Invitation to Review for Manuscript EU-JER ID#1912060654

6 messages

European Journal of Educational Research <editor@eu-jer.com> Wed, Dec 11, 2019 at 2:29 PM
Reply-To: European Journal of Educational Research <editor@eu-jer.com>
To: European Journal of Educational Research <indah@bsi.uin-malang.ac.id>

Dear Dr. Rohmani Nur Indah, (indah@bsi.uin-malang.ac.id)

I am the editor of "European Journal of Educational Research" (EU-JER) (https://www.eu-jer.com/). EU-JER has been indexed by SCOPUS, ERIC, ErihPlus, IndexCopernicus et al. This mail is a special invitation to review an article for one-time. We're sorry if we've made a disturbance.

We have read your paper entitled “Logical Flaws in Indonesian Students’ Argumentative Essays” in "LSCAC Conference Proceedings, The 4th International Conference on Language, Society and Culture in Asian Contexts (2016), Volume 2017", from which we know that you have explored deeply in your area, and we think that you were expert to review for our manuscript. It is an honor if we could have you with us as a reviewer.

The manuscript, entitled "Reasoning in Argumentative Writing by Students with Different Ethnics in Indonesia" (Manuscript ID#1912060654) has been submitted to EU-JER.

We realise that our expert reviewers greatly contribute to the high standards of the Journal, and we thank you for your present and/or future participation.

If you accept our invitation to review, the deadline for reviewing is December 29, 2019. Please let us know as soon as possible if you will be able to accept our invitation to review.

We would be grateful if you would kindly agree to act as a reviewer for this paper. If you agree to review, we will send the empty reviewer form and the manuscript.

Here is the abstract of the manuscript:

Reasoning in Argumentative Writing by Students with Different Ethnics in Indonesia

This study was intended to describe the effect of Indonesian culture on the argumentative writing of undergraduate students with English major. Variations shared by Bataknese and Javanese ethnics were also investigated to find out variations of argumentative pattern within the shared pattern of argumentation among the various ethnics in Indonesia were also investigated. The two objectives were achieved by applying descriptive qualitative design in which 10 students of Javanese ethnics and 10 students of Bataknese where involved in the study. The argumentative writing of the 20 students were analyzed by applying qualitative data analysis model. The result of the study showed that the undergraduate students of both Javanese and Bataknese shared common patterns of arguments in terms of text structure, reasoning, and affective appeal. Meanwhile, variations in ethnic value between Bataknese writers and Javanese writers causes variations in text structure of argumentative writing in two aspects namely in developing thesis statement and in drawing conclusion.

We are looking forward to hearing you.

PS: We will send the certificate of appreciation to you after review.

Best regards,

Ahmet Savas, Ph.D.
Editor, European Journal of Educational Research
editor@eu-jer.com
www.eu-jer.com

Rohmani Nur Indah <indah@bsi.uin-malang.ac.id> Fri, Dec 20, 2019 at 6:24 AM
To: European Journal of Educational Research <editor@eu-jer.com>

I accept the invitation.
As I read the abstract, the article is potential for publication since it has a special focus on the role of ethnicity in argumentation.

Thank you for the offer, I'm glad that I get the opportunity to join European Journal of Educational Research as one of invited reviewers
[Quoted text hidden]

Editor - European Journal of Educational Research <editor@eu-jer.com> Fri, Dec 20, 2019 at 1:01 PM
To: Rohmani Nur Indah <indah@bsi.uin-malang.ac.id>

Dear Dr. Indah,

Thank you so much for agreeing to review the manuscript "Reasoning in Argumentative Writing by Students with Different Ethnics in Indonesia" (Manuscript ID#1912060654) for European Journal of Educational Research, although you are very busy.

The blinded manuscript and the empty reviewer form appear at the addition of this email. We kindly ask you to fill out this form. If it is necessary, you can make corrections at the word file of the manuscript as explanations.

We kindly remind the deadline for review due December 29, 2019.

All communications regarding this manuscript are privileged. Any conflict of interest, suspicion of duplicate publication, fabrication of data or plagiarism must immediately be reported to me.

We are looking forward to getting your valuable report.

Best regards,

Ahmet Savas, Ph.D.
Editor, European Journal of Educational Research
www.eu-jer.com
editor@eu-jer.com

[Quoted text hidden]

2 attachments

EUJER_ID_1912060654.docx
3358K

EU-JER_REVIEWER_FORM_R2613.docx
329K

Rohmani Nur Indah <indah@bsi.uin-malang.ac.id> Sun, Dec 22, 2019 at 7:13 AM
To: Editor - European Journal of Educational Research <editor@eu-jer.com>

Dear Ahmet Savas, Ph.D

Please find the attached commented manuscript and reviewer form.
This article is free from the issues of conflict of interest, suspicion of duplicate publication, fabrication of data or plagiarism

Thank you for the valuable opportunity to review the manuscript for European Journal of Educational Research

Dr. Rohmani Nur Indah
Faculty of Humanities UIN Maulana Malik Ibrahim Malang Indonesia
Editor in chief El Harakah Journal of Islamic Culture
http://ejournal.uin-malang.ac.id/index.php/infopub
[Quoted text hidden]

3 attachments

EU-JER_REVIEWER_FORM_R2613.docx
133K

EU-JER_REVIEWER_FORM_R2613.pdf
269K

EUJER_ID_1912060654_reviewed.docx
3348K

Editor, European Journal of Educational Research <editor@eu-jer.com> Sun, Dec 22, 2019 at 2:56 PM
To: Rohmani Nur Indah <indah@bsi.uin-malang.ac.id>

Dear Dr. Rohmani Nur Indah,

We thank you very much for making your efforts to the journal of “European Journal of Educational Research”. We have honored to see you as the reviewer of EU-JER. We welcome your contributions in future. Please see the attached certificate of appreciation.

After the author does the corrections which you gave, we may resend the revised paper in order to check whether all corrections have been done.

Best regards,

Ahmet Savas, Ph.D.

Editor, European Journal of Educational Research
editor@eu-jer.com
www.eu-jer.com

[Quoted text hidden]

certificate-of-appreciation-Rohmani Nur Indah.pdf
314K

Rohmani Nur Indah <indah@bsi.uin-malang.ac.id> Mon, Jan 16, 2023 at 1:11 PM
To: reviews@webofscience.com

WOS_REVIEW_ID:8384553
[Quoted text hidden]

certificate-of-appreciation-Rohmani Nur Indah.pdf
314K

Reasoning in Argumentative Writing by Students with Different Ethnics in Indonesia

Abstract: This study was intended to describe the effect of Indonesian culture on the argumentative writing of undergraduate students with English major. Variations shared by Bataknese and Javanese ethnics were also investigated to find out variations of argumentative pattern within the shared pattern of argumentation among the various ethnics in Indonesia were also investigated. The two objectives were achieved by applying descriptive qualitative design in which 10 students of Javanese ethnics and 10 students of Bataknese where involved in the study. The argumentative writing of the 20 students were analyzed by applying qualitative data analysis model. The result of the study showed that the undergraduate students of both Javanese and Bataknese shared common patterns of arguments in terms of text structure, reasoning, and affective appeal. Meanwhile, variations in ethnic value between Bataknese writers and Javanese writers causes variations in text structure of argumentative writing in two aspects namely in developing thesis statement and in drawing conclusion.

Keywords: *culture, patterns of arguments , variations, ethnics*

Introduction

Indonesia, geographically, is one of Asian countries. Asian culture is said to have different culture from Western's. Western's value is individualism in which individuals should have sufficient freedom. In contrast, Asians' values is collectivism who see themselves as parts of one or more groups (family, co-workers, tribes, nations) and emphasize their connectedness to members of these collectives. This difference is formed in their L1 and affects their L2 writing rhetoric pattern (Connor, 2008). Western rhetoric is characterized by practical and scientific orientation, and factual concrete evidence; they are more direct in their argumentation. Meanwhile, Asian's is typically humanistic aesthetic orientation and subjective in providing evidence. Therefore, they tend to use indirect approach in their argumentation (Kaplan in Uysal, 2012). However, culture cannot be regarded as national entity; within a culture, there are variations of

Commented [1]:
(Connor et al., 2008)

Commented [2]:
Mention it in references

rhetoric (Comfort, 2001). It implicitly states that within Asian and Western culture, there are variations in their rhetoric patterns.

Indonesia consists of various ethnics group such as *Batak Toba* who reside in North Sumatera, Indonesia around Toba Lake, Javanese who live in Java, Manado whose residence in North Sulawesi, etc. Their rhetorical pattern will be varied although they belong to Asian culture which will be in line with Comfort's statement (Comfort, 2001).

Commented [3]:
You need to elaborate further on the relationship between culture and reasoning. There are two views on this issue, whether reasoning is shaped by culture, or culture shapes reasoning. How does this paper respond to these views?

This study was intended to find out the variations of reasoning in argumentative writing written by undergraduate students of English Department with two different ethnics groups in Indonesia namely *Batak Toba* and Javanese. The two ethnics have different values. *Batak Toba* lives' purpose is to achieve three main ideals namely to be wealthy, to have many sons and daughters, and family honor which is reflected by their motto: *Hamoraon* (wealth), *Hagabeon* (hoping to have many sons and daughters), *Hasangapon* (family honor) (Sari, B.T, 2018). They are very ambitious to achieve this purpose and they work hard. In daily life, they speak to the point, frankly and give less consideration on others' feelings. This is an implementation of other motto of theirs: *Tedak songon indahan di balanga* (Something which is transparent, objective, and open; just exactly like rice in the pan).

Commented [4]:
(Sari et al., 2018)

Javanese live with different value; they value more on harmony which they call as live in *rukun* (Hawkins, 1996). In daily life, this value is represented in a principle: *tanggap ing sasmita*. It means a Javanese should be keen on inferring implicit and symbolic meaning (Pudentia, 2015:426). To achieve harmonious life, one with Javanese ethnic should not say something directly; they have to say something implicitly and they believe that their interlocutors have the ability to infer the implicit and symbolic meaning as the principle of their communication requires everyone to be *tanggap ing sasmita*.

In argumentative writing, the writer is intended to convince his readers by applying argumentative text structure, reasoning, and persuasive appeal to accept his claim or thesis

statement. Ways of convincing readers, according to Ramage *et.al* (2016) are realized in three aspects, they are: (1) text structure; (2) reasoning; and (3) affective appeals. Toulmin *et.al* (2003:11) further explains that reasoning is developed by providing: (1) claim (writer's stance which he tries to prove); (2) reason itself (motive for the claim); (3) ground (data which supports the claim); (4) warrant (underlying assumption that completes the relationship between claim and reason); and (5) backing (the basis on which we believe that the warrant is believable). This theory is resulted from the research conducted to the argumentative writing written by Western writers. From the perspective of culture, Asian writers may have different ways of convincing his readers to accept his claim. It can be seen from Western argumentative writing which is more direct in expressing claim, and scientific by providing more ground and warrant; while Asian writers are indirect, less scientific, less ground and warrant (Schwarz & Asterhan, 2008).

Indonesian argumentative writing is characterized with indirect, less ground and less warrant. Argumentative writing written by Batak writers may be different from that of written by Javanese writers in terms of text structure, reasoning, and affective appeals although in general they show indirectness, less ground, and less warrant. This is caused by different values they have within the same national cultural entities. There may be variations in their argumentative writing in the attributes that characterize the Asian writers argumentative writing.

Commented [5]:
This statement needs evidence, support with citation

Methodology

In this study, three classes of undergraduate students majoring in English education which consists of twenty five students in each class were assigned to write argumentative writing with the topic of *Should social media be banned?* All of the students were in the 8th semester and based on their curriculum as well as the result of the interview, the students had

studied how to write argumentative writing. All of the 75 writings were examined to find out the writing which fulfill the criteria of argumentative writing. Based on the result of the examination, there were 10 Javanese ethnics students' argumentative writing and 10 Batak ethnics writing were found to fulfill most of the argumentative writing text structure. The 20 writings were used as the data of this study.

This study was designed with qualitative descriptive design. The data were analysed by applying Bogdan & Biklen; data analysis model in which data analysis is firstly begun by data identification and classification by taking the theory or argumentative writing as temporary predetermined of data identification and classification. This was intended to find out descriptions of the argumentative writing of the two ethnics writers. Patterns of convincing the readers applied by the two ethnic writers was found out by observing the interrelatedness between the two ethnics values and the way of convincing their readers. Recurrent pattern was identified as the underlying causes of the two ways of convincing their readers.

Commented [6]:
Year of publication?
Mention it in references

Findings / Result

The result of the data analysis showed that there were Variationss of argumentative writing obeying Asian culture in specific pattern reflecting variations within the national cultural entities were applied by the two ethnics writers.

1. General Pattern Reflecting National Cultural Entities

   In general, the two ethnic writers argumentative writing were characterized by the characteristics reflecting Asian culture as their national cultural entities. This characteristics were found in the text structure and reasoning of the argumentative writing.

   a. Text Structure

      The text structure consists of: (a) introductory paragraph; (b) writer's position paragraph; and (c) conclusion.

Commented [7]:
See the template, remove numeric order

Commented [8]:
Representation of ethnicity should be elaborated first before coming to the justification that the writing characterized the cultural entities. I think this paragraph is put later, not earlier. You need to describe the general pattern in the finding, and later connect to the research assumption that it is affected by culture later in the discussion

By Applying Definition, Personal Opinion, Issue, and Implicit Thesis Statement in Introductory Paragraph

Commented [9]:
Check the sequence and explain earlier, is it the first strategy applied in the introductory paragraph?

a) Definition

In developing the *Introduction* of the argumentative writing, the subjects count on definition (1a) and personal opinion (1b) to introduce the issue (1c) in order to catch readers' attention, as shown in the data below.

> Data 1a
> Social media refers to the means of interactions among people in which they create, share, and/or exchange information and ideas in virtual communities and networks.

In data 1a, the introduction was begun with *Social media refers to the means of interactions among people in which they create, share, anexchange information and ideas in virtual communities*…; and it belongs to definition. Definition refers to detailed description of something in attempt to avoid readers' misunderstanding and to gain more precise image of what is being defined (Ary *et.al* 2010 : 36).

Commented [10]:
Mention it in references

The term *refers* used in the data is intended to describe social media as the means of communication. To gain more precise image of what social media is, the subject also presented the function of social media as seen in the clause *in which they create, share, and exchange information and ideas*. Besides, the subject also put an emphasis that the communication could happen among several people by stating *in virtual communities and networks.* Therefore, it was true to say that the sentence was called definition. The subjects developed the introduction by giving the definition.

It seemed that the subject thought the readers' attention could be tapped if only the readers understand the topic being discussed in the writing. For this reason, the subject believed that giving definition could catch readers' attention.

It was different from what the experts (Ramage*et.al*, 2016) stated about the introduction in argumentative writing. The introduction should be begun with the presentation of current

event, memorable scene, illustrative story related to the topic being discussed in order to catch readers' attention.

The use of definition in the introduction to begin the argument by the subject might be meant to catch readers' attention in different way from that of stated in the theory. It might be true to say that the subjects assumed readers would not be interested in the topic being discussed if the readers did not know what the topic was. Therefore, giving a definition to readers became one way for the subjects to catch their readers' attention.

b. Personal Opinion

In addition to the presentation of definition, the subjects also provide their personal opinion to catch readers' attention in the introduction, as seen in data 1b.

> **Data 1b**
> Nowadays, most teens has been influenced by social media. They usually used social media to post and upload status, picture.

In data 1b, the sentence *Nowadays, most teens has been influenced by social media* is classified as personal opinion because it contains the subject's beliefs in the social media. This is in line with the definition of *personal opinion* put forwarded by Sims (2016) in which he states that *personal opinion* is what someone believes about an idea, question, or topic while Ramage *et.al* (2016) claim that introduction should be developed by providing facts of current event, memorable scene, and illustrative story. By comparing the sentence (*Nowadays, most teens has been influenced by social media*) to Sims (2016) and to Ramage *et.al* (2016), it is logical to conclude that the sentence is personal opinion.

In relation to the personal opinion provided above, the subject might think that the readers would accept the writer's statement even if it was only personal opinion. This might be caused by certain feature of mode of communication. Qingxue (2003) mentioned that Western people expected messages to be detailed, clear-cut, and definite. It meant that if there are not enough data or not apparent, they will ask blunt questions because they feel uncomfortable with

Commented [11]:
Mention it in references

Commented [12]:
Mention it in references

Commented [13]:
Mention it in references

vagueness and ambiguity which is often associated with limited data. In contrast, Eastern people are comfortable with ambiguity and nurture interpersonal harmony. This theory may be the reason for the absence of empirical data in subjects' writing. The subjects and the readers of this writing are Asians, so the subject may think that personal opinion is enough to get the readers accept his argument.

c. Issue

After presenting personal opinion, the subjects present the issue as it can be seen in data 1c below:

Data 1c

> **Social media itself has many positive effects to get and share information and also we can get many friends. But, besides of the positive effect, social media also has many negative effects especially for Junior High School students. They are to make them lazy or disturb their focus and to waste their money. That's why social media should be banned for Junior High School students.**

Data 1c was called issue. Issue refers to debatable topic requiring different opinion which indicates one's position towards the topic that needs to be discussed (Knapp & Watskins, 2005:201). The word *debatable* means that it emerges positive and negative side of something.

