CHAPTER I
INTRODUCTION

This introduction outlines several points, including research background, problem identification, research scope, questions, objectives, and significance.

1.1 Research background

The rapid growth of technology has significantly impacted developments in Indonesia's educational system. One of these is the implementation of the Kurikulum Merdeka, designed to facilitate technological developments in the learning process. This curriculum emphasises student-centred learning. (Budiwati et al., 2022; Kepmendikbudristekdikti, 2022; Pertiwi et al., 2022). This student-centred learning approach is based on the Indonesian Minister of National Education policy, Nadiem Makarim, regarding the Kurikulum Merdeka, which provides students with the freedom to learn (Sari & Murwaningsih, 2023). Freedom in learning means that every student has the freedom to exercise autonomy in deciding what and how to study the themes offered by the curriculum. This curriculum does not limit what must be learned inside and outside school. Therefore, a teacher is challenged to be creative in implementing the teaching and learning process. (Pertiwi et al., 2022)

Implementing the Kurikulum Merdeka also requires developing critical thinking, which aligns with developing 21st-century skills. 21st-century skills development is 4C, including critical thinking, creativity, collaboration, and communication (Shafiana et al., 2020). The latest approach in teaching English as a Foreign Language, or English Foreign Language (EFL) classes, has emphasized

the importance of developing critical thinking among EFL learners, especially in strengthening reading skills. Indeed, critical thinking is now generally seen as an essential skill taught, such as reading and writing. Sena & Etienne (2022) said that the ability to think critically through language as an EFL learner is more than just knowing the meaning and it is based on individuals' critical thinking.

Furthermore, according to Garrison, D. R. (1991), individuals' critical thinking abilities vary according to the activities used to enhance them. Having the skills for effective critical thinking in a domain does not necessarily imply having the metacognitive ability to determine when to engage in which aspects or having the disposition, attitude, or mindset to engage in them, all of which are required for being an excellent critical thinker (Facione, 2011). Almost all research that proposed ways for integrating essential thinking skills highlighted the elements of modelling, questioning, and leading student practice (Snyder, 2008).

Besides developing critical thinking, the Kurikulum Merdeka emphasizes learning engagement, including cognitive, psychomotor, affective, or behavioural. Learning engagement is now also a trending issue in EFL classes. In EFL classes, active participation and involvement of students in the learning process not only shows the development of the 4 C skills (Critical thinking, Creative, Collaborative, Communicative) but also in terms of affective, cognitive, and psychomotor skills (Chamisijatin et al., 2023). Learning a foreign language, especially English, requires passion, hard work, practice, and reflection. In the context of EFL classes, students must practice active interaction in the target language and learn from mistakes by consistently reflecting and introspecting themselves on the learning

process and learning outcomes as well as practicing active interaction with the target language and all of which requires a high level of student involvement (Liu, 2020). In other words, the quality of English language learning in EFL classes can be seen from students' participation in the learning process until they achieve four English language competencies (listening, speaking, reading, and writing). Therefore, teachers must design learning well, innovatively, creatively, and funly (Kusuma, 2022).

This phenomenon is similar to that in several high schools in Indonesia, where these schools have implemented the Kurikulum Merdeka, which emphasizes student involvement in the learning process, especially in learning English. Still, the methods used, especially in learning English, have not yet been implemented. It shows no interaction or active involvement of students in learning. (Nanda et al., 2024). Apart from that, students have not demonstrated an increased ability to analyze, process, or solve problems as a manifestation of developing critical thinking processes (Khalifatussalam, 2021). Starting from this phenomenon, researchers tried to explore effective learning designs further to explore students' critical thinking skills and make them more actively involved in learning.

Current rapid technological developments have offered several solutions for using technology in learning that are interactive and fun and provide students with freedom and independence in learning anywhere and at any time. Munir et al. (2023) stated that one of the right solutions to overcome the problem of student involvement in learning is to use electronic modules, or what is often abbreviated as "e-module." According to him, designing an e-module with interactive and

systematic features will make it easier for students to understand the material provided. If traced, a module is a learning process tool created systematically based on a curriculum delivered using an internet network, packaged into one smallest learning unit, and studied individually over a certain period. The module helps students learn independently, and learning becomes interesting because it can be done outside the classroom. It allows students to express learning according to their interests and skills, assesses skills from learning outcomes with practice questions in the module, and improves their ability to interact with the environment and involvement in the learning process (Diansah, 2020).

E-modules, a collaboration between technology and using modules as learning media, are expected to increase learning engagement and student critical thinking ability and be an English Language Teaching (ELT) innovation for the millennial generation. The approach to teaching English has often changed due to the development of innovations that have improved teaching and learning methods (Wedell, 2022). This statement encourages the development of various innovations in teaching and learning English, which aim to improve student achievement and competence. One of the current innovative developments in teaching and learning English is interactive electronic modules and collaboration with websites or multimodal. Interactive e-modules are digital learning resources that use multimedia elements, including images, animation, video, and audio, to make learning more interactive and interesting. They are often used to present independent study material systematically organized into learning units, with each

activity linked to facilitate navigation and interaction with the program (Nurhikmah et al., 2021; Sidiq et al., 2021; Vachruddin et al., 2024).

Interactive e-modules include multimedia features like films, animations, and graphics to enhance the learning experience. Interactive Learning Activities: These modules feature interactive learning activities to help students develop critical, creative, and inventive thinking abilities; Personalized Learning: Interactive e-modules can accommodate students of varying learning rates and demands, resulting in a more personalized learning environment; Accessibility: These modules may be accessed using a variety of platforms, including PCs, cellphones, and tablets, making them extremely accessible (Sidiq et al., 2021; Vachruddin et al., 2024; J. E. Wijaya & Vidianti, 2020). Furthermore, (Sidiq et al., 2021; states that interactive E-modules are proven to improve student learning outcomes in disciplines such as physics and religious education, improve students' critical thinking skills, allowing them to analyze arguments and conclude learning effectively, as well as encourage autonomous learning by allowing students to practice problem-solving and deep thinking skills without the need for external assistance. Google Sites is a web-based tool that lets users construct simple websites without knowing how to code. This makes it an excellent choice for creating and hosting interactive e-modules.

Google Sites, a component of the Google Workspace suite, is extensively used for developing personal, educational, and professional websites. Key features of Google Sites include Ease of Use: Google Sites is noted for its user-friendly interface, which allows anybody to create and administer websites without

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requiring considerable technical knowledge. Collaboration capabilities: It has powerful collaboration capabilities that allow numerous people to work on the same site while tracking changes. Customization: With a range of themes and design tools, users may change the appearance and content of their websites. Integration with Other Google Tools: Google Sites works perfectly with Google Drive, Google Docs, and Google Sheets, making it simple to share and manage material (Hardianti & Alyani, 2023).

Interactive e-modules assisted by Google sites are one of the recent innovations in English language teaching, encouraging student participation in learning and reading and writing habits. In their research, Sevtia et al. (2022) developed learning media based on Google Sites, especially in physics learning, to improve high school students' conceptual understanding and critical thinking skills. His research revealed that Google Sites-based physics learning media can improve high school students' conceptual understanding and critical thinking skills. The research results state that the learning media used is valid, effective, and efficient. This research was supported by Ramasundrum (2022), which investigated the influence of Google Sites on scientific achievements and verified this statement. Based on this research, teachers can improve the quality of their teaching by utilizing free and simple technological tools. Support and space must be provided for teachers to use and feel comfortable with these tools effectively. Besides that, Rahmatsyah and Dwiningsih (2021) also explain that interactive e-modules are electronic modules consisting of a collection of non-printed digital learning resources arranged systematically and can be used independently by students to

solve problems in their way. Among the many types of e-modules, there are interactive variations. Interactive e-modules have the advantage of being interactive for users, easy to navigate, and display visual, audio, and video animations. It also has tests or quizzes that automatically generate feedback effects. The interactive e-module includes learning components for each sub-chapter, learning videos, summaries, and practice quizzes after each sub-chapter. Most e-modules contain basic competency mapping, instructions for use, and the content itself.

Several studies related to the use of e-modules in learning state that the use of e-modules, especially those facilitated by the Google Site, is very effective in increasing student competence (Adzkiya & Suryaman, 2021; Ginting & Afifah, 2022; Reskiyati et al., 2023; Sevtia et al., 2022). However, most research focuses more on student learning outcomes than critical thinking skills or student involvement in learning. Additionally, one limited study investigated how interactive e-modules based on Google sites were applied to learning.

For example, Ulinuha & Parnawati (2023) who researched students' perspectives on using Google Sites in general English classes in college, implying that the module was efficient, fun, and inspiring. The results also indicated that students enjoy using the English Module since it encourages and helps them enhance their learning abilities. Despite the use of Google Sites in the form of an English Module as additional material for General English courses at universities, it received a positive response from students; however, This study confirms student feedback that various adjustments are required to improve the module's usability, particularly in terms of learning experience. Therefore, subsequent studies are

advised to evaluate the usage of e-modules in online and offline classrooms or flipped learning scenarios. Interactive learning activities, such as those found in experiential learning modules, are good in encouraging critical thinking and participation. These exercises motivate students to think critically and apply their knowledge in real situations (Dvergsten & Haugen, 2015).

