

## Gagne's Nine Events in Mobile-Assisted Vocabulary Learning for Higher Education

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**ABSTRACT:** *This study aims to develop a mobile application based on Nine Events Gagne to improve vocabulary mastery of Arabic research methodology. The application was developed using the ADDIE Model, involving four lecturers as expert evaluators and 25 6th-semester students as end users. Data were collected through a combined method: qualitative feedback from content and instructional design experts and quantitative data from lecturer and expert questionnaires. The application trial was conducted during eight meetings at State Islamic Institute (IAIN) Ponorogo to evaluate the practicality and effectiveness of the application in improving vocabulary mastery. The development of Nine Instructional Design Events Gagne in Mobile-Assisted Vocabulary Learning began with analysing student needs, learning styles, and learning objectives to design an application to support research vocabulary learning. The design stage includes pre-class analysis, knowledge context, review process, and design of learning activities. The results of the material expert test showed that 92% of the vocabulary was by academic topics, with an average score of 4.5/5. The media test showed that the application design was very positive, with a score of 4.6/5 for ease of use and interactivity and 4.7/5 for visual design. As many as 90% of respondents considered the interactive features effective in improving vocabulary comprehension. The effectiveness test using a paired sample t-test on 25 students showed a significant increase in pre-test and post-test scores, with a t-value of 10.627 and a p-value <0.001. This mobile application successfully improved student comprehension, retention, and engagement through semantic mapping, gamification, and immediate feedback. The study's limitations were the limited number of samples and the focus only on vocabulary. Further research is recommended to expand the scope of the application and sample to explore long-term impacts.*

Penelitian ini bertujuan mengembangkan aplikasi seluler berbasis *Nine Events Gagne* untuk meningkatkan penguasaan kosakata metodologi penelitian bahasa Arab. Aplikasi dikembangkan menggunakan Model ADDIE, melibatkan empat dosen sebagai evaluator ahli dan 25 mahasiswa semester 6 sebagai pengguna akhir. Data dikumpulkan melalui metode

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gabungan, yaitu umpan balik kualitatif dari ahli konten dan desain instruksional serta data kuantitatif dari kuesioner dosen dan ahli. Uji coba aplikasi dilakukan selama delapan pertemuan di Institut Agama Islam Negeri (IAIN) Ponorogo untuk mengevaluasi kepraktisan dan efektivitas aplikasi dalam meningkatkan penguasaan kosakata. Pengembangan *Nine Instructional Design Events Gagne* dalam *Mobile-Assisted Vocabulary Learning* dimulai dengan analisis kebutuhan mahasiswa, gaya belajar, dan tujuan pembelajaran untuk merancang aplikasi pendukung pembelajaran kosakata penelitian. Tahap desain mencakup analisis pra-kelas, konteks pengetahuan, proses peninjauan, dan perancangan kegiatan pembelajaran. Hasil uji ahli materi menunjukkan 92% kosakata sesuai dengan topik akademis, dengan skor rata-rata 4,5/5. Uji media menunjukkan desain aplikasi sangat positif, dengan skor 4,6/5 untuk kemudahan penggunaan dan interaktivitas, serta 4,7/5 untuk desain visual. Sebanyak 90% responden menilai fitur interaktif efektif meningkatkan pemahaman kosakata. Uji efektivitas menggunakan *uji-t* sampel berpasangan pada 25 mahasiswa menunjukkan peningkatan signifikan pada skor pretes dan postes, dengan nilai  $t$  10,627 dan nilai  $p < 0,001$ . Aplikasi seluler ini berhasil meningkatkan pemahaman, retensi, dan keterlibatan siswa melalui pemetaan semantik, gamifikasi, dan umpan balik langsung. Keterbatasan penelitian pada jumlah sampel yang terbatas dan fokus yang hanya pada kosakata. Penelitian lanjutan disarankan untuk memperluas cakupan aplikasi dan sampel guna mengeksplorasi dampak jangka panjang.

**Keywords:** *Arabic Language Learning, ASP Context, Nine Events Gagné, Mobile Application.*

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## I. INTRODUCTION

Language teaching for specific purposes has undergone rapid development along with the progress of the times and needs analysis. This development is not only limited to English but includes various other languages, including Arabic (Golfetto, 2020). As one of the six official languages of the United Nations, Arabic plays an important role in religious discussions, diplomacy, negotiations, and global affairs. Arabic for Specific Purposes (ASP) has been adapted for various needs, such as trade (Abdul Ghani et al., 2019), tourism (Mohamed, 2014), and Islamic education (Amro et al., 2023), with the development of modules designed to equip learners with specific vocabulary and skills. In addition, ASP has a significant role in Islamic legal education programs (Essa et al., 2020) and Arabic language skills training for certain professions, such as library staff (Abdullah & Eltingari, 2016).