The issue in data 1c was started from L.4-L.6 *Social media itself has many positive effects to get and share information and also we can get many friends.* The phrase *positive effects* referred to the benefit of using social media. The issue completely existed in data 1c as in L.7-L.11 *Besides the positive effect, social media also has negative effects…* By saying that social media also has the negative effect, it means that the data in 1c was said as an issue.

In these lines, the subjects stated the positive sides of using social media such as getting and sharing information; and getting many friends. Following this idea, in L.7-L.10, the subject mentions the negative sides of social media such as making them lazy or disturbing their focus, and wasting their money.

Commented [14]:
Mention it in references

Commented [15]:
The lines are not identifiable to readers

Commented [16]:
See the above comment

The way the subject introduces an issue in *Introduction* differs from the theory as seen in these following Figures:

Commented [17]:
Describe whether all the data showed difference to the theory or only some of them

Commented [18]:
Figure 4.2 or figure 2?

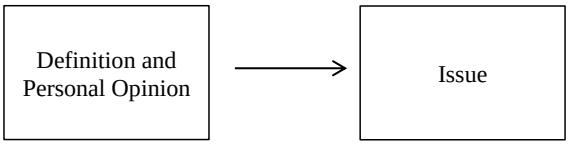


Figure 1. Introducing Issue written by the Subjects

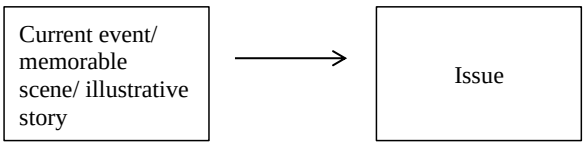


Figure 4.2. Introducing Issue according to the Theory (Ramage, 2016)

d. Implicit Thesis Statement

Besides introducing the issue, the subjects present their thesis statement by using thesis statement as seen in data 2

> Data 2
> They depend on social media to get more followers and to become outstanding. This habit that is using social media obviously lead the teens to some bad effects.

In data 2, thesis statement is stated implicitly. Thesis statement is defined as the sentence that represents writer's position on an issue (Ramage *et.al*, 2018:314). By taking the definition of thesis statement, data 2, in L.6-L.7, was categorized as thesis statement. It was proven by the subject's judgment as well as her position on social media in which she stated social media could cause bad effects on teenagers. Besides, the thesis statement was implicitly stated as the

writer's position implied in the phrase of *bad effects* on social media which indicates the writer's agreement on banning social media.

The implicit thesis statement might be affected by the subjects' culture as being Asians. Chen & Starosta (2003) asserted that Asian people had reserved communication style. It leads Asians to express themselves in a subtle or indirect way in verbal or non-verbal expression communication especially for the purpose of understanding and avoiding confrontation. It can be seen when Asians feel a need to reject their counterparts' request or action which potentially brings damage to harmony. Based on this theory, it is assumed that the implicit thesis statement made by the subjects was also due to their wanting to be polite by implicitly showing their position about an issue. They may think about readers' prospective disagreement with their point of view, and they also want to maintain harmony with the readers.

Commented [19]:
Mention it in references

Table 1. Portion of Introductory Paragraph Components in the Theory and in the Subjects' Paragraph Writing

Component of Argumentative Text Structure	According to Theory (Ramage, et al, 2016)	In Subject's Writing	Degree of match
Introductory paragraph	It should contain: 1. Current events 2. Illustrative Story 3. Memorable events 4. Issues 5. Thesis Statement	It contains: 1. – 2. – 3. – 4. Issue 5. Thesis Statement	40 %

In table 1, the subject developed his introductory paragraph by providing *issue* and *thesis statement*. The *thesis statement* is directly written as the *issue* is introduced. For the subject of this research, statement of *issue* is sufficient requirement to write *thesis statement*. This fact made the subject felt that writing two components was enough in developing the introductory paragraph of argument. This was fewer than it should be; it is just only 40% of the number of the components that the introductory paragraph should have according to the theory. Ramage *et al*, (2016), claims that the introductory paragraph should contain five components as shown in table 4.16. Such number was needed because *thesis statement* could be written

Commented [20]:
Table 4.26 or table 1?

only after the *issues* to be argued had been reminded by the writer. The reminding was done by providing *current event, illustrative story* and *memorable events* and it was intended to ensure that the readers of the introductory paragraph have remembered the topic to be developed and made the readers realize that the topic is in controversy. Only after this, the *issue* was written and the *thesis statement* was written.

The difference between the two ways of developing the introductory paragraph may lie in two factors: culture and language mastery. The way how an introductory paragraph of argumentative writing is developed as required in the theory (Ramage, et al, 2016) is true in western culture of thinking and for native speakers of English. They believe that not all of his argumentative reader candidates remember the *issue* and realize that there is controversy in the topic. The controversy leads to *pros* and *cons*. Upon the completion of this requirement, the writing of his *thesis statement* shows clearly his attitude towards the controversy. While the one developed by the subject of the study is resulted from his culture which allows him to write *thesis statement* soon after writing the *issue*. He assumes that his reader candidates have known well about the controversy. The reader candidates are also assumed to understand why the topic is controversial. This may be the reason why the components of the introductory paragraph in the argumentative writing developed by the subjects of the study are fewer than those suggested by the theory.

d. Implicit Thesis Statement

Besides introducing the issue, the subjects present their thesis statement by using thesis statement as seen in data 2

Data 2

They depend on social media to get more followers and to become outstanding. This habit that is using social media obviously lead the teens to some bad effects.

In data 2, thesis statement is stated implicitly. Thesis statement is defined as the sentence that represents writer's position on an issue (Ramage *et.al*, 2018:314). By taking the definition of thesis statement, data 2, in L.6-L.7, was categorized as thesis statement. It was proven by the subject's judgment as well as her position on social media in which she stated social media could cause bad effects on teenagers. Besides, the thesis statement was implicitly stated as the writer's position implied in the phrase of *bad effects* on social media which indicates the writer's agreement on banning social media.

The implicit thesis statement might be affected by the subjects' culture as being Asians. Chen & Starosta (2003) asserted that Asian people had reserved communication style. It leads Asians to express themselves in a subtle or indirect way in verbal or non-verbal expression communication especially for the purpose of understanding and avoiding confrontation. It can be seen when Asians feel a need to reject their counterparts' request or action which potentially brings damage to harmony. Based on this theory, it is assumed that the implicit thesis statement made by the subjects was also due to their wanting to be polite by implicitly showing their position about an issue. They may think about readers' prospective disagreement with their point of view, and they also want to maintain harmony with the readers.

Table 2. Portion of Introductory Paragraph Components in the Theory and in the Subjects' Paragraph Writing

Component of Argumentative Text Structure	According to Theory (Ramage, et al, 2016)	In Subject's Writing	Degree of match
Introductory paragraph	It should contain: 6. Current events 7. Illustrative Story 8. Memorable events 9. Issues 10. Thesis Statement	It contains: 6. – 7. – 8. – 9. Issue 10. Thesis Statement	40 %

In table 2, the subject developed his introductory paragraph by providing *issue* and *thesis statement*. The *thesis statement* is directly written as the *issue* is introduced. For the subject of this research, statement of *issue* is sufficient requirement to write *thesis statement*. This fact made the subject felt that writing two components was enough in developing the

introductory paragraph of argument. This was fewer than it should be; it is just only 40% of the number of the components that the introductory paragraph should have according to the theory. Ramage *et al,* (2016), claims that the introductory paragraph should contain five components as shown in table 4.16. Such number was needed because *thesis statement* could be written only after the *issues* to be argued had been reminded by the writer. The reminding was done by providing *current event, illustrative story* and *memorable events* and it was intended to ensure that the readers of the introductory paragraph have remembered the topic to be developed and made the readers realize that the topic is in controversy. Only after this, the *issue* was written and the *thesis statement* was written.

The difference between the two ways of developing the introductory paragraph may lie in two factors: culture and language mastery. The way how an introductory paragraph of argumentative writing is developed as required in the theory (Ramage, et al, 2016) is true in western culture of thinking and for native speakers of English. They believe that not all of his argumentative reader candidates remember the *issue* and realize that there is controversy in the topic. The controversy leads to *pros* and *cons*. Upon the completion of this requirement, the writing of his *thesis statement* shows clearly his attitude towards the controversy. While the one developed by the subject of the study is resulted from his culture which allows him to write *thesis statement* soon after writing the *issue*. He assumes that his reader candidates have known well about the controversy. The reader candidates are also assumed to understand why the topic is controversial. This may be the reason why the components of the introductory paragraph in the argumentative writing developed by the subjects of the study are fewer than those suggested by the theory.

Commented [21]:
Double typing.
Delete this part

2) By Applying Writer-Based Reasons in Writer's Position Paragraph

After presenting the introduction, the subjects presented their *writer's position* paragraph which was different from that of mentioned in the theory (Ramage*et.al,* 2016). In

developing the paragraph of *Writer's position*, the subjects used writer-based reasons in order to make their arguments persuasive to the intended readers as shown in data 3.

Data 3

Secondly, the social media can make someone become lazy. They will not be able to manage their time because they have been enjoy to play their social media. Their time will pass useless.

In data 3, writer's position was presented by using writer-based reasons. Writer-based reasons is defined as expressing arguments which is simply based on the writer's perspective and written for himself (Flower, 1979). It reflects the associative, narrative path of the writer's line of thoughts. With reference to this definition, writer-based reason can be seen through subject's statements as seen in L.17-L.19. Within these lines, the subject mentioned the effect of social media on someone's activity. The subject mentioned that users would enjoy using social media much so that they could not manage their time well. The underlying assumption here was that it was wrong to use social media. But, this assumption might not resonate with readers, as students, who thought that social media was needed to support their studying. Thus, it was seen that the subjects merely expressed her argument without considering the points that effectively anchored within the audience beliefs and values.

Commented [22]: Mention it in references

Commented [23]: Do you mean the definition as the strategy used in the introductory paragraph or another? Use specific term to avoid ambiguity

Commented [24]: What do you mean? Readers cannot identify the lines you mean

Commented [25]: This line should appear before Table 3

Writer's Position based on Theory (X)	Writer's Position written by the Subjects (Y)	Percentage of match of X and Y
Audience-based reasons (Ramage, *et.al*, 2016)	Writer-based reasons	0 %

Commented [26]: Complete the table with the sample of the writer's statement/position to clarify the percentage of match 0%

Ways of the subjects' stating *writer's position* as compared to the theoretical truth is shown in Table 3.

Table 3. Degree of Match between Writer's Position in Theory and in Subjects' Writing

In table 3 the subject provided argument for his position, of being pros or cons, by giving reason which is based on his own thinking or based on his own opinion, which is called as *writer's-based reason*. This is very much different from what it should be, as stated in a theory of writing argument, as claimed by Ramage, *et.al* (2016). According to this theory, one's position in argumentative writing should be based on the reasons that the audience believed to be true or simply stated as *audience-based reason*. This theory is rooted in the western culture and the writers referred to in the theory are native speaker of English who have mastered the language very well. The two factors, culture and mastery of English, may be the causes why the subject's writing of his position in the argumentative writing does not match with what is expected in the theory.

Commented [27]:
Describe whether this tendency occurs in all of the data of only some of them

3) By Repeating Previous Sentences and Writing Irrelevant Suggestion in Concluding Paragraph

a. By Repeating Previous Sentences

Commented [28]:
Do you mean rephrasing the thesis statement?
The writer does not copy paste or repeat the sentence.

To end the argumentative writing, the subject wrote *Conclusion* paragraph which was different from that of stated by experts (Ramage*et.al*, 2016). The subjects tended to repeat previous sentences from the *Introduction* and *Writer's position* paragraph. The repetition is described in data 4.

Data 4

In conclusion, social media should be banned for students at Junior High School because it gives more negative effects for them.

In data 4, the subject provided a paragraph which belonged to conclusion. A conclusion is defined as the end result of an argument. It is the main points that a writer makes in her paper (Sims, 2012:17). Data 4 shows that it is a conclusion as it is begun with the conjunction *In conclusion*…;and placed in the last paragraphs which indicates the final decision of the subject on her arguments (L.41-L.42). However, the conclusion as in data 4 did not consist of her main

Commented [29]:
Mention it in references

Commented [30]:
See the above comment on how to make the data identifiable

points. In L.41, the subject stated her position towards the topic which was the repetition of thesis statement previously mentioned in introductory paragraph. This was to say that the subject did not reword her points on writer's position paragraph to the concluding paragraph. However, it was mentioned in the theory of Ramage*et.al* (2016) that concluding paragraph should consist of the summary of the writer's points of argument. As the data differed from the theory, it might be due to the subjects' lack of knowledge about writing a concluding paragraph. The subjects might think that restating their thesis statement was enough to give a sense of closure and emphasis of ideas to the readers.

b. By Writing Irrelevant Suggestion to the Topic

In addition to the conclusion that sums up overall ideas of subjects' argument, concluding paragraph also consists of suggestion. Suggestion is supposed to evoke readers to take actions (Ramage *et.al*, 2016).

The way the subjects presented the suggestion is shown in data 5 below.

Data 5

Rewritten Version

I suggest for teenagers nowadays you must be use your social media sufficiently.

Data 5 is called suggestion. Suggestion is defined as a proposal offered which is used to shape one's decision (Spears, 2013:451). In data 5, conclusion was explicitly shown through the word *suggest*. Based on the data above, it could be seen that it was a statement of offering readers to use social media sufficiently. So, data 5, L.31 belonged to suggestion. It was placed within the concluding paragraph, specifically in the last layer of text structure.

Commented [31]:
Mention it in references

Commented [32]:
See the above comment

However, based on data 5 above, it is shown that the suggestion is irrelevant to the topic which required the subjects to decide to ban or not to ban social media. In other words, it was said as being irrelevant because the subject did not stand on any position toward the topic. The subject seemed to let the readers choose whether they could use social media or not. Meanwhile, a suggestion should have about the actions offered to the readers, but it was not found in subjects' statement of suggestion.

The irrelevant suggestion in the subjects' writing might be due to the subjects' difficulty on focusing the topic and on linking it to the suggestion logically.

Commented [33]:
This sentence is not a new paragraph

The way of writing conclusion in argumentative writing is different from the theory proposed by the expert (Ramage*et.al,* 2016). The difference is shown in Table 4.8

Commented [34]:
Desrcibe whether it occurs in the whole data or not

Table 4. The Comparison of Concluding Paragraph according to the Theory and the Application by the Subjects

Conclusion Based on Theory (X)	**Conclusion Written by Subjects (Y)**	**Percentage of match of X and Y**
Sum up writer's argument without repeating previous sentences	Repeating previous sentences without summing up arguments	0 %
Provide suggestion that calls for actions (Ramage*et.al,* 2016)	Irrelevant suggestion to the topic	0 %

Commented [35]:
See the above comment

Table 4 showed that the concluding paragraph written by the non-native speakers of English was completely different from those written by the native speakers as mentioned in the theory. None of the theory of concluding paragraph was drawn on subjects' concluding paragraph. It may be due to the cultural thought pattern of the subjects as being Asian whose thinking tends to be circular. This is in line with Kumaravadivelu (2007:53) who states that Asians use a lot of repetitions in writing. In addition to the repetition, the subjects might find it difficult to state a suggestion which might be caused by their culture as Asians; and they tend

Commented [36]:
Mention it in references

to avoid stating their opinion directly. Their attempt to avoid giving direct opinions might also be the reason of why suggestions in their argumentative writing became less obvious which was led to the irrelevant suggestion to the topic.

b. Reasoning

The subjects persuaded their readers by utilizing their reasoning in writing argumentative text. The subjects' reasoning was laid on using simple sequence of cause and effects; and using pseudo-evidence which is shown below in detail.

1) By Using Pseudo-Evidence

Pseudo-evidence is the example which is not factual; it does not have any data and tend to be more like the writer's opinion. This concept was not found in theory, but it was created to accommodate the facts in the data. With reference to this, it was found that the subjects use pseudo-evidence in writing their argumentative text as seen in data 6.

Data 6

> Firstly, social media make people do the crime easily. For example: "Audrey case" We can see that the case happened because of bullying in social media. Audrey was almost die because of bullying and mistreating by some people. It is surely make Audrey get mental pressure. To avoid the crime in social media, it is better to avoid the social media.

In data 6, subjects' reasoning was accompanied by pseudo evidence. Evidence refers to the all the verifiable data and information that a writer might use as support for an argument (Ramage*et.al*, 2016:88). Verifiable in this definition means that the data and information should be objective in which the source and the content of the information itself refer to factual evidence.

By using the definition of evidence as the criteria to determine whether something is called as evidence or not, in data 6, specifically in *For example: Audrey case. We can see that the case happened because of bullying in social media. Audrey was almost die*

because of bullying and mistreating by some people. The subject tried to provide evidence in order to clarify what she means by *do the crime easily* (L.17). It was realized by providing "Audrey", as a bullying case. However, the example in which the writer tried to provide as evidence was not accompanied by verified information since the subject did not show any source and details of the information to support her own statement in L.16-L.17. Though it did not belong to factual evidence, the example in data 6 could be called as pseudo-evidence since it was intended to support the subject's argument stating that social media facilitates people to do criminality.

