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The Self-reported Perceptions of Engineering Students' Critical Reading Strategies

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Abstract

Developing students' critical reading skills is essential, especially those in the universities, because they will be required to read extensively journal articles and scientific textbooks in English. However, little is known about the Diploma students' critical reading skills. Thus, this article discusses Diploma engineering students' critical reading self-rated perceptions in English language class. The study employs a quantitative research method based on a descriptive survey design. The research sample is made up of 44 Diploma students from a university in the southern region of Malaysia. Data is collected using a questionnaire distributed online using google form through course teachers. Reliability testing is conducted for each section of the questionnaire prior to collecting data. Findings indicate that the Diploma level engineering students have a limited level of readiness in using critical academic reading skills. It is hoped that the results of this research will help teachers use innovative approaches to foster critical thinking ability among engineering students. Possible pedagogical implications of the findings for language learning and teaching and future potential research areas is also discussed.

Keywords: Critical Reading Strategies, Engineering, Perceptions, Reading Skills, Self-Rated

Introduction

Reading has long been known of as a passive or receptive activity, but it is now also regarded an active cognitive process. Readers should be prepared with critical reading skills before reading a text. This is because they must examine, evaluate, and criticise the reading material as they proceed to ensure the accuracy of the information (Alderson, 2000). The ability to read critically, according to Watson and Reissner (2014), is the foundation for

autonomous thinking and knowledge creation, which is vital for academic and professional success. While reading, critical readers will be able to assess, infer, and examine the arguments. Hudson (2007) asserted that children who are taught critical reading skills will be able to identify, synthesise, compare, and contrast key elements in texts. Critical reading entails not only comprehending the text (Brassell & Rasinski, 2008), but also determining the correctness of facts and their interpretations (Candan, 2003). The ability to: (a) form judgments and inferences; (b) distinguish between facts and opinion; and (c) recognise the author's aim or points of view are crucial skills for readers to proceed beyond what the text concluded to the point of how the author arrived at that conclusion and its accuracy (Wheeler et al., 2007)

Furthermore, the Malaysian Higher Education Action Plan 2015–2025 (MoHE, 2015) intends to develop high-quality human capital, marketable graduates, and knowledgeable workers. The Malaysian Higher Education Ministry's executed the National Education Blueprint 2013–2025, which is to reform the education system and make Malaysian graduates employable. Students will be able to readily analyse, synthesise, and evaluate material in the text if they develop critical reading strategies (Kadir et al., 2014). Sengupta (2002) suggests that students should be exposed to a variety of texts of varying lengths and difficulty since they will be asked to analyse and assess the author's statements, arguments, and opinions. Furthermore, students with strong critical reading skills can choose to read "between the lines" by asking questions and forming hypotheses (Langer, 1990; Marshall, 2012).

Despite several studies highlighting the advantages and usefulness of using critical reading strategies when reading a text, many ESL students have traditionally considered reading, particularly critical reading, as difficult skills to acquire (Ameyaw & Anto 2018; Bigozzi et al., 2017; Abd Kadir et al., 2014). Furthermore, there is strong evidence to support the assumption that Malaysian students lack critical reading skills as numerous studies, government papers, and the media have all addressed the issue of low critical reading abilities among Malaysian students (Rubaai and Hashim, 2021; Salleh and Baker, 2018; Salleh, 2018; Zin et al., 2014). Furthermore, according to the latest Education GPS (2021) report for the Programme for International Student Assessment (PISA), Malaysian students scored 415 points in reading literacy, compared to an average of 487 points in OECD countries, and Malaysia's index of students' cognitive adaptability was one of the lowest among PISA-participating countries and economies (-0.3 PISA Index, rank 60/64). This suggests that students could only read superficially and had low critical reading strategies. Thus, it is necessary to effectively manage and strengthen students' critical reading abilities (Salleh & Baker, 2018; Salleh, 2018, Zin et al., 2014; Aisyah, 2012).

Literature Review

Critical Reding

The term critical reading refers to the act of interpreting printed material and attributing meaning to it is referred to as (Samsuddin & Aspura, 2021; Abd Kadir et al., 2014). Critical reading is the ability to think, or cogitate, while reading (Vaseghi, Gholami, & Barjestech, 2012), to evaluate a text and draw many inferences from it in a way that leads to various conclusions (Bobkina & Stefanova, 2016). The ability to comprehend the written word, to conceptualise meaning from the text, to understand the author's aim, to be aware of the text's theme, and to employ language to produce special effects are all required for

critical reading text comprehension (Taboada et al., 2009). Reading critically, then, is reading with a critical mind, which leads to comprehension, evaluation, and a decision to accept or reject what has been read.