ASP has also been utilised to design specialised syllabi for military journalism (Bakker, 2020) and tourism website development (Abdul Ghani et al., 2019). In addition, textbooks designed to teach Arabic reading skills have integrated ASP in various fields, such as economics, management, banking management, and mobile application development for tourism (Golfetto, 2020). ASP has been used to create a mobile

application specifically designed to teach vocabulary for research methods (Alkayed & Kitishat, 2021). These examples demonstrate ASP's flexibility and relevance in meeting learners' needs in various fields.

Arabic language learning, especially in Arabic for Specific Purposes (ASP) and Arabic Research Methodology courses, still faces various challenges, one of which is limited vocabulary that hinders students' ability to write and communicate effectively. Difficulty understanding research method terminology is one of the main obstacles experienced by students, thus affecting their ability to write and communicate. In addition, the lack of optimal use of learning media in traditional teaching methods further exacerbates this problem (Al-Abdullatif & Alsubaie, 2022; Bakker, 2020). Another obstacle that often arises is the lack of in-depth understanding of research method terminology, which is a significant obstacle in writing Arabic research proposals (Abdul Ghani et al., 2019).

In the context of the Arabic for Specific Purposes (ASP) Course, the development of strategic language learning materials requires careful and thorough preparation. The main focus of ASP is vocabulary teaching tailored to students' needs. In contrast, the Arabic Language Research Methodology Course provides the theoretical and methodological foundations for developing learning, including vocabulary learning itself. This requires a methodical examination of the various pedagogical components such as resources, objectives, approaches, criticism, and assessment (Norton & Buchanan, 2022). Martin emphasised the importance of learning design models as an organised instrument for understanding the elements influencing the learning process (Li et al., 2022). By setting guidelines for course development, instructional design has a critical role in motivating students, shaping their perspectives, and designing activities that support optimal understanding (Elwood & Jordan, 2022).

Gagne's Nine Events Model emphasises that effective learning consists of a series of systematic steps, from capturing students' attention to helping them transfer knowledge from short-term to long-term memory. The model encourages the use of mobile applications as a tool to facilitate learning and allow students to apply their knowledge in new contexts. Gagne's approach aligns with the cognitive stages of adult learning and supports instructors in increasing teaching effectiveness through active student engagement and participation. In addition, the Nine Events framework also strengthens the quality of learning materials and the teaching process, making learning more transparent, enjoyable, and motivating for students (Lin et al., 2024).

Applying Gagne's Nine Events instructional design to vocabulary learning has been proven effective. Structured steps that start with attracting attention to increasing knowledge retention provide systematic guidance that supports educators and improves overall classroom effectiveness (Iqbal et al., 2021). This instructional design aims to create a compelling and engaging learning environment, in line with the current trend of integrating learning technology into the teaching process (Hanafi et al., 2020).

Chobthamdee & Sukwan stated that online technology provides students alternative access to learning materials (Chobthamdee & Sukwan, 2022), enabling a more flexible and practical learning experience (Hariadi & Wuriyanto, 2016). Unlike time-consuming assignments and assessments in traditional learning, online and mobile-based learning environments offer an efficient and interactive experience (Pedro et al., 2018; Yu et al., 2023). In addition, the increasing demand for global education without borders and the

ease of access to digital devices and technologies have significantly driven the development of online education (Morris et al., 2020).

This study addresses the challenges in teaching Arabic research methods vocabulary by integrating Gagne's Nine Events learning design and mobile application-based learning technology. This approach enhances vocabulary acquisition by giving students continuous and unlimited access to mastering critical research terminology. This study proposes a potential solution by incorporating Gagne's learning design in an Arabic Research Methodology course and utilising mobile application-based online learning technology to enhance the efficacy and accessibility of research methods vocabulary. This new methodology effectively addresses the gap in thematic vocabulary resources and provides students with broader access to critical research terminology.