The use of pseudo-evidence in data 6 might be due to the subjects' lack of knowledge about the case which was supposed to present how criminality could be spread through social media.

The way of presenting evidence in subjects' argumentative writing was different from the theory proposed by Ramage*et.al* (2016:88) as seen in the table below:

Commented [37]:
Describe whether all data presents evidence similar to this pattern or not

Table 5. The Presentation of Evidence in Argumentative Writing Based on the Theory and the Subject's Writing

Evidence based on Theory	**Evidence on Subject's Writing**	**Degree of Match**
Facts including interviews, questionnaire, surveys, and statistical data (Ramage*et.al*, 2016:88)	Pseudo-evidence	0 %

In table 5, it can be concluded that the evidence that the native speakers' culture provide should be about facts which are credible. Meanwhile, in non-native speakers' culture like Asians, evidence should not be a fact. It can be taken simply from the writer's experience and understanding which are less credible compared to the facts as stated in the theory.

Commented [38]:
Elaborate more explanation whether the students do not mention the credible source to clarify the fact/evidence used because they do not know how to cite well or because citation is not taught

This finding was based on the different cultural thoughts pattern of Western and Asians. Western people avoid ambiguity so that they tend to ask for credible facts, while Asians are likely open to ambiguity. It makes the Asians care less the credibility of the supporting ideas to their claim. It might be the reason why the evidence written by the subjects were completely different from the one stated in the theory. This was represented as 0% as mentioned in the table above.

2) By Organizing Cause and Effect

The data analysis showed that the causes and effects are: (a) succeeding; and (b) successively or sequentially presented in the data as it was stated by Martin and Rose (2008). Each logical relations of this type of sequence is presented as follow.

Commented [39]:
Mention it in references

a. Succeeding

Data 7a

> Firstly, the social media can make someone do the crime easily. For instance, someone can bully someone else by their social media, like Facebook, Instagram, etc. Someone also can spread the hoax to others in order to make someone else can not live comfortable. Then, someone can do the plagiarism.
>
> Secondly, the social media can make someone become lazy. They will not be able to manage their time because they have been enjoy to play their social media. Their time will pass useless.

Data 7a is categorized as succeeding cause and effect explanation. It is indicated through the effect that immediately comes after the cause. It can be seen in L.10 and L.17 which represent the subject's agreement on banning social media. In L.10, it was mentioned that social media made someone to do criminality easily. By using the word *make*, it meant that social media was the cause, while the effect was about the easiness of doing criminality. The succeeding cause and effect explanation is also seen in L.17. In this line, it was mentioned that social media could make someone lazy. Similar to the word used in L.10, the word *make* indicates that social media is the cause, and the effect is *lazy*.

Commented [40]:
Identify the lines of the in brackets

From the two points above, it is shown that both of the points are not sequentially related; they are separated ideas that have their own cause-effect relationship.

b. Sequentially

Data 7b

> First, most teens stay connected to the internet, accessing social media the whole time. They always check their social media account on the smartphone from the time they wake up in the morning till they back to sleep at night. They usually stayed up at the whole night. This habit could ruin their sleep pattern and it would lead to a higher risk of exhaustion and depression. It can affect their performance at school.

Data 7b is categorized as sequential explanation of cause and effect. Martin and Rose (2008:150) states that sequential explanation is constructed by a series of events that is chained one to another. By using this definition to categorize the logical relations between events, it is relevant to say that it belongs to sequential explanation of cause and effect. Data 7b presents that it is social media that causes one bad effect that is disturbing one's sleep pattern as seen in L.12. The word *sleep pattern* as the impact of using social media becomes the cause of *exhaustion* as stated in L.13. Then, the *exhaustion* affects the students' performance at school seen in L.14. The flow from sleep pattern, exhaustion, and also students' performance at school shows how one problem that is social media can emerge one bad effect and causes one to another.

Commented [41]:
Mention it in references

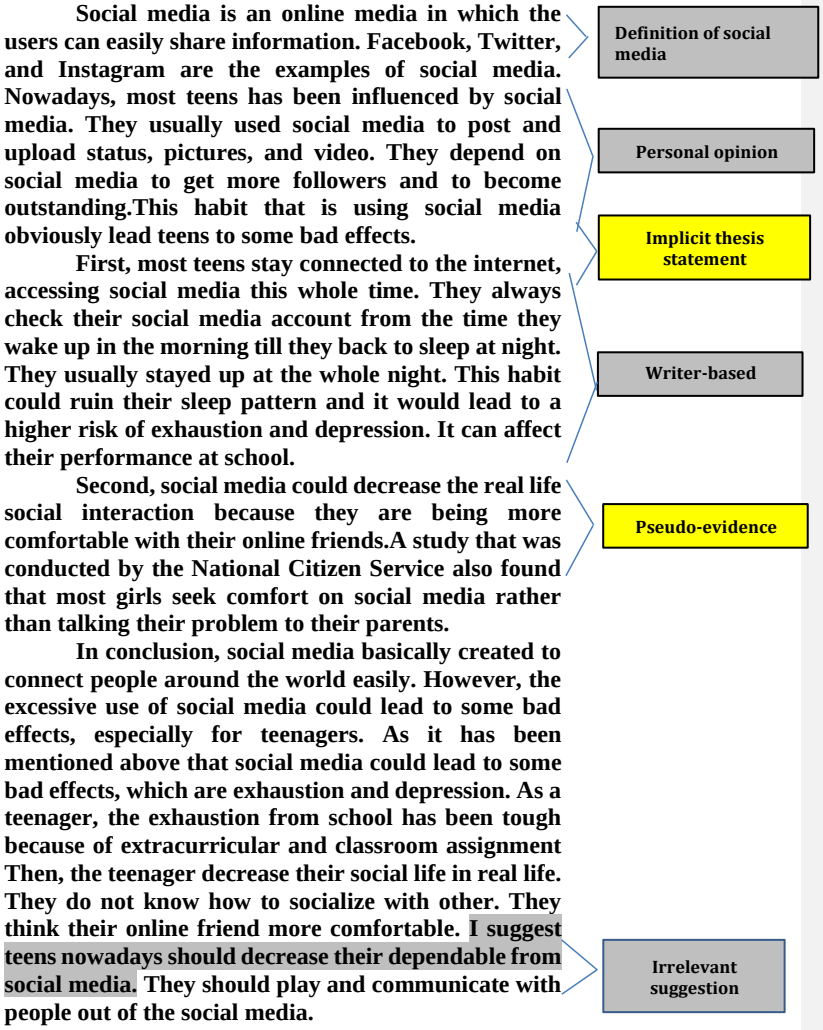
Despite of the category as sequential cause and effect, the subjects did not provide detail explanation of how sleep pattern could cause exhaustion and affect students' performance at school. The subjects let the readers to link cause-effect relationship to their own understanding. This might be the reason of assuming writers' not caring about their intended readers.

3) Affective Appeal

Affective appeal is expressed by using pathos which consists of the application of affective factors through the use of concrete language, narrative, metaphor, images, and

anecdotes. It can also be expressed by ethos which is the application of writer's credibility through the application of statistics and refutation of the opposing argument (Ramage, 2016).

The data showed that this appeal was not used by the subjects. To prove it, data 8 below is shown to show that none of the appeals is used in subjects' argumentative writing.



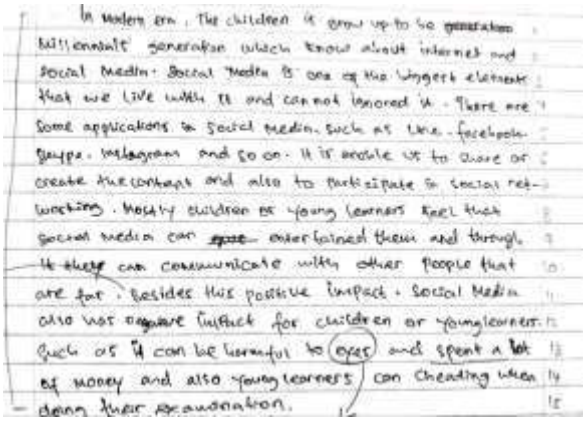
2. Variations Reflecting Ethnics Cultural Values

The data analysis showed that variations in patterns of argumentative writing were found in the ethnics writers' argumentative writing in two aspects namely: (1) in developing thesis statement; and (2) in drawing conclusion.

a) Stating thesis statement

Javanese ethnics formulate his thesis statement very implicitly as shown in data 9.

Data 9


In modern era, The children is grow up to be generation millenials generation which know about internet and social media. Social media is one of the biggest element that we live with it and can not ignored it. There are some applications in social media such as like, facebook, twitter, instagram and so on. It is possible us to share or create the content and also to participate in social networking. Mostly children or young learners feel that social media can entertained them and through it they can communicate with other people that are far. Besides this positive impact, social media also has negative impact for children or young learners such as it can be harmful to eyes and spent a lot of money and also young learners can cheating when doing their examination.

In data 9, he implicitly said that social media should not be banned. This is indicated by the sentence *we cannot ignore the social media* in L.4 due to the fact that: (1) social media has a lot of types and (2) the children were born in the social media era. He did not say explicit word to show his position. He might hope the readers to be able to infer the implicit meaning as expected by Javanese community principle namely *Tanggap Ing Sasmita.* This behavior may be affected by the value of harmony to the readers as required by the value of *rukun.*

The Bataknese writers used explicit words in formulating his thesis statement as shown in data 10.

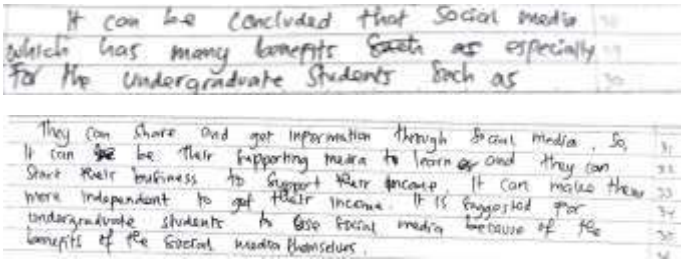
Data 10

In data 10, the Bataknese writers explicitly stated that social media should be banned. This is indicated by the explicit statement *Therefore, I agree that social media should be banned.* Even though the relationship between the introduction and the statements of banning the social media is not rationally explained. The explicitness might due to the fact that the Bataknese writers are direct and open as required by the motto *Tedak songon indahan di balanga* (Something which is transparent, objective, and open; just exactly like rice in the pan).

b) In Drawing Conclusion

The Javanese writers draw conclusions by repeating the negative or the positive effects of social media depending on his position or thesis statement towards the social media as seen in data 11.

Data 11

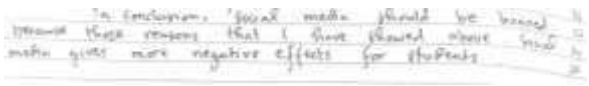


In data 11, the negative effect of the social media were not repeated since his statement was social media should not be banned that was implicitly stated in introduction. This might be intended to keep harmony between the writers and the readers as required by the ethnic value

namely *rukun.* If the Javanese writer drew explicit conclusion then his social status might be considered higher than the readers which are not in line with their ethnics values because such conclusion may result in inharmony or not *rukun* between the writers and the readers.

The Batak writers draw the conclusions by repeating the thesis statement which was formulated explicitly in conclusion as seen in data 12.

Data 12



In data 12, the Bataknese writer drew explicit conclusion by stating explicitly that social media should be banned. This might be the reflection of *Tedak songon indahan di balanga* (Something which is transparent, objective, and open; just exactly like rice in the pan) which require the Batak ethnics to be open and explicit.

Discussion and Conclusion

The research findings were national cultural entities of various ethnics in Indonesia affect rhetorical pattern of argumentative writing in terms of text structure and reasoning. The two aspects were characterized by indirect, less ground, and less warrant. In text structure, the introduction, writer's position paragraph, and conclusion reflect the national cultural entities which make them different from the patterns of Western's argumentative writing. In introductory paragraph, the researcher used definition, personal opinion, and introduced the issue to catch readers' attention. Western writers relate argument to the current event, memorable scene, and illustrative story to catch readers' attention (Ramage *et.al*, 2016:45). In reasoning, the national cultural entities of various ethnics in Indonesia are characterized by indirectness, subjective ground, and absence of warrant. Pseudo-evidence were used to organize cause-effect relationship in their argumentation.

Variations in patterns of argumentative writing as resulted from different ethnics cultural values are limited to the development of thesis statement and drawing conclusions. For Batak writers who values more on explicitness, direct, and to the point develop thesis statement and draw conclusion in line with the value. They explicitly express thesis statement and draw explicit conclusion. Meanwhile, Japanese writers who value harmony (*rukun*) and *tanggap ing sasmita* develop thesis statement and draw conclusions implicitly.

Connor (2008) found that there is shared argument patterns among individuals coming from the same culture meaning that culture of individuals affect the patterns of their arguments. This findings support the current study both of them agree that shared culture will cause individuals to have the same patterns of arguments. In the current study, it is stated that national cultural entities causes various ethnics in Indonesia to have general patterns (shared patterns) of argumentative writing among various ethnics in Indonesia.

Xinghua (2015) found out that English speaking participants used analytical strategy in their arguments while Chinese speaking participants used hortatory strategy. This difference was influenced by both English and Chinese. Connor (1996) states that culture is realized in one's L1. In relation to the study of Xinghua (2015), Chinese participants use Chinese as their L1 meaning that their culture which is represented in L1 causes them to apply hortatory strategy in their writing, while English speaking participants, whose L1 is English, choose to apply analytical strategy because of the influence of their culture which is realized in their L1. The two evidences showed that culture affects their strategy of arguing in argumentative writing. This is also in support of the current study saying that ways of convincing the readers in terms of text structure, reasoning, and affective appeal is affected by the culture.

Comfort (2001) found that there were variations within shared pattern of argumentative writing due to culture variations within the national entities. The current study saying that there were variations in thesis statement development and drawing conclusion between Batak ethnics

Commented [42]:
Xinghua and Clare (2015)

Commented [43]:

Xinghua and Clare (2015)

writer and Javanese writer in their argumentative writing confirmed the finding of Comfort's. In the context of Indonesian culture, the shared-pattern of argumentative writing among various ethnics are mostly influenced by national cultural entities while variations cause by cultural variations within the national cultural entity occurs in small aspects of argumentative pattern.

Conclusion

Based on the findings and discussion, it is concluded that culture affects rhetorical patterns of argumentative writing. Different culture causes different patterns of argumentative writing. Different ethnics have different values within the shared-culture, and this difference causes variations in patterns of argumentative writing.

Commented [44]: Add with implication of the research based on the finding

References

Comfort, J. (2001). African-American women's rhetorics and the culture of Eurocentric scholarly discourse. In C. G. Panetta (ed.) *Contrastive rhetoric revisited and redefined* (pp. 91-104). Mahwah, NJ: Lawrence Erlbaum Associates.

Connor, Ulla, Nagelhout, Ed, Rozycki, William V. (2008). Contrastive Rhetoric Reaching to Intercultural Rhetoric. Netherlands: John Benjamins Publishing.

Hawkins, M. (1996). Is *Rukun* Dead? Ethnographic Interpretations of Social Change and Javanese Culture. *The Australian Journal of Anthropology*.7 (3). 218-234.

Pudentia, MPSS. (2015). *Metode Kajian Tradisi Lisan*. Jakarta: Yayasan Pustaka Obor Indonesia.

Ramage, J., J.C.Bean, &J. Johnson. (2016). *Writing Arguments: A Rhetoric with Readings.* New York: Pearson Education, Inc.

Sari, B.T, Chasiotis, A, Vijver , F.J.R, Bender, M. (2018). Parental Culture Maintenance, Billingualism, identity, and Well-Being in Javanese, Batak, and Chinese Adolescents in Indonesia. *Journal of Multilingual and Multicultural Development.* Routlegde Taylor & Francis Group

Schwarz, B.B. and Asterhan, C.S.C. (2008). Argumentation and Reasoning. *Elsevier Handbook of Educational Psychology: New Perspectives on Learning and Teaching.*

Toulmin, S. (2003). *The Uses of Argument.* New York: Cambridge University Press.

Xinghua, L.N and Clare, F. (2015). Argument Structures in Chinese University Student's Argumentative Writing: A Contrastive Study. *English Text Construction*, 8 (1), 65-87. John Benjamins Publishing Company.