Based on the explanation above, it can be emphasized that critical thinking skills and learning engagement are still referenced because they are essential teachings to be promoted and are in line with 21st-century learning, which places great emphasis on the concept of critical thinking (Kai et al., 2021). Meanwhile, student involvement in education depends on how teachers design interactive learning using technology or social media close to students (Kusuma, 2022).

Technology has been increasingly crucial in increasing student motivation and engagement in language classes since the turn of the century. There were several research related to the use of technology in improving students' critical thinking and learning engagement, as well as several factors that influence students' critical thinking and learning engagement. Terasne et al. (2022) investigated the factors that influence EFL students' critical thinking skills and reading achievement in the reading classroom, and the findingreveals that critical thinking skills are not due to this individual. Even though the individual was born with vision and hearing problems that affect the innate ability of critical thinking, motivation, and interest also influence the students' critical thinking. Cognitive factors such as memory, attention, awareness, and forgetting influence critical thinking and reading achievement in the classroom. A similar study by Yulianti & Gunawan (2019),

which examined the effect of the problem-based learning (PBL) learning model on students' conceptual understanding and critical thinking in high school physics subjects, discovered a significant relationship between guided problem-based learning and students' understanding of concepts and critical thinking in senior high school. Furthermore, critical thinking is evaluated using technology, such as a study undertaken by Bravo et al. (2022), which highlights the relevance of digital proficiency as a foundation for strengthening other skills. by defining six dimensions (critical, cognitive, operational, social, emotional, and projective). These dimensions discuss the critical use of technology, the application of technology in everyday life, and social innovation, which encourages rethinking digital literacy from a multidimensional and interdimensional perspective.

Moreover, Anas et al. (2020), Kodri et al. (2020), and Kari et al.) investigate several learning models using technologies to improve students' critical thinking. Anas et al. (2020) clearly stated that scientific and technological advancements allow teachers to create a variety of learning media that can be used in the learning process and state that video technology media can aid in the teaching and learning process by helping students understand science concepts and improving their critical thinking skills. This finding is supported by Kodri et al. (2020), who examined Technological Pedagogical Content Knowledge (TPACK) and its impact on students' critical and creative thinking abilities—and discovered that TPACK positively impacted critical and creative thinking skills in students. In other words, if the TPACK of the teacher improves, the student's critical and creative thinking skills will also improve. Similarly, Kari et al. (2022) investigate the validity of

products using learning tools that use the Discovery Learning approach to boost students' creative thinking skills in science class. The findings of this study show that learning aids based on the Discovery Learning model to increase students' creative thinking skills are appropriate for use in school. It is also recommended that further researchers study the development of comparable devices, pay close attention to each component and aspect of the learning device, and identify the challenges. However, these studies mostly focus on the fields of physics and mathematics. Although several studies examine the factors that influence critical thinking, this research limits its scope to the higher education or university level. This prompted researchers to dig deeper into the influence of the use of technology on the critical thinking skills of EFL students in high school level, especially in reading comprehension.

On the other hand, several studies related to learning engagement state that the use of technology in learning influences student involvement and critical thinking in the learning process, such as research conducted by. Li & Li (2022) investigated learning engagement using flipped classroom activities and proposed that the teacher and other educational stakeholders should provide more significant assistance to learners to cater to their emotional engagement and help them cope with the problems they face throughout the flipped learning experience. The study may help professional researchers better understand flipped instruction in the EFL setting and develop and implement flipped classes, considering the positive and negative factors influencing learner engagement. Furthermore, Wiliani et al. (2023) investigate students' engagement using Glide and state that by using various

learning media, students and teachers will have a more enjoyable learning environment. They recommend further research to explore and create another app using Glide. However, several of these investigations contradict the study conducted by Heflin et al. (2017), which analyzed student learning in three different collaborative learning contexts, both with and without mobile technology, to assess students' involvement, critical thinking, and cooperative learning attitudes. The findings show that mobile technology is connected with favorable student views of collaborative learning but increased student disengagement in class. Furthermore, the tools utilized to produce written solutions had a stronger relationship with students' critical thinking than the collaborative learning environment type. Students who created paragraph responses on a mobile device showed much less critical thinking than those who used a computer keyboard or wrote comments by hand.

The breakthrough results of several studies prioritizing critical thinking skills and learning involvement in EFL learning and the contradicting research on how technology is used in learning are still interesting trend issues to explore further. Additionally, several recommendations provided by previous research that direct future research to analyze the influence of using more varied tools on students' critical thinking skills and learning engagement attracted the researcher's attention.

Given the abundance of MOOCs and learning platforms now available, the researcher on this study decided to use Google Sites to facilitate interactive

electronic modules for learning. There are numerous strong arguments in favour of using Google Sites for e-module production, including:

1. Simplicity of Use: Students and teachers with different levels of technological proficiency may utilise Google Sites due to its intuitive interface and drag-and-drop capabilities. This simplicity accelerates the development and implementation of e-modules

2. Google Workspace Integration for Education: Google Sites easily connects to other Google Workspace programs, including Google Drive, Docs, Sheets, and Slides. This integration increases teacher and student productivity by streamlining material production, collaboration, and storage.

3. Cost-effectiveness: Since Google Sites is frequently included in Google Workspace membership plans, businesses using Google's productivity products can save money. Their cost makes greater access to e-learning resources possible, especially for educators or institutions with little funding.

4. Branding and customisation: Google Sites, despite its simplicity, provides educators with a wide range of customisation choices, enabling them to imbue e-modules with their branding, teaching philosophies, and educational goals. For participants, this branding coherence creates a seamless learning environment.

5. Compatibility and accessibility: Google Sites guarantees consistency between different platforms and devices, allowing students to easily access e-modules on PCs, laptops, tablets, and smartphones.

6. Google Sites also complies with accessibility guidelines, which improves inclusion for students with impairments.

Several conveniences offered by Google Sites empower researchers in this study to use Google Sites as a website that facilitates the delivery of interactive electronic modules, which are delivered in a structured manner according to learning outcomes that met through several learning activities such as learning videos, presentation slides, learning materials such as expository texts, which requires students to think critically, as well as some interactive quizzes that attract student involvement in learning, and as well as to analyse more deeply their influence on the critical thinking skills and learning engagement of senior high school students in EFL classes.

1.2 Problem Identification

Several studies have examined how teachers design learning using technology to improve critical thinking, stating that it is very influential (Aoki, 2010; Karten, 2017; Kerimbayev et al., 2023). Likewise, research on increasing student involvement in learning is also greatly influenced by the use of technology and media in learning (Mishra & Koehler, 2006; Reddy et al., 2020; Winch & Gingell, 2000). Furthermore, The recent study has also implemented and developed website-based e-modules that are simple, easy to use, and easy to access, facilitated by

Google sites to increase student interaction in learning (Ernest & Putra, 2023).

Moreover, student involvement in learning English is still generally researched in terms of learning effectiveness. Still, students' learning engagement in emotional, physical, and cognitive engagement inside and outside the class has not been studied intensely.

On the other hand, implementing the Kurikulum Merdeka in Indonesia still emphasises student-centred learning, where students can learn independently according to their interests and learning styles (Kepmendikbudristekdikti, 2022). Implementing the Kurikulum Merdeka is also expected to develop 21st-century skills, and critical thinking is one of the main points that must be designed to face global challenges (Sari & Murwaningsih, 2023). Furthermore, student participation in this curriculum is seen in how students interact, and their involvement in the learning process is adjusted to their interests and learning styles (Subhan, 2022). However, implementing the Kurikulum Merdeka has not run optimally, where teachers and textbooks still dominate the learning process. Of course, this shows that learning has not been or has not been adapted to students' interests and learning styles.

Furthermore, several studies also show that critical thinking is the most important educational skill for producing competent graduates to compete regionally and globally in the 21st century when governments and industries are trying to develop their economies. Therefore, schools are responsible for meeting these and other community needs. Schools must reconsider their goals to create and implement curricula that will produce the human resources necessary to find

workable answers to these requirements (Shah, 2010). According to Thompson (2011), teachers must make teaching critical thinking a priority for their students, regardless of their discipline or level of education.

This phenomenon is similar to the current problem of learning English at the high school level. The phenomenon can be seen from several recent studies that are still researching improving students' critical thinking skills (Serevina et al., 2019; Terasne et al., 2022). Moreover, several studies are still exploring the lack of student interaction in the learning process, where students tend to be passive in responding to the learning activities provided. Based on that problem, this research aims to solve and investigate the method of increasing critical thinking ability and interaction or students' learning engagement in emotional, physical, and cognitive engagement in and outside of the class.

The method of increasing students' critical thinking ability and learning engagement in learning English at the high school level refers to several previous studies that utilized technology in learning, especially learning English using interactive e-modules assisted by Google Sites, encouraging researchers to implement learning by combining the use of interactive e-module assisted by Google site to determine its effect in improving critical thinking skills and learning engagement of high school students in EFL classes. Furthermore, this encouragement is also strengthened by the Kurikulum Merdeka, which is still relatively new and has begun to be widely implemented, and interactive e-modules assisted by Google Sites have also started to be widely used. However, implementing interactive e-modules assisted by Google sites has not yet seen

precise results on critical thinking skills and learning engagement in the English learning process. The implementation of interactive e-modules assisted by Google Sites is what makes this gap must be addressed immediately. It becomes an opportunity for a researcher to cover it in this research.

