

# Exploring the Correlation Between Higher-Order Thinking Skills, Reading Strategies, and Reading Literacy Among EFL Students in the Digital 4.0 Era

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**Abstract:**

This study aims to explore the correlation between reading strategies, higher-order thinking, and reading literacy of EFL students in this Digital Era 4.0 at UKI Paulus Makassar among English as a Foreign Language (EFL) students in the Digital 4.0 era, with a focus on students in the Accounting program at UKI Paulus Makassar. Using a quantitative research design, this study examines the relationship between reading strategies and HOTS through a correlational approach. The results show that the use of HOTS significantly influences students' reading literacy, with a t-value of 2.164 and a significance value of 0.000, which is less than the 0.05 threshold. In contrast, the use of reading strategies did not significantly affect reading literacy, with a t-value of 0.352 and a significance value of 0.726. The study also found a positive correlation between HOTS and reading strategies ( $r = 0.682$ ,  $p < 0.01$ ), as well as between HOTS and reading literacy ( $r = 0.432$ ,  $p < 0.05$ ). These findings emphasize the importance of integrating HOTS in reading instruction to enhance students' literacy skills, and highlight the need for incorporating educational technology to support more effective HOTS development and reading strategies. The study recommends further development of HOTS-based teaching materials and the continued use of technology to improve educational quality in the digital age.

**Keywords:** Higher-Order Thinking Skills (HOTS), reading strategies, reading literacy, educational technology, English language learning.

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## A. Introduction

In the 21st century, characterized by globalization and technological advancements, significant transformations are taking place in the education system. Traditional educational strategies once placed students at the center as passive recipients of knowledge delivered by

teachers. However, modern pedagogical approaches now view teaching as a dynamic dialogue between the teacher and the student, as well as between the student and the content being studied. An essential shift is occurring from focusing solely on the acquisition of knowledge and achievements to the development of skills. This perspective reflects the idea that there is no one-size-fits-all solution to every problem, but rather a range of challenges that require critical thinking and adaptability (Rima Abu Jaber Baransi, 2019).

The presence of information technology in the 21st century has connected millions of people globally, forming the basis for massive online transactions in trade and transportation, heavily relying on internet technology (Thi et al., 2017). One significant aspect of this technological shift is its integration into the field of education. Modern technology allows for the development and reliance on digital tools in various aspects of life, from transactions to knowledge creation (H. J. Kim et al., 2020). The Fourth Industrial Revolution, first introduced in Germany in 2011, marks an era where technology and the internet are advancing rapidly, impacting almost all human activities, including education (Moraes et al., 2022).

In the context of education, especially amid the COVID-19 pandemic, the shift toward remote learning and the increased use of digital technology has become even more pronounced. Education is no longer solely focused on the delivery of knowledge, but on fostering critical thinking, innovation, and creativity. The concept of Education 4.0 involves applying advanced technologies such as cloud computing, the Internet of Things (IoT), and cyber-physical systems, which influence how teaching and learning take place (Agrawal et al., 2021). However, while technology offers numerous benefits, its use in education also presents challenges, such as how to enhance students' reading comprehension in digital contexts.

An essential skill that students must master is reading, which plays a crucial role in language acquisition, especially in English as a Foreign Language (EFL) contexts. Reading comprehension depends not only on a broad vocabulary and prior knowledge but also on the use of effective reading strategies. Numerous studies have shown that reading strategies play a vital role in improving text comprehension (Hoon & Embros, 2020). However, in higher education settings, including at UKI Paulus Makassar, reading skills are often taught through conventional methods that do not fully utilize the potential of technology to enhance reading comprehension (Nicely, 2015).

With technological advancements, the use of digital learning materials, such as e-books and interactive learning applications, has gained popularity in enhancing students' reading skills. Studies suggest that the combination of audio and visual signals in digital reading environments can improve comprehension, particularly for struggling readers (Zare et al., 2016). Therefore, integrating technology into education is crucial for improving reading skills and developing Higher-Order Thinking Skills (HOTS), which are increasingly recognized as vital in 21st-century education.

The importance of HOTS in education today cannot be overstated. HOTS involves not just recalling and understanding information but also analyzing, evaluating, and creating new solutions from the information presented (Ganapathy & Kaur, 2014). The implementation of HOTS is expected to help students develop critical and creative thinking skills, enabling them to apply knowledge in more complex situations, as is required in English learning at the university level (Putra & Abdullah, 2019).

However, despite the emphasis on HOTS in education, many schools and universities, including those in Indonesia, still face challenges in effectively integrating these skills into their curricula (Fariyani & Kusuma, 2021). Therefore, this study aims to explore the correlation between reading strategies, higher-order thinking, and reading literacy of EFL students in this Digital Era 4.0 at UKI Paulus Makassar, particularly to understand how technology can influence both aspects and contribute to enhancing the quality of education in the future.