European Journal of Educational Research

ISSN: 2165-8714
http://www.eu-jer.com/

Review Form

Manuscript ID:	EU-JER_ID#	**Date:**	22 December 2019
Manuscript Title:	Reasoning in Argumentative Writing by Students with Different Ethnics in Indonesia		

ABOUT MANUSCRIPT (Mark with "X" one of the options)	Accept	Weak	Refuse	Not Available
Language is clear and correct	X			
Literature is well written	X			
References are cited as directed by APA	X			
The research topic is significant to the field	X			
The article is complete, well organized and clearly written		X		
Research design and method is appropriate	X			
Analyses are appropriate to the research question	X			
Results are clearly presented		X		
A reasonable discussion of the results is presented	X			
Conclusions are clearly stated	X			
Recommendations are clearly stated				X

GENERAL REMARKS AND RECOMMENDATIONS TO THE AUTHOR

- The issue presented in this article is significant to support the idea that ethnic culture shapes rhetorical pattern. However, the analysis should clearly identify whether the tendency occurs merely because of the cultural background of the students and not because of their writing proficiency. You may suggest to further studies to dig more on the relationship among reasoning, culture and proficiency
- The reasoning reflected in student's writing is supported by their knowledge on academic writing. Elaborate the description on the student's current competence i.e. the skill to cite from credible resources. Otherwise, the inference that the reasoning is influenced by the culture is inadequate as it is also affected by their writing proficiency
- Revise the organization of the data analysis to facilitate reader's understanding
- This article is potential for publication in this journal with some revisions

THE DECISION (Mark with "X" one of the options)

Accepted: Correction not required	
Accepted: Minor correction required	
Conditionally Accepted: Major Correction Required	X
Refused	

Reviewer Code: R2613 (The name of referee is hidden because of blind review)

Certificate of Appreciation

Presented to

Rohmani Nur Indah, Ph.D.

on December 21, 2019 for her contribution to *"European Journal of Educational Research"* as reviewer at Vol.9, Iss.1.

European Journal of Educational Research

www.eu-jer.com
ISSN: 2165-8714

Ahmet Savas

Ahmet Savas Ph.D.

Editor-in-Chief

European Journal of Educational Research

Volume 9 Issue 1 (January 2020), Pages: 385-394 (volume9-issue1.html)

Research Article

Variations in Reasoning in Javanese and Bataknese Students' Argumentative Writing: A Study on the Relation between Ethnicity and Reasoning

Berlin Sibarani , *Betharia Pandia*

10.12973/eu-jer.9.1.385 (https://doi.org/10.12973/eu-jer.9.1.385)

Pub. date: January 15, 2020

Abstract

This study was intended to describe the relation between students' reasoning and their ethnicities. Comparison between the argumentative writings written by Javanese and Bataknese students - two of the ethnics found in Indonesia- was conducted to seek shared and variation of reasoning between the two ethnics. Interpretation on the results of such comparison was made in order to find out the relation between reasoning and ethnicity. To achieve the objective, a descriptive qualitative research design was applied. Twenty students consisting of 10 Javanese and 10 Bataknese were involved in the study. They were assigned to write 20 argumentative writing. Qualitative data analysis was applied to analyze the 20 argumentative writing. The result of the study showed that both Javanese and Bataknese students shared common patterns of arguments in terms of text structure, reasoning, and affective appeal. Meanwhile, difference in cultural value between Bataknese and Javanese students caused minor variation (differences) in text structure of argumentative writing in two aspects namely in developing thesis statement and drawing conclusion. Ethnicity's relation to variation in argumentative writing is limited to the two aspects: to the writing of thesis statement and drawing conclusion.

Keywords: *Culture, patterns of arguments, variations, ethnics.*

References

Chen, G. M., & Starosta, W. J. (2003). Asian approaches to human communicating: A dialogue. *Intercultural Communication Studies, 12*(4), 1-16

Comfort, J. (2001). African-American women's rhetorics and the culture of Eurocentric scholarly discourse. In C. G. Panetta (Ed.), *Contrastive rhetoric revisited and redefined* (pp. 91-104). Mahwah, NJ: Lawrence Erlbaum Associates.

Connor, U., Rozycki, & William V. (2008). *Contrastive rhetoric reaching to intercultural rhetoric*. Amsterdam, The Netherlands: John Benjamins Publishing.

Flower, L. (2000). *Writing for an audience.* Boston, MA: Harcourt Brace Jovanovich.

Hawkins, M. (1996). Is rukun dead? Ethnographic interpretations of social change and Javanese culture. *The Australian Journal of Anthropology, 7*(3), 218-234.

Knapp, P., & Watkins, M. (2005). *Genre, text, grammar.* Sydney, Australia: University of New South Wales Press.

Kumaravadivelu, B. (2008). *Cultural globalization and language education.* London, UK: Mary Jane Peluso

Martin, J. R., & Rose, D. (2008). *Genre relations: Mapping culture*. London, England: Equinox Publishing Ltd.

Pudentia, M. (2015). *Metode kajian tradisi lisan* [The research method in spoken discourse]. Jakarta, Indonesia: Yayasan Pustaka Obor Indonesia.

Ramage, J., Bean, J. C., & Johnson, J. (2016). *Writing arguments: A rhetoric with readings.* New York, NY: Pearson Education.

Sari, B. T., Chasiotis, A., Vijver, F. J. R., & Bender, M. (2018). Parental culture maintenance, bilingualism, identity, and well-being in Javanese, Batak, and Chinese adolescents in Indonesia. *Journal of Multilingual and Multicultural Development, 39*(10), 853-867.

Schwarz, B. B., & Asterhan, C. S. C. (2008). Argumentation and reasoning. In K. Littleton, C. Wood, J. Kleine Staarman (Eds.), *International Handbook of Psychology in Education.* Bingley, UK: Emerald Group Publishing.

Sims, M. (2012). *The write stuff thinking through essays.* London, UK: Pearson Education.

Spears, D. (2013). *Improving reading skills*. New York, NY: McGraw Hills.

Toulmin, S. (2003). *The uses of argument.* New York, NY: Cambridge University Press.

Uysal, H. H. (2012). Argumentation across L1 and L2 writing: Exploring cultural influences and transfer issues. *Vigo International Journal of Applied Linguistics, 9*(1), 133-159.

Xinghua, L. N., & Clare, F. (2015). Argument structures in Chinese university student's argumentative writing: A contrastive study. *English Text Construction*, 8(1), 65-87.

European Journal of Educational Research Online ISSN: 2165-8714

Research Article doi: 10.12973/eu-jer.9.1.385

European Journal of Educational Research
Volume 9, Issue 1, 385 - 394.
ISSN: 2165-8714
http://www.eu-jer.com/

Variations in Reasoning in Javanese and Bataknese Students' Argumentative Writing: A Study on the Relation between Ethnicity and Reasoning

Berlin Sibarani*
Universitas Negeri Medan, INDONESIA

Betharia Pandia
STBA-PIA, INDONESIA

Received: October 4, 2019 ▪ Revised: September 8, 2019 ▪ Accepted: January 15, 2020

Abstract: This study was intended to describe the relation between students' reasoning and their ethnicities. Comparison between the argumentative writings written by Javanese and Bataknese students - two of the ethnics found in Indonesia- was conducted to seek shared and variation of reasoning between the two ethnics. Interpretation on the results of such comparison was made in order to find out the relation between reasoning and ethnicity. To achieve the objective, a descriptive qualitative research design was applied. Twenty students consisting of 10 Javanese and 10 Bataknese were involved in the study. They were assigned to write 20 argumentative writing. Qualitative data analysis was applied to analyze the 20 argumentative writing. The result of the study showed that both Javanese and Bataknese students shared common patterns of arguments in terms of text structure, reasoning, and affective appeal. Meanwhile, difference in cultural value between Bataknese and Javanese students caused minor variation (differences) in text structure of argumentative writing in two aspects namely in developing thesis statement and drawing conclusion. Ethnicity's relation to variation in argumentative writing is limited to the two aspects: to the writing of thesis statement and drawing conclusion.

Keywords: *Culture, patterns of arguments, variations, ethnics.*

To cite this article: Sibarani, B., & Pandia, B. (2020). Variations in reasoning in Javanese and Bataknese Students' argumentative writing: A study on the relation between ethnicity and reasoning. *European Journal of Educational Research*, *9*(1), 385-394. https://doi.org/10.12973/eu-jer.9.1.385

Introduction

Indonesia, geographically, is one of Asian countries. Asian culture is said to have different culture from Western's. Western value is individualism in which individuals should have sufficient freedom. In contrast, Asians' values is collectivism who see themselves as parts of one or more groups (family, co-workers, tribes, nations) and emphasize their connectedness to members of these collectives (Connor, 2008). This difference is formed in their L1 and affects their L2 writing rhetoric pattern. Western rhetoric is characterized by practical and scientific orientation, and factual concrete evidence; they are more direct in their argumentation. Meanwhile, Asian's is typically humanistic aesthetic orientation and subjective in providing evidence. Therefore, they tend to use indirect approach in their argumentation (Kaplan as cited in Uysal, 2012). However, culture cannot be regarded as national entity; within a culture, there are variations of rhetoric (Comfort, 2001). It implicitly states that within Asian and Western culture, there are variations in their rhetoric patterns.

Indonesia consists of various ethnic groups such as *Batak Toba* who reside in North Sumatera, Indonesia around Toba Lake, Javanese who live in Java, Manado whose residence in North Sulawesi. Their rhetorical pattern will be varied although they belong to Asian culture which will be in line with Comfort's statement as mentioned previously.

This study was intended to find out the relation between reasoning and ethnicity in argumentative writing written by undergraduate students of English Department from different ethnic groups in Indonesia namely *Batak Toba* and Javanese. The two ethnics have different values. *Batak Toba* life purpose is to achieve three main ideals namely to be wealthy, to have many sons and daughters, and family honor which is reflected by their motto: *Hamoraon* (wealth), *Hagabeon* (hoping to have many sons and daughters), *Hasangapon* (family honor). They are very ambitious to achieve

* **Corresponding author:**
Berlin Sibarani, Universitas Negeri Medan, Indonesia. ✉ berlin.sitiotio@gmail.com

this purpose and they work hard. In daily life, they speak to the point, frankly and give less consideration on others' feelings. This is an implementation of other motto of theirs: *Tedak songon indahan di balanga* (Something which is transparent, objective, and open; just exactly like rice in the pan) (Sari, 2018)

Javanese live with different value; they value more on harmony which they call as live in *rukun* (Hawkins, 1996). In daily life, this value is represented in a principle: *tanggap ing sasmita*. It means a Javanese should be keen on inferring implicit and symbolic meaning (Pudentia, 2015). To achieve harmonious life, one with Javanese ethnic should not say something directly; they have to say something implicitly and they believe that their interlocutors have the ability to infer the implicit and symbolic meaning as the principle of their communication requires everyone to be *tanggap ing sasmita*.

In argumentative writing, the writer is intended to convince his/her readers by applying argumentative text structure, reasoning, and persuasive appeal to accept his/her claim or thesis statement. Ways of convincing readers, according to Ramage *et.al* (2016) are realized in three aspects, they are: (1) text structure; (2) reasoning; and (3) affective appeals. Toulmin (2003:11) further explains that reasoning is developed by providing: (1) claim (writer's stance which he tries to prove); (2) reason itself (motive for the claim); (3) ground (data which supports the claim); (4) warrant (underlying assumption that completes the relationship between claim and reason); and (5) backing (the basis on which we believe that the warrant is believable). This theory is resulted from the research conducted to the argumentative writing written by Western writers. From the perspective of culture, Asian writers may have different ways of convincing his readers to accept their claim. It can be seen from Western argumentative writing which is more direct in expressing claim, and scientific by providing more ground and warrant; while Asian writers are indirect, less scientific, less ground and warrant (Schwarz & Asterhan, 2008).

Indonesian argumentative writing is characterized with indirect, less ground and less warrant. Argumentative writing written by Bataknese writers may be different from that written by Javanese writers in terms of text structure, reasoning, and affective appeals although in general they show indirectness, less ground, and less warrant. This is caused by different values they have within the same national cultural entities. There may be variations in their argumentative writing in the attributes that characterize the Asian writers' argumentative writing.

Methodology

In this study, three classes of undergraduate students majoring in English Education which consisted of twenty five students in each class were assigned to write argumentative writing with the topic of *Should social media be banned?* All of the students were in the eighth semester and based on their curriculum as well as the result of the interview, the students had studied how to write argumentative writing. All of the 75 argumentative writing were examined to find out the writing which fulfilled the criteria of argumentative writing. Based on the result of the examination, there were 10 Javanese students' argumentative essays and 10 Bataknese essays were found to fulfill most of the argumentative writing text structure. The 20 essays were used as the data of this study.

This study was designed with qualitative descriptive design. The data were analysed by applying Bogdan & Biklen's model (2014) in which data analysis is firstly begun by data identification and classification. The identification and classification was conducted by taking the theory of argumentative writing as temporary predetermined category. The data analysis was intended to find out descriptions of the Javanese and Bataknese students' argumentative writing. Patterns of convincing the readers applied by the two ethnic students were found out by observing the interrelatedness between the two ethnic groups' values and their ways of convincing their readers. Recurrent pattern was identified as the underlying causes of the two ways of convincing their readers.

Findings /Results

Based on the results of the data analysis, it was found out that the reasoning between the Javanese and Bataknese students were varied in two aspects: in the writing of thesis statement and drawing conclusion. This indicated that ethnic cultural value is related only to the two aspects, while to the other aspects of reasoning in argumentative writing the two ethnics shared common patterns. Both Javanese and Bataknese students wrote text structure, reasoning, and affective appeal in the same ways. These findings were presented here in details.

1. Common Patterns of Reasoning in Javanese and Bataknese Writing.

In writing arguments, the two ethnics shared features of reasoning. This commonality was found in two aspects of arguments: in the text structure, and reasoning.

A. Text Structure

1) The Development of Introductory Paragraph

In writing the arguments, the two ethnics wrote paragraphs that were classified into three parts: introduction, writer's position and conclusion. This structure is different from the structure developed by European people as asserted in Ramage (2016). According to Ramage (2016), the structure the two ethnics wrote missed one aspect,

namely *opposing view*. Introductory paragraph of the argument was developed by providing definition of the topic (motion) as in data 1a, by giving personal opinion as in data 1b, and by presenting issues as seen in data 1c and thesis statement as seen in data 1d.

Data 1a showed that the students of the two ethnics developed the introductory paragraph by giving definition:

Data 1a

Social media refers to the means of interactions among people in which they create, share, and/or exchange information and ideas in virtual communities and networks.

Data 1a was classified as definition because it fulfilled the characteristics of a definition proposed by Ary (2010: 36). Data 1a contained description of *social media* in order to avoid readers' misunderstanding and to gain more precise image of what *social media* was. It described the function of social media: namely as a means of communication and how the social media worked. It seemed that the subject thought the readers' attention could be tapped if only the readers understood what *social media* was; the readers would not be interested in *social media* if the readers did not know what *social media* was. Unlike what Ramage (2016) proposed that the introduction should be begun with the presentation of current event, memorable scene, illustrative story related to the topic being discussed in order to catch readers' attention.

The introductory paragraph of the argument developed by the two ethnics was also characterized with the provision of *personal opinion* as shown in data 1b.

Data 1b

Nowadays, most teens has been influenced by social media. They usually used social media to post and upload status, picture.

Data 1b contained *personal opinion* because it conveyed their beliefs in the social media; it did not have any facts about it. Statement like this was called *personal opinion* by Sims (2016). This introduction is different from what it should be. Ramage (2016) claimed that introduction should be developed by providing facts of current event, memorable scene, and illustrative story. The Javanese and Bataknese writers might think that the readers would accept the writer's introduction even if it was only a personal opinion. Eastern people are comfortable with ambiguity and nurture interpersonal harmony (Hawkins, 1996). The Javanese and the Bataknese writers and the readers are Asians, so the subject may think that personal opinion was enough to get the readers accept their arguments. It might be the reason for the absence of empirical data in the introduction. On the contrary, Qingxue (2003) said that Western people expected messages to be detailed, clear-cut, and definite; if there are not enough data or not apparent, they will ask blunt questions because they feel uncomfortable with vagueness and ambiguity which are often associated with limited data.

The introduction developed by the Javanese and the Bataknese was also characterized with the provision of *issues* as seen in data 1c.

Data 1c

Social media itself has many positive effects to get and share information and also we can get many friends. But, besides of the positive effect, social media also has many negative effects especially for Junior High School students. They are to make them lazy or disturb their focus and to waste their money. That's why social media should be banned for Junior High School students.

Knapp & Watkins, (2005: 2001) defined issue as debatable topic which requires different opinion, one's position towards the topic and needs to be discussed. Data 1c showed that the introduction was developed by presenting the negative and positive effects of the social media. Such negative and positive effects were debatable; different people might have different opinions and different positions toward the effects. Based on this description, the Javanese and Bataknese students developed the issue in the introductory paragraph of arguments by presenting the *definition* of *social media*, wrote their *personal opinion* and put forward the *issue* to be discussed. The way they developed the issue of the introductory paragraph was visually presented figure 1.

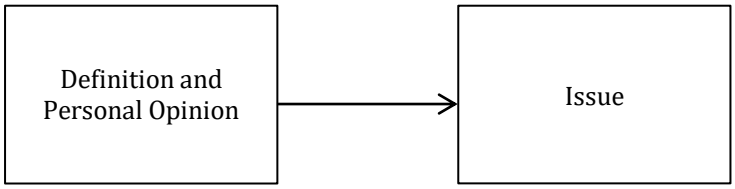


Figure 1. Development of Issue in the Introductory Paragraph of Argument by Javanese and Bataknese Students

The issue development as shown in Figure 1 is different from the development of issue done by the European writer as shown in Figure 2.

