

The Development of the Inquiry Complexity Reading Strategy (ICRS) in Online Academic Reading

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Abstract—The digital age requires relevant skills and strategies in online academic reading. Appropriate reading strategies and media are needed in academic reading. The lack of interactive teaching, learning strategies, and media has caused students' low critical and creative thinking skills in an online academic reading course. Inquiry and complexity-based learning with online tools can solve these problems. This study aims to develop an Inquiry Complexity Reading Strategy (ICRS) and test its feasibility and effectiveness in enhancing students' critical and creative thinking skills in academic reading. This study applied a Research and Development (R&D) method with ADDIE model. A set of questionnaires and observation data are used for product validity and product effectiveness analysis. The ICRS was very feasible, with expert validity of 95% and expert practicality of 93%. The effectiveness of the ICRS is proven. Therefore, it could be concluded that the ICRS could enhance students' critical and creative thinking skills and participation in an online academic reading course. The teaching and learning activities employing blogs, digital tools, and social media have increased student interaction and sharing of ideas. The limitation of this study is that students' characteristics do not significantly differ in achievement. The ICRS can be used as an alternative and reference to be applied by reading teachers in the EFL context.

Index Term—development, inquiry complexity reading strategy, online academic reading

I. INTRODUCTION

Students' reading strategies in reading printed materials are not similar to hypermedia reading. Learners read hypermedia materials using digital tools to search for information. Hypermedia reading requires online tools, text modes, and relevant learning styles and is also affected by the readers' cultures. Learners also apply metacognitive and socio-affective reading strategies (Erni, 2021a; Marboot et al., 2020). Metacognitive reading strategies enable learners to be critical thinkers, while socio-affective strategies could reduce their anxiety and fear by communicating, interacting, and sharing ideas with others.

Many studies indicate that Indonesian teachers do not create ample opportunities for students to share their thoughts and ideas on their reading through social media and platforms. English teachers lack the technological skills to teach online, the constraints on access to the internet, the devices used for teaching and learning, and effective interaction in electronic teaching and learning (Mazlan et al., 2022). Currently, Indonesian students' hypermedia reading strategies and media use in their learning cannot improve their critical and creative reading ability (Erni, 2021a). Consequently, relevant measures should be taken to improve the current classroom instructions for academic reading courses. Hence, in this study, the researchers have employed the Inquiry Complexity Reading Strategy (ICRS) to equip students and educators with relevant strategies to enable students to read critically and creatively. The objectives of this paper are to develop an Inquiry Complexity Reading Strategy (ICRS) for teaching online academic reading and to test its feasibility and its effectiveness in enhancing students' critical and creative thinking skills in online academic reading.

II. LITERATURE REVIEW

A. Academic Reading

Academic reading involves an interactive process of thinking, evaluating, judging, visualizing, and problem-solving

that involves the readers' review with a constructive meaning (Anderson, 1991). Synergy will occur if the readers have relevant background knowledge and experience related to the content. For foreign language learners, the information in the reading materials is translated from L2 to L1 and develops multiple skills (Movahedi & Talebi, 2020). The readers apply appropriate reading strategies to comprehend an academic text (Razak & Babikkoi, 2014), including understanding general ideas, identifying main ideas and supporting details, and comprehending the implicit meaning and contextual meaning (Short, 2014). Implicit reading enhances the ability to remember better what was given in short-term memory, while explicit reading uses a graphic organizer to recognize data in long-term memory (Lee, 2011). The more learners interact in a learning context, the more communicative skill is built across contexts (Bergman & Beehner, 2015). Therefore, teachers should equip students with relevant sources, media, and social environments (Nur, 2003) to make learning more successful and fun (Oxford, 1989). The use of wrong reading strategies contributes to students' reading failures (Erni, 2021b).

Academic reading requires readers to employ critical and creative thinking skills. Critical thinking (CT) skills are the ability to make intelligent decisions and solve problems (Facione, 2000; Fahim et al., 2012). CT skill includes making inferences, deduction, interpreting, recognizing assumptions, and evaluating arguments. Elements of CT are analyzing and evaluating reasons and evidence, making an assumption and rejecting unwanted inferences, using the complete evidence, making relevant distinctions, avoiding inconsistency and contradiction, and reconciling apparent contradictions (Paul et al., 1989). Creative thinking skills include fluency, flexibility, originality, and elaboration (He, 2017). Sternberg's dimensions of creativity are intelligence, style, and personality, involving the mental process of creative thinking and creative problem-solving in planning, monitoring, and evaluating/meta-components (He, 2017).