## **B. Research Methodology**

This study employs a quantitative research design to examine the correlation between reading strategies and higher-order thinking skills (HOTS) among EFL students in the digital era 4.0 at UKI Paulus Makassar. A correlational approach was chosen to determine whether reading strategies are significantly associated with HOTS. The independent variable is reading strategies, while the dependent variable is HOTS.

### **a. Population and Sample**

The research targets second-semester students from the Accounting Program, Classes A and B, at UKI Paulus Makassar. The sample will represent the broader population of EFL students at the university.

**b. Research Instruments**

Data was collected using a combination of objective and non-objective tests:

- Multiple-choice test (20 questions) to assess reading comprehension.
- Essay test (10 questions) to evaluate deeper understanding and critical thinking.

Both tests are designed from textbook materials and supplementary readings to measure reading comprehension and HOTS.

**c. Data Collection Procedure**

The data collection will involve the following steps:

1. Introduction to reading strategies.
2. Administration of reading comprehension tests (both multiple-choice and essay formats).
3. Clear explanation of test instructions to students.
4. A two-hour window for students to complete each test.
5. Data collection will span six sessions.

**d. Data Analysis Techniques**

To analyse the data, the researcher administered a 30-item English reading comprehension test to students from the accounting program at UKIP Makassar. The aim was to investigate the correlation between reading comprehension and other variables. The data analysis process involved classifying students' reading comprehension levels by calculating the average scores using specific formulas.

Tabel 1 Converted Score of students' reading comprehension

Score Range	Category
80-100	Very Good
66-79	Good
56-65	Fair
40-55	Poor
≤39	Very Poor

Table 2 Scoring Students' answer for Reading Comprehension

No.	Criteria	Score
1	<ul style="list-style-type: none"> <li>- Correct inference with many supporting details, good explanations, and well-chosen examples</li> <li>- Explanation is very specific and shows that the student can make valid inferences</li> <li>- Text evidence is specific, well-chosen, and strongly supports the inference made</li> </ul>	4
2	<ul style="list-style-type: none"> <li>- Correct inference with a supporting detail or example from the text</li> <li>- Explanation is general enough to show that the student can make plausible inferences</li> <li>- Text evidence is relevant and partially supports the inference made</li> </ul>	3
3	<ul style="list-style-type: none"> <li>- Correct inference but no supporting detail or example from the text</li> <li>- Incorrect inference</li> <li>- Explanation is not specific enough to support the inference</li> <li>- Text evidence provided weakly supports the inference made</li> </ul>	2
4	<ul style="list-style-type: none"> <li>- Incorrect inference</li> <li>- No explanation is given for the inference or explanation does not make sense</li> <li>- Ideas not based on the text or response does not provide evidence from the text</li> </ul>	1
5	No response is given or response given does not relate to the text	0

(Adaptation of the Texas Education Agency by HISD, 2016)

$$\bar{X} = \frac{\sum X}{N}$$

Where:

$\bar{X}$  = Average

$\sum X$  = Total raw score

N = Number of individuals

Malik, 2018)

The researcher used the *Pearson Product Moment* correlation coefficient with the SPSS 26.0 *for windows application* for a significant correlation between students' vocabulary mastery and reading comprehension.

Table 3 the interpretation of Pearson correlation analysis

Score of Product Moment (r)	Interpretation
0.00-0.20	Very poor
0.20-0.40	Low
0.40-0.70	Moderate
0.70-0.90	High
0.90-1.00	Very High

(Sudijono, 2008)

The following are the statistical hypotheses:

-  $H_0 = r_{xy} < r_{table}$

$H_0$  is accepted if  $r_{xy} < r_{table}$  or there is no significant correlation between reading strategies and Higher Order Thinking Skills (HOTS) of EFL Students in the digital era 4.0 of UKIP Paulus Makassar

$H_1 = r_{xy} \geq r_{table}$

$H_1$  is accepted if  $r_{xy} \geq r_{table}$  or there is a significant correlation between reading strategies and Higher Order Thinking Skills (HOTS) of EFL Students in the digital era 4.0 of UKIP Paulus Makassar

Note:

$r_{xy}$ : Coefficient variable between variable “x” and “y”

**C. Finding**

The data analysis conducted for this study focused on exploring the relationship between reading literacy, higher-order thinking skills (HOTS), and reading strategies. Using the ANOVA method, the analysis aimed to test the correlation between these variables among students at UKI Paulus Makassar.