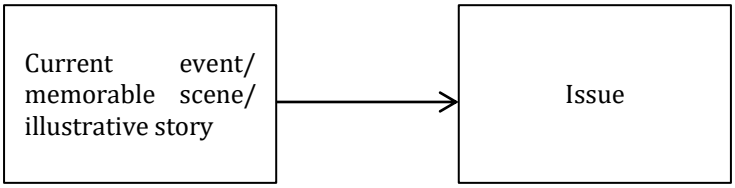


Figure 2. Introducing Issue according to the Theory (Ramage, 2016)

The difference between the two figures indicated that Javanese and Bataknese students developed introductory paragraph in different way from the way the European people did (see Ramage, 2016).

The last character of the introductory paragraph of argument developed by the Javanese and Bataknese students was the way how they wrote *implicit thesis statement,* as shown in data 1d.

Data 1d

They depend on social media to get more followers and to become outstanding. This habit that is using social media obviously lead the teens to some bad effects.

In data 1d, the students stated that *social media* may cause *bad effects* on teenagers, without stating that the *social media* should be banned. However, this statement indicated their argumentative position that social media could cause *bad effects* on teenagers. Data 1d was in line with the assertion that Asian people had reserved communication style which leads Asians express themselves in an indirect way in verbal or non-verbal expression communication especially for the purpose avoiding confrontation which potentially brings damage to harmony (Chen & Starosta, 2003).

Comparison of the introductory paragraph development made by Javanese and Bataknese, which classified as Asian, to those developed by European as asserted in Ramage (2016) is presented in table 1.

Table 1. The Differences in Introductory Paragraph of Arguments Developed by Asian students (Javanese and Bataknese) and European People as Asserted in Ramage (2016)

Component of Argumentative Text Structure	**According to Theory (Ramage, et al, 2016)**	**In Subject's Writing**	**% Match**
Introductory paragraph	It should contain: 1. Current events 2. Illustrative Story 3. Memorable events 4. Issues 5. Thesis Statement	It contains: 1. Definition of motion (topic) 2. Personal opinion 3. – 4. Issue 5. Thesis Statement	40 %

Table 1 showed that Javanese and Bataknese, classified as Asian, developed introductory paragraph of arguments in different ways from European. This may be caused by the difference in their culture as asserted by Chen & Starosta (2003).

2) The Development of Writer's Position Paragraph

In order to get the readers agree with their thesis statement, the two ethnics students developed the writer's position by providing *common based reason*, as seen in data 2.

Data 2

Secondly, the social media can make someone become lazy. They will not be able to manage their time because they have been enjoy to play their social media. Their time will pass useless.

In data 2, the two ethnics provided reasons which are very general, like making the social media users *lazy* and *unable to manage their time;* unlike European writer who used reasons anchored within the audience belief and value to persuade the readers to agree with the writer as asserted by Ramage, (2016). In addition, in data 2, the two ethnic students used third personal pronoun, like *someone, they, etc.;* instead of using second personal pronoun, like *you*, as European people usually do, as exemplified in Ramage (2016). Kumaravadivelu (2007) stated that Indonesia students used indirectness to show politeness and this was assumed to be reason why the two ethnics students used third personal pronoun in their argument rather than the second personal pronoun. The difference between the two types of writers in were presented in table 3.

Table 3. The Difference between Writer's Position Developed by Javanese and Bataknese (Asian) students and European People Asserted in Ramage (2016)

Writer's Position based on Theory (X)	**Writer's Position written by the Javanese and Bataknese (Y)**	**% match of X and Y**
Audience-based reasons Reasons anchored within the audience belief and value Ramage, (2016)	Common-based Reasons Reasons within general truth	0 %

3) The Development of Concluding Paragraph

The concluding paragraph was developed by the Javanese and Bataknese students by repeating the thesis statement conveyed in the introduction as shown in data 3 and providing suggestion as shown in data 4. The concluding paragraph was begun by providing repetition of thesis statement as seen in data 3.

Data 3

In conclusion, social media should be banned for students at Junior High School because it gives more negative effects for them.

In data 3, the two ethnic students did not mention their points of argument. This way was different from the way European people do. In developing their concluding paragraph, according to Ramage*et.al* (2016), European summarize their points of argument. The difference might due to the fact the two ethnics might think that restating their thesis statement was enough to give a sense of closure and emphasis of ideas to the readers. Following the restatement of the thesis statement, suggestion was written as in 4.

Data 4

I suggest for teenagers nowadays, you must be used your social media

sufficiently.

The suggestion in data 4, seemed to make the conclusion stronger. With such suggestion, the writer emphasized the writer's conclusion that the social media had negative effects to its users. This way of developing concluding paragraph was different from that of applied by European (Ramage*et.al,* 2016). The difference is shown in Table 4

Table 4. The Comparison of Concluding Paragraph Developed by Javanese and Bataknese with Those Developed by European as Stated in Ramage (2016).

Conclusion Based on Theory (X)	**Conclusion Written by Subjects (Y)**	**Percentage of match of X and Y**
Sum up writer's argument without repeating previous sentences	Repeating previous sentences without summing up arguments	0 %
Provide suggestion that calls for actions (Ramage*et.al*, 2016)	Suggestion related to the topic	0 %

This is in line with Kumaravadivelu (2007, p. 3) who stated that Asians used a lot of repetitions in writing and tend to avoid stating their opinion directly. Writing suggestions allowed them to avoid direct statement of opinion.

B. Reasoning

The subjects persuaded their readers by utilizing their reasoning in writing argumentative text. It was in line with one of the ways of persuading readers stated by Connor (1991). However, the Asian's reasoning as the way of persuading readers were different from the one stated by Connor (1991). The subjects' reasoning was laid on using simple sequence of cause and effects; and using pseudo-evidence which is shown below in detail.

1) By Using Non - Factual-Evidence

The *non-factual evidence* is evidence which does not have any data and tends to be more like opinion. With reference to this definition, it was found that the subjects use *non-factual evidence* in writing their argumentative text as seen in data 5.

Data 5

> *Firstly, social media make people do the crime easily. For example: "Audrey case" We can see that the case happened because of bullying in social media. Audrey was almost die because of bullying and mistreating by some people. It is surely make Audrey get mental pressure. To avoid the crime in social media, it is better to avoid the social media.*

In data 5, the reasoning was accompanied by *non-factual evidence*. Evidence refers to the all the verifiable data and information that a writer might use to support the argument (Ramage*et.al,* 2016, p. 88). Verifiable in this definition means that the data and information should be objective in which the source and the content of the information itself refer to factual evidence.

By referring to the definition of evidence, the examples provided in data 5 were not evidences because the writer did not show any source and details of the information; therefore examples were not factual evidence. However, the provision of these examples was intended to support the writer's argument that social media triggered people to do criminality. This way of providing reasons was different from the theory proposed by Ramage*et.al* (2016, p. 88) as seen in the table 5.

Table 5. The differences in Presentation of Evidence by the Javanese and Bataknese and by Europeans Asserted in Ramage 2016.

Evidence based on Theory	Evidence on Subject's Writing	Degree of Match
Facts including interviews, questionnaire, surveys, and statistical data (Ramage*et.al,* 2016:88)	Non- Factual evidences	0 %

The difference shown in table 5 was related to the difference between European and Asian culture. Americans prefer a practical and scientific orientation, absolutism, and factual concrete evidences, while Japanese prefer a more humanistic, aesthetic orientation and with more subjective evidences (Wisal, 2012).

2) By Organizing Cause and Effect

The cause and effect reasoning provided by the Javanese and Bataknese were organized in two ways, namely in succession and in sequence. The organization of cause and effect in succession was seen in data 5a.

Data 5a

> *Firstly, the social media can make someone do the crime easily. For instance, someone can bully someone else by their social media, like Facebook, Instagram, etc. Someone also can spread the hoax to others in order to make someone else can not live comfortable. Then, someone can do the plagiarism.*
>
> *Secondly, the social media can make someone become lazy. They will not be able to manage their time because they have been enjoy to play their social media. Their time will pass useless.*

In data 5a, the effect immediately follows the cause. It was mentioned in data 5a that social media made someone to do criminality easily. It meant that social media was the cause, and doing criminality was the effect. The succession of the cause and effect was mentioned that social media could make someone lazy. Social media was the cause, and *lazy* was the effect. The two ethnics students also organized the cause and effect sequentially as seen in data 5b.

Data 5b

> *First, most teens stay connected to the internet, accessing social media the whole time. They always check their social media account on the smartphone from the time they wake up in the morning till*

they back to sleep at night. They usually stayed up at the whole night. This habit could ruin their sleep pattern and it would lead to a higher risk of exhaustion and depression. It can affect their performance at school.

Data 5b is categorized as sequential explanation of cause and effect, which matched the definition put forwarded by Martin and Rose (2008:150). In data 5b, it is the social media that causes one bad effect that is disturbing one's *sleep pattern* and the *sleep pattern* as the impact of using social media becomes the cause of *exhaustion.* Then, the *exhaustion* affects the students' performance at school. The flow from *sleep pattern*, *exhaustion*, and also *students' performance at school* shows how one problem, in this case: *social media,* arise and resulted in one bad effect which causes one to another. The argument developed by the Javanese and Bataknese and its structure as well as its reasoning was presented in figure 3.

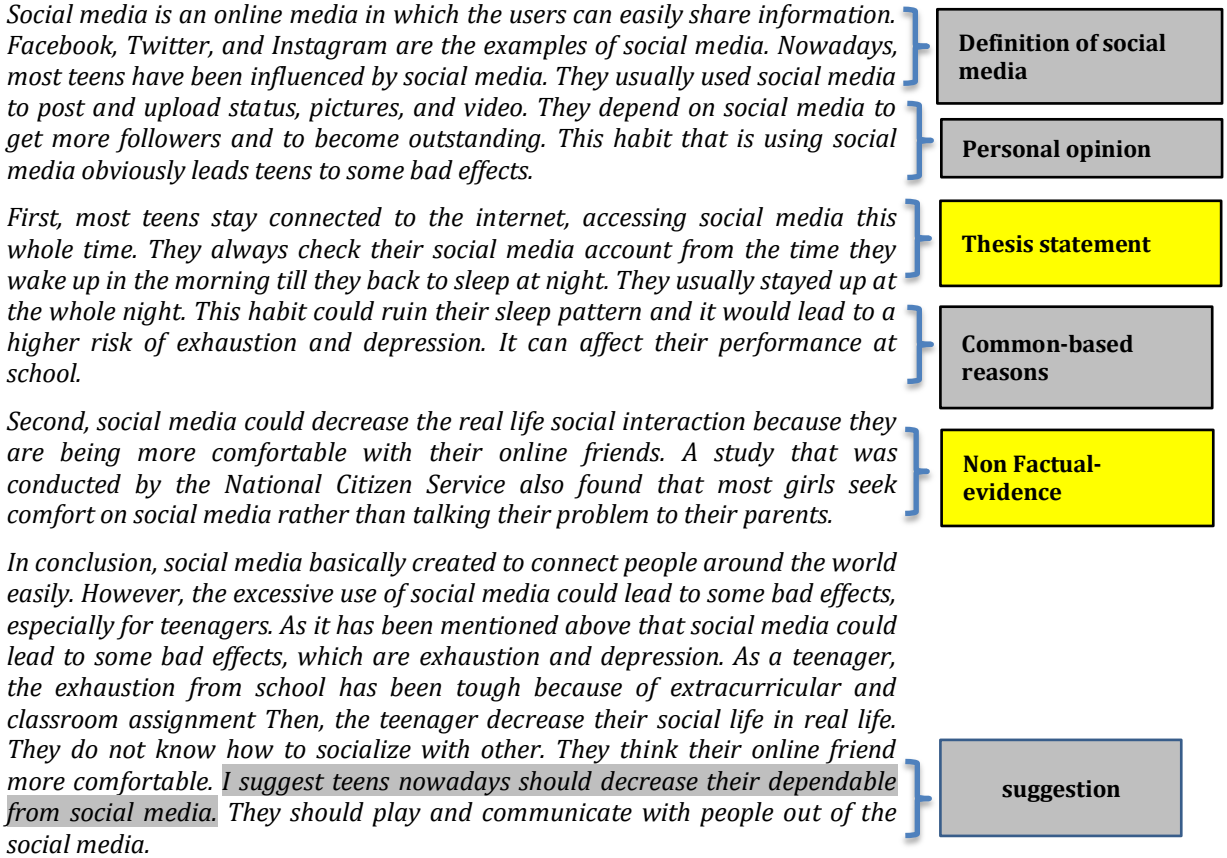


Figure 3: Example of Students' Argument with Its Text Structure and Reasoning

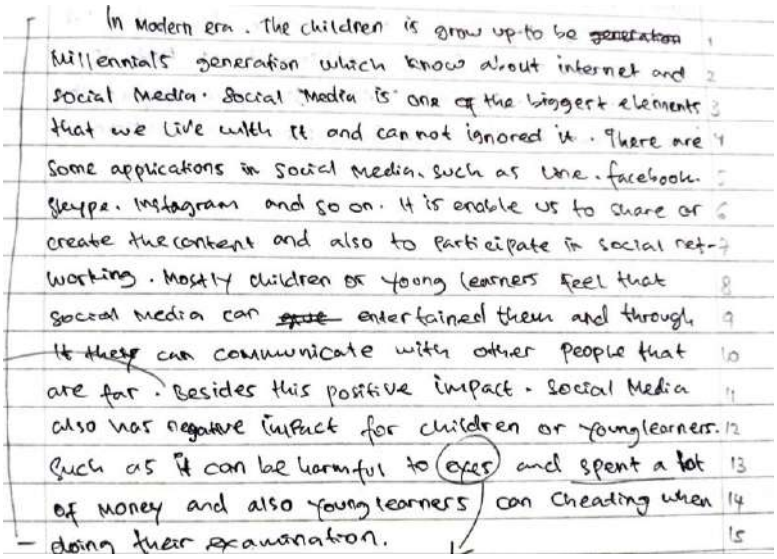
2. *Variations Reflecting Ethnics Cultural Values*

The data analysis showed that variations in patterns of argumentative writing were found in the ethnics writers' argumentative writing in two aspects namely: (a) in developing thesis statement; and (b) in drawing conclusion.

a) Stating thesis statement

Javanese ethnics formulate his thesis statement very implicitly as shown in data 9.

Data 6

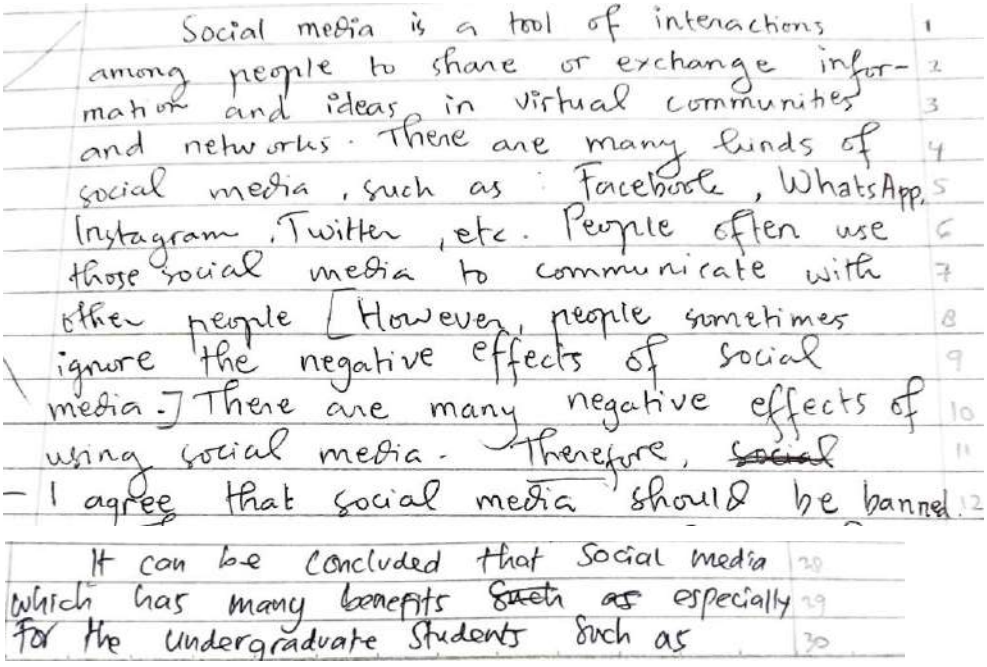


In modern era. The children is grow up to be ~~generation~~ Millennials generation which know about internet and social media. Social media is one of the biggest elements that we live with it and can not ignored it. There are some applications in social media, such as line. facebook. Skeype. Instagram and so on. It is enable us to share or create the content and also to participate in social networking. Mostly children or young learners feel that social media can ~~give~~ entertained them and through it they can communicate with other people that are far. Besides this positive impact. Social Media also has negative impact for children or young learners. Such as it can be harmful to eyes and spent a lot of money and also young learners can cheating when doing their ~~examination~~.