According to Spear-Swerling (2019), reading literacy, is the basis of academic performance at all levels of education. Students must be able to read and, even more importantly, to be critically literate. Students must be literate in reading and, more crucially, critical literacy. This is necessary for them to meet the economic, social, cultural, digital, and political demands of an increasingly globalised world (Naidoo et al., 2012). This means that, as in this study, reading literacy and critical engagement with texts at the university level must be developed to keep up with the expanding need for critical literacy abilities in the workplace. This is one of the difficulties pupils confront when they are unable to demonstrate autonomous learning from reading (Odewole, 2019)

According to Wade et al (2019), the reader's task is to determine whether the reader agrees with the author or disagrees with the author, taking a position, which means forming a critical attitude toward the reading. To put it another way, reading, interpreting, identifying, agreeing with, or refuting written text requires a critical mind. As for the current study, critical reading is the ability of a reader to comprehend by recognising and identifying personal and societal meanings in written material without having to read them in the text.

According to Perez et al (2018), critical reading entails asking questions to analyse the terminology, concepts, and purpose of the text, identifying author-introduced elements of argument, evaluating the evidence and credibility of the content, and positioning the reader in relation to the text. Finally, critical reading can help students identify between several relationships, discriminations, inequities, and injustices in a text and apply that knowledge in their everyday lives. As a result, Law (2011) claims that enhancing reading competency, which includes critical reading, is possible, but only if effective and consistent reading approaches are utilised. This study feels it is necessary to investigate critical reading ability from the perspective of the students, whereby students self-rate their own ability in critically reading comprehension text.

Students' Perceptions of Critical Reading

Students' perceptions have been demonstrated to influence their behaviour and willingness to learn (Karabay et al., 2019; Licorish et al., 2018). Similarly, Karasakaloglu et al (2012) believe that one of the essential variables facilitating critical reading is reader self-perception. Furthermore, how students perceive their own competence affects their academic success, perseverance, and motivation in school-related tasks (Usher et al., 2019; Taboada et al., 2009; Pajares, 2008). Negative perceptions of one's reading abilities, according to Hall (2009), are detrimental because it may hinder students from reading. According to Guthrie et al., positive reading perceptions tend to drive learners to read a wide range of reading materials, 2009). The study concluded by emphasising the importance of students to develop positive perceptions of critical reading abilities.

There are numerous literatures on students' reading perceptions. Karasakaloglu et al (2012), for example, conducted a study to find out what teacher trainees think about their own critical reading. The findings of their study revealed that the teacher trainees' views vary by gender and graduate programmes. Karadag (2014) performed a similar study with the goal of eliciting primary school teachers' evaluations of their critical reading abilities and competency. The findings indicated that primary school teacher did not consider themselves

critically literate and did not know how to apply critical reading methods. Considering the literature on the perceptions of students' critical reading strategies, it is clear that positive perceptions is essential toward reading. Thus, it is important to investigate self-rated perceptions of the students in the local context of the current study

Materials and Methods

This section highlights the methodology conducted to answer the research questions. The research design, data collection tools, data collection procedures and data analysis techniques are presented. A quantitative research design was employed in this study. According to Creswell (2014), quantitative research is a systematic and objective approach of using numerical data from a small subset of a population. In addition, Babbie (2010) claims that a quantitative technique is utilised to analyse data that is primarily numerical. This study used quantitative research to answer the findings from the students' perceptions of their critical reading ability.

A total of forty-four Diploma students majoring in engineering studies were from two intact classes in a university at the southern region of Malaysia. An intact sampling is non-probability sampling technique in which researchers choose an already-formed group to participate in the study (Elfil & Negida, 2017). In this study the students are already in two different classes with no difference in their ability or performance taking the same Integrated Language Skills (ELC 151) English proficiency course. The two groups were chosen using simple random cluster method. The chosen samples could provide sufficient information with regard to critical reading perceptions of their critical reading abilities.