## II. METHOD

This study uses the ADDIE Model to develop a mobile application to improve the mastery of Arabic research methodology vocabulary in 6th-semester students of the Arabic Language Education Study Program. The development process begins by analysing the difficulties faced by students in understanding and using the specific vocabulary needed to write a research proposal (Pratama et al., 2024).

The study involved two main groups of subjects: four lecturers teaching Arabic Language Education courses and twenty-five sixth-semester students in the same program. The lecturers acted as expert evaluators, assessing the suitability of the mobile application content to academic standards and its effectiveness in teaching Arabic vocabulary. Meanwhile, the students acted as end users of the application, actively using it to improve their Arabic vocabulary mastery. Feedback from both groups was key to evaluating the application's usability, learning experience, and overall effectiveness (Noetel et al., 2022).

The research instrument consisted of closed and open-ended questions. Closed-ended questions used a 5-point Likert scale, arranged based on the rubric of Gagne's Nine Events instructional design in vocabulary learning, as developed by Dolnicar (Dolnicar, 2021). The questionnaire to assess the practicality of the mobile application in vocabulary learning was adapted from Hasegawa (Honjo et al., 2024). The Arabic language lecturers' evaluation of the mobile application's instructional material design used the framework Panis suggested (J et al., 2024). In addition, open-ended questions were included to gather opinions and suggestions from experts regarding the steps involved in Gagne's Nine Events instructional design for vocabulary learning (McNeill & Fitch, 2023).

Data were obtained through a structured questionnaire administered to two groups: four expert validators in Arabic content and three experts in instructional design. The experts filled out a questionnaire that included both closed and open-ended questions to assess the application's content, effectiveness, and design. In addition, feedback from 25 students was collected through a closed-ended questionnaire with a 5-point Likert scale, which evaluated the application's usability, learning experience, and effectiveness.

The validation data of Nine Events Gagne's learning design is divided into two categories, namely qualitative and quantitative data. Qualitative data includes expert feedback and suggestions, while quantitative data consists of scores obtained from instruments filled out by three learning design experts and four Arabic language

lecturers. The experts evaluated various aspects, including learning objectives, outcomes, content (quizzes and games), learning processes, and linguistic elements (Isnaeni et al., 2022).

This application has been tested on 25 Arabic Language Education (PBA) students in semester 6 at IAIN Ponorogo, involving eight learning meetings followed by the use of the application to assess its practicality and effectiveness in improving vocabulary learning. This combined approach provides a comprehensive evaluation of the design and implementation of the application.

### III. RESULT AND DISCUSSION

#### Analysis

##### *Analysing Learning Style*

Before designing and adopting Gagné's Nine Events Model and the online mobile application, the researcher conducted a needs analysis to understand the needs of students in the Research Methods course. This analysis included a review of the curriculum, lesson plans, and learning media used by instructors and a review of relevant literature to ensure that the model could enhance students' learning motivation. Gagné's Nine Events Model consists of nine main stages, implemented by considering theories, methods, strategies, media, and mutually supportive learning activities. The framework also integrates VAK (Visual, Auditory, Kinesthetic) learning styles to accommodate individual differences in students' information processing.

The researcher also conducted a comprehensive analysis to understand students' learning styles and preferences. Observations were used to identify their interaction patterns with the learning materials, such as taking notes (kinesthetic/visual), listening (auditory), or discussing (social). Interviews provided in-depth insights into effective learning methods, such as reading texts, listening to lectures, or doing hands-on activities. Data from both methods were systematically integrated into a framework that supports individual needs-based instructional design, thereby optimising the learning of research methods vocabulary.

##### *Analysing Learning Objectives*

This learning objective emphasises the importance of mastering specific and relevant academic vocabulary to support students' ability to write research proposals. Mastery of terminology covering research methodology, data collection and analysis techniques, theoretical basis, population, sample, and statistics in research is designed to ensure students have the essential competencies needed in compiling scientific proposals. In addition, the ability to write a thesis proposal independently using appropriate and relevant vocabulary reflects the emphasis on autonomy and accuracy in academic communication. This analysis shows that the learning objectives aim to improve students' linguistic competence and strengthen their critical thinking skills in processing and articulating ideas contextually and scientifically. This is important to support students' success in meeting academic demands while building a foundation for their contributions to data-driven research.