In data 6, the Javanese student implicitly said that social media should not be banned. This is indicated by the sentence *we cannot ignore the social media* in L.4 due to the fact that: (1) social media has a lot of types and (2) the children were born in the social media era. He did not say explicit word to show his position. He might hope the readers to be able to infer the implicit meaning as expected by Javanese community principle namely *Tanggap Ing Sasmita.* This behavior may be affected by the value of harmony to the readers as required by the value of *rukun.*

The Bataknese writers used explicit words in formulating his thesis statement as shown in data 7.

Data 7



Social media is a tool of interactions among people to share or exchange information and ideas in virtual communities and networks. There are many kinds of social media, such as Facebook, WhatsApp, Instagram, Twitter, etc. People often use those social media to communicate with other people. However, people sometimes ignore the negative effects of social media. There are many negative effects of using social media. Therefore, ~~social~~ I agree that social media should be banned.

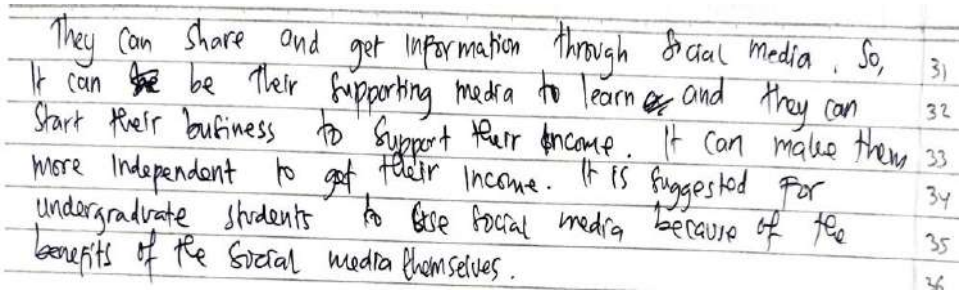
It can be concluded that Social media which has many benefits ~~such as~~ especially for the undergraduate students such as

In data 7, the Bataknese writers explicitly stated that social media should be banned. This is indicated by the explicit statement *Therefore, I agree that social media should be banned.* Even though the relationship between the introduction and the statements of banning the social media is not rationally explained. The explicitness might due to the fact that the Bataknese writers are direct and open as required by the motto *Tedak songon indahan di balanga* (Something which is transparent, objective, and open; just exactly like rice in the pan).

b) In Drawing Conclusion

The Javanese writers draw conclusions by repeating the negative or the positive effects of social media depending on his position or thesis statement towards the social media as seen in data 8.

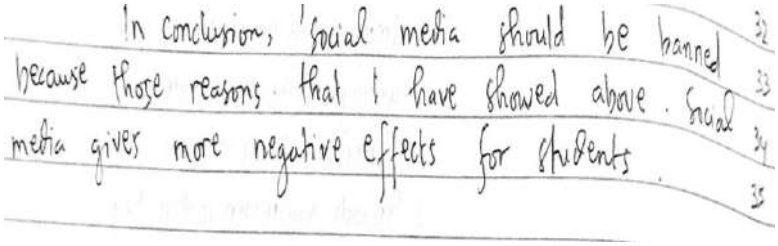
Data 8


They can share and get information through social media. So, it can be their supporting media to learn and they can start their business to support their income. It can make them more independant to get their income. It is suggested for undergraduate students to use social media because of the benefits of the social media themselves.

In data 8, the negative effect of the social media were not repeated since his statement was social media should not be banned that was implicitly stated in introduction. This might be intended to keep harmony between the writers and the readers as required by the ethnic value namely *rukun.* If the Javanese writer drew explicit conclusion then his social status might be considered higher than the readers which are not in line with their ethnic group's values because such conclusion may result in disharmony or not *rukun* between the writers and the readers (Pudentia, 2015).

The Batak writers draw the conclusions by repeating the thesis statement which was formulated explicitly in conclusion as seen in data 9.

Data 9


In conclusion, social media should be banned because those reasons that I have showed above. Social media gives more negative effects for students.

In data 9, the Bataknese writer drew explicit conclusion by stating explicitly that social media should be banned. This might be the reflection of *Tedak songon indahan di balanga* (Something which is transparent, objective, and open; just exactly like rice in the pan) which require the Batak ethnics to be open and explicit.

Discussion and Recommendation

Reasoning developed by Javanese and Bataknese students varied in two parts of the argument: in writing thesis statement and drawing conclusion. This indicated that ethnic cultural value is related only to the two aspects, while to the other aspects of reasoning in argumentative writing the two ethnics shared common patterns.

The common patterns shared by the two ethnics were in applying the text structure of the argument which include the development of introductory paragraph, writer's position paragraph, and conclusion. The shared patterns reflect the national cultural entities which make them different from the patterns of Western's argumentative writing. In introductory paragraph, the two ethnic students used definition, personal opinion, and introduced the issue to catch readers' attention. In reasoning, the paragraphs developed by the two ethnic students are characterized by indirectness, subjective ground, and absence of warrant.

Variations in patterns of argumentative writing as resulted from different ethnic groups' cultural values are limited to the development of thesis statement and drawing conclusions. Bataknese writers who value more on explicitness, and directness develop thesis statement strongly and draw conclusion firmly. Meanwhile, Javanese writers who value harmony (*rukun*) and *tanggap ing sasmita* develop thesis statement weakly and draw conclusions indecisively.

Connor (2008) found that there is shared argument patterns among individuals coming from the same culture meaning that culture of individuals affect the patterns of their arguments. These findings support the current study both of them agree that shared culture cause individuals to have the same patterns of arguments. In the current study, it is stated that national cultural entities causes various ethnics in Indonesia to have general patterns (shared patterns) of argumentative writing among various ethnics in Indonesia.

Connor (1996) states that culture is realized in one's L1. Xinghua and Clare (2015), found out that Chinese participants applied hortatory strategy in their writing because of their L1 (Chinese) influence, while English speaking participants applied analytical strategy because of their L1 (English) influence. The two evidences showed that the L1, in which one's culture was preserved, affected their strategy of arguing in argumentative writing. This is also in support of the current study saying that ways of convincing the readers in terms of text structure, reasoning, and affective appeal is affected by the culture.

Comfort (2001) found that there were variations within shared pattern of argumentative writing due to culture variations within the national entities. The current study showed that there were variations in thesis statement development and drawing conclusion between Bataknese and Javanese writers in their argumentative writing confirmed the finding of Comfort's. In the context of Indonesian culture, the shared-pattern of argumentative writing among various ethnic groups are mostly influenced by national cultural entities while variations cause by cultural variations within the national cultural entity occurs in small aspects of argumentative pattern. However, further research on the effect of language mastery to reasoning in the argumentative writing is recommended since this study did not pay sufficient attention to this phenomena. Addition of ethnic number involved in a further study is also recommended for a more firmed conclusion on the argumentative pattern variations within national cultural entity.

Conclusion

National cultural entities mostly affect different ethnics which constitute the nation on their developing the reasons in their argumentative writing. The effects cause various ethnics of the nation to share common patterns in applying the text structure of the argument which include the development of introductory paragraph, writer's position paragraph, and conclusion. The national cultural entities also cause the various ethnics to share common patterns in reasoning. Their reasons are commonly developed with indirectness, subjective ground, and absence of warrant. Specific cultural value that distincts an ethnic from the other in the nation cause them to have variations in patterns of argumentative writing. The effect of the ethnic groups' cultural values is limited to the development of thesis statement and drawing conclusions. Bataknese writers who value more on explicitness, and directness develop thesis statement strongly and draw conclusion firmly. Meanwhile, Javanese writers who value harmony (*rukun*) and *tanggap ing sasmita* develop thesis statement weakly and draw conclusions indecisively.

References

Chen, G. M., & Starosta, W. J. (2003). Asian approaches to human communicating: A dialogue. *Intercultural Communication Studies, 12*(4), 1-16

Comfort, J. (2001). African-American women's rhetorics and the culture of Eurocentric scholarly discourse. In C. G. Panetta (Ed.), *Contrastive rhetoric revisited and redefined* (pp. 91-104). Mahwah, NJ: Lawrence Erlbaum Associates.

Connor, U., Rozycki, & William V. (2008). *Contrastive rhetoric reaching to intercultural rhetoric*. Amsterdam, The Netherlands: John Benjamins Publishing.

Flower, L. (2000). *Writing for an audience.* Boston, MA: Harcourt Brace Jovanovich.

Hawkins, M. (1996). Is rukun dead? Ethnographic interpretations of social change and Javanese culture. *The Australian Journal of Anthropology, 7*(3), 218-234.

Knapp, P., & Watkins, M. (2005). *Genre, text, grammar.* Sydney, Australia: University of New South Wales Press.

Kumaravadivelu, B. (2008). *Cultural globalization and language education.* London, UK: Mary Jane Peluso

Martin, J. R., & Rose, D. (2008). *Genre relations: Mapping culture*. London, England: Equinox Publishing Ltd.

Pudentia, M. (2015). *Metode kajian tradisi lisan* [The research method in spoken discourse]. Jakarta, Indonesia: Yayasan Pustaka Obor Indonesia.

Ramage, J., Bean, J. C., & Johnson, J. (2016). *Writing arguments: A rhetoric with readings.* New York, NY: Pearson Education.

Sari, B. T., Chasiotis, A., Vijver, F. J. R., & Bender, M. (2018). Parental culture maintenance, bilingualism, identity, and well-being in Javanese, Batak, and Chinese adolescents in Indonesia. *Journal of Multilingual and Multicultural Development, 39*(10), 853-867.

Schwarz, B. B., & Asterhan, C. S. C. (2008). Argumentation and reasoning. In K. Littleton, C. Wood, J. Kleine Staarman (Eds.), *International Handbook of Psychology in Education.* Bingley, UK: Emerald Group Publishing.

Sims, M. (2012). *The write stuff thinking through essays.* London, UK: Pearson Education.

Spears, D. (2013). *Improving reading skills*. New York, NY: McGraw Hills.

Toulmin, S. (2003). *The uses of argument.* New York, NY: Cambridge University Press.

Uysal, H. H. (2012). Argumentation across L1 and L2 writing: Exploring cultural influences and transfer issues. *Vigo International Journal of Applied Linguistics, 9*(1), 133-159.

Xinghua, L. N., & Clare, F. (2015). Argument structures in Chinese university student's argumentative writing: A contrastive study. *English Text Construction*, 8(1), 65-87.

Source details

European Journal of Educational Research

Open Access

Scopus coverage years: from 2018 to Present

Publisher: Eurasian Society of Educational Research

E-ISSN: 2165-8714

Subject area: Social Sciences: Education

Source type: Journal

CiteScore 2021
2.4

SJR 2021
0.310

SNIP 2021
0.800

View all documents > | Set document alert | Save to source list | Source Homepage

CiteScore | CiteScore rank & trend | Scopus content coverage

¡ Improved CiteScore methodology

CiteScore 2021 counts the citations received in 2018-2021 to articles, reviews, conference papers, book chapters and data papers published in 2018-2021, and divides this by the number of publications published in 2018-2021. Learn more >

CiteScore 2021

$$2.4 = \frac{1{,}157 \text{ Citations } 2018 - 2021}{478 \text{ Documents } 2018 - 2021}$$

Calculated on 05 May, 2022

CiteScoreTracker 2022

$$3.0 = \frac{1{,}713 \text{ Citations to date}}{570 \text{ Documents to date}}$$

Last updated on 05 April, 2023 • Updated monthly

CiteScore rank 2021

Category	Rank	Percentile
Social Sciences └ Education	#479/1406	65th

View CiteScore methodology > | CiteScore FAQ > | Add CiteScore to your site

European Journal of Educational Research

COUNTRY	SUBJECT AREA AND CATEGORY	PUBLISHER	H-INDEX
Netherlands Universities and research institutions in Netherlands Media Ranking in Netherlands	Social Sciences Education	Eurasian Society of Educational Research	13

PUBLICATION TYPE	ISSN	COVERAGE	INFORMATION
Journals	21658714	2018-2021	Homepage How to publish in this journal amgimenez@ucam.edu

SCOPE

The journal's Editorial Board and Review Panel welcome rigorous, double-blinded manuscripts that make a significant contribution to theoretical and applied approaches in education. Manuscripts published in EU-JER primarily constitute original research, methodologies, methods, and theoretical perspectives relevant to an international audience. The journal includes a particular interest in research toward scholarly analyses of issues and trends that inform educational practice(s) within and/or across sectors.

Quartiles

FIND SIMILAR JOURNALS

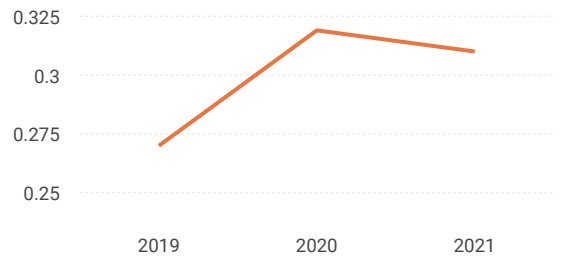
1
Elementary Education Online
TUR
63%
similarity

2
Egitim ve Bilim
TUR
61%
similarity

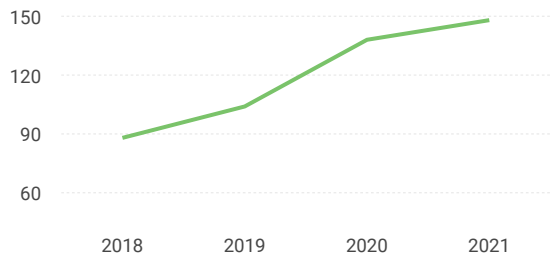
3
Egitim Arastirmalari - Eurasian Journal of
TUR
55%
similarity

4
Pegem Egiti Dergisi
TUR
5
s

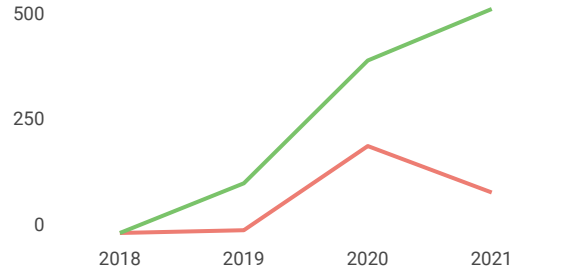
SJR



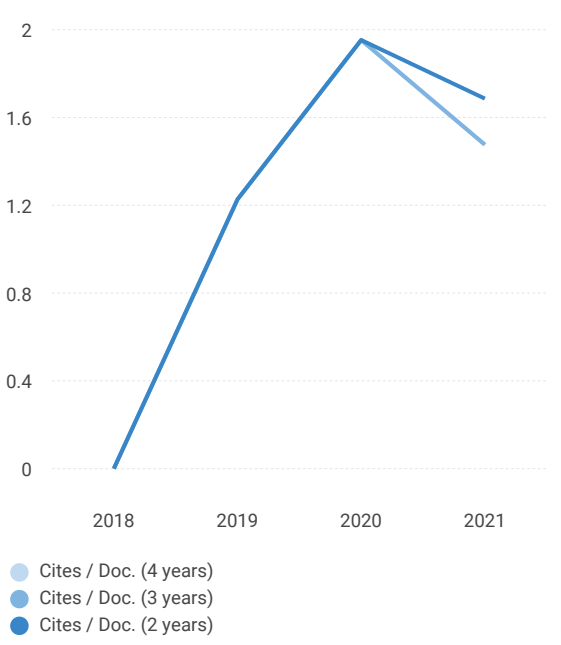
Total Documents



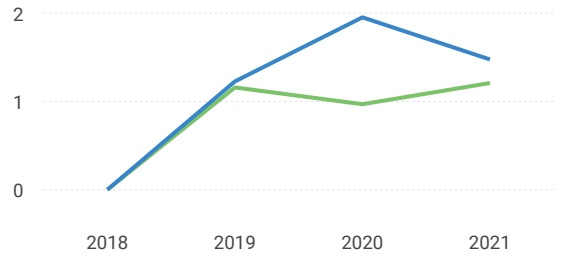
Total Cites Self-Cites



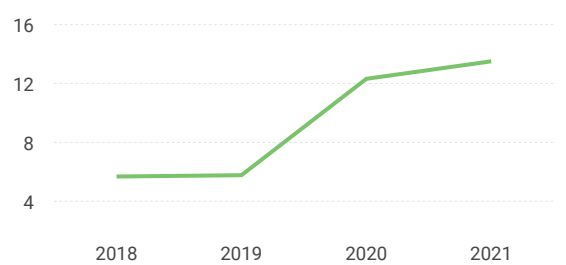
Citations per document



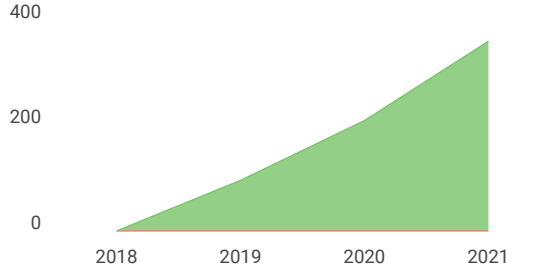
External Cites per Doc Cites per Doc



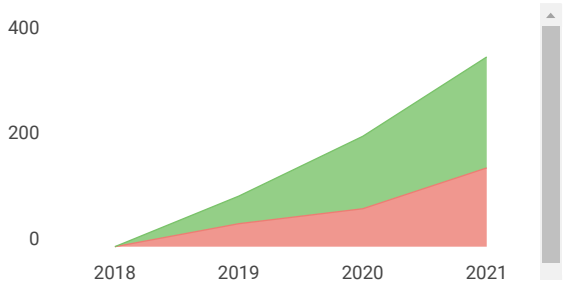
% International Collaboration



Citable documents Non-citable documents



Cited documents Uncited documents



← Show this widget in your own website

Just copy the code below and paste within your html code:

```
<a href="https://www.scimag
```

SCImago Graphica

Explore, visually communicate and make sense of data with our **new data visualization tool**.