B. *Connectivism*

The connective theory is relevant in the digital age. Educators adopt the connective theory to design teaching activities and develop learning materials for learners to learn and work in an internet learning environment (Siemens, 2005). Due to the high increase in the integration of technology in teaching and learning, students' learning strategies have also evolved. These new learning strategies and the learning environment have positive impacts on students' comprehension of hypermedia materials (Trnova & Trna, 2013; Ulfatin et al., 2022). The principles of connective theory are (1) learning and knowledge are built on diverse views, (2) learning is about connecting specialized nodes or information sources, (3) learning can be delivered through non-human devices, (4) the capacity to know more is more critical than what is already known, (5) nurturing and maintaining connections are needed to facilitate continuous learning (6) the ability to see the connections among fields, ideas and concepts is an essential skill, (7) up to date knowledge is the main objective of learning activities, (8) decision-making is a learning process (Siemens, 2005, pp. 9-10). Internet learning makes students more independent as they explore the latest information to build better knowledge.

C. *Inquiry-Based Learning (IBL)*

Inquiry-Based Learning (IBL) requires learners to take ownership of their learning and navigate their learning to formulate meaning and manage activities with the teacher's guidance (Pedaste et al., 2015; Levy et al., 2013). The process includes exploring, generating, developing, and answering question activities (Swanson et al., 2014). The five stages of IBL are: (a) orientation: the process of stimulating learners' curiosity and providing a challenging problem statement, (b) conceptualization: the process of stimulating learners' curiosity and providing a challenging problem statement, (c) investigation: the process of stimulating learners' curiosity and providing a challenging problem statement, (d) conclusion: the process of concluding the data, comparing ideas, drawing hypotheses, and formulating research questions, (e) discussion: presenting data from particular / the whole inquiry cycle by communicating with others and controlling the whole learning process by engaging in reflective activities (Pedaste et al., 2015, pp. 54-55).

IBL includes identifying topics, generating research questions, identifying the research problem, thinking critically about the issue, answering questions, drawing conclusions, and reflecting on the inquiry process (Vajoczki et al., 2011). Swanson's five stages of IBL are exploration, question and problem identification, methods of Investigation, data collection and analysis, conclusion development, and creativity (Swanson et al., 2014). The readers are required to think, categorize, question, re-explain, construct new knowledge from existing knowledge, and be responsible for themselves and others (Franc & Morton, 2014). IBL helps students to identify what they are doing, explore in its structured environment, and make sense of their explorations in the class before completing their reading (Swanson et al., 2014). It could be concluded that improving learners' critical thinking and creative thinking skills are the objectives of IBL.

D. *Complexity Theory*

The proponents of complexity theory propose that learners should take an active role and develop agency over their learning (Mahmoud & Galante, 2020). Their learning process and reading are integrated into the ecology of complex interdependent systems (Larsen-Freeman, 2018). *Social complexity learning* shapes the learner's communicative and cognitive abilities. The individual and his environment influence each other, so a spiraling adaptation occurs in time. Teachers should consider how learners interact and adapt to a complex system (Nelson, 2011). Social learning helps learners to develop adaptive behaviours, cultural change, and social understanding (Heyes, 2016). Online tools like wikis, web tools and social media support social interactions. Online tools allow students to interact and share ideas at any place, time, and community.

Based on the literature review, the researchers employed the Inquiry Complexity Reading Strategy (ICRS) in this study. The ICRS is employed in response to the high-frequency use of digital media and tools in the education system (Abuhassna et al., 2022).

III. METHODOLOGY

This study applied a Research and Development (R & D) method with ADDIE model. The ICRS was developed in systematic sequences or stages. The five development stages proposed by the ADDIE model are analysis, design, development, implementation, and evaluation. The stages in the ADDIE model provide feedback and lead to ICRS development. The stages are presented in Figure 1.