Table 3 ANOVA

ANOVA Table					
	Sum of Squares	df	Mean Square	F	Sig.

reading Literacy	Between	(Combined)	176.333	15	11.756	2.176	.030
* HOTS	Groups	Linearity	67.090	1	67.090	12.420	.001
		Deviation from Linearity	109.244	14	7.803	1.444	.186
	Within Groups		183.667	34	5.402		
	Total		360.000	49			

Table 3 show that linearity (.001) were lower than 0.05. It indicated that all the data were linear.

Table 4 ANOVA

**ANOVA Table**

		Sum of Squares	df	Mean Square	F	Sig.	
reading Literacy Reading Strategies	Between Groups	(Combined) Linearity	271.033	30	9.034	1.929	.068
		Deviation from Linearity	38.762	1	38.762	8.278	.010
			232.272	29	8.009	1.711	.112
	Within Groups		88.967	19	4.682		
	Total		360.000	49			

Table 4 shows that linearity (.010) were lower than 0.05. It indicated that all the data were linear.

Table 3: Coefficients for the Regression Model Predicting Reading Literacy

**Coefficients<sup>a</sup>**

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B	
					Lower Bound	Upper Bound
1	(Constant)	B	Error	Beta		
	102.691	2.611	39.329	.000	97.438	107.943

HOTS	.120	.055	.389	2.164	.036	.008	.231
Reading Strategies	.012	.035	.063	.352	.726	-.059	.083

a. Dependent Variable: Reading Literacy

The results indicated that the use of HOTS significantly influenced reading strategies, with a t-value of 2.164 and a significance value of 0.000, which is lower than the 0.05 threshold. Therefore, there was a significant influence of HOTS use on the reading literacy of UKIP Paulus Makassar students. On the other hand, the use of reading strategies did not significantly influence reading literacy, with a t-value of 0.352 and a significance value of 0.726. Thus, there was no significant influence of reading strategies on the reading literacy of UKIP Paulus Makassar students.

Table 5: Correlation Matrix for HOTS, Reading Strategies, and Reading Literacy

<b>Correlations</b>		HOTS	Reading _Strategi es	Reading_Li teracy
HOTS	Pearson Correlation	1	.682**	.432**
	Sig. (2-tailed)		.000	.002
	N	50	50	50
Reading_S trategies	Pearson Correlation	.682**	1	.328*
	Sig. (2-tailed)	.000		.020
	N	50	50	50
Reading_L iteracy	Pearson Correlation	.432**	.328*	1
	Sig. (2-tailed)	.002	.020	
	N	50	50	50

\*\* . Correlation is significant at the 0.01 level (2-tailed).  
 \* . Correlation is significant at the 0.05 level (2-tailed).

Table 5 shows that there is a correlation between HOTS and reading strategies, as indicated by the significant value of 0.000 ( $<0.05$ ) with  $r = 0.682$ , which is categorized as a positive correlation. Additionally, there is a correlation between HOTS and reading literacy, as well as between reading strategies and reading literacy, both of which are supported by a significant value of 0.000 ( $<0.05$ ) and  $r = 0.328$ , also categorized as a positive correlation.

#### **D. Discussion**

Reading comprehension items are used to assess readers' proficiency and their ability to engage with and understand various forms of reading materials. Comprehension is a complex process that forms the foundation of language proficiency. Proficient reading depends not only on understanding information quickly and effortlessly but also on cognitive development influenced by formal instruction and early-life experiences.

Students today need critical thinking skills to meet the demands of the real world. A significant challenge in achieving this is the inadequate dissemination of resources for effectively teaching Higher Order Thinking Skills (HOTS) at UKI Paulus Makassar. Students with intermediate or low cognitive abilities may struggle to understand and respond to questions, while more advanced students may find the questions too easy or not stimulating enough. Additionally, students bring diverse prior knowledge and experiences, which significantly shape their cognitive abilities. While many studies have explored HOTS in education, limited research focuses on its role in enhancing English reading comprehension.

The results indicate that HOTS significantly influences reading strategies, with a t-value of 2.164 and a significance value of 0.000, which is lower than the 0.05 threshold. Therefore, HOTS has a significant effect on the reading literacy of students at UKI Paulus Makassar. However, the use of reading strategies did not significantly affect reading literacy, with a t-value of 0.352 and a significance value of 0.726.

This study's findings suggest that the consistent use of HOTS strategies in teaching reading comprehension in the classroom significantly enhances students' reading achievement. The relationship between HOTS and reading is closely intertwined, as HOTS strategies can facilitate reading comprehension, and reading, in turn, can promote the development of HOTS. In addressing the challenges faced at the school, it became clear that using higher-order thinking

strategies was essential for reading comprehension. For today's students, thinking and learning styles are just as important as cognitive abilities (Nejmeh, 2011).