### *Mobile App-Based Vocabulary Learning Analysis*

The aspects that need to be analysed from the mobile application based on Nine Events of Gagné include two main elements, namely learning styles and learning objectives. In analysing learning styles, it is important to ensure that the application can accommodate various learning styles, such as Visual, Auditory, and Kinesthetic (VAK). For example, the application must provide visual elements such as videos, graphs, and diagrams, auditory features such as narration or verbal explanations, and interactive activities such as drag-and-drop quizzes for kinesthetic learning styles. In addition, the application must be able to identify the dominant learning style of users through surveys or observations of their interaction patterns and evaluate the effectiveness of the media and activities provided to support these learning styles. Real-time feedback and customisation options must also be available to ensure that the application can meet the needs of various learning styles.

Meanwhile, in analysing learning objectives, the application must include academic vocabulary relevant to the research methodology, such as the terminology used in the introductory chapter, data analysis techniques, and sample populations. The application must also connect the vocabulary to the context of writing a research proposal to ensure its relevance and accuracy. To support autonomous learning, the application should provide features such as vocabulary exercises, interactive quizzes, and access to additional resources that allow students to learn independently. In addition, the application should provide activities that train students' critical thinking skills, such as proposal writing simulations or case studies, and ensure the use of technology to improve learning efficiency, for example, with an automatic vocabulary search feature that makes it easier for students to find the correct terms. By analysing these aspects, the application can be optimised to effectively meet the needs of students' learning styles and learning objectives.

### **Design**

#### *Pre-Class Analysis: Creating an Optimal Learning Environment*

Pre-class analysis is the stage that aims to create an optimal learning environment, as described in "The Nine Events of Gagne's Instructional Design." This stage includes collecting data on students' learning styles, selecting appropriate learning methods, and determining strategies that will support students in achieving the best learning outcomes (Gökoğlu et al., 2024).

The main focus of pre-class analysis is to attract students' attention, formulate clear learning objectives, and relate new material to students' existing knowledge. Applying Gagne's Nine Events in the context of mobile-assisted vocabulary learning in higher education emphasises the importance of designing learning experiences that build student engagement early on, laying the foundation for developing deeper language comprehension. In addition, Vygotsky's social interaction theory emphasises that learning is an individual process and a collaborative one, where the dynamic relationship between students and their environment, including interactions with instructors and peers, is essential in facilitating intellectual development (Umar et al., 2023).

In the context of language education, Pre-Class Analysis focuses on cognitive aspects and social and emotional dimensions that support collaborative learning. Therefore, learning strategies that involve communicative, social, and metacognitive approaches are essential to maximise student engagement in the learning process. Gagne's Nine

Events provides a framework for seamlessly integrating these strategies in face-to-face and technology-assisted learning contexts such as mobile-assisted learning. With this approach, students are guided to remember and understand language vocabulary and develop the social and cognitive skills necessary to apply their knowledge in real-world situations, which is especially important in higher education (Gökoğlu et al., 2024).

#### *Knowledge Context: Cultivating Intellectual Engagement*

In the context of Gagne's Nine Events of Instructional Design on Mobile-Assisted Vocabulary Learning in higher education, fostering intellectual engagement becomes a crucial element to ensure the success of the learning process. Gagne emphasises the importance of early stimulation and orientation that focuses students' attention on learning material, allowing them to engage in their learning activities fully. Huang et al. explained that social interaction in the educational context is fertile ground for intellectual engagement and knowledge construction, where students actively collaborate and discuss to understand the material more deeply (Radhakrishnan & Akila, 2021). This is reflected in the mobile-assisted learning approach, which integrates technology to enhance the learning experience and strengthen intellectual engagement through interactions within the application or platform (Poçan et al., 2023).

As part of Gagne's Nine Events, each step, from attracting students' attention to providing effective feedback, plays a vital role in supporting the process of intellectual engagement. Gagne states that external stimulation provided in the early stages of learning, accompanied by clear demonstrations, will strengthen students' understanding and deepen their focus. Metacognitive, communicative, and memory learning strategies also contribute significantly to this stage by facilitating more effective information integration and allowing students to relate new knowledge to existing knowledge. Technology in this context optimises the application of these strategies, providing students with opportunities to actively learn, analyse, and evaluate material, increasing their knowledge retention and motivation (J. J. Chen & Johannesmeyer, 2021). The integration of technology in learning supports optimal absorption of material, ensuring that students' intellectual engagement is well maintained throughout the learning process.