1.3   Research Scope

Based on the review of several previous studies, this research adopts a mixed-methods experimental design (the Concurrent embedded design). In concurrent embedded design, both qualitative and quantitative data are collected simultaneously in one phase, in which quantitative is the primary method and qualitative is the secondary method, which supports data to analyse the effect of interactive e-modules assisted by Google sites on students' critical thinking and learning engagement of senior high school students in EFL classes. Concurrent embedded design is a robust research strategy combining qualitative and quantitative methodologies to understand complicated research problems thoroughly. By combining both forms of data, researchers may get more nuanced and dependable results. This method is especially beneficial in disciplines requiring qualitative and quantitative insights to answer the research issue properly.

Creswell (2018) States that in a mixed-method experimental (or intervention) design, the researcher gathers and analyses quantitative and qualitative data before incorporating the information into the trial or intervention trial. This design incorporates qualitative data gathering into an experiment or intervention, allowing participants' personal experiences to be incorporated into the

study. Thus, qualitative data becomes a supplementary data source integrated into collecting experimental data before and after the test.

This research aims to analyze the effect of interactive e-modules on the critical thinking and learning engagement of high school students in EFL classes. The quantitative and qualitative data in this research were analyzed by conducting experimental research consisting of two sample groups: the experimental and control groups. The sample used was students in the F phase or XI grade from one of the high schools that implemented the Kurikulum Merdeka in their learning process and were active in using technology as learning media. The school that meets the criteria for this research is SMA Negeri 2 Kuta, which was chosen based on the results of an initial search conducted directly at the school, and the suitability of the purpose of this research was determined by conducting interviews with the principal and one of the English teachers at the school. The research leads to quasi-experiments. Quasi-experiments have a control group but cannot wholly control external variables that influence the conduct of the experiment. In school research, it is often impossible to determine a control group according to the rules in experimental research. This difficulty is because students have been grouped into classes. Therefore, quasi-experiments are used because it is difficult to obtain a control group.

The goal was achieved by collecting the data through a pre-test in the first step before providing treatment using an Interactive e-module assisted by Google Sites and a post-test as quantitative data to measure critical thinking skills. An engagement survey, research notes, documents, and observations before, during,

and after the interventions were also used as qualitative data to verify and compare the quantitative data. As well as supplementary data to support the quantitative data. Meanwhile, the control class only used supporting textbooks for high school English learning in the F phase, but the instruction and the text were the same in both classes. The objective of both classes was also the same: to enable learners to understand, analyse, and respond to exposition text in written communication through reading comprehension activities.

1.4 Research Questions

Based on the thoughts above, the research questions can be formulated as follows.

1. Is there any significant effect of interactive e-modules assisted by Google sites on the critical thinking skills of Senior High School Students in EFL classes?

2. Is there any significant effect of interactive e-modules assisted by Google sites on the learning engagement of Senior High School Students in EFL classes?

3. Is there any simultaneous effect of interactive e-modules assisted by Google Sites on critical thinking skills and learning engagement of Senior High School Students in EFL?

1.5 Research Objectives

Based on the previously mentioned problems, research objectives can be divided into general and specific objectives, formulated as follows.

1. General purpose

   This research aims to determine the effect of an interactive e-module assisted by Google Sites on high school students' critical thinking ability and learning engagement in EFL classes.

2. Specific object

   More specifically, this research aims to:

   a. Analyzing whether there is any significant effect of using interactive e-modules assisted by Google Sites on high school students critical thinking skills in EFL class.

   b. Analyzing whether there is any significant effect of using interactive e-modules assisted by Google Sites on high school students' learning engagement in EFL classes.

   c. Analyzing whether there is a simultaneous effect of interactive e-modules assisted by Google Sites on critical thinking ability and learning engagement of high school students' critical thinking ability and learning engagement in EFL class.

1.6 Research Significance

It is hoped that the findings of this helpful research both theoretically and practically for those who have an interest in learning to teach English, which can be formulated as follows:

1. Theoretical significance

   It is hoped that the research results can strengthen previous theories. This study is also helpful in improving the theoretical basis of English Language

Teaching, especially in using interactive e-modules assisted by Google Sites to enhance students' critical thinking skills and learning engagement.

2. Practical Significance

Practically, the findings of this research are expected to be useful for English teachers, students, and future researchers.

    a.   For English teachers

Hopefully, this research will be helpful for teachers in providing a deeper understanding of the innovative strategies or media used in carrying out the teaching and learning process. By involving interactive e-modules assisted by Google site in this research, it is hoped that teachers can increase awareness of the importance of creative and innovative media in teaching and learning, especially in improving critical thinking ability and learning engagement of high school students in EFL classes.

    b.   For students

It is hoped that it can facilitate student-oriented learning in the implementation of the Kurikulum Merdeka and provide more opportunities for freedom of learning for students in developing their critical thinking skills as one of the competencies that must be possessed in facing the challenges of the 21st century. Furthermore, it is hoped that it can encourage students to increase their learning engagement while at the same time directing them to success in learning English as a foreign language.

c. For Future Researchers

Hopefully, this can be an additional reference in similar research fields to obtain other meaningful concepts and perspectives regarding the application of student-centred learning in the Kurikulum Merdeka using interactive e-modules assisted by Google Sites to increase students' critical thinking skills and learning engagement in the learning process.

1.7 Definitions of Key Terms
1.7.1 Conceptual Definition

1. Critical Thinking Concept

Critical thinking is the ability to analyse, evaluate, and synthesize information logically and systematically to make sound decisions or solve problems. In this study, critical thinking refers to students' ability to critically examine arguments, detect bias, evaluate evidence, and communicate findings in an English as a Foreign Language (EFL) context. According to context, critical thinking has been defined differently in the literature. All cognitive processes and strategies, as well as attitudes related to decision-making, problem-solving, investigation, or higher-order thinking, are included in critical thinking. Additionally, critical thinking includes rationally deciding what to believe. (Norris, 1985). According to Harris and Hodges (1995), critical thinking is the process of

making conclusions about the value or impact of a text by looking at its qualities, events, and happenings in its context. Critical thinking skills come from cognitive, psychological, and pedagogical approaches. Critical thinking is described by the types of behaviour and abilities that a critical thinker might exhibit from a cognitive psychological point of view. In contrast, critical thinking is equated with the highest level category of information processing from an educational point of view. (van der Zanden et al., 2020).

More profoundly, Halpern (1998) defines critical thinking as the type of thinking involved in problem-solving, formulating inferences, calculating possibilities, and making successful decisions. Ennis (1985) also defines critical thinking as consisting of three essential parts: the problem-solving process, the reasoning process, and the decision-making process. According to Syarifah et al. (2018), in general, thinking ability consists of four levels: memorizing (remember thinking), essential (basic thinking), critical (critical thinking), and creative. Memorization skills, which are almost automatic or reflexive, are the lowest level of thinking. The next level is basic skills (primary thought). This ability includes understanding addition and subtraction concepts and applying them to problems. Critical thinking consists of reading with good comprehension, identifying necessary and unnecessary information, and examining, relating, and interpreting each aspect of a situation or problem. Apart from that, critical thinking also includes collecting, organizing, remembering, and analyzing data. Those parts show that they can draw conclusions from the data provided and identify contradictions and inconsistencies in a data group.

According to Brookfield (1997), teachers must model critical thinking because it provides students not only with a model but also a scaffold for all actions in the classroom and helps develop trust between teacher and students. According to Rear (2017), the taxonomy of critical thinking skills developed by theorists such as Bloom (1956), Ennis (1987), and Facione (1990) is helpful for pedagogical purposes because it provides a framework for how critical thinking can be systematically taught in a learning environment.

Bloom's taxonomy (1956) defines six main types of thinking, ranging from the most basic skills (low-level thinking) at the lowest level to the most complex (high-level thinking) at the upper level. There are six main categories: knowledge, understanding, application, analysis, synthesis, and assessment (Patricia, 2019). The following is a brief description of the main categories from the appendix to the Taxonomy of Educational Goals:

a. Knowledge is the recall of specific and universal procedures and processes or patterns, structures, or arrangements.

b. Comprehension refers to understanding or perception in which an individual understands what is said and can apply the material or concepts communicated without having to relate it to other material or feel its full consequences.

c. Application is the use of abstractions in specific and concrete situations.

d. Analysis is decomposing a communication into its constituent aspects or parts to clarify the relative hierarchy of ideas or the relationships between the concepts presented.

e. Synthesis is the process of combining materials and pieces to produce a single whole.

f. Evaluation produces conclusions regarding the usefulness of materials and processes for specific purposes.

There is various research on questioning approaches in developing Critical Thinking, with Haynes and Bailey (2003) highlighting the need to ask the right questions to improve students' critical thinking skills. Other research conducted by Brown and Kelley (1986) and Hemming (2000) focused on enhancing questioning strategies in classroom discussions to help students practice and demonstrate critical thinking during the learning process. The book 'Asking Right: A Guide to Critical Thinking' states that when teachers actively use essential questioning approaches to engage students in the learning process, students' critical thinking is best fostered. Here are examples of questions from all of this research:

1. What do you think about this?

2. Why do you believe this?

3. What is your knowledge based on?

4. What does it suggest or presuppose?

5. What explains, connects, or follows from it?

6. How do you see it?

7. Should this be looked at differently?

The questions above require students to assess the correctness, clarity, depth, and breadth of their reasoning (Synder, 2008). By challenging them during

the thinking process, students can begin to think about their thoughts, which is believed to help them develop critical thinking skills.