Data Collection

A set of questionnaires was used as the instrument in the data collection procedure. There are two sections in the questionnaire with 39 questions. The learners' demographic characteristics were investigated in Section A, whereas critical reading practices were examined in Section B. The questionnaire was used to collect information on the students' self-rated perceptions to use critical reading strategies. Table 1 displays the questions asked based on each critical reading strategies to explore the students' self-rated critical reading practises

Table 1

Students' self-rated ability to use critical reading strategies

Strategy	Ques. No	Questions
Strategy 1: Knowledge	1 2 3 4	I can remember the information from a text that I have read I can identify specific terms in a text I can identify main ideas in a text. I can identify supporting details in a text
Strategy 2: Comprehension	5 6 7 8 9 10 11 12	I can read and understand the title of a text. I can quickly read through long and difficult texts, locating relevant details. I can describe the main ideas in a text. I can describe supporting details in a text. I can explain the meaning of words, or sentences from the context. I can find specific information from a text. I can recognise a paraphrase. I can understand the relationships: • within sentences. • between sentences
Strategy 3: Application	13 14 15 16 17	I can predict the outcomes of an article. I can use the knowledge that I have when I read a text. I can use my personal experiences to improve my understanding of a text when I read. I can read about an idea in a text and use it in other situations that I read about. I can read about an idea in a text and use it to solve problems in my own life
Strategy 4: Analysis	18 19 20 21 22 23	When I read a text, I know the difference between a fact and an opinion. When I read a text, I can show which points are relevant to the topic written about. When I read a text, I can conclude what the text is about. When I read a text, I can identify the reasons for certain actions in the text. When I read, I can separate the idea within the text into its different parts. When I read, I can identify similarities and contradictions in a text.
Strategy 5: Synthesis	24 25 26	I can connect the ideas: • within a paragraph. • between paragraphs. I can summarise information after reading a text. I can draw conclusion after reading a text
Strategy 6: Evaluation	27 28 29	I can decide on the trustworthiness of the information in a text. I can make a decision on the argument when I read.

	30	I can determine the strength of an idea in a text.
	31	I can determine the weakness of an idea in a text.
	32	I can determine the relevancy of an idea in a text.
	33	I can identify and explain writers': • views in a text. • attitudes in a text. • intentions in a text.
	34	I can determine the trustworthiness of sources in a text. I can draw conclusion after reading a text.

Source: Adapted from Anderson, L.W. & Krathwohl, D.R., 2001, A taxonomy for learning, teaching and assessing: A revision of Bloom's Taxonomy of educational objectives, Complete edition, Longman, New York, NY

The questionnaire consists of four-point Likert scale: (1) Never, (2) Sometimes, (3) Most of the Time, and (4) Always questions. This scale is important to understand the intensity of the strategies students are equipped with and to achieve consistency in analysing the data. Besides, statements are worded simple, clear, relevant, and precise to ensure that each student understood them. The questionnaire was distributed to 44 Diploma students from two intact classes through the course lecturers. Students have to self-rate their ability on critical reading skills based on self-perception. Reliability testing was conducted for each section and the Cronbach's Alpha coefficients are reported in Table 2.

Table 1

Reliability Test based on Cronbach's Alpha coefficients

Sections	Number of Items	Cronbach's Alpha
Lower-Order Thinking Skills		
Knowledge	4	77.1
Comprehension	8	90.0
Application	5	86.9
Higher-Order Thinking Skills		
Analysis	6	87.8
Synthesis	3	87.0
Evaluation	8	94.3

The analysis in Table 2 above is presented based on the lower-order thinking skills and higher-order thinking skills. The lower order thinking skills consist of the knowledge, comprehension, and application categories. The higher-order thinking skills consist of the analysis, synthesis, and evaluation categories. Overall, the scales showed good internal consistency of items in the questionnaire. As such, no items were deleted from the questionnaire.

Data Analysis

The collected data from the questionnaire was analysed for descriptive analysis using the Statistical Package for the Social Sciences (SPSS) version 25. The questionnaire data were analysed by determining the overall means and standard deviations of the learners' self-rated critical reading perceptions, The data were visually displayed in tables using means and standard deviations This process was aligned with White's (2005:98) in a study investigating critical reading self-perceptions of Grade 8 English FAL learners.

Results and Discussion

The following section presents the findings of the study. Figure 1 and Figure 2 below show the demographic profile of the respondents in terms of gender and the course of study respectively.