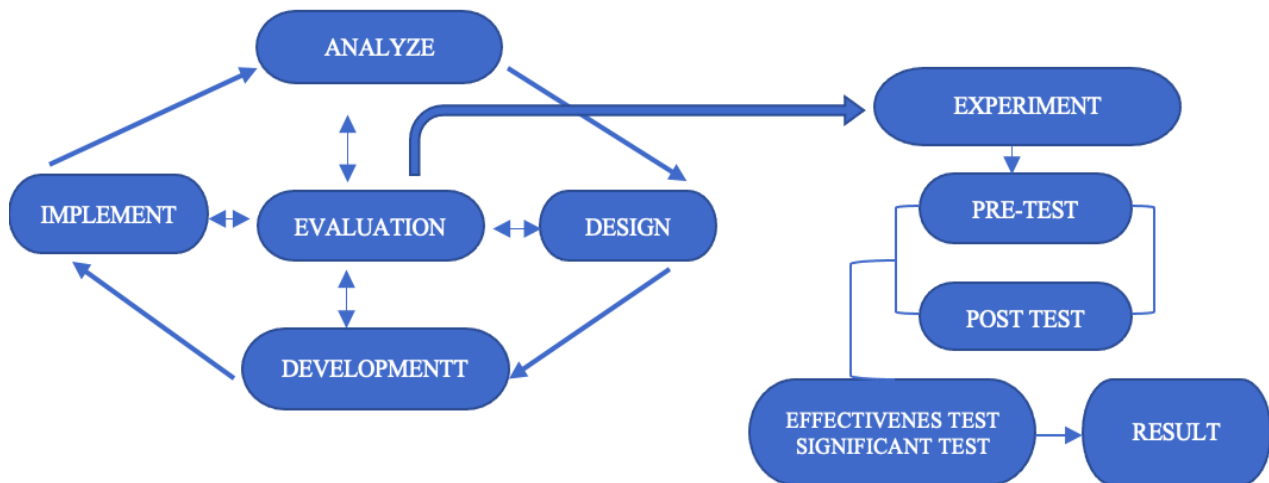


Figure.1. Stages of ADDIE Pretest and Post-test Experimental Design

Figure 1 describes the analysis, design, development, and implementation stages carried out in this study. Formative evaluation is carried out in each stage to gain product validity and practicality. In contrast, summative evaluation is carried out at the end of the stages to obtain product effectiveness - pre-test, post-test, and t-test are used in this study. Third-semester students enrolling in academic reading courses are the respondents. ARCS Model of Instructional Design is used to obtain expert validity (Keller, 1987, pp. 2-5).

IV. FINDINGS

The findings are on the ICRS, its validity and its effectiveness. The underpinning theories of these are inquiry-based, complexity, and connective theories.

A. Analyze Stage

(a). The Needs Analysis

Based on the needs analysis, the learners are further categorized into a few categories based on their characteristics: concrete, analytical, communicative, and authority-oriented. Concrete learners prefer to learn English by using pictures, games, movies, and videos, talking with their partners, and practising language outside class. Analytical learners enjoy studying grammar using English books, reading newspapers, learning on their own, finding mistakes, and solving problems. Communicative learners prefer listening to native speakers, talking to partners in English, watching TV and movies, using English in public places, and listening to new English words. Authority-oriented learners prefer to learn using their textbooks and do note-taking.

The questionnaires using a Likert scale of 1- 4 found that students' learning styles were also categorized into concrete, analytical, communicative, and authority-oriented. The concrete learning styles were applied by 72% of the students, analytical learning styles were used by 62% of students, communicative ones were used by 73% of the students, and authority-oriented learning styles were used by 62% of the students.

(b). The Curriculum Analysis

The university implemented an independent learning curriculum. The objectives are students should become collaborative learners and practice critical thinking, problem-solving, and creativity skills.

(c). The Facilities Analysis

Technological equipment and the internet are available for hybrid learning. The learners have their own devices/computers. A digital library is also available for students.

B. Design Stage

Inquiry-based, complexity, and connectivity theories underpin the design. The ICRS is gradually developed through the learning process in which online tools serve as a learning source, media, and structured environment. The design of the ICRS begins with several activities, namely, 1) compiling reading materials, 2) designing research instruments, 3) collecting several applications and digital tools for online reading, 4) identifying students' reading strategies, and 6) redesigning the ICRS. The online tools were used as sources of reading materials. The ICRS was developed through five stages:

(a). Orientation

This is a process of stimulating students' curiosity and interests. Hypermedia reading materials were used in this study. With the teacher's guidance during pre-reading activities, learners switch on a community-centred lens. Then, learners identify the source of information through the internet. The teacher provides demonstrations using the learning tools, such as Google translate, read-aloud, grammar, vocabulary and collocation tools. The teacher offers problems for the students to solve. Next, the students start skimming, scanning, and predicting activities to solve the given problems.