Metrics based on Scopus® data as of April 2022

R **Ratri** 5 months ago

Is the European Journal of Educational Research (Eu-jer) still in Quartile 3?
On Scimagojr and Eu-jer's web page it still says Q3.
Is there no Quartile update from Eu-jer because if I check the site score rank on web Scopus, Eu-jer's percentile has reached 65th (including Q2).
We ask the Scimago team to be able to update the Eu-jer quartile journal.

reply

SCImago Team

Melanie Ortiz 5 months ago

Dear Ratri,
Thank you for contacting us. Our data come from Scopus, they annually send us an update of the data. This update is sent to us around April / May every year. The SJR for 2021 was released on 11 May 2022. Therefore, the indicators for 2022 will be available in May/June 2023 and before that date we can´t know what will happen with this journal.
Best Regards, SCImago Team

S **SUKAINAH HASAN SALEH** 9 months ago

How long does it take to review a paper in the journal for acceptance or rejection?

reply

Action needed: Your new review assignment - 770464

1 message

Frontiers in Education Editorial Office <education.editorial.office@frontiersin.org>

Sat, Sep 11, 2021 at 5:12 AM

Reply-To: Frontiers in Education Editorial Office <education.editorial.office@frontiersin.org>
To: Rohmani Indah <indah@bsi.uin-malang.ac.id>

Dear Dr Indah,

Thank you for accepting to review the manuscript "Addressing Study Skills, Learning Theory and Critical Thinking Skills in Principles of Economics Courses". In order to keep the review process timely, please aim to complete your review report by 17 Sep 2021 via this link https://review.frontiersin.org/review/bootstrap/797a4a27-f096-40d8-a12b-c2624a9112e9

You will be presented with an online structured questionnaire that will guide you through the review, focusing on objective criteria. Where appropriate, please provide detailed feedback to the authors on how they can improve the manuscript.

You can find full Review Guidelines here https://www.frontiersin.org/Journal/ReviewGuidelines.aspx?s=513&name=higher_education

Many thanks for taking the time to support the review process of this submission, and for providing the authors with expert feedback and valuable input.

Best regards,

Your Frontiers in Education team

Frontiers | Editorial Office - Collaborative Peer Review Team
www.frontiersin.org
Avenue du Tribunal Fédéral 34, 1005 Lausanne, Switzerland
Office T 41 21 510 1793

For technical issues, please contact our IT Helpdesk (support@frontiersin.org) or visit our Frontiers Help Center (zendesk.frontiersin.org/hc/en-us)

----------MANUSCRIPT DETAILS----------
Manuscript title: Addressing Study Skills, Learning Theory and Critical Thinking Skills in Principles of Economics Courses
Manuscript ID: 770464
Authors: Jeff Sarbaum and Eric Howard
Journal: Frontiers in Education, section Higher Education
Article type: Methods
Submitted on: 03 Sep 2021
Edited by: Ana Teresa Ferreira Oliveira
Research Topic: Pedagogic Innovation and Student Learning in Higher Education: Perceptions, Practices and Challenges

----------FURTHER INFORMATION----------
What happens after I complete my review report? Once you have submitted your report, the handling editor will assess the level of revisions needed and will activate the Interactive Review Forum. There, the authors will receive and respond to your comments. During the Interactive Review, you can directly discuss with the authors their responses and the revisions needed. You can at any stage contact the handling editor or the Editorial Office if you need advice.

How can I make a final recommendation or withdraw from the process? You can finalize your involvement by choosing one of three options:

1. Endorse the manuscript for publication. After the authors have addressed your comments, you can choose to endorse publication of the manuscript. If you have no revisions request for the authors, you can endorse the manuscript already in the Independent Review stage. In this case your review will become finalized, and your reviewer tab will be closed. If the paper is accepted, your name will publicly appear on the article as confirmation that

you validated this contribution as rigorous scholarly work. You should only endorse the manuscript if it has been sufficiently revised to address raised concerns, and the work is accurate as well as presented in an adequate language level.

2. Recommend rejection to the Editor. At any stage of the review process you may recommend rejection to the Editor, in which case you will remain anonymous to the authors. If you submitted a report and comments, they will remain visible but closed from further discussion. You should choose this option if the manuscript contains objective errors or ethical issues that cannot be rectified during revisions.

3. Withdraw from the review process. If you are unable to continue because of, for example, time constraints, you may withdraw at any stage of the review process and you will remain anonymous to the authors. Your report and comments will remain visible, but closed from further discussion.

What do I need to consider to ensure an ethical review?

1. If you detect a potential conflict of interest between you, the editors, the authors or their work, you should contact the Editorial Office immediately.

2. The manuscript should remain confidential during the review process. The contents of the discussions in the Review Forum are also confidential and may not be shared even after publication.

3. Reviewers are anonymous during the review process and we encourage you to preserve this anonymity until endorsement and acceptance.

Thank you for finalizing your Independent Review Report - 770464

1 message

Frontiers in Education Editorial Office <education.editorial.office@frontiersin.org>

Tue, Sep 14, 2021 at 7:16 AM

Reply-To: Frontiers in Education Editorial Office <education.editorial.office@frontiersin.org>
To: Rohmani Indah <indah@bsi.uin-malang.ac.id>

Dear Dr Indah,

Thank you for submitting your independent review report for the manuscript "Addressing Study Skills, Learning Theory and Critical Thinking Skills in Principles of Economics Courses". As you endorsed publication of this manuscript in its current form, your peer review process is now finalized. The handling editor has been notified, and you can find a copy of your report below.

You can access the manuscript here:
http://review.frontiersin.org/review/770464/0/0

Best regards,

Your Frontiers in Education team

Frontiers | Editorial Office - Collaborative Peer Review Team
www.frontiersin.org
Avenue du Tribunal Fédéral 34, 1005 Lausanne, Switzerland
Office T 41 21 510 1793

For technical issues, please contact our IT Helpdesk (support@frontiersin.org) or visit our Frontiers Help Center (zendesk.frontiersin.org/hc/en-us)

----------MANUSCRIPT DETAILS----------
Manuscript title: Addressing Study Skills, Learning Theory and Critical Thinking Skills in Principles of Economics Courses
Manuscript ID: 770464
Authors: Jeff Sarbaum and Eric Howard
Journal: Frontiers in Education, section Higher Education
Article type: Methods
Submitted on: 03 Sep 2021
Edited by: Ana Teresa Ferreira Oliveira

Frontiers Review Guidelines

To ensure an efficient review process, please familiarize yourself with the Frontiers review guidelines. The Frontiers review process has unique features, including an interactive review stage, and a focus on objective criteria.
https://www.frontiersin.org/Journal/ReviewGuidelines.aspx?s=513&name=higher_education

---------- Independent Review Report, Reviewer: Rohmani Indah
EVALUATION
Please describe the new method or protocol reported in this manuscript, and its purpose
This study reminds that there is still much to do to improve critical thinking of university students. Moreover, current findings also state that in higher education there is a trend of deteriorating critical thinking that needs to be anticipated. Therefore, the authors address the issue of critical thinking by relating it to study skills and learning theories
Please highlight the limitations and advantages.
The limitation of this study is on the context of the economic course, but unfortunately the rationale regarding the specificity of the context has not been exposed in the background. Authors have not addressed the issue of critical thinking with the current status of the students' study skills and knowledge of learning theory. It was stated that many students were still poor in these variables, but not supported with exact information. However, the advantage of the finding is on its transferability to several other contexts at the higher education level
Are there objective errors or fundamental flaws? If yes, please detail your concerns.

No, not found.
Check List
Is the English language of sufficient quality?
Yes
Is the quality of the figures and tables satisfactory?
Not Applicable
Does the reference list cover the relevant literature adequately and in an unbiased manner?
Yes
Are the statistical methods valid and correctly applied? (e.g. sample size, choice of test)
Yes
Are the methods sufficiently documented to allow others to apply them?
Yes
Is there adequate validation of the proposed method?
Yes
Are the data underlying the study available in either the article, supplement, or deposited in a repository? (Sequence/expression data, protein/molecule characterizations, annotations, and taxonomy data are required to be deposited in public repositories prior to publication)
Not Applicable
Does the study adhere to ethical standards including ethics committee approval and consent procedure?
Not Applicable
Have standard biosecurity and institutional safety procedures been adhered to?
Not Applicable
Please provide your detailed review report to the editor and authors (including any comments on the Q4 Check List):
The data on assessment after the students complete the video and the results of student reflection after following the instruction on critical thinking need to be included.

To facilitate the reader's understanding, the presentation of the analysis of the results of the assessment and student reflection can be displayed in the form of a table or chart.
QUALITY ASSESSMENT:
Method validated by effective results
3
Applicability
4
Interest to a general audience
3
Quality of the writing
3
Rigor
3
Significance to the field
5

New author comments in the Review Forum - 770464

1 message

Frontiers in Education Editorial Office <education.editorial.office@frontiersin.org>

Tue, Oct 19, 2021 at 2:12 AM

Reply-To: Frontiers in Education Editorial Office <education.editorial.office@frontiersin.org>
To: Rohmani Indah <indah@bsi.uin-malang.ac.id>

Dear Dr Indah,

New comments were just posted by author Jeff Sarbaum, for the manuscript "Addressing Study Skills, Learning Theory and Critical Thinking Skills in Principles of Economics Courses".
Please visit the discussion forum to review these comments within the next few days:
https://review.frontiersin.org/review/bootstrap/8a04bdd9-97ed-43be-854b-9ba7bc853e29

You should then take one of the following actions:

1. Endorse publication: the authors satisfactorily addressed your comments, and you agree to be listed as a reviewer on the manuscript, if published.

2. Post comments: you have further concerns you would like the authors to address. Use the comment boxes under each review question to communicate these, and “Submit all Comments” at the end.

3. Recommend rejection: the authors are unable or unwilling to address your comments, or you have found the manuscript to contain objective errors or ethical issues that cannot be resolved. Your recommendation will be sent to the handling editor while you will remain anonymous to the authors and will not be asked to participate any further in the review process. Your report will remain available in the review forum.

When reviewing the authors’ responses, bear in mind that your mandate is to evaluate the accuracy and validity of the manuscript, not its potential impact.
Many thanks for your time participating in the collaborative review process of this manuscript. You can contact us should you have any questions.

Best regards,

Your Frontiers in Education team

Frontiers | Editorial Office - Collaborative Peer Review Team
www.frontiersin.org
Avenue du Tribunal Fédéral 34, 1005 Lausanne, Switzerland
Office T 41 21 510 1793

For technical issues, please contact our IT Helpdesk (support@frontiersin.org) or visit our Frontiers Help Center (zendesk.frontiersin.org/hc/en-us)

Manuscript title: Addressing Study Skills, Learning Theory and Critical Thinking Skills in Principles of Economics Courses
Manuscript ID: 770464
Authors: Jeff Sarbaum and Eric Howard
Journal: Frontiers in Education, section Higher Education
Article type: Methods
Research Topic: Pedagogic Innovation and Student Learning in Higher Education: Perceptions, Practices and Challenges
Submitted on: 03 Sep 2021
Edited by: Ana Teresa Ferreira Oliveira

Frontiers Review Guidelines

To ensure an efficient review process, please familiarize yourself with the Frontiers review guidelines (link below). The Frontiers review process has unique features, including an interactive review stage, and a focus on objective criteria.

Frontiers: Acceptance of manuscript you reviewed - 770464

2 messages

Frontiers Education Editorial Office <education.editorial.office@frontiersin.org> Wed, Jan 5, 2022 at 3:24 PM

Reply-To: Frontiers Education Editorial Office <education.editorial.office@frontiersin.org>
To: indah@bsi.uin-malang.ac.id

Dear Dr Indah,

Frontiers Education Editorial Office has sent you a message. Please click 'Reply' to send a direct response

The manuscript you reviewed was accepted for publication:

Manuscript title: Addressing Study Skills, Learning Theory and Critical Thinking Skills in Principles of Economics Courses
Journal: Frontiers in Education, section Higher Education
Article type: Methods
Authors: Jeff Sarbaum, Eric Howard
Edited by: Ana Teresa Ferreira Oliveira

Here's the link to the article:
http://www.frontiersin.org/Review/EnterReviewForum.aspx?activationno=b0f9a900-edc9-4eb6-a5ff-e1ce3d909e07

Are we meeting your needs?

At Frontiers we are constantly trying to improve our Collaborative Review process and would like to get your feedback on how we did. Please complete our short 3-minute survey and we will donate $1 to Enfants du Monde, a Swiss non-profit organization:
https://frontiers.qualtrics.com/jfe/form/SV_23lZFf7F7p0mLD7?survey=reviewer&aid=770464&uid=1474651
Thank you very much for taking the time to share your comments.

Best regards,

Your Frontiers in Education team

Frontiers | Editorial Office - Collaborative Peer Review Team
www.frontiersin.org
Avenue du Tribunal Fédéral 34, 1005 Lausanne, Switzerland
Office T 41 21 510 1793

For technical issues, please contact our IT Helpdesk (support@frontiersin.org) or visit our Frontiers Help Center (zendesk.frontiersin.org/hc/en-us)

Rohmani Nur Indah <indah@bsi.uin-malang.ac.id> Wed, Jan 5, 2022 at 4:24 PM
To: Frontiers Education Editorial Office <education.editorial.office@frontiersin.org>

Thank you for the notification
[Quoted text hidden]

Frontiers: Article Published

1 message

Education Production Office <education.production.office@frontiersin.org>

Wed, Feb 2, 2022 at 11:45 AM

Reply-To: Education Production Office <education.production.office@frontiersin.org>
To: indah@bsi.uin-malang.ac.id

Education Production Office has sent you a message. Please click 'Reply' to send a direct response

Dear Dr Indah,

We are pleased to announce that the following article you reviewed was published in Frontiers in Education, section Higher Education.

Manuscript Title: Addressing Study Skills, Learning Theory and Critical Thinking Skills in Principles of Economics Courses

Article type: Methods

Authors: Jeff Sarbaum, Eric Howard

To view the online publication, please click here:
http://journal.frontiersin.org/article/10.3389/feduc.2022.770464/full?&utm_source=Email_to_rerev_&utm_medium=Email&utm_content=T1_11.5e4_reviewer&utm_campaign=Email_publication&journalName=Frontiers_in_Education&id=770464

Please cite this article as: Jeff Sarbaum, Eric Howard (2022). Addressing Study Skills, Learning Theory and Critical Thinking Skills in Principles of Economics Courses . *Front. Educ.* **7**:770464. doi: 10.3389/feduc.2022.770464

This article is an open access publication, which means that it is accessible to any reader anywhere in the world. We encourage you to share the article link with your colleagues. The article is also being disseminated onto the Frontiers research network (Loop) and possibly other outlets. Please ensure that your Frontiers profile on the Loop network is up-to-date by editing it here:
http://loop.frontiersin.org/people/me

We constantly strive to improve our review process, and we would also like to get your feedback. Please complete our short 3-minute survey and we will donate $1 to Enfants du Monde, a Swiss non-profit organization:
https://frontiers.qualtrics.com/jfe/form/SV_23lZFf7F7p0mLD7?survey=reviewer&aid=770464&uid=1474651

Thank you again for your contribution to Frontiers.

Best regards,

Frontiers Education Production Office
education.production.office@frontiersin.org
www.frontiersin.org

For technical issues, please contact our IT Helpdesk - support@frontiersin.org

frontiers

Addressing Study Skills, Learning Theory and Critical Thinking Skills in Principles of Economics Courses

Jeff Sarbaum[1*], Eric Howard[1]

[1]Department of Economics, University of North Carolina at Greensboro, United States

Submitted to Journal:
Frontiers in Education

Specialty Section:
Higher Education

Article type:
Methods Article

Manuscript ID:
770464

Received on:
03 Sep 2021

Journal website link:
www.frontiersin.org

Conflict of interest statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest

Author contribution statement

JS - Survey design, analysis, writing (50%)
EH - Literature review, writing (50%)

Keywords

Study Skills, Critical Thinking, pedagogy, teaching economics, Learning Theory

Abstract

Word count: 103

The Wall Street Journal recently noted that U.S. “employers say too many schools aren’t teaching students the skills they need—or even basic critical thinking” (Belkin, 2018). This paper (1) motives the need for economics and other college educators to (A) address study habits in the classroom, (B) explain the importance of critical thinking skills, and (C) define what critical thinking is to introductory students; and (2) provides an overview of how the authors accomplish this in their classrooms. The authors encourage readers to borrow this information to create a study skills and critical thinking module for their own students when teaching principles courses.