Teachers must create a learning environment where students feel comfortable thinking about their answers rather than just thinking about them by helping students through the process and being aware of their initial reluctance (Synder, 2008). Assign students to form teams of two, one as a problem solver and the other as a peer coach. Using the steps provided by Facione (2015).

Table 1. 1 Core Critical Thinking Skills. according to Facione (2015)

No	Insufficient capabilities	Sub-Skills
1	Interpretation	Categorise, describe meaning, and clarify meaning.
2	Analysis	Examine concepts, recognise arguments, identify causes and statements
3	Conclusion	Question evidence, speculate options, and reach conclusions.
4	Evaluation	Evaluate the credibility of claims and the quality of arguments through inductive or deductive reasoning.
5	Explanation	State results and defensive techniques and provide reasons
6	Self-Regulation	Self-examination and self-correction

Using these problem-solving strategies helps guide students through critical thinking and collaborative learning. Therefore, teachers are responsible for determining learning designs according to the Kurikulum Merdeka, which incorporates new changes. The Kurikulum Merdeka requires students to develop skills independently and have technologically advanced knowledge, such as using

artificial intelligence (AI) tools to guide learning. Learning is designed to enhance essential skills such as critical thinking, communication, collaboration, and creativity. (Haryati et al., 2022)

2. Learning Engagement

Learning engagement is the level of active participation, emotional involvement, and cognitive commitment that students show in their learning process. This research comprises four dimensions:

- Outside of class, cognitive engagement refers to the work and determination required to complete academic assignments other than those assigned in the classroom.
- Emotional involvement refers to positive attitudes and passion for learning tasks and activities.
- Cognitive engagement in class refers to the mental attention and strategic approaches employed while learning in the classroom.
- Physical involvement involves observable participation, such as attending classes, engaging in discussions, and completing assignments.

According to previous research studies, learning engagement helps students significantly improve their critical thinking skills. Those findings are evident when students participate in a collaborative learning setting; they typically demonstrate their involvement through speaking, eye contact, body movements, or posture. Disengaged individuals are frequently observed gazing at technology, not making eye contact, and being non-participants. Furthermore, students who produced

papers with short typing on mobile devices appeared less likely to display deep critical thinking than students who wrote written responses on computers or paper (Heflin et al., 2017).

Various research studies have presented several concepts to describe or examine the significance of learning engagement in students' critical thinking abilities. Burch et al. (2015)Created a theory-based student engagement survey and identified two theoretical methods frequently used by student engagement researchers. The first is based on learning and education theory, while the second is rooted in management philosophy. They also suggested that combining the two techniques could create an appropriate conceptual framework.

Astin's (1984) Student Engagement Theory argues that educational policies and practices cause students to expend psychological and physical energy, which leads to their learning and personal growth. Astin states that student learning and personal development are closely related to the amount and quality of physical and psychological energy invested in engagement.

Furthermore, Steele and Fullagar (2009) shifted their focus from education-based theory to exploring student engagement using the Job Characteristics Model (Hackman & Oldham, 1980). The results of their empirical study provide evidence supporting the implementation of these changes in educational settings. Choosing only education or management ideas may limit the breadth of information and understanding regarding both areas.

Moreover, Astin's (1984) Student Involvement Theory offers a significant explanation of student involvement, but it must be integrated with management

theory. Kahn (1990) stated that engaged employees are ready to dedicate emotional, physical, and cognitive resources to perform their tasks effectively. Educational researchers have supported the idea that engagement consists of three components: cognitive engagement, emotional engagement, and physical engagement, as described by Csikszentmihalyi (1990), Jackson & Marsh (1996), and Steele & Fullagar (2009).

Based on several theories, Burch et al. (2015) suggested testing student participation using Kahn's (1990) emotional, physical, and cognitive investment components. They indicated that cognitive involvement can occur inside or outside the classroom. Then, Burche identified four specific aspects of student engagement: emotional engagement, physical engagement, cognitive engagement during class, and cognitive engagement outside of class.

Researchers in this study were motivated and obliged to support student learning. They adopted the engagement scale developed by Burch et al. (2015), who introduced a theory-based student engagement scale and verified its size through two experiments. Burch recommended that future research utilize the scale to assess students' emotional engagement, physical engagement, cognitive engagement in the classroom, and cognitive engagement outside the classroom. According to Burch et al. (2015), follow-up studies that utilize the findings of such investigations can strategically change the learning environment through classroom activities that align with individual variants, resulting in highly engaged students.

In contrast, research on student engagement lacks a theoretical basis regarding the components that influence student learning. The findings from

Burch's four-factor model of student engagement indicate that student engagement is not a single component. Students may be emotionally, physically, or cognitively engaged in or outside the classroom. These four characteristics allow researchers to investigate further the relationship between classroom engagement and engagement with learning. Burch also suggests that such innovative student engagement approaches will enable schools to monitor participation in classes and courses and offer the information necessary to create continuous improvement initiatives for student engagement. Burch's statement is relevant to this research study, which conducted Google Sites as an innovative student engagement approach that helps the teacher monitor students' learning engagement in the class and its influence on the student's critical thinking skills.

3. Interactive E-Modules based on Google Sites

Interactive electronic modules are digitally constructed teaching tools that promote learning through user participation. Utilising Google Sites, these modules combine multimedia material such as text, videos, quizzes, and hyperlinks in an easily accessible online platform. In this study, these modules are designed to facilitate autonomous learning, improve critical thinking, and increase engagement in EFL learning by offering interactive and adaptive elements that are matched to the learners' requirements.

The significant influence of contemporary technology on education, especially in critical thinking and learner engagement, has been highlighted by several recent studies. One crucial area of research that has gained attention is the idea of multimodality in education. Collaboration through multimodal writing

exercises has produced impressive results, according to Kessler (2022), outperforming control groups in terms of text length, linguistic diversity, and communication efficacy, among other metrics. Philippe et al. (2020) defined multimodality as integrating print, visual imagery, and design to communicate complex concepts. The previous study represents a significant change in educational paradigms favouring more engaging and immersive learning environments.

This transition towards multimodal education necessitates fundamentally reevaluating teaching and learning approaches. The integration of interactive e-modules, facilitated by platforms like Google Sites, exemplifies this evolution. As highlighted by Nan and Huriyah (2022), e-modules represent meticulously prepared, electronically delivered instructional materials, fostering self-directed learning experiences. The flexibility afforded by e-modules transcends temporal and spatial constraints, enabling students to access learning resources conveniently, and promoting autonomy and engagement.

The Indonesian Kurikulum Merdeka emphasizes the need for teachers to embrace technological innovation to improve English language education. The innovation calls for switching from conventional paper-based materials to electronic substitutes like e-modules (Winatha & Abubakar, 2018). The growing craze for using e-modules to enhance learning experiences indicates a more significant trend. Laili Mas'udah (2021) explains that interactive e-modules are carefully created materials intended to develop topic skills through engaging and systematic information delivery.

In English as a Foreign Language (EFL) instruction, the adoption of Google Sites as a platform for interactive e-module delivery has gained traction. Educators increasingly leverage this tool to cultivate student engagement and foster critical thinking skills. Sevtia et al. (2022) exemplify this trend by creating Google Sites-based learning media for physics education, employing a comprehensive 4D model encompassing design, definition, dissemination, and development. Furthermore, Norelyn (2022) underscores the utility of Google Sites as a versatile platform for creating immersive e-learning environments, offering various resources ranging from modules and interactive worksheets to video courses and academic reminders. Integrating multimodal learning approaches facilitated by platforms like Google Sites represents a paradigm shift in educational practice. By embracing technology and innovative pedagogical strategies, educators can foster student engagement, autonomy, and critical thinking skills, enriching the learning experience and preparing students for the challenges of the digital age.

1.7. 2 Operational definition

1.   Critical thinking

Critical thinking is one of the 21st-century skills. This skill requires students to think critically about the material assigned to them, not just procedurally. Critical thinking encourages students to investigate and address current problems. As stated above, students must be able to answer difficulties by critical thinking. So, critical thinking is associated with problem-solving skills.

Education with an integrated curriculum framework can help students develop, practice, and continuously engage in active learning of critical thinking skills. Besides being instructors and facilitators of student learning, teachers have an essential role in improving students' critical thinking skills. Teachers act as facilitators in creating a critical-thinking environment, as Kim and Pollard (2017) recommended. Critical thinking skills, connected with the material instrument design, are needed to complement the teaching and learning process.

Based on this, this research focuses on students' critical thinking skills in problem-solving under the thinking of Halpern (1998), who defines critical thinking as the type of thinking involved in problem-solving, formulating inferences, calculating possibilities, and making successful decisions. Critical thinking in this research was analyzed by using the two theories described above, namely, Bloom's Taxonomy perspective (2001), to understand data from student pretest and posttest analysis, which contains HOTS questions, as well as the Core Critical Thinking Indicator from Facione (2015). to determine students' critical thinking skills through the use of e-modules assisted by Google Sites by adopting questions to strengthen critical thinking skills from Facione (2015).