(b). Conceptualization

It is the process of generating information through questioning and hypothesizing activities. Students develop questions before reading. Questioning is a process to obtain answers. Students search for information to answer the questions. They make assumptions. The teacher divides the students into small groups based on their interests. Then, the students develop mind maps using the collected data and further discuss the answers to the questions.

(c). Investigation

It is the stage of exploration, experimentation, and interpretation. Exploration is the process of planning and generating information based on given problems. Students explored information through hypermedia reading. The students tried to develop their comprehension by making inferences. The experimentation process refers to students formulating their hypotheses by formulating questions. They then relate the new knowledge from their reading to their experiences to generate reading comprehension. Data interpretation is the process of making meaning through collecting and synthesizing data. Students used contextual and structural clues. Students then drew inferences and compared them with their peers.

(d). Conclusion

It is the stage in which the readers conclude the findings. The students compared their inferences. Students stated their evaluations of the writer's attitude, their opinions toward the text, and the writer's purposes. Students stated their understanding of the text by answering their formulated questions. They reflected on what they had learned (implications/conclusion). Students shared their new ideas with their peers.

(e). Social Complexity

It is the process of presenting their findings and sharing their ideas with their peers. The objective is to examine how students cope with social complexity during the sharing session. Creation: The students applied their reading to their real life. Socialization: Students engaged in communication with their peers using online tools. They interacted with peers and experts and shared their knowledge through Blogs, wikis, and social media.

C. Development Stage

The ICRS was designed using computer tools and online media to gain product validity based on the inquiry, connectivity, and complexity learning concept. The expert questionnaires were adopted from Keller's ARCS Instructional Design Model. The strategies are attention-getting, relevance, confidence, and satisfaction.

The attention-getting strategies of the ICRS consist of Non-incongruity and conflict, concreteness, variability, inquiry, and participation. The average validity test result is 89.6 % (highly valid). The details can be seen in Table 1.

TABLE 1
THE VALIDITY SCORES OF ATTENTION-GETTING STRATEGIES

No	Components	Percentage Scores(%)
1	Non-incongruity, conflict	90
2	Concreteness	85
3	Variability	86
4	inquiry	95
5	Participation	92
	Average	89.6

The relevance strategies include experience, present worth, future usefulness, need matching, ling, and choice strategies. The validity test results show an average 96 % (highly valid) score. The details can be seen in Table 2.

TABLE 2
THE VALIDITY SCORES OF THE RELEVANCE STRATEGIES

No	Component	Percentage Scores (%)
1	Experience	97
2	Present Worth	95
3	Future Usefulness	97
4	Need Matching	96
5	ling	98
6	Choice	93
Average		96

Confidence strategies consist of learning requirements, difficulty, expectations, attributions, and self-confidence. The validity test results on the confidence strategies show an average score of 91.6% (highly valid). The details can be seen in Table 3.

TABLE 3
THE VALIDITY SCORES OF CONFIDENCE STRATEGIES

No	Component	Scores
1	Learning Requirements	94
2	Difficulty	93
3	Expectation	90
4	Attributions	85
5	Self-Confidence	96
Average		91,6

The satisfaction strategies consist of learning consequences, unexpected rewards, favourable outcomes, avoiding negative influences and scheduling. The validity test results show an average score of 93.6% (highly valid). The details can be seen in Table 4.

TABLE 4
THE VALIDITY SCORES OF SATISFACTION STRATEGIES

No	Component	Scores
1	Natural Consequences	96
2	Unexpected Rewards	90
3	Positive Outcomes	95
4	Avoid Negative Influences	93
5	Scheduling	94
Average		93.6

Expert Advice – The developed was tried out to limited respondents to obtain the practice validity of the. The expert did some observations and wrote some comments and suggestions (he wrote commentaries on the observation sheet). The expert is an English lecturer who provided some advice on the teaching method. The amendments were made by the researchers by adding more explanations and providing more demonstrations and detailed instructions. The researchers gave more precise and concise instructions. The experts' comments and suggestions are shown in Table 5.