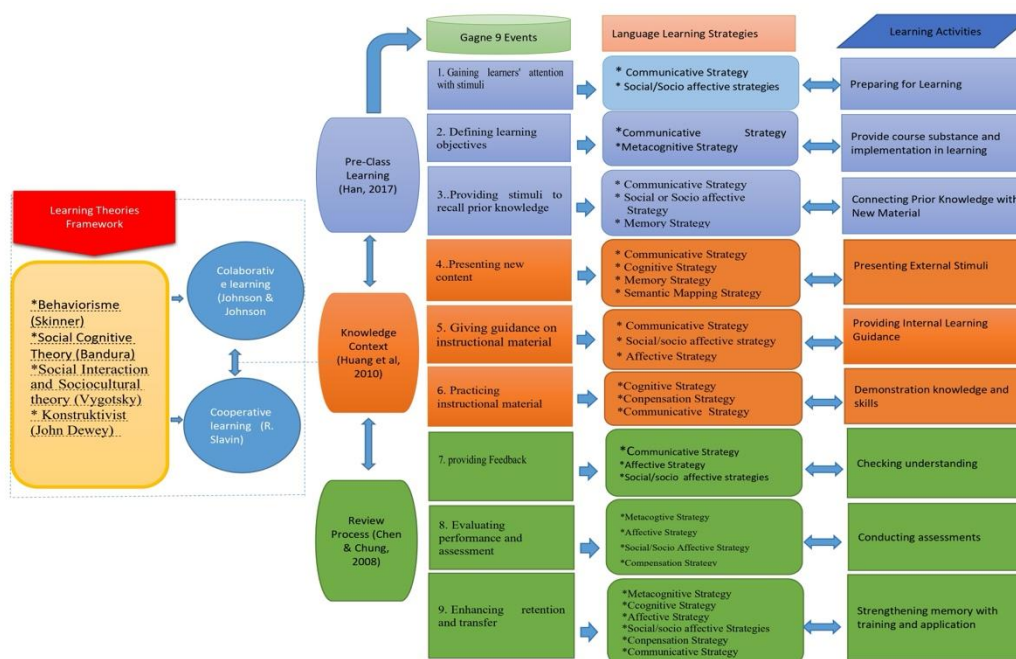
#### *Review Process: Fostering Sustainable Growth*

The Review Process in Gagné's instructional design model catalyses strengthening continuous learning and application of knowledge in higher education contexts (McNeill & Fitch, 2023). In the context of Mobile-Assisted Vocabulary Learning (MLL), the review conducted through the last three stages—providing feedback, evaluating and assessing performance, and enhancing retention and transfer of knowledge—is a critical element in ensuring that students not only acquire theoretical knowledge but are also able to apply it in real-world situations (Yu et al., 2022). The feedback stage allows students to understand their strengths and areas for improvement in their learning, while the performance evaluation provides a clear picture of competency achievement. In addition, efforts to enhance the retention and transfer of knowledge ensure that the material learned is understood and applicable in a broader context, supporting long-term continuous learning (Komalawardhana et al., 2021).

In this process, various learning strategies covered in "The Nine Events of Gagne's Instructional Design" play an important role in supporting successful language acquisition. By implementing cognitive, metacognitive, social, affective, compensatory, and environmental strategies, learning focuses on transferring knowledge and creates a

comprehensive experience for students. Cognitive strategies lead to a deep understanding of language structures, while metacognitive strategies help students plan and evaluate their learning process. Social and affective strategies enrich the learning experience by optimising student interaction and motivation, while compensatory strategies address limitations that students may face in language learning. By carefully integrating these strategies, mobile-assisted language learning enables long-term mastery relevant to academic, professional, and everyday contexts, supporting sustainable learning goals (Komalawardhana et al., 2021).

During this phase, the researcher developed the structure of Gagne's Nine Events learning model for vocabulary acquisition. This learning model was designed along with learning scenarios to address various problems identified through previous analysis. Details of the model development can be seen in Figure 1 below.



*Figure 1. Framework for developing the design of Gagne's Nines Events instructional model in vocabulary learning*

## Development

### *Designing Learning Activities*

Developing instructional design in the context of "Gagne's Nine Events of Instructional Design" focuses on arranging structured and directed learning activities to achieve the desired learning objectives. In the development stage, instructors must systematically design and integrate learning activities to support effective learning processes, especially in mobile technology vocabulary learning. This development includes selecting activities by learning objectives and encouraging active student participation by using mobile tools that can enrich their learning experiences. By utilising the principles of Gagne's Nine Events, such as paying attention, conveying learning objectives, and providing feedback, instructors can create more interactive and relevant learning experiences for students in higher education. Effective instructional design in this context allows for a more dynamic learning process and focuses on optimal vocabulary mastery.