2. **Learning Engagement**

Although researchers understand student engagement as a multifaceted construct, much research ignores the distinct contributions of each engagement component and the overall engagement construct. Therefore, whether we can distinguish between each dimension's contribution and the construct's overall impact remains uncertain. Examining an entire build and a particular dimension

simultaneously is challenging because of the lack of clarity in distinguishing between them.

Align with the previous understanding of student engagement, this research tries to measure four elements of student engagement using a student engagement scale by adopting a survey test created by Burch (2015) with an engagement scale consisting of 4 factors, namely emotional, physical, and cognitive engagement into two segments, in class and outside of class which conducted through a validation process. There are 24 items from the engagement scale in the engagement survey. The survey was conducted on students at SMA Negeri 2 Kuta in experimental and control classes during the last two weeks of the odd semester of the 2023/2024 academic year. The average age of respondents was 16-18 years, and all participants were willing to assess their students' participation level.

3. Interactive E-Module assisted by Google Site

Interactive e-modules include learning components that contain material for each subchapter, learning videos, summaries, and practice quizzes after each subsection. Interactive e-module assisted by Google Site consists of basic competency mapping, instructions for use, learning material, and activities through multimedia presentations, highlights, practice questions, and a glossary. The procedure for compiling interactive e-modules based on Google sites in this research adapts the e-module contained in the book "Procedure for Preparing Electronic Modules" written by Najuah et al. (2020), as well as a web-based interactive e-module developed by Bahri et al., (2022), where the e-module developed in the research has gone through a validation process from a team of

media experts with an average media suitability score of 89.19% in the outstanding category. Meanwhile, the material was adjusted to the class level used as a sample, so it requires validation of the English learning material for the F phase of high school students contained in an interactive e-module assisted by Google Sites.

1.8   Research Assumptions
Based on the findings from previous research, this research can assume that students' critical thinking skills and learning engagement can be analysed for their influence through interactive e-modules assisted by Google sites in the English learning process of high school students in EFL classes.

1.9   Publication
The study was published in the Indonesian Educational Development Journal (IJED) Indonesian Educational Development Journal (IJED) has been accredited (SINTA 4) based on the decision of the Indonesian Ministry of Education and Culture Number 255/E/KPT/2022, which is valid for five years since it was promulgated on December 7, 2022. It contains English language writing from research results on learning development, educational measurement and evaluation, and educational management.

CHAPTER II
REVIEW OF RELATED LITERATURE

2.1   Theoretical Review

The theoretical foundation of this research delves into critical thinking, learning engagement, and the nature of interactive e-modules, particularly those assisted by Google Sites. These theoretical underpinnings serve as a framework for understanding the dynamics between technology-enhanced learning environments and student outcomes.

2.1.2 The Nature of Critical Thinking

Critical thinking, an essential skill in modern education, encompasses various cognitive processes crucial for effective problem-solving and decision-making. Based on a review of several studies related to critical thinking from the beginning to the latest in the development of critical thinking, several similar definitions of critical thinking are stated. Ennis (1964) and Kurfiss (1988) emphasize the learnability of critical thinking, highlighting the role of peers and teachers in its development and providing many significant conclusions: 1) Critical thinking is a talent that can be learned; peers and the teacher are helpful sources for critical thinking skill development; 2) Issues, problems, or questions serve as a starting point for research and a source of inspiration for in-depth analysis; 3) Effective courses strike a balance between providing help based on students' developmental needs and forcing them to think critically; 4) Assignments are the main focus of the courses as opposed to texts and lectures. Objectives, procedures, and assessments place more emphasis on using content than on merely obtaining it;

5) Students must present and defend their views in writing or other suitable formats; 6) Students work together to expand their knowledge and thinking skills, For instance, in small group and pair problem-solving; 7) Several courses foster students' metacognitive talents, especially those that focus on problem-solving techniques; 8) The course design takes into account the student's developmental requirements and considers them. In these classes, instructors lay out expectations clearly before assisting students in understanding how to meet them.

Furthermore, Moon (2007) Underscores the multifaceted nature of critical thinking, emphasizing its capacity to analyze data, construct knowledge, and draw reasoned conclusions as follows: 1) The capacity to engage in critical thinking involves examining a variety of data obtained from many sources, processing it rationally and creatively, questioning and analyzing it, and drawing well-reasoned conclusions that can be supported and justified. Prejudice and passing judgment are their opposites. Constructing knowledge is necessary, and its meaning varies depending on the situation. 2) Developing your argument, analyzing concepts, or synthesizing various thoughts connected to complicated concepts are examples of critical thinking. Various paths may lead to the same outcome, or multiple conclusions may arise from the same problems.

Moreover, Fischer & Spiker (2000) elaborate on critical thinking's broad scope, encompassing reasoning, metacognition, and reflection. It was agreed upon by 500 politicians, employers, and educators that critical thinking is a wide phrase that defines reasoning in an open-ended way with an infinite number of answers. As Jones et al. (1997) articulated, the consensus among educators underscores

critical thinking as a foundational skill for navigating complex challenges in the 21st century.

Aligned with this perspective, Kai et al. (2021) emphasize the importance of critical thinking in fostering high-level cognitive skills essential for future success. Ramalingam et al. (2020) further delineate critical thinking skills, also called cognitive skills, including: a) Analyzing: identifying intended and actual inferential relationships between statements, questions, concepts, descriptions, or other forms of representation intended to express beliefs, judgments, experiences, reasons, information, or opinions. b) Interpret, describe, categorize, and clarify the meaning c) Evaluate: Compare and contrast statements and arguments to define intellectual curiosity. d) Conclusion: determining whether the information is sufficient and reliable e) Making a decision f) Problem-solving.

Furthermore, Benjamin Bloom developed Bloom's taxonomy in 1956 to determine the level of reasoning skills that students use for effective learning. Then, in 2001, cognitive psychologists, theorists, and learning researchers rewrote and published an updated version of Bloom's taxonomy (Sena & Etienne, 2022).

Those findings are in line with the critical thinking theory developed by Facione (2015), which emphasizes that the essence of critical thinking includes interpretation, analysis, evaluation, inference, explanation, and self-regulation of the precise description analysis of each component based on the Expert's consensus description summarised in Table 2.1

Table 2. 1 The core of critical thinking skills (Facione, 2015).

Core Critical Thinking Skills		
SKILLS	Experts' Consensus Description	Subskills
Interpretation	"To comprehend and express the meaning or significance of a wide variety of experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures, or criteria."	Categorise Decode significance Clarify meaning
Analysis	"To identify the intended and actual inferential relationships among statements, questions, concepts, descriptions, or other forms of representation intended to express beliefs, judgments, experiences, reasons, information, or opinions."	Examine ideas Identify arguments Identify reasons and claims
Inference	"To identify and secure elements needed to draw reasonable conclusions; to form conjectures and hypotheses; to consider relevant information and to reduce the consequences flowing from data, statements, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other forms of representation."	Query evidence Conjecture alternatives: Draw logically valid or justified conclusions
Evaluation	"To assess the credibility of statements or other representations that are accounts or descriptions of a person's perception, experience, situation, judgment, belief, or opinion; and to assess the logical strength of the actual or intended inferential relationships among statements, descriptions, questions, or other forms of representation."	Assess the credibility of claims. Assess the quality of arguments that were made using inductive or deductive reasoning.
Explanation	"To state and to justify that reasoning in terms of the evidential, conceptual, methodological, criteriological, and contextual considerations upon which one's results were based; and to present one's reasoning in the form of cogent arguments."	State results Justify procedures Present arguments.

Self-Regulation	"Self-consciously to monitor one's cognitive activities, the elements used in those activities, and the results educated, particularly by applying skills in analysis, and evaluation to one's inferential judgments with a view toward questioning, confirming, validating, or correcting either one's reasoning or one's results."	Self-monitor Self-correct

Source: APA Report: Expert Consensus Statement on Critical Thinking. (ERIC ED 315 423)

Based on the importance of critical thinking in students facing global challenges, several previous studies still recommend the development of critical thinking in learning for further studies. These recommendations strengthen this research by adopting the concept of critical thinking analysis, according to Facione (2015), to analyse further the influence of using interactive e-modules assisted by Google sites on students' critical thinking skills.

2.1.2 The Nature of Learning Engagement

The theoretical exploration of learning engagement provides a rich backdrop for understanding the potential impact of interactive e-modules on students' critical thinking and learning engagement. As Finn (1998) asserts that engagement is a linchpin for academic success and educational reform efforts, highlighting its multifaceted nature in shaping students' learning experiences. Furthermore, according to the National Research Council and the Institute of Medicine (2004), engagement is the cornerstone of efforts to reform high schools. Moreover, the categorization of engagement into behavioural, effective, and cognitive dimensions by Fredricks et al. (2004) offers a nuanced perspective on the various facets of student involvement in the learning process. This holistic view aligns with the objectives of our research study, which seeks to assess the efficacy

of interactive e-modules in fostering behavioural engagement and cognitive and affective dimensions of student participation.

Engagement is an essential concept in education that is being examined and debated in academia. Several learning engagement concepts have developed over time, and several theoretical developments are related to learning engagement from the beginning to the present. Finn (1989) states that student involvement is included in participation and identification. Identification relates to affective engagement, such as whether students have developed a sense of belonging to the learning community and whether they have positive relationships with the school and staff. Participation refers to student learning behaviour at school. However, Finn's concept of participation is limited to the behavioural and affective levels.