TABLE 5
THE EXPERTS' COMMENTS ON THE ICRS

Components	Instructional activities	Problems	Suggested changes
Pre-instructional activities	Motivational introductory learning	None	None
Assessment	Pre-test	Instruction was too fast and had an insufficient explanation	Add more examples and explanation
	Continuous assessment	Continuous assessment is not clear.	Make a precise assessment.
Content presentation	Presentation	Information on offline and online activities was missing.	Add more information for the two activities
Follow-up activities	Activities	Too many instructional activities. Instruction in imperative sentences needs further explanation	Simplify the instructional activities. Use imperative sentences. Describe each activity.
	Time learners spend for reading	Limited time to practice reading	Add more reading activities
Follow-up activities		Conflicts occur during interaction and sharing sessions	Explain the differences between interaction skills and sharing. State the aim of each activity.
Post-instructional activities	Attention	Instructional activities attract less attention	Add motivational activities.
Assessment	Post-test	Limited time	Need more time

Technological experts assessed the technological practice validity of the ICRS. The experts are the lecturers teaching media courses. The average result of practical technological validity is 93% - it is very practical. The ICRS is very practical for hypermedia reading. The details can be seen in Table 6.

TABLE 6
THE TECHNOLOGICAL EXPERT VALIDITY

Aspect	Scores			Category
	Rater 1	Rater 2	Rater 3	
Relevance	3.75	4	4	1.00-1.50: very limited practice 1.51-2.50: limited practice 2.51-3.50: sufficient practice 3.51-4.00: ample practice
Easy accessibility	3.75	3.75	3.50	
Convenience	3.50	3.50	3.75	
Usefulness	3.75	3.75	3.75	
Total	14.75	15	15	
Average	3.73			
Category	93%: Ample practice			

Students Validity. The interview was conducted to obtain user validity. This is based on students' entry skills and preferences. The interview responses given by students, *"I have my own devices; I use Kakao talk; I used IG to talk and discuss with friends. We have learned reading one and English vocabulary courses through online media. I like to discuss reading with friends through Apps. I enjoy reading hypertext more than printout text. I prefer to discuss with friends and through social media"*. The instruction meets learners' entry skills and preferences, and the ICRS is valid. The revised ICRS consists of five learning stages (refer to Figure 2).

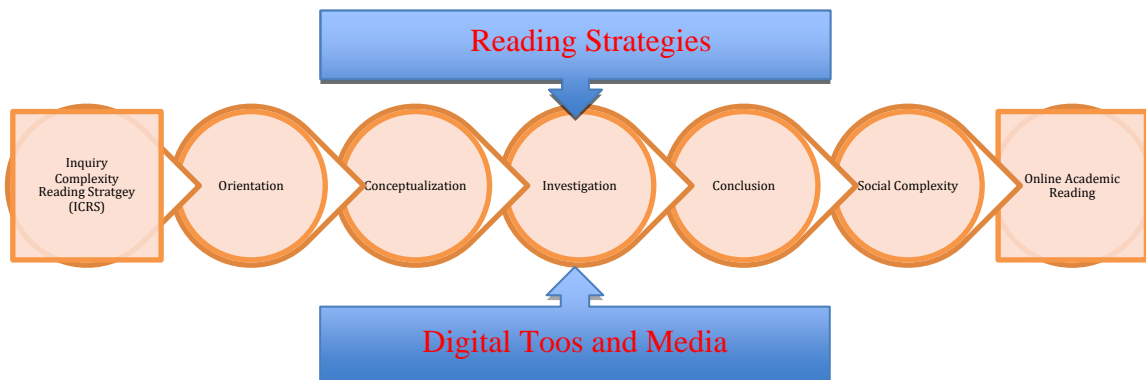


Figure 2. The Design of the ICRS

The ICRS is further improved based on the comments of the expert, practice and technological validators. Then, it has been verified as valid (refer to Table 7).

TABLE 7
THE INQUIRY COMPLEXITY READING STRATEGY (ICRS)

