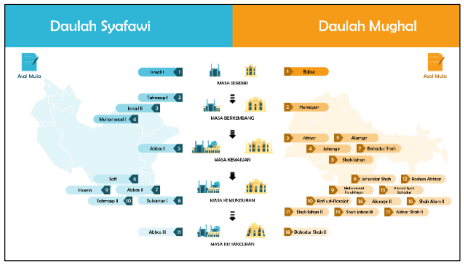
Page 1	**Page 2**
	
Main Menu	Menu Utama
Sub menu: 1. The Beginning 2. Profile and history of the 1st to 11th kings 3. Next button	Sub menu: 1. The Beginning 2. Profile and history of the 1st to 18th kings 3. Back Button
	
Pop-Up “The Beginning”	Pop-Up “The Beginning”
Available button: 1. Exit button	Available button: 1. Exit button t
	
Pop-Up “King”	Pop-Up “King”
Available button: 1. Exit button	Available button: 1. Exit button

Table 3. Storyboard Website Infographic PC Version

	Main Menu Sub Menu: 1. The Beginning: Daulah Syafawi; Daulah Mughal 2. Profile and history of the kings: Daulah Syafawi; Daulah Mughal
	Pop-Up "The Beginning" Available button: 1. Exit button

The fundamental concept of literacy encompasses the ability to read and write, coupled with the comprehension of information through these activities (Bartlett, 2008). In the educational context, this translates to students' capacity to process instructional material through reading and writing. The identified learning challenges at As Sakinah Sidoarjo Islamic Junior High School, namely difficulties in memorization, understanding scholarly disagreements (khilafiyah), and grasping the timeline of Islamic cultural history, fall within the purview of learning literacy. These challenges pertain to students' comprehension of information, specifically the historical narratives of the Shafawi and Mughal dynasties.

Learning literacy involves a complex interplay of cognitive processes in information processing. Memory, a central component, comprises three stages: encoding, storage, and retrieval. Constructing images is a key encoding process that facilitates information comprehension. Santrock, citing Paivio, asserts that memories are stored through both verbal and image codes, and the richer the image code, the more robust the memory (Santrock, 2018). This notion supports the hypothesis that infographics can enhance students' understanding and retention of learning materials.

Website infographics represent a form of Information and Communication Technology (ICT) utilization in education. The integration of ICT as a learning medium has proliferated since the latter half of the 19th century. Sun, Finger, & Liu (2014) research, tracing the evolution of e-learning from 1977 to 2005, highlighted three major themes: personal computers, the internet, and the intersection of ICT and pedagogy. This third wave led to the current emphasis on Technological Pedagogical Content Knowledge (TPACK) in educational research and practice.

The website infographic in this study is an interactive medium, allowing users to navigate freely and select information according to their preference. This exemplifies human-to-system interaction, wherein users actively engage with the media (Faculty of Social Sciences, 2013). With 78% of ninth-grade students at As Sakinah Islamic Junior High School exhibiting visual and kinesthetic learning styles, this infographic is particularly well-suited as an alternative literacy tool. Both visual and kinesthetic learners tend to

process information effectively through visual media and movement or touch (Jabari, 2020; Ridwan, 2017).

While acknowledging the diverse learning styles within the student population, it's important to note that auditory learners, though a minority, still require consideration. Despite being primarily designed for visual and kinesthetic learners, the website infographic's suitability extends to all ninth-grade students, who belong to the alpha generation. This generation is characterized by their active use of gadgets and preference for visualized learning (Hafilda, Lestari, & Ratnasari, 2022; Heriawan, Darmajari, & Senjaya, 2012). Moreover, research has demonstrated that infographics facilitate comprehension of information (Resnatika, Sukaesih, & Kurniasih, 2018; Saputra, Ratumbuysang, & Utama,, 2021; Wulandari, Abidin, & Praherdhiono, 2019), suggesting that students of all learning styles can benefit from this media.

The website infographic aims to develop functional reading skills, encompassing review, analysis, synthesis, and appreciation (Aswita, Nurmawati, Salamia, Sarah, Saputra, Kurniawan, Yoestara, Fazilla, Zulfikar, Putri, Iqbal, & Ismail, 2022). Aligning with the learning objectives, students are expected to comprehend and appreciate the historical timeline of the Shafawi and Mughal Empires. The infographic features visual details that emphasize the developmental flow of both dynasties from their establishment to their decline. The chronological order of rulers, their reigns, and significant historical events are clearly presented with appropriate icons. As previously discussed, the detailed image codes facilitate the encoding process for students, enhancing their understanding of the subject matter (Santrock, 2018). Furthermore, the interactive features encourage active student engagement, while the well-organized presentation of content through clickable buttons eliminates the need to flip through pages to revisit previously read material.