On the other hand, Farrell and Brunton (2020) revealed several psychological elements, such as peer groups, online teacher engagement, self-confidence, and structural factors, such as life load and course design, that drive successful student engagement in online learning. Furthermore, Astin (2014) coined the term "learning participation" and named it "engagement." According to Astin, participation is similar to effort because it refers to an individual's energy in their learning experiences, such as attending lectures, actively participating in student organizations, and connecting with friends or lecturers. Engagement, not effort, involves students' behavioral characteristics, such as how they act.

Furthermore, according to Astin's original theory, engagement includes behavioral, cognitive, and affective components. This statement is also confirmed by (2004), who states that student engagement is broadly classified into behavioral,

affective, and cognitive engagement. Understanding behavioral engagement requires investigating how children behave in the classroom and at school and whether they are actively engaged in learning tasks and school activities. Students' feelings, such as happiness, sadness, boredom, worry, and enthusiasm about learning, are examples of affective involvement. Finally, cognitive engagement is defined as students' mental efforts in learning and their self-reflection on their learning practices.

Greg Kearsley and Ben Shneiderman, an independent consultant who designs, produces, and teaches online courses, stated engagement theory (Kearsley & Schneiderman, 1998). An essential principle behind engagement theory is that students must actively engage in learning activities through relationships with others and practical work. While interactions like this are possible without the use of technology, it is believed that technology can increase engagement in ways that are otherwise difficult to achieve. As such, engagement theory is designed to serve as a conceptual framework for technology-based learning and teaching. Although it was not developed directly from other learning theoretical frameworks, it has many similarities to many different frameworks. The insights gleaned from engagement theory, as elucidated by Kearsley and Shneiderman (1998), underscore the pivotal role of technology in augmenting student engagement through interactive learning activities. By leveraging the affordances of platforms like Google Sites, our study aims to investigate how technology-mediated interactions can enhance students' active involvement and deepen their cognitive processing.

A theory-based student engagement survey was also developed by Burch et al. (2015), which combined two approaches; the second has its roots in management philosophy, whereas the first is grounded in learning and education theory. They also proposed combining the two approaches to produce a suitable conceptual framework. Furthermore, the call for future research by Burch et al. (2015) to explore students' cognitive involvement outside the classroom resonates with our inquiry into the extended impact of interactive e-modules on students' critical thinking skills beyond traditional learning settings. By examining students' cognitive, emotional, and physical engagement with technology-enhanced learning environments, our study seeks to inform pedagogical practices to cultivate highly engaged learners.

The ongoing discourse on leveraging technology to promote student involvement in learning, as evidenced by González-Carriedo & Esprivalo Harrell (2018), underscores the relevance and timeliness of our research endeavor. By elucidating the synergistic relationship between interactive e-modules and student engagement, our study contributes to the evolving landscape of technology-mediated pedagogy and its implications for educational practice. Involved learning implies that all students emphasize the importance of making valuable contributions when participating in activities that require active cognitive processes, such as learning (Laksmi et al., 2021).

Several other studies study student engagement by utilizing technology as a learning media (Sheerah et al., 2022; Sheerah & Yadav, 2022; K. F. Wijaya, 2024) Some studies use one learning application, such as flipbooks, videos, or

gamification. They have not studied further the collaboration of several learning activities with various applications in one media to involve student interaction in independent learning whenever and wherever they are.

In sum, by situating our research within the broader theoretical framework of learning engagement, we aim to elucidate the transformative potential of interactive e-modules in fostering students' critical thinking and enhancing their overall learning experience.

2.1.3 The Nature of Interactive E-Module Using Technology

The use of modules in learning has developed due to technological developments. At the beginning of its development, the module was used as systematic and structured teaching material to make it easier for students to understand the learning material. Furthermore, it is easier for teachers to determine student's understanding of each subtopic by providing exercises at the end of the module delivery session (Laili Mas'udah, 2021).

This learning module then finally developed into a creative and innovative learning media in the form of electronic modules or what are often called e-modules, which can be used independently by students easily whenever and wherever they are, offline or online, as long as they are connected to the internet network (Triwisata & Almunawaroh, 2021).

The evolution of interactive e-modules represents a significant stride in leveraging technology to enhance student learning experiences. Initially conceived as systematic teaching materials to facilitate comprehension, e-modules have metamorphosed into dynamic and versatile learning media. As elucidated by Laili

Mas'udah (2021) and Triwisata and Almunawaroh (2021), this transformation has empowered students to engage with learning content autonomously, transcending temporal and spatial constraints.

According to Santoso et al., (2021), Interactive e-modules may be tailored to different learning styles by adding various multimedia components and interactive features. Here are several techniques for accomplishing this:

1. Multimedia Integration includes photos and movies: To accommodate visual learners, use photos, movies, and animations. Audio and sound: Use audio narrations, sound effects, and music to engage auditory learners. Use interactive components like quizzes, games, and simulations to engage learners with varying learning styles.

2. Adaptive Learning includes unique Learning routes: Using adaptive learning technology, you may construct unique learning routes depending on individual learners' strengths, limitations, and learning styles. Dynamic Content: Ensure that the content varies dynamically based on student performance, giving more demanding material for advanced learners and more accessible material for those who need it.

3. Interactional Activities Scenario-based learning includes real-life settings in which learners may engage, making the learning experience more engaging and meaningful. Incorporate collaborative activities that allow students to work together, encouraging social learning and collaboration.

4. User-Centered Design Methodology: Provide quick feedback tools to assist learners in understanding their performance and adapting their learning tactics accordingly.

5. Navigation and Organization include organized Navigation: Divide the e-module into organized learning sections with straightforward navigation, making it easier for learners to follow along and remain on track. Self-Paced Learning: This method allows students to work at their own speed, reviewing information as required or moving on when they are ready.

6. Formative evaluations: Include formative evaluations throughout the e-module to offer fast feedback and keep learners on pace. Summative evaluations: Include summative evaluations at the conclusion of each unit or module to measure student comprehension and offer a complete review.

7. Accessibility Features and Options: To accommodate learners with impairments, make sure that the e-module contains accessibility features such as text-to-speech capabilities, high contrast mode, and closed captions.

8. Continuous Evaluation and Improvement, Including User Input: Gather user input to continually review and enhance the e-module, ensuring that it stays effective and interesting for all learners.

By adopting these tactics, interactive e-modules may be created to accommodate a variety of learning styles, improving the overall learning experience and driving more engagement and comprehension among learners.

Among the latest advancements in e-module development are website-based platforms, exemplified by Google Sites, which offer interactive learning

opportunities tailored to diverse learning styles and preferences. As Vachruddin et al., (2024), highlighted, these interactive e-modules harness multimedia elements to captivate student interest and foster more profound engagement with the material. Moreover, they facilitate collaborative learning experiences, enabling students to interact independently and in groups, as underscored by the research of various scholars.

The efficacy of Google Sites-assisted interactive e-modules in enhancing student learning outcomes has garnered attention in educational research. While several studies have demonstrated their positive impact on student engagement and critical thinking skills, a notable discrepancy exists, as evidenced by findings by Jihan Nabilah et al., (2023). This divergence underscores the need for further investigation into the contextual factors influencing the effectiveness of interactive e-modules in different educational settings. Based on this controversy, the previous research still recommends that other researchers conduct further research on the efficacy of learning assisted by interactive e-modules based on the Google site in different contexts (Kai et al., 2021; Mudau, Patience.K. & Van Wyk, 2021; Tomas et al., 2015).

By setting our study within the larger debate on the history and efficacy of interactive e-modules, we want to provide useful insights into the transformational potential of technology-enhanced learning environments. Through rigorous empirical study, we aim to explicate the subtle link between interactive e-modules powered by Google Sites and students' critical thinking abilities and learning engagement. Interactive e-modules are intended to engage learners by including

interactive components such as multimedia integration, scenario-based learning, and adaptive learning technologies.

These modules can use a variety of multimedia to accommodate different learning styles, incorporate real-life scenarios that are directly relevant to the learner's environment, and create learning routes that assess and adjust to individual progress. For example, the use of adaptive e-learning technologies marks an enormous step forward in customisation, allowing instructional materials to dynamically adjust themselves to match the learner's development and competence levels. By incorporating these features into module designs, interactive e-learning may dramatically increase information acquisition, retention, and overall learning experience. Finally, our research aims to inform educational approaches and technology interventions that enhance student learning in the digital era.

2.2   Empirical Review

This research is supported by several previous studies on e-modules using technology for critical thinking and learning engagement. The following are some related research.

2.2.1 E-modules using technology and Critical thinking

This study builds upon previous research that examines the correlation between technology-enhanced learning environments and critical thinking skills. Extensive empirical research indicates that e-modules, especially those facilitated by platforms like Google Sites, possess significant potential for enhancing students' critical thinking skills. The latest research focuses on developing an Interactive

Physics E-Module to enhance students' critical thinking skills. This study, conducted by Cynthia, Kaharuddin Arafah, and Pariabti Palloan, follows the ADDIE model to ensure a comprehensive approach to educational development. The findings promise to provide valuable insights into the effectiveness of these e-modules in the classroom.