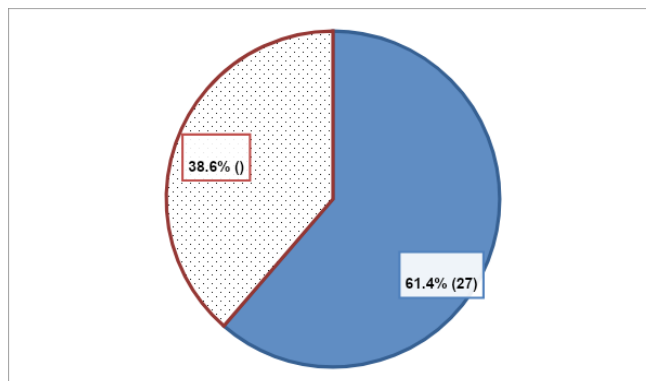


Fig 1: Demographic Profile based on Gender

Based on Figure 1 above, it was noted that from the total of 44 participants of the study, 61.4 percent are females and 38.6 percent are males.

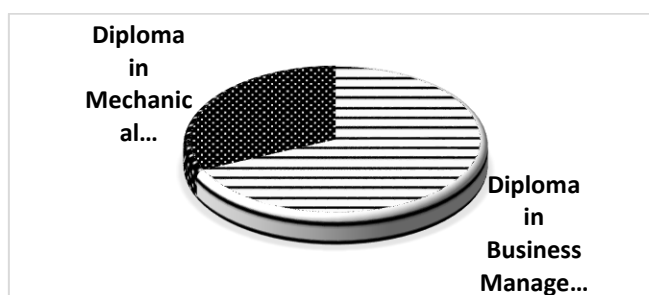


Fig 2: Demographic Profile based on Courses of the Participants

In terms of their course of study, Figure 2 above reveals that majority of the students (68 percent) are from the Business Management Faculty majoring in Diploma in Business Management. On the other hand, 32 percent are engineering field students majoring in Diploma in Mechanical Engineering.

Students Perceptions of Critical Reading

This section reveals the findings from the questionnaire regarding the students' self-rated perceptions on their critical reading skills. The Diploma students' perceptions of the six Bloom's Taxonomy skills are presented in this section: (1) knowledge; (2) comprehension; (3) application; (4) analysis; (5) synthesis; and (6) evaluation. In this paper, these skills are divided into two categories: lower-order thinking skills and higher-order thinking skills. Lower-order thinking skills include knowledge, understanding, and application, whereas higher-order thinking skills include analysis, synthesis, and assessment. Table 2 highlights the students' self-rated perceptions of using critical reading strategies.

Table 2

Students' self-rated perceptions of using critical reading strategies

Critical Reading Strategies	N	Minimum	Maximum	Mean	Std. Deviation
Lower-Order Thinking Skills					
Knowledge	44	2.00	4.00	2.9375	0.53409
Comprehension	44	1.75	4.00	2.8949	0.55637
Application	44	2.00	4.00	2.9318	0.57213
Higher-Order Thinking Skills					
Analysis	44	2.00	4.00	2.8742	0.52773
Synthesis	44	2.00	4.00	2.8409	0.63282
Evaluation	44	1.88	4.00	2.7500	0.57944

It is highlighted in Table 2 that the majority of students perceived that they could apply the first strategy in the critical reading skills which is knowledge with a mean score of 2.9375. This is followed by the application strategy with a mean of 2.9318 and the critical reading comprehension strategy received a mean score of 2.8949. The three strategies that scored high results are from the lower-order thinking skills based on Bloom's Taxonomy. In the higher-order thinking skills, the analysis strategy and synthesis strategy received mean of 2.8742 and 2.8409 respectively and the least mean for critical reading strategy is evaluation with only a mean of 2.7500. Exploring the students' perceived ability in critical reading strategy, it was noted that students perceived high on their lower-order thinking skills. Critical reading skills related to knowledge strategy gained the highest mean. This as illustrated in the Blooms Taxonomy is the first strategy to understand further the reading text. Students perceived that they can recall specific information read from the text and identify specific terms, main ideas and supporting details stated in the reading comprehension test text. However, evaluation strategy is the second last strategy and it is the higher-order thinking skills strategy indicating that students had limited confidence in their abilities to evaluate a text. This highlights students perceived that they are unable to evaluate text in depth. This is worrying as university students are expected to be able to think critically and evaluate texts' trustworthiness, validity and accuracy of information, point of view, and bias of information. Students self-rated perceptions in this study found that students have the perceptions that they have difficulty evaluating higher-order textual comprehension questions. Despite the usefulness of this critical reading approach, students self-rated perceptions were found deficient when it came to using it from their own perspective.