**Figure 2.** Gagne's Nine Events in Mobile-Assisted

Figure 2 illustrates a variety of multimedia strategies that can be applied to enhance vocabulary acquisition and retention. As examples of hierarchical lexicons, Figure 2a visually maps semantic relationships between terms utilising concepts such as hypernyms, hyponyms, homonyms, and meronyms. Figure 2b depicts vocabulary practice through voiceovers and quizzes designed to strengthen students' auditory and pronunciation pathways. Figure 2c shows a tiered game that maintains students' interest by facilitating the development of lexical fluency from easy to more complex levels. Figure 2d shows a picture dictionary that links definitions with visual illustrations to support scientific vocabulary development. Through interactive components such as audio, images, and adaptive challenges, these tools enhance cognitive representations, encourage retention through practical application, and provide scaffolding for domain-specific terminology. This dynamic approach supports significant vocabulary development tailored to students' evolving needs and abilities.

### **Material Expert Test Results**

The results of the material expert test showed that the vocabulary content presented in the mobile application was very relevant to learning objectives in higher education, especially in mastering academic vocabulary that is often used in academic and professional contexts. Material experts also assessed that using semantic mappings, such as hypernyms, hyponyms, and others, in the application provided a clear picture of the relationship between words, which helped students understand the concept more deeply. In addition, the material compiled in the application was in accordance with the applicable curriculum in higher education by integrating terminology relevant to learning needs in linguistics and language science. However, material experts provided recommendations to enrich the application with more contexts of vocabulary used in actual sentences or scientific contexts to make it easier for students to understand. The material suitability test of the 50 vocabularies tested quantitatively showed that 92% of material experts considered the vocabulary to be by the desired academic topic. In contrast, 8% were considered inappropriate because the terminology was less frequently used in academic studies. The evaluation by five material experts resulted in an average material suitability score of 4.5/5, which indicated that the learning material was appropriate for achieving the objectives.

### **Media Expert Test Results**

The results of the media expert test showed that the application interface design received a positive assessment, with media experts assessing the interface as intuitive and easy for students to navigate. Features such as visual semantic mapping, audio, and interactive quizzes provide an engaging experience for users. In addition, the application

was considered very interactive thanks to elements such as quizzes, vocabulary-based games, and audiovisual media that support vocabulary comprehension more effectively. Media experts also assessed that using a thematically and alphabetically arranged vocabulary database greatly assisted students in finding relevant vocabulary according to their needs. User engagement was also successfully maintained through adaptive challenges and gamification, contributing to students' learning motivation and vocabulary retention. In terms of quantitative, the application obtained an average score of 4.6/5 for ease of use and interactivity and a score of 4.7/5 for visual design and functionality, based on media testing of 50 students. In the trial of using the application on a mobile device, 95% of media experts assessed that the application ran smoothly without technical glitches, with the application loading speed reaching an average of 3 seconds. Testing of interactive features, such as quizzes and games, showed that 90% of respondents felt these features improved their understanding of the vocabulary learned, confirming the effectiveness of these elements in strengthening vocabulary mastery.

### Implementation

Implementing Gagne's Nine Events in learning design provides a systematic framework for creating compelling and structured learning experiences. In the context of vocabulary learning, especially for specific purposes (ASP), the application of Gagne's Nine Events not only helps to organise clear learning stages but also facilitates the development of interactive and adaptive learning activities. Learning activities based on Gagne's principles enable students to actively participate in learning, improve understanding, and strengthen skills relevant to academic goals.