The key findings of the research on the Interactive Physics E-Module include: 1) Effectiveness in Improving Critical Thinking Skills: The study found that the interactive physics e-module significantly improved students' critical thinking skills, with an average N-Gain value of 0.35, indicating a medium level of improvement; 2) Positive Practitioner Assessment: The e-module received outstanding ratings from practitioners (teachers/educators) across various aspects, including content feasibility (83.1%), presentation feasibility (84.2%), language feasibility (82.5%), graphics (83.6%), and software feasibility (86.7%); 3) Development Process: The e-module was developed using the ADDIE model, which includes stages of Design Analysis, Development, Implementation, and Evaluation. This structured approach ensured that the e-module was effectively tailored to meet educational needs; 4) User-Friendly Design: The interactive physics e-module was designed to be simple and easily accessible, allowing users to engage with the content on various devices, including mobile phones and computers; 5) Comprehensive Learning Features: The e-module includes various interactive elements such as student worksheets, simulations, animated videos, and practice questions, which facilitate independent learning and enhance student engagement (Ali & Zaini, 2023).

Furthermore, Hidayat et al. (2023), develop digital teaching materials (e-modules) in social science learning to optimize students' critical thinking skills. This study aims to provide teaching materials that suit students' characteristics and support improving critical thinking skills as one of the skills of the 21st century. Data collection methods in this investigation were carried out through several techniques, including 1) Interviews to validate various findings, especially during needs analysis, expert reviews, and practical use of the developed e-modules; 2) Observation to observe the learning process and use of e-modules in the actual context; 3) Questionnaire used to measure the level of validity and practicality of the e-module; 4) Essay Test to assess the increase in students' critical thinking skills after using the e-module. The data collected was then analyzed using a paired samples test, ensuring the data met the requirements for a normal and homogeneous distribution. The results obtained from testing the effectiveness of e-modules on students' critical thinking skills show that e-modules for social science learning have a positive and significant contribution. The paired sample test states that the research data is normally distributed and homogeneous, indicating that using e-modules effectively can optimize students' critical thinking skills.

Susanti et al., (2023), explore the effectiveness of Google Sites-based e-modules in enhancing students' critical thinking skills. Focusing on 21st-century learning, the research highlights how interactive learning media can empower students in their educational journey. This study provides further evidence of the correlation between e-modules and Google Sites by showcasing the efficacy of multimedia resources and interactive elements in enhancing students' understanding

of complex topics. The use of e-modules contributes to the development of students' critical thinking skills in several ways: 1) Interactive Learning: E-modules, particularly those based on Google Sites, provide an interactive platform that encourages students to engage actively with the material. This interactivity helps students practice critical thinking by allowing them to explore concepts, ask questions, and participate in discussions; 2) Diverse Learning Formats: E-modules present learning materials in various formats, including text, images, audio, and video. This diversity caters to different learning styles and helps students understand complex concepts better, which is essential for developing critical thinking skills; 3) Self-Regulated Learning: E-modules allow students to learn at their own pace, enabling them to revisit sections of the material for clarity. This self-regulation fosters independent thinking and encourages students to take responsibility for their learning, which is crucial for critical thinking development; 4)Practical Activities and Exercises: The e-modules include exercises, skills worksheets, and practical activities based on the Discovery Learning model. These activities enhance critical thinking by challenging students to analyze information, evaluate different perspectives, and draw conclusions based on evidence; 5) Feedback Mechanisms: E-modules are equipped with feedback features that allow students to assess their understanding and receive immediate information about their performance. This instant feedback motivates students to reflect on their learning and improve their critical thinking skills; 6) Collaborative Learning Opportunities: Including discussion forums within the e-modules facilitates collaboration among students, allowing them to share ideas and engage in problem-

solving. This collaborative environment enhances critical thinking by exposing students to diverse viewpoints and encouraging them to articulate and defend their reasoning.

Moreover, the study evaluated the effectiveness of the e-modules based on several aspects, including Participants' reactions to them, changes in their knowledge, competencies, skills, and attitudes, and overall perceptions of their usefulness. The data collected from the questionnaires were analyzed quantitatively to determine the average scores and categorize the effectiveness of the e-modules. The main findings regarding student perceptions of Google Sites-based e-modules reveal very high effectiveness in enhancing learning: 1) Overall Effectiveness: The e-modules received an average usefulness score of 85.48, categorized as "very high."; 2) Learning Experience: 87.90% of students felt the e-modules provided new learning experiences, and 85.48% believed they increased learning effectiveness; 3) Guidance and Support: 83.47% of students rated the guidance for studying as high, and 81.45% felt the e-modules accommodated their learning styles and speeds; 4)Engagement and Interaction: 83.06% of students felt the e-modules allowed them to express opinions and engage in problem-solving in a fun way. Overall, students responded positively to the e-modules, viewing them as effective tools for improving critical thinking skills and enhancing learning experiences.

This finding supported by the latest research Pertiwi and Purnawarman, (2023), which investigates on the use of Google Sites as an e-learning module during the Covid-19 pandemic. The study highlighted several specific features of Google Sites that were beneficial for online learning, including various multimedia

elements, such as videos for topic explanations, which enhance the learning experience by making it more engaging and interactive; Quizzes and facilitating assessment and feedback in an online learning environment; User-Friendly Homepage, which helps students navigate easily; When students select their class, they can access organized material information, including weekly topics and focus areas, which aids in structured learning; Google Sites offers flexibility, allowing students to access learning materials anytime and anywhere, which is particularly important for online education. These features collectively contribute to a more effective and engaging online learning experience for students.

The study's main findings regarding students' perceptions of Google Sites are as follows: A significant majority of students (70%) reported that Google Sites is a common tool for them, indicating a high level of familiarity. Additionally, 55% of students strongly agreed that they felt capable of using Google Sites, while 45% agreed that they knew how to use all its features for their learning. The study found that 75% of students agreed that they encountered no significant difficulties in using Google Sites, suggesting that the platform is perceived as user-friendly. Many students expressed curiosity about the features available on Google Sites, with 65% agreeing that they actively sought to understand the functions of each feature. This indicates a level of engagement and willingness to explore the platform. Students also appreciated the flexibility of Google Sites, with 55% agreeing that they could access it anytime and anywhere, which is crucial for online learning. Overall, students found Google Sites helpful, engaging, interactive, and easy to use, although some challenges were noted, such as unstable internet connections. These

findings suggest that Google Sites was well-received by students as a practical e-learning module during the Covid-19 pandemic.

Previous research indicates that utilizing E-modules with the assistance of Google Sites is a promising approach to enhancing students' critical thinking abilities. Interactive elements, collaborative resources, and personalized learning routes can motivate students to evaluate, investigate, evaluate actively, and debate, enhancing comprehension and logical deductions. Additional investigation is required to ascertain the enduring influence of these approaches on the cultivation of analytical thinking and their effectiveness across various academic disciplines and student populations. This study intends to contribute to the growing body of literature on technology-mediated pedagogy and its impact on the formation of critical thinking by aligning with these significant previous findings. The researcher aims to use thorough empirical investigation to clarify the precise methods by which interactive e-modules, aided by Google Sites, impact students' cognitive processes and reasoning abilities. Our research aims to enlighten educational practitioners and policymakers on the transformative power of modern learning technologies in developing critical thinking skills in 21st-century learners.

2.2.2 E-module Using Technology and Learning Engagement

This research study expands on a substantial collection of literature emphasizing the crucial significance of technology-enhanced learning settings in promoting student engagement. Prior studies have repeatedly shown that e-modules, especially with platforms such as Google Sites, provide creative

opportunities for encouraging active engagement and long-term interest in education.

Zakiyah and Dwiningsih (2022) investigate the efficacy of interactive e-modules in improving students' visual-spatial intelligence, specifically in the context of ionic bonding. The study employed a one-group pretest-posttest design with the following methodology: The study comprised a sample of 15 students from a senior high school situated in Mojokerto, East Java. The students chosen were given preferential treatment through the utilization of an interactive e-module that specifically concentrated on the subject matter of ionic bonding. At first, the students took a pretest to evaluate their initial understanding and visual-spatial ability in relation to ionic bonding before the intervention.

The intervention involved the creation of an interactive e-module using the Flip PDF Professional program. The e-module incorporated several components, including learning objectives, material summaries, practice questions, and learning videos. The students actively participated in this e-module as a component of their learning process. Following the students' engagement with the e-module, they conducted a posttest to assess any alterations in their knowledge and visual-spatial intelligence. The data obtained from the pretest and posttest were examined using descriptive statistics, such as N-gain tests, normality tests, and paired sample t-tests, performed using the IBM SPSS Statistics software. The purpose of this analysis was to assess the efficacy of the interactive e-module in enhancing students' academic performance.

The primary conclusions of the study addressing the efficacy of the interactive e-module are as follows: The study found a substantial increase in learning outcomes, with an average N-gain of 0.81. This indicates a significant improvement in students' visual-spatial intelligence after utilising the interactive e-module for learning about ionic bonding. The normality test showed p-values of 0.836 for the pretest and 0.436 for the posttest, both of which exceeded the significance level of 0.05. This suggests that the data followed a normal distribution, which confirms the reliability of the findings. The homogeneity test revealed that the variances of the pretest and posttest findings were homogeneous, with a significance value of 0.185 based on the mean. This value is greater than 0.05. The treatment's statistical significance was determined using a paired sample t-test, which provided a two-tailed significance value of 0.000, indicating a value lower than the acceptable level of 0.05. The adoption of the alternative hypothesis (H1) was based on this outcome, which indicated a significant influence of the interactive e-module in enhancing students' visual-spatial intelligence. The significant level of student interest witnessed while utilizing the interactive e-module implies that these resources have the potential to enhance student engagement and motivation. Therefore, the study suggested that educators incorporate interactive and multimedia components into their lessons in order to establish a more dynamic and interesting learning environment.