Table 3 below reveals in details the mean for all the items in the questionnaire based on the two levels of thinking ability; lower-order and higher-order thinking skills.

Table 3

Mean score of Diploma students' lower-order thinking skills

No	Items	Mean	Std Deviation
Section 1: Knowledge			
1	I can recall the information in a text	2.80	.668
2	I am able to identify specific terms in a text	2.80	.701
3	I can identify main ideas in a text	3.09	.676
4	I can identify supporting details in a text	3.07	.728
OVERALL MEAN		2.94	.693
Section 2: Comprehension			
1	I can read and understand the title of a text.	3.25	0.651
2	I can quickly read through long and difficult texts, locating relevant details.	2.73	0.694
3	I can describe the main ideas in a text.	3.00	0.647
4	I can describe supporting details in a text.	2.91	0.741
5	I can explain the meaning of words, or sentences from the context.	2.68	0.740
6	I can find specific information from a text.	2.89	0.722
7	I can recognise a paraphrase.	2.75	0.866
8	I can understand the relationships:• within sentences. • between sentences	2.95	0.714
OVERALL MEAN		2.89	0.722
Section 3: Application			
1	I can predict the outcomes of an article.	2.70	0.701
2	I can use the knowledge that I have when I read a text.	3.09	0.741
3	I can use my personal experiences to improve my understanding of a text when I read.	3.09	0.709
4	I can read about an idea in a text and use it in other situations that I read about.	2.91	0.709
5	I can read about an idea in a text and use it to solve problems in my own life	2.86	0.668
OVERALL MEAN		2.93	0.706

Table 2 shows that the Diploma students display a limited level of readiness in utilising the skills in the first section (M=2.94, SD=0.693) (knowledge). In particular, the students exhibited limited readiness in: (a) recalling the information in a text, (M=2.80, SD=0.668) and (b) identifying specific terms in a text (M=2.80, SD=0.701). The students were also found to be more moderately ready and confident in identifying supporting details in a text (M=3.07, SD=0.728) and identifying main ideas in a text (M=3.09, SD=0.676).

The results in Table 2 also indicate that the Diploma students display a limited level of readiness in applying the skills in the second section, Comprehension (M=2.89, SD=0.722). In particular, they were relatively weaker in explaining the meaning of words or sentences from the context (M=2.68, SD=0.740), reading through long and difficult texts or skimming and scanning skills (M=2,73 SD=0.694), recognising a paraphrase when reading an academic text

($M=2.75$, $SD=0.866$). However, they seem moderately ready in skimming and scanning long texts in order to locate relevant details ($M=3.200$, $SD=1.031$). Besides the students were confident in reading and understanding the title of the text ($M=3.25$, $SD=0.651$), and describing the main idea in a text ($M=3.00$, $SD=0.647$).

The results also show that the Diploma students displayed a limited level of readiness in practicing the skills in Application ($M=2.93$, $SD=0.706$). The results pointed out to the fact that students were the least ready and confident in predicting the outcome of an article ($M=2.70$, $SD=0.701$). In contrast, they appeared to be more confident in applying their personal experiences to the reading process ($M=3.09$, $SD=0.709$), and using the knowledge that they have when reading a text ($M=3.09$, $SD=0.741$). This ability has allowed them to connect and understand in a more in-depth manner the text they are reading. skill is very complex because this skill is what you need.

Table 3

Mean score of Diploma students' higher-order thinking skills

No	Items	Mean	Std Deviation
Section 4: Analysis			
1	When I read a text, I know the difference between a fact and an opinion.	2.73	0.660
2	When I read a text, I can show which points are relevant to the topic written about.	2.95	0.714
3	When I read a text, I can conclude what the text is about.	3.05	0.653
4	When I read a text, I can identify the reasons for certain actions in the text.	2.93	0.661
5	When I read, I can separate the idea within the text into its different parts.	2.86	0.683
6	When I read, I can identify similarities and contradictions in a text.	2.75	0.686
OVERALL MEAN		2.88	0.676
Section 5: Synthesis			
1	I can connect the ideas:• within a paragraph. • between paragraphs.	2.82	0.657
2	I can summarise information after reading a text.	2.93	0.759
3	I can draw conclusion after reading a text	2.77	0.711
OVERALL MEAN		2.84	0.709
Section 6: Evaluation			
1	I can decide on the trustworthiness of the information in a text.	2.70	0.734
2	I can make a decisions on the argument when I read.	2.84	0.608
3	I can determine the strength of an idea in a text.	2.82	0.657