The research results show that implementing HOTS-based teaching materials had a positive impact on the development of students' literacy skills, particularly in general writing and reading courses. These materials promoted critical and creative thinking, which students found motivating (Anwar, 2021). In addition to HOTS, literacy plays a crucial role in developing critical thinking skills (Feriyanto & Putri, 2020).

By illustrating the steps taken to enhance students' literacy, creative thinking, and collaboration skills, this approach also increased their motivation to persist in reading (Ferrer & Staley, 2016). There is a significant positive relationship between digital literacy and the teacher's ability to develop HOTS assessments (Widana & Ratnaya, 2021).

Understanding the content allows students to build deeper layers of conceptual thinking, thereby enhancing their Higher Order Thinking Skills. This is critical for teachers, as it demonstrates that selecting relevant and engaging reading materials can help students become more literate (Sinambela & Saragih, 2018).

The integration of HOTS with learning techniques significantly aids students in developing ideas more effectively, leading to improved academic performance. Students who combine learning strategies with HOTS are more likely to use HOTS for generating ideas. This process helps them understand the activities involved in receiving and processing information, which aids in idea generation (Heong et al., 2019).

Therefore, developing HOTS-based assessments for reading to optimize literacy remains essential. The results can help improve teachers' understanding and skills in using HOTS-based reading assessments to enhance teacher literacy (Putri & Syafar, 2022).

Integrating HOTS into reading comprehension learning is crucial. Educators must employ a variety of strategies to foster the development of reading comprehension skills, particularly when implementing HOTS in their teaching practices. This involves devising instructional approaches to facilitate student learning, focusing on the development of reading comprehension skills, setting learning objectives, formulating diverse questions, promoting group discussions, offering constructive feedback, and cultivating motivation (Yesi Elsa Fitriani, 2021).

Higher-order thinking skills have long been a focus in education. HOTS is critical for cognitive development as it enables students to examine content at a deeper level, uncover hidden meanings, evaluate assumptions and evidence, and appraise conclusions. Reading, as a complex skill, relies heavily on higher-level cognitive processes due to the implicit information found in texts. Reading comprehension can be evaluated by assessing the degree of higher-order thinking demonstrated through essay questions (Mayor, 2024).

By utilizing HOTS, students engage in critical and creative thinking. The use of prior knowledge during the learning process fosters critical thinking and enhances engagement. Implementing HOTS techniques can improve students' reading comprehension by encouraging in-depth reading to ensure a thorough understanding of the text's content. The researcher evaluates students' comprehension by posing questions related to the material, and the HOTS approach impacts their reading comprehension abilities (Hikmah & Winarto, 2022).

The challenges of conducting assessments during the COVID-19 pandemic can be effectively addressed using the HOTS-based literacy measuring instrument. Empirical evidence supports its effectiveness in assessing students' reading literacy. Both students and teachers have expressed a favorable view of this instrument, and there is optimism that ongoing evaluation of reading literacy will continue to improve students' reading abilities, particularly in relation to HOTS (B et al., 2023).

Students engage in active retrieval of knowledge from long-term memory by making predictions about the text and responding to the lecturer's material. By analyzing the image, title, and supporting concepts, and integrating prior knowledge, students enhance their reading process through performance feedback and comprehension strategies (Thamrin & Agustin, 2019).

### **Conclusion**

This study explored the correlation between reading strategies, higher-order thinking, and reading literacy of EFL students in this Digital Era 4.0 at UKI Paulus Makassar in the 21st century, focusing on EFL students at UKI Paulus Makassar. The results highlight the significant role that HOTS plays in enhancing reading comprehension, as evidenced by the positive correlation between HOTS and reading literacy.

The research found that HOTS strategies significantly influence reading literacy, demonstrating that fostering higher-order thinking skills can enhance students' ability to

comprehend complex texts. Conversely, while reading strategies are essential, their direct influence on reading literacy was not found to be significant in this study, suggesting that simply applying reading strategies without incorporating critical thinking and active engagement may not yield optimal results.

Moreover, the study underscores the importance of integrating technology into the learning process to facilitate the development of HOTS. Digital tools, such as e-books and interactive applications, support students in grasping content more effectively by incorporating multimodal elements that cater to diverse learning needs. The ongoing development of HOTS-based teaching materials and assessments is crucial for enhancing students' cognitive abilities and literacy skills, preparing them to thrive in an increasingly digital and complex world.

In conclusion, the integration of HOTS and technology into reading comprehension instruction is vital for enhancing students' literacy and critical thinking abilities. Educators must continue to innovate their teaching methods, leveraging digital resources and strategies that promote deeper engagement with content. The findings of this study suggest that the future of education lies in fostering skills that go beyond knowledge acquisition, focusing on developing students' capacity to analyze, evaluate, and create in response to information—a fundamental requirement in the digital era.

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