**Table 1. Nine's Event's Gagne and Learning Activities**

Nine's Event's Gagne		Learning activities
1	Stimulus for engagement	In the preparation phase of learning, a reflective introduction is carried out before starting the acquisition of knowledge. The lecturer begins the apperception process by clarifying the learning contract, as well as explaining the tasks that are structured and independent. Next, elements of the mobile application that focus on vocabulary development in research methods are introduced and designed to attract students' interest. In this session, questions regarding the responsibility of graduation are raised, which in turn encourages dialogue regarding the acceleration of the completion of students' theses.
2	Educational Objectives	This course is designed to help students understand and professionally identify vocabulary errors in research methods. As the context and significance of the course are explained, the main goal becomes clear: to provide students with the skills to apply their knowledge of vocabulary in a thesis proposal. Learning objectives include developing an appreciation for diversity and using research methods and terminology professionally and independently.
3	Incentive to Remember Material	In this learning activity, students work in diverse groups to connect old information with new information. They are asked to generate ideas using terminology related to common research methods. As a first step, a pre-test is conducted to assess students' basic abilities while creating an atmosphere conducive to understanding and considering previously acquired knowledge. This ensures that students have a strong foundation to continue learning and further exploration in education.

Nine's Event's Gagne		Learning activities
4	Demonstrating New Content	In learning activities, extrinsic stimuli are applied through visual semantic mapping, which strategically helps students map vocabulary groups or topics in specially designed mobile applications. This approach is enriched with gamification, where the levels of difficulty are arranged in stages to increase the challenge and motivation to learn. Additionally, a vocabulary database is provided to make searching for words by category or alphabet easier. After the material is finished, an assessment is carried out to ensure students' understanding of the vocabulary they have learned.
5	Providing Content Direction	During the discussion group, the lecturer provides guidance by directing participants to first think about the definition of vocabulary terms before accessing the available vocabulary database. The main focus is to encourage participant independence in exploring and understanding understanding.
6	Implementing Learning Materials	In this learning activity, students can illustrate their skills and competencies through a semantic mapping flow, from the core concept to supporting ideas. They discuss, debate, and condemn insults that must be added or removed while expressing their findings. This activity culminates through individual quizzes and group-based games, creating a spirit of constructive student competition.
7	Offer Feedback	In this learning activity, students' understanding is assessed through direct feedback to verify their answers. The mobile application plays an important role in providing feedback that helps students deepen their vocabulary understanding through quizzes, games, and a "vocabulary database" that includes alphabetical and thematic dictionaries. After each learning module, the application also provides assignments that encourage students to complete work online and offline, improving their academic writing skills.
8	Feedback and Assessment	This learning activity is continued with the implementation of assessment through final exams, individual quizzes, and group performance evaluations. The primary assessment is carried out through project-based learning activities and portfolios, where students are analysed based on their ability to identify vocabulary and sentence errors in the thesis proposal as a form of recognition of their outstanding performance.
9	Increase Memory and Applications	Memory reinforcement through applications and training is carried out using various methods to ensure understanding and mastery of the vocabulary that has been learned. Students are asked to construct sentences, read and translate vocabulary, and participate in online assessments that provide individual feedback. Analysing vocabulary and sentence errors in the proposal achieves a deep and meaningful learning experience.

## Evaluation

To test the effectiveness of the mobile application developed, limited testing was conducted on 25 students. The effectiveness test was conducted with Paired-test to measure the effectiveness of the developed product.

**Table 2. Paired Sample Test for Pre-Test and Post-Test**

		Paired Samples Test					t	df	Sig. (2-tailed)
		Paired Differences							
Pair	Pre-test - Post-Test	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
1		15.86800	7.46619	1.49324	-18.94989	-12.78611	10.627	24	.000

The table above shows the results of a paired samples t-test comparing pre-test and post-test scores. The mean difference between the pre-test and post-test is 15.868, with a standard deviation of 7.46619 and a standard error of the mean of 1.49324. The 95% confidence interval for this difference is between -18.94989 and -12.78611, indicating that the difference found is significant. With a t-value of 10.627 and a p-value (Sig. 2-tailed) of less than 0.001, it can be concluded that the difference between pre-test and post-test scores is very significant, indicating a significant improvement after the treatment.

The design of this mobile application combines quiz-based exercises and engaging games that evaluate students' vocabulary knowledge and comprehension. In addition, the application makes it easy for users to find relevant vocabulary through a "vocabulary database" consisting of two types of dictionaries arranged thematically and alphabetically. In addition, the application provides assignments after the learning material is completed and encourages student engagement by requiring them to complete learning tasks offline (Yu et al., 2022).