Contribution to the field

Many students enter college with poor study habits and critical thinking skills. Furthermore, many students do not understanding learning theory and how to study effectively and efficiently. We propose a first week of class module and set of resources that teaches best practice study habits, defines critical thinking.

Ethics statements

Studies involving animal subjects

Generated Statement: No animal studies are presented in this manuscript.

Studies involving human subjects

Generated Statement: No human studies are presented in this manuscript.

Inclusion of identifiable human data

Generated Statement: No potentially identifiable human images or data is presented in this study.

Data availability statement

Generated Statement: The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Addressing Study Skills, Learning Theory and Critical Thinking Skills in Principles of Economics Courses

Eric Howard
Department of Economics
Joseph M. Bryan School of Business and Economics
University of North Carolina at Greensboro
467 Bryan Building
P.O. Box 26170
Greensboro, NC 27402
eshoward@uncg.edu

Mr. Howard is a lecturer in the Department of Economics with research focuses on economics of education, intellectual history, and the philosophy and methodology of economics and has been teaching undergraduate economics for seven years. Prior to teaching he spent 12 years in education research and program evaluation with emphasis on teacher effectiveness and research design.

Jeffrey Sarbaum
Department of Economics
Joseph M. Bryan School of Business and Economics
University of North Carolina at Greensboro
466 Bryan Building
P.O. Box 26170
Greensboro, NC 27402
jksarbau@uncg.edu

Dr. Sarbaum is is a senior lecturer in the department of economics with research focuses on the economics of education, teaching pedagogy, and experimental design. He has been teaching for economics for 25 years and is a recepient of numerous teaching awards.

Abstract

The *Wall Street Journal* recently noted that U.S. "employers say too many schools aren't teaching students the skills they need—or even basic critical thinking" (Belkin, 2018). This paper (1) motives the need for economics and other college educators to (A) address study habits in the classroom, (B) explain the importance of critical thinking skills, and (C) define what critical thinking is to introductory students; and (2) provides an overview of how the authors accomplish this in their classrooms. The authors encourage readers to borrow this information to create a study skills and critical thinking module for their own students when teaching principles courses.

JEL Codes: A2
Keywords: study skills, critical thinking, pedagogy, teaching economics

INTRODUCTION

The *Wall Street Journal* recently noted that U.S. "employers say too many schools aren't teaching students the skills they need—or even basic critical thinking" (Belkin, 2018). While a recent meta-analysis found "that students make substantial gains in critical thinking during college", the study's authors went on to note that "observed gains in critical thinking appear to have deteriorated over time…" (Huber & Kuncel, 2016, p. 456). A survey of 202 departments of economics ranked "the ability to use critical thinking skills" first in a list of the ten most important student learning outcomes (Allgood, Walstad, & Siegfried, 2015, p. 290). In a recent survey of the literature on 21st century skill frameworks, sixteen articles were identified with "problem solving" or "critical thinking" skills being prioritized ten or nine times respectively out of the 16 frameworks reviewed (Rios et al., 2020). The study's authors went on to analyze 142,000 job advertisements and found "problem solving" to be the fourth most requested skill, behind oral communication, written communication, and collaboration (Rios et al., 2020). If "critical economic thinking" is defined as "effective, high-quality problem solving" (Leyden, 2012, p. 2), how can economics educators promote this skill development?

The goal of this paper is twofold: First, to motive the need for a study habits and critical thinking skills intervention by economics educators; second, to provide set of resources and research to present to students the first week of class to aid in the development of study habit and critical thinking skills.

The paper is divided into four additional sections. Section 2 provides broader motivation by reviewing the larger literature on the need, in fact, the demand among employers for graduates better equipped in critical thinking and problem-solving skills. Section 3 discuss the results of a survey on study habits conducted by the authors. Section 4 outlines the materials presented to students to promoted better studying and critical thinking skills. Finally, Section 5 provides concluding remarks.

STUDY SKILLS, LEARNING, AND THE DEMAND FOR CRITICAL THINKING

A meta-analysis of studies (N = 72,431, k = 344) examining the relationship between study habits, skills, and attitude inventories and constructs and college outcomes, found that "study habits and attitude inventories are the most predictive of performance," even when compared to a student's high school grades or standardized test scores (Credé & Kuncel, 2008). A more recent comprehensive review of the literature on study skills and their efficacy revealed that distributed practice, self-explanation, and interleaved practice, techniques often used by instructors when developing critical thinking skills, demonstrated either "high" or "moderate utility" in improving student learning across a wide range of class and student factors (Dunlosky et al., 2013). On the other hand, "summarization, highlighting, the keyword mnemonic, imagery use for text learning, and rereading" exhibited the lowest utility and were found to not consistently promote student learning (Dunlosky et al., 2013, p. 5). In other words, study habits and the type of skills students utilize are significant for promoting or inhibiting learning.

What types of study skills do students actually employ while in college? Course Hero, an online learning platform, has recently provided some informal data on their users' study habits. More than half of Course Hero users do most of their studying Monday through Wednesday and approximately 25-28 percent of their users studying takes place between 9 PM and 5 AM (Course Hero, 2019). Research has consistently shown that sleep deprivation leads to poorer learning outcomes (Doyle & Zakrajsek, 2018; Ro, 2018). Several recent studies have found that students are likely to use ineffective study habits (Hora & Oleson, 2017; Miyatsu et al., 2017; Nonis & Hudson, 2010). The National Survey of Student Engagement (NSSE), based at the Indiana University Bloomington School of Education, provides one of the most comprehensive surveys, including 531 colleges and university in the U.S. The NSSE survey finds that while students in 2019 are spending more time in academic preparation compared to students in 2004, there has been a decline in this preparation the last few years.

Elaborating on Huber and Kuncel's previously mentioned work, which found that students make substantial gains in critical thinking during college, but that "the observed gains in critical thinking appear to have deteriorated over time despite increased interest in fostering critical thinking skills" (2016, p. 456), Huber and Kuncel offer three potential explanations for the deterioration in the observed gains among students: (1), if "students have increasingly learned more critical thinking skills before entering college…(then)…overall gain scores should be reduced"; (2), with college enrollment increasing over time "many new students (who were previously not in the college cohort) may not be sufficiently prepared to learn more complex reasoning skills (pulling gain scores down)"; and (3), "students have become less willing or able to learn critical thinking skills over time" (2016, p. 457). Even if (1) or (2), the most encouraging potential explanations, is the reason for the college gains decline, neither resolves the fact the employers consistently report a lack of critical thinking skills in college graduates.

A recent study by the Educational Testing Service (ETS) identified what they have described as a "paradox" among Millennials, those born between 1981-1996 (Dimock, 2019), regarding their educational attainment and their corresponding achievement on several international assessments. While the Millennials are "on track to be our most educated generation ever… they consistently score below many of their international peers in literacy, numeracy, and problem solving in technology- rich environments" (Goodman, Sands, & Coley, 2015, p. 4). Using data from the Organization for Economic Co-operation and Development (OECD) and their Programme for the International Assessment of Adult Competencies (PIAAC) survey "of nationally representative samples of adults age 16 to 65", the ETS study reported "[i]n literacy, U.S. millennials scored lower than 15 of the 22 participating countries" (Goodman, Sands, & Coley, 2015, p. 4, 5, Fig. 1). The ETS report closes their executive summary by noting "despite investments and reforms in K-12 education over the past decades, America continues to lose ground in terms of the developed skills of its adult population and workforce" (Goodman, Sands, & Coley, 2015, p. 5).

Evidence of the issues highlighted in the ETS report are already making themselves felt among some sectors of the American labor market. A recent *Wall Street Journal* article found that while ever increasing numbers of students are entering and completing four-year degrees, incentivized by federal education policy and assisted with student loan subsidization, however, "technology is changing faster than colleges can keep up and employers say too many schools aren't teaching students the skills they need—or even basic critical thinking" (Belkin, 2018). This has led to an increasing demand among U.S. employers for specific skills over four-year degrees and to heavier investments by employers, such as AT&T which spent over $1 billion dollars to retrain approximately 100,000 employees, to meet the increasing demands of the labor market, especially in the manufacturing, technology and health-care industries (Belkin, 2018). And even more recently *Inside Higher Ed* reported that "75 percent of employers claim the students they hire after 12, 16 or more years of formal education lack the ability to think critically and solve problems" (Haber, 2020).

Acknowledging the importance of critical thinking skills to the labor market and the larger economy is one thing but defining exactly what is meant by "critical thinking" is quite another. As one group of economists have noted, critical thinking is often "not well defined" and in economics there has been "relatively little" published on this topic, despite the fact that we often strive to emphasize "the economic way of thinking" in many of our principles courses (Greenlaw & DeLoach, 2003, p. 36). Leyden (2012), in his book dedicated to developing critical thinking in economics, describes it as "all about effective, high quality problem solving" (Leyden, 2012, p. 2). Mulnix (2012) provides a review of several definitions of critical thinking and then arrives at the following for what she feels is the preferred description of the "critical thinker":

> This suggests that the fundamental skill to be acquired by a critical thinker is the ability to recognize inferential connections holding between statements, where this would include the ability to understand the possibility that what we believe might be false and the ability to identify the sorts of evidence that would undermine our beliefs (Mulnix, 2012, p. 474).

Students that have an adequate understanding of critical thinking and can successfully employ those skills can improve their learning outcomes (Abrami, et al., 2015; Huber & Kuncel, 2016). However, as just reviewed, the larger literature indicates that students are not always ready and/or prepared to develop those skills at the post-secondary level (Huber & Kuncel, 2016; Pithers & Soden, 2000). Further, while economists recognize the importance of critical thinking skills for student learning (Allgood, Walstad, & Siegfried, 2015, p. 290), there is relatively little literature on the topic among economists. A recent review of the literature only identified 13 citations (see Allgood, Walstad, & Siegfried, 2015) dealing with "active learning" in economics (Boyle & Goffe, 2018).

While many students believe to overcome poor performance they just need to study more, research suggests that study time alone will not necessarily lead to improved learning (Chew, 2011; Doyle & Zakrajsek, 2018; Nonis & Hudson, 2010). Furthermore, many students leave exams believing they did well when this is not the case. Ambrose et al. (2010, pp. 4-6) identifies seven research-based principles to improve learning in their book *How Learning Works*:

1. Prior knowledge
2. How students organize knowledge
3. Motivation
4. Skill acquisition, interpretive practice, and appropriate application
5. Goal-directed practice
6. Level of student development and climate of the course
7. Self-directed learning, including an emphasis on meta-cognition

Without students, or educators, understanding how learning works, what critical thinking is, and what study skills are most effective, it is rather fanciful to believe students will successfully develop the critical thinking skills economics educators rank as the most important learning outcome, and that employers demand. As some recent research has demonstrated, "elements of critical thinking need to be taught *explicitly*, rather than assumed to come along for the ride when thoughtful teachers run through complex material with students" (emphasis original; Haber, 2020). The next sections of this paper provide results from study habits questions posed to students in the authors classes; followed by an example of a set of resources the authors go over in class and assign to students in an attempt to help prepare them to be able to learn more effectively and think more critically.

STUDENT STUDY HABITS QUESTIONNAIRE

At the beginning of the Spring 2020 semester, the authors administered a survey to students (n~275) enrolled in their principles of micro and macroeconomics courses asking about their study habits. Some good news bad news patterns emerged. While 62% of the students reported taking notes when reading the textbook half of the time or more, only 8% reported that they always read the textbook. While 95% of the students reported taking notes in class half of the time or more, only 5% reported that they always rewrite their notes at some point after class.

Lastly, when asked what the most important factor in successful learning is, 87% of the students reported "learning in a way that matches your learning style" or "the intention and desire to learn", while only 13% reported "Paying close attention to the material as you study" or "the time you spend studying", and less than 0.5% reported "What you think about while you study". The responses to this question are of particular note because a wide body of literature has shown that matching learning style does not correlate with gains in learning (Pashler et al., 2008; Willingham et al., 2015). And while having an intention and desire to learn is a commendable goal, it is of limited value unless time is spent studying and paying attention while doing so. In fact, of the answer choices, the single most important determinant of learning is "what you think about while studying" (Hyde & Jenkins, 1969; see also Chew, 2011).

The conclusion from the survey is that a majority of students in the authors classes may be unaware of, or discount, behaviors that translate into successful learning and the development of critical thinking skills.

A CLASSROOM STUDY SKILLS AND LEARNING MODULE

The authors propose educators of introductory economics classes address the topic of study skills, learning theory, and critical thinking head on inside their own classrooms. What follow is a description of the resources, content, and approach the authors take.

The first week of classes, a class meeting is devoted to the topics of studying, learning, and the value of critical thinking. This not only brings awareness of the issue to students, but helps the instructor create a framework for understanding and allows students to organize the information into new learning habits to draw from (Ambrose et al., 2010). During the class a presentation of the following materials is given:

- **What does it mean to study and how should you study?** A casual conversation with the class to see what they think and to give students an opportunity to hear from and discuss with their peers.
- **Some myths and facts about studying and learning**
    - If you want deeper comprehension of materials print might be better than digital (Alexander & Singer. 2017).
    - If you take longhand notes, review them, and focus on core concepts, you learn more and perform better on exams (Carter et al., 2017; Morehead et al., 2019).
    - If you cram and don't get an adequate amount of sleep you impede your ability learn, manipulate, and even recall information (Doyle & Zakrajsek, 2018; Ro, 2018).
    - If you incorporate effect study skills you can spend less time studying and get better results, while matching your learning style doesn't help but what you think about while studying certainly does (Chew, 2011; Willingham et al., 2015).
    - If you use critical thinking skills in college you will learn more and have better grades (Huber & Kuncel, 2016).
- **How learning works** –A quick walk through and explanation of Ambrose's seven points on how learning works is provided, with a particular focus on how the elements of the course relate to these principles of learning (Ambrose et al. 2010; Chew, 2011).

- **What is critical thinking?** – The meaning of the definitions from Leyden and Mulnix are explored, followed by a conversation that asks students why they think critical thinking is important (Leyden, 2012; Mulnix, 2012).
- **What are cognitive and non-cognitive skills?** The authors explain to students that "30-40 percent of the explained variance in achievement test scores across students is due to personality traits and not IQ" (Heckman, Pinto, & Savelyev, 2013, p. 2056). Soft skills matter (Jackson, 2014, 2018).
- **Why does all of this matter?** The students are engaged in a discussion of The *WSJ* quote (Belkin, 2018), the ETS study on skill development (Goodman et al., 2015), and that employers want critical thinking and problem-solving skills (Chanler, et al., 2019; Heckman et al., 2019; Johanns, 2019; Rios, et al., 2020).

Prior to the next class meeting, students are directed to watch a series of six videos on "How to Study" (~36 minutes in total) developed by Samford University cognitive psychologist Stephen Chew (see Chew, 2011) the titles for which are:

- Beliefs That Make You Fail…Or Succeed
- What Students Should Understand About How People Learn
- Cognitive Principles for Optimizing Learning
- Putting the Principles for Optimizing Learning into Practice
- I Blew the Exam, Now What?

Chew's videos review much of the material introduced in the classroom discussion and further expand the material by practically demonstrating how students can apply the findings from cognitive science to their class through best practices regarding note take, reading, studying for exams and how to move forward when not performing poorly on tests. Upon completing the video series, students are assigned a multiple-choice assessment to ensure they were completed and paid attention to. The next class, a brief conversation about the videos occurs and students are asked to contemplate what they have learned and how they plan to integrate the information into the how they will prepare and study for the class.

While the authors do not formally assess the impact of their module, research has consistently demonstrated that targeted instruction can be effective in changing student study skills as long as the material is in context, within the content domain, and promotes active learning and metacognitive awareness (Dunlosky et al., 2013; Hattie et al., 1996; Miyatsu et al., 2017).

CONCLUSION

There is a growing body of literature in economics where scholars are attempting to incorporate the findings from the cognitive and learning sciences to improve learning outcomes. This paper attempted to identify the issues involved, provide an overview of the broader literature, and describe how the authors have attempted to develop a classroom response. While it recognized that the introduction of a study skill module takes up valuable classroom time, how can a student become a better critical thinker if he or she does not have a basic understanding of effective study skills, how learning works, and what critical thinking is? On these grounds, the introduction of such a module is a most valuable use of classroom time. The authors encourage other educators to develop their own study skills and learning theory module based in part, or in whole, on the information and resources discussed in this paper.

REFERENCES

Abrami, P. C., Bernard, R. M., Borokhovski, E., Waddington, D. I., Wade, C. A., & Persson, T. (2015). Strategies for teaching students to think critically: A meta-analysis. *Review of Educational Research*, *85*(2), 275–314.

Alexander, P. A., & Singer, L. M. (2017, Oct. 15). A new study shows that students learn way more effectively from print textbooks than screens