Stages	Activities
Orientation	<p>Pre-reading: T: Provide material and learning objectives T: Ask brainstorming questions. T: Ask students to set up their media tolls Ss: Set up reading goals. Ss: Switch on read-aloud tolls, listen and repeat. Ss: Previewing, using typographical features, find keywords. Pre-questioning: Ss: Write pre-reading questions, and recall information. Examples: What is the text about?</p>
Conceptualization	<p>Questioning Ss: Make prediction questions. Example: What is the main idea of the text? What is the writer's main point in the passage? Ss: Read the introductory and concluding sentences and find the general idea/ main ideas. Ss: Underline the keywords, and identify the detailed information. Example: What is the author's message given in the passage?</p>
	<p>Hypothesis Generation T: Groups students into five based on their expertise. Ss: Collaborate and confirm the hypothesis Example: It is stated in the passage that</p>
Investigation	<p>Exploration Ss: Explore the information through the text, and formulate the implied meaning. Example: The author implies that ...</p>
	<p>Experimentation Ss: Visualize/ formulate the unstated information by developing the statement/ questions: Example: Which of the following is not mentioned? Ss: Interpret the contextual meaning of the passages. Ss: Collaborate with peers to formulate new ideas/ information. Example: This can be inferred from a passage that...</p>
	<p>Data Interpretation Ss: Use contextual and structural clues, and develop inferences. Examples: The underlined word is closest in meaning to.... The pronoun in line X refers to Ss: State personal inferences and compare with peers.</p>
Conclusion	<p>Conclusion Ss: State the writer's attitude, opinion, and purposes. Ss: State their understanding by formulating relevant questions Example: What is the author's purpose in writing this passage? Ss: Develop new ideas based on personal meaning, and formulate questions. Example: What is the best ending? T: Facilitate students when they face difficulties.</p>
Social complexity	<p>Creation and socialization Ss: Complete the reading project Ss: Engage in communication and association using media tools with peers and experts. Ss: Develop reading comprehension based on their personal and contextual understanding. Ss: Show their awareness of others' thoughts and feelings during online interaction and discussion.</p>
	<p>Reflection Ss: Cooperate with proficient readers using media tools, and ask for critique and evaluation. Ss: do reflection and revision after the online discussion Ss: Apply personal and contextual meaning in real life and share information using their blogs, wikis and social media. Evaluation: Teacher and peer evaluation.</p>
	<p>Students worksheet: https://docs.google.com/document/d/1GmxofcYmgRED6WVLRGUFqQ5etsbPFEju/edit?usp=sharelink&oid=101608478685788035082&rtpof=true&sd=true</p>

D. Implementation Stage

At this stage, the ICRS product and practical validity are obtained. The ICRS was then implemented in academic reading classes for product effectiveness. Thirty-three students were the respondents. They had taken a pre-test before the intervention. After the intervention, the respondents were given a post-test.

(a). Normality Testing

A normality test was carried out as the prerequisite of paired sample t-test. The results of the normality test using the Shapiro-Wilk formula indicate that the Sig value of the pre-test was $0.279 > 0.05$, and the Sig value of the post-test was $0.595 > 0.05$. It can be concluded that the data distribution is normal. The results are presented in Table 8.

TABLE 8
NORMALITY TEST

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Reading pre-test	.165	33	.023	.961	33	.279
Reading post-test	.118	33	.200*	.974	33	.595

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

(b). Effectiveness Testing

The effectiveness of the product was analyzed using the t-test formula. The total sample was 33. The mean scores of the post-test are higher than the mean of the pre-test (post-tests = 78.67 and pre-test =57.67). The significant test indicates that the value of Sig two-tail of $.000 < 0.05$ is significant. It is concluded that the ICRS is effective and able to enhance students' critical and creative thinking skills in online academic reading. The details are presented in Table 9.

TABLE 9
PAIRED SAMPLE T-TEST

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre-test-Posttest	21.00000	3.16228	.55048	22.12129	19.87871	38.148	32	.0001

Respondents' pre-test, post-test, and participation scores are presented in Figure 3. The mean pre-test score is 57.67, and the post-test score is 78.67. The students' participation average score of 82.60 is high. It is concluded that learners are motivated to learn online academic reading using ICRS. The details are presented in Figure 3.