4	I can determine the weakness of an idea in a text.	2.70	0.701
5	I can determine the relevancy of an idea in a text.	2.80	0.668
6	I can identify and explain writers': • views in a text. • attitudes in a text. • intentions in a text.	2.64	0.650
7	I can determine the trustworthiness of sources in a text.	2.64	0.718
8	I can draw conclusion after reading a text.	2.86	0.734
OVERALL MEAN		2.74	0.688

Based on the findings shown in Table 3, it is revealed that the students also displayed a limited level of readiness in utilising the fourth skill (analysing) ($M=2.88$, $SD=0.676$). In particular, the students were found to have had difficulty in distinguishing facts from opinions ($M=2.73$, $SD=0.660$) and identifying similarities and contradicting ideas in a text ($M=2.75$, $SD=0.686$). Students were also found to be confident in highlighting relevant ideas from the irrelevant ($M=2.95$, $SD=0.714$). This might be due to Diploma students' concerns that their analysis would be wrong or that the work would be too difficult for them. These findings is similar to those of Anuar and Sidhu (2017); Zin et al (2014), who found that the students in their studies had difficulty analysing texts. However, the students were found moderately ready in making conclusion of the text ($M=3.05$, $SD=0.653$).

The results in Table 3 also indicated that the students displayed a limited level of readiness in applying Synthesis skills ($M=2.84$, $SD=0.709$). They have difficulty in summarising information after reading a text ($M=2.93$, $SD=0.759$). It was noted that all the synthesis skills were perceived as difficult by student with moderate readiness. The results in Table 4 shows that the students have a limited level of readiness in evaluation ($M=2.74$, $SD=0.688$). The student appeared to have limited readiness in determining the trustworthiness of sources in a text ($M=2.64$, $SD=0.718$) and also identifying and explaining writers' views, attitudes and intentions in a text ($M=2.64$, $SD=0.650$) Since the evaluation strategies seem to be the hardest to acquire, it has recorded the lowest mean of all the lower-order and higher-order thinking skills.

As a whole, the students showed limited readiness in all the six reading strategies with slightly higher perceptions in the lower-order thinking skills than the higher-order thinking skills. The highest perceived strategy was noted for the most basic reading strategies (knowledge) and the lowest perceptions is recorded for the highest level of reading strategies in Blooms taxonomy of critical reading strategies which is evaluation. This could probably due to the self-perceptions that evaluating ideas in a text is difficult for Diploma level education.

Conclusion

This study investigated the critical reading perceptions of diploma engineering students taking Integrated Language Skills (ELC151) English course in a university in the southern region of Malaysia. Based on the sociocultural theory of literacy, students are required to accept their own self-perceptions, which allows them to critically examine other parts of their life and in the case of current study, the students self-rated perceptions of critical reading strategies. Mokhtari and Reichards' (2002:249) assert in their study that "it is extremely

necessary for students to be cognisant and monitor their own reading habits". The findings, collected through a questionnaire revealed that, based on the students' self-rated perceptions of their critical reading skills, the students had a limited level of readiness in critical thinking strategies. The participants in this study self-rated their perceptions of the ability to critically analyse reading materials and findings showed that they had limited readiness in using the critical reading strategies when reading a text. This is both for lower-order and higher-order thinking skills. The findings also revealed that they had more difficulties attempting higher-order critical reading strategies.

Implications and Recommendations

Despite the many challenges that students face in the classroom, the findings demonstrated that students' perceptions of critical reading abilities are vital for their students should work together to monitor critical reading skills, and the teacher should commit to encouraging, acknowledging, and appreciating students who initiate and participate in critical reading activities and discussions in the classroom. This may improve their self-perception of their critical reading skills by increasing their reading performance.

Teachers should teach critical reading strategies either explicitly or implicitly so that students will be more likely to be aware of a wider range of critical reading skills. Furthermore, teachers and students should work together to monitor critical reading skills, and the teacher should commit to encouraging, acknowledging, and appreciating students who initiate and participate in critical reading activities and discussions in the classroom. This may improve their self-perception of their critical reading skills by increasing their reading performance.

Schools, universities and education institutions should form critical reading relationships or collaboration between teachers and parents. Such a collaboration could potentially increase parental involvement and create awareness on their children's critical reading performances, thereby increasing not only students' chances of cultivating critical thinking skills and improving their critical reading performances, but also their ability to become critically literate citizens of the world.

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