Furthermore, Pertiwi and Purnawarman, (2023) investigate the utilization of Google Sites as an e-learning platform within the Covid-19 epidemic. This study emphasizes the transformative impact of this innovative platform on the teaching

and learning experience for both students and teachers. Google Sites has demonstrated its value as a tool for learning by offering interactive elements that enhance engagement and accessibility. Students have provided favourable feedback, stating that they found it beneficial and straightforward to browse. The research data was gathered using two main methodologies: interviews and questionnaires. An interview was conducted with an experienced instructor who had more than eight years of teaching expertise and was proficient at utilizing Google Sites for online instruction during the COVID-19 pandemic.

The interview comprised 15 open-ended inquiries that centered on the rationales for utilizing Google Sites as an e-learning module, its advantages, encountered difficulties, and approaches to surmounting those difficulties. This qualitative methodology facilitated a comprehensive understanding of the teacher's experiences and viewpoints. A survey was disseminated to a group of 15 students who had been use Google Sites actively for their studies. The survey consisted of 25 items that evaluated students' perspectives on many areas of Google Sites, including their level of knowledge, proficiency, difficulty, curiosity, and flexibility. The presented quantitative data provide a deeper understanding of students' experiences and opinions towards the platform. Following data collection, the researcher utilized explanation-building analysis, a qualitative methodology that entails constructing a story that aligns with theoretical notions. By employing this approach, the researcher was able to thoroughly examine the data and establish a connection between the findings and the study's goals, furnishing substantiation for the research's conclusions.

The main findings of the research regarding students' perspectives on Google Sites are as follows: The study revealed that 75% of students experienced no significant problems when using Google Sites, indicating that they found the platform user-friendly and efficient. Students gave good opinions on Google Sites, and characterized it as useful, interesting, dynamic and easy to use. Interview results showed favourable reactions from students, who expressed their appreciation for the platform's capabilities, including video explanations, quizzes, and assignment submissions. The findings revealed that the majority of students (65% agree, 30% strongly agree) actively sought to investigate the functionality of each feature offered on Google Sites, thus demonstrating their curiosity and engagement with the platform. Students found Google Sites highly adaptable, with a 95% consensus that Google Sites can be accessed at any time and from any location. These attributes greatly enhanced their learning experience during the pandemic. All things considered, these Google Site tools helped to create a more efficient and interesting online learning environment throughout the epidemic, therefore benefiting teachers and students alike.

A contradiction emerges from the research conducted by Nabilah et al., (2023), which investigates how using Google Sites as a learning tool affects fifth graders' science and technology results. The study applied a quasi-experimental non-equivalent control group design quantitative research methodology. This approach was selected to investigate the effects of using Google Sites as a learning tool on student learning outcomes in the natural sciences compared to traditional learning media.

In this design, two groups were formed: the experimental group, which utilized Google Sites, and the control group, which relied on conventional media. In order to assess the students' learning outcomes before and throughout the session, the researchers administered pre-test and post-tests. Using this approach, the researchers were able to methodically assess the effectiveness of the Google Sites media in a controlled environment, thereby taking into consideration any elements that could potentially influence the results. The study's primary findings indicated that the utilization of Google Sites as a learning aid had no impact on the learning outcomes of fifth-grade Natural Sciences (IPA) students at SDN Beji Timur. The hypothesis testing revealed no significant difference in students' average learning outcomes when using Google Sites, despite the potential advantages of increased access to learning materials and promotion of interactive learning. The study suggests that several factors, such as the teachers' technological proficiency and the alignment of the materials with the students' environment and personality, could potentially account for the observed absence of impact.

Additionally, Google sites have served as a valuable tool for enhancing student engagement in biological research. Similar to one of the conducted investigations by Sagita et al., (2023), was to explore how high school students perceive the use of Google Sites to improve their research skills. The study focuses on utility, ease of use, attitude, and intention to use this platform for research learning. With a descriptive qualitative approach, the research involved 125 students and three Biology teachers, highlighting the effectiveness of Google Sites in developing essential research skills.

The researchers gathered data for the study through a methodical strategy covering various key stages: a questionnaire was distributed to assess their attitudes, perceptions, and intentions regarding using Google Sites. The questionnaire focused on the students' attitudes, perceived usefulness, ease of use, and intention to use Google Sites. The study included 125 students from three schools, with a broad representation: 28 from School X, 67 from School Y, and 30 from School Z, to provide a strong and reliable data set. Biology teachers were extended invitations to take part. Teachers were given the option to participate willingly, and they were assured that their involvement would not negatively affect their professional standing. This approach aimed to foster an atmosphere of openness and collaboration.The researchers analyzed the questionnaire responses by utilizing calculations of frequencies, percentages, and averages in order to gain a comprehensive understanding of the students' perceptions.

The researcher on this study intends to contribute to the continuing discussion on technology-mediated teaching methods and their effect on student engagement by incorporating these important findings into their research. Through comprehensive empirical analysis, the researcher aims to clarify how interactive e-modules utilizing Google Sites impact students' engagement and participation in the learning process. This study aims to inform educational practitioners about the transformative potential of novel learning technologies in fostering student engagement and academic success by expanding the discussion on this topic.

2.3 Conceptual Framework

This study uses a mixed-methods experimental design (the Concurrent embedded design) in which quantitative is the primary method and qualitative is the secondary method, which is supporting data to analyze the effect interactive e-modules assisted by Google sites on the critical thinking and learning engagement of senior high school students in EFL classes. The researcher collects and analyzes quantitative data before incorporating the findings into the trial or intervention trial. This design includes qualitative data collection into an experiment or intervention, allowing participants' personal experiences to be considered in the study. Thus, qualitative data becomes a supplemental data source incorporated into collecting experimental data before and after the test.

Quantitative and qualitative data was collected by conducting experimental research using two sample groups, namely the experimental group and the control group. However, if the researcher cannot determine a control group, this form of research results in a quasi-experiment; quasi-experiments include a control group but cannot wholly control extraneous variables that influence the experiment results. Defining a control group in educational settings using experimental research criteria is often difficult because students have been divided into classes. A quasi-experiment is used if it is difficult to get a control group.

This research study consists of one independent variable and two dependent variables. The English e-module assisted by Google Sites is used as an independent variable. The dependent variables are students' critical thinking skills and learning engagement. The data collection was conducted by delivering a pre-test as the initial stage in data collection before treatment, using an interactive e-module assisted by

Google Site in the experimental class and a textbook in the control class, and a post-test was used to evaluate critical thinking skills.
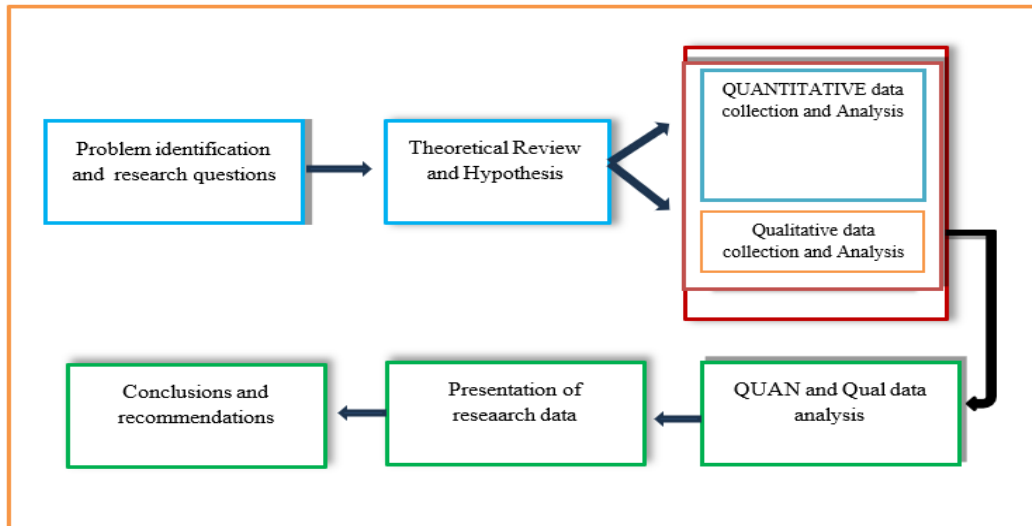

Figure 2.1 Mixmethod experimental research design (Concurrent Embedded design with Quantitative as the primary method adopted from Cresswell (2018)

2.4 Research Hypothesis

a. Interactive e-modules assisted by Google sites significantly affect the critical thinking skills of high school students in EFL classes.

b. Interactive e-modules assisted by Google sites significantly affect the learning engagement of high school students in EFL classes.

c. Interactive e-modules based on Google sites in EFL classes simultaneously effect the critical thinking skills and learning engagement of high school students in EFL classes.