Notwithstanding the aforementioned advantages, website infographics present certain limitations. A primary obstacle is the reliance on internet connectivity, as the media necessitates online access. Additionally, there exists the potential for students to access unrelated applications or websites when granted permission to utilize devices for infographic engagement. This latter issue can be mitigated through vigilant teacher supervision during instructional periods. Addressing the former challenge, however, hinges on the availability of school resources. In educational settings equipped with WiFi, such as the research site in question, teachers can readily leverage this infrastructure to ensure seamless access to the infographic. Conversely, in the absence of school-provided WiFi, instructors can advise students to utilize devices with cellular data plans prior to the lesson involving the infographic.

Despite the aforementioned advantages, website infographics present certain limitations. A primary obstacle is their reliance on internet connectivity, as these media necessitate online access for utilization. Additionally, the potential exists for students to access unrelated applications or websites when granted permission to utilize laptops for infographic engagement. This latter issue can be mitigated through vigilant teacher supervision during instructional periods. However, the issue of internet connectivity can pose a challenge if the school does not provide WiFi access to meet students' learning

needs. Fortunately, As Sakinah Islamic Junior High School has facilitated students with WiFi access, thereby enabling the seamless utilization of website infographics. This provision of resources was a key consideration in the design of the website infographic.

From an information processing theory perspective, the website infographic contributes to two core aspects of cognitive processes outlined by Robert M. Gagne in 1974. Gagne posits that learning fundamentally entails a change in individual disposition and competence that is enduring and not solely attributed to developmental growth (Mundir, 2022). Central to the information processing approach are cognitive processes such as attention, memory, and thinking (Santrock, 2018). The visually engaging nature of infographics, coupled with students' affinity for technology, can enhance their attention to the educational content presented through this medium. This heightened attention fosters a deeper engagement with the material, facilitating the encoding of information into memory. Furthermore, the visual nature of infographics aids the recall process, as stored memories consist of both verbal and image codes. The more effectively students remember the material through this dual coding process, the greater their capacity to engage in higher-order thinking processes such as analysis, synthesis, and evaluation of the learned content.

CONCLUSION

The DDD-E development model's initial stages, "Decide" and "Design," have been successfully implemented. The "Decide" stage encompassed the analysis of learning objectives, delimitation of material scope, development of prerequisite skills, and resource assessment. This comprehensive analysis culminated in the decision to develop a website infographic, taking into account learning objectives, teaching materials, learning challenges, and students' diverse learning styles. The "Design" stage, similarly structured, involved four key steps. The first step focused on creating a content outline, categorizing the material into the histories of the Shafawi and Mughal dynasties. Each dynasty's history was further divided into subtopics exploring their origins, periodization, rulers' profiles, and leadership contributions. The second step entailed designing flowcharts to delineate the website's operational flow for both Android and PC versions. The third step involved designing the visual layout, with careful attention to image icons aimed at capturing student interest. Finally, a storyboard was created to summarize the visual presentation accompanying each user interaction with the available features. Based on theoretical frameworks, the presented website infographic design is hypothesized to facilitate the development of functional reading skills in students. This hypothesis is grounded in the belief that the visual and interactive aspects of this medium can effectively engage students' attention, enhance memory retention, and promote a deeper understanding of the educational content. The findings of this study offer novel insights in Islamic education and serve as a valuable reference for Islamic Education teachers seeking to develop website infographics through a systematic, evidence-based approach. The integration of technology and pedagogy in this manner has the potential to significantly enhance student learning outcomes and engagement in Islamic studies.

The current study's findings are limited to the "Decide" and "Design" phases of website infographic development. Empirical evidence demonstrating the effectiveness of the infographic in facilitating Islamic Education learning literacy is lacking, as the research has not progressed to the development and evaluation stages. Therefore, future researchers are encouraged to continue the development process, culminating in the creation of a fully functional website infographic. This would enable the collection of empirical data to assess the media's impact on Islamic Education learning literacy. Furthermore, future research should delve deeper into the multifaceted dimensions of literacy and their implications for Islamic Education, exploring additional media formats that can effectively foster these dimensions.

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