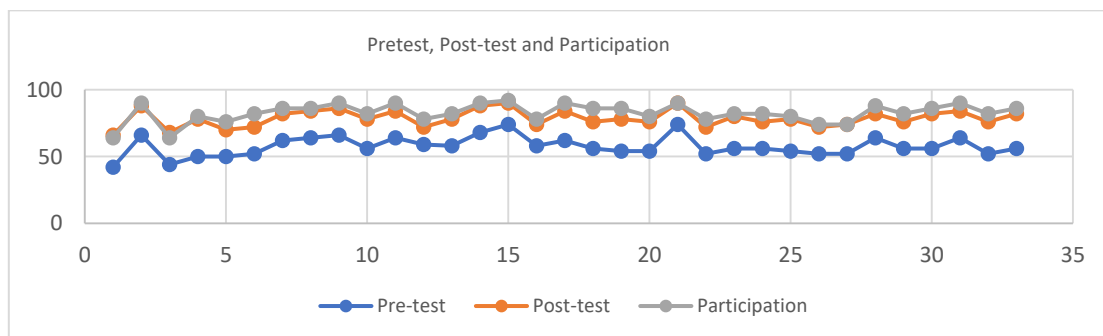


Figure 3. The Result of Pretest, Posttest, and Participation

E. Evaluation Stage

The evaluation stage has been carried out in an integrated manner, from the analysis stage to the development stage. The evaluation has been carried out by the practice expert, technological experts, and users to gain product feasibility. The feasibility and effectiveness of ICRS are proven.

V. DISCUSSION

The effectiveness of the ICRS in increasing students' critical and creative reading skills is proven in this study. The ICRS can be applied in a hybrid learning environment. The findings of this study have shown that online tools allow students to access learning materials more easily (Barisone et al., 2019). Then, with the teacher's assistance, students utilize relevant reading strategies in multiple systems through five stages (Orientation, Conceptualization, Investigation, Conclusion, and Social complexity). Through these stages, a relationship exists between the learning elements and the external environment (Mason, 2008). The effectiveness of the ICRS in a hybrid learning environment is proven in this study as the Ed-Tech is effective for online and offline learning (Aminah & Cahyono, 2022).

The orientation stage includes pre-reading and preparation activities for online reading. The usage of online tools during pre-reading activities has increased students' reading comprehension of detailed information, structural meaning, and references. At this stage, learners apply problem-solving, global, and navigation strategies. Peer interactions influence how a reader thinks and acts (Erni, 2021a; Marboot et al., 2020; Wu, 2021). At the conceptualization stage, learners generate information through questioning or hypothesizing and gathering information through interactions to develop better reading comprehension. At the investigation stage, exploration and experimentation can generate new information and relate them to their own experience. Interpreting and making meaning are developed through collecting

and synthesizing data. At the conclusion stage, learners do evaluations and reflections based on their reading. The last stage is social complexity. It requires readers to interact at different levels with their group members (Aureli & Schino, 2019). Teachers' assistance is essential for learners to develop agency in their learning (Ellis, 2021). It enables students to reform and accommodate the dynamic nature of their learning (du Plessis, 2021). The teacher needs to consider social complexity to conduct social activities (Bergman & Beehner, 2015).

Digital tools have created a learning space without boundaries and, at any time, open opportunities for students to share ideas (Ally, 2008). Online tools, media, organization, and environment increase learners' competence for social changes (Satiman & Zulkifli, 2022). The ICRS with online tools is a new learning strategy instruction and delivery task system in EFL context that effectively influences learners' acquisition (Sangrà et al., 2012; Tahounehchi, 2021). Through online learning, students could use global, problem-solving, support, and socio-effective strategies interchangeably (Erni, 2021a). Through Web tools, students established structured learning and applied a variety of learning strategies independently and collaboratively (Murphy & Cifuentes, 2001). Hence, students' critical and creative thinking or inductive reasoning skills have improved (Misrom et al., 2020). The ICRS, through each stage, facilitated learners with experiences and opportunities for collaboration and interaction. These activities have improved students' engagement in online academic reading. Communication and networking, creativity and openness, relationships and dynamical systems, and collectivity and connectedness (Marrison, 2006) were brought into practice. Also, effective technology integration offers opportunities to enhance social interaction and motivation (Heafner, 2004). The teacher's role is an integrative agent mediating between the real to virtual, technological to scientific, curriculum to skill, and cognitive to interactive learning (Raposo et al., 2020).

VI. CONCLUSION

The research findings reveal that: (1) The ICRS, which consists of cognition and social learning stages, could accommodate students' needs and characteristics. Their social and educational interactions were enhanced, (2) The ICRS has an expert validity score of 96% and the expert practicality score of 93%. (3) The ICRS was proven effective in enhancing learners' critical and creative reading skills for academic reading. The pre-test mean score is higher than post-test mean score. Students' participation was also improved. The ICRS with online tools resulted in students learning with more confidence, gaining in-depth exploration, and promoting dynamics and global interaction. The percentage of students interacting and sharing ideas via social media tools, blogs and wikis has increased. Students' characteristics do not affect their learning performance. In Conclusion, the ICRS can be applied by English teachers to teach academic reading in the EFL context.

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