Gagné's Nine Events model is applied with systematic steps in mobile-assisted vocabulary learning. First, the stimulus for engagement begins with the introduction of the application and questions that encourage discussion. Then, the learning objectives are explained to help students understand vocabulary applications in research. In the incentive to remember the material, students are organised into groups to connect new information with existing knowledge. Demonstrating new content is done by visual semantic mapping and gamification while providing content directions, leading to an independent vocabulary exploration. In applying learning materials, students illustrate vocabulary through quizzes and games. Feedback is given through the application, while assessment is done with exams and projects. Finally, improving memory and application is done through continuous practice that strengthens vocabulary understanding.

Each event in Gagne's Nine Events model supports vocabulary learning in a specific and structured way. Starting with an initial engagement that grabs students' attention and introduces the mobile app, the app uses visual semantic mapping to help students understand the relationships between vocabulary words. The app also features quizzes and games that support vocabulary recall and practical application. Through interactivity, students are given immediate feedback that reinforces their understanding. Ongoing assessments and assignments involving the mobile app ensure retention, while gamification and adaptive challenges increase student engagement and motivation.

Mobile apps motivate and enhance student engagement in vocabulary learning through interactive elements, such as gamification, quizzes, and visual semantic mapping. In the context of Gagne's Nine Events, the app facilitates initial stimulation by introducing features that interest students and providing clear direction regarding learning objectives. In-app gamification, with gradual difficulty levels, motivates students to

continue learning. In addition, the app's immediate feedback feature helps students deepen their vocabulary understanding. Through adaptive challenges and tasks to complete, the app supports vocabulary retention and increases overall student engagement.

The effectiveness test of the mobile application on 25 students using a paired sample t-test showed a significant increase between pre-test and post-test scores, with a t-value of 10.627 and a p-value <0.001. This indicates that the mobile application implemented with the Gagné model successfully improved students' vocabulary mastery. Implementing the Gagné model, which includes steps such as semantic mapping and interactive feedback, is effective in helping students understand and remember vocabulary. With significant positive changes, the vocabulary learning objectives were achieved through the use of the application, which facilitated deeper learning and increased student engagement in the vocabulary learning process.

This finding aligns with previous studies showing that mobile technology can improve students' motivation and academic achievement. The integration of technology in education, especially in language learning, offers innovative solutions that support different learning styles and increase student engagement (Poçan et al., 2023; Wang et al., 2023).

In the context of teaching Arabic for Specific Purposes (ASP), the application of mobile technology is very relevant. As highlighted by Golfetto and Essa, student-based curriculum design is essential to optimise learning outcomes (Essa et al., 2020; Golfetto, 2020). Mobile applications that support vocabulary learning have been shown to be effective in various contexts, such as the development of Arabic language modules for tourism (Mohamed, 2014) and Islamic finance (Amro et al., 2023). Semantic mapping strategies tailored to learning objectives also contributed significantly to students' understanding (L. Chen et al., 2023; Ghafar & Noor, 2017).

In addition, gamification implemented in mobile applications increases student engagement by allowing them to control their learning pace and style, which is important in learning more complex vocabulary (Almelhes, 2024; Amalia et al., 2022; J. J. Chen & Johannesmeyer, 2021). This approach proves that using mobile-based applications can positively impact Arabic language learning for specific purposes, improving vocabulary comprehension and supporting better retention among students.

#### **IV. CONCLUSION**

A mobile application combining quizzes, games, and visual semantic mapping was shown to be effective in enhancing students' vocabulary learning using Gagné's Nine Events model. The application organises the steps from introduction to assessment of the material, with interactive elements such as gamification and quizzes that reinforce vocabulary comprehension. Immediate feedback and adaptive challenges enhance students' retention and motivation to learn. The effectiveness test of the mobile application on 25 students using a paired sample t-test showed a significant increase between pre-test and post-test scores, with a t-value of 10.627 and a p-value <0.001. In teaching Arabic for Specific Purposes, the application effectively developed vocabulary and enhanced students' retention. Implementing semantic mapping and gamification strategies positively contributed to students' vocabulary comprehension and learning, demonstrating the benefits of using mobile technology in this context. Theoretical

implications of using mobile apps in Gagné-assisted vocabulary learning suggest that semantic mapping and gamification can enhance vocabulary comprehension and retention. The app enhances student engagement by providing immediate feedback, adaptive tasks, and challenges that support vocabulary application in a fun and interactive learning context. The limitations of this study lie in the limited sample and the use of mobile applications that only focus on vocabulary without considering other aspects of language learning. Future studies are suggested to expand the scope of the application to other language skills and expand the sample to explore the long-term impact of mobile technology use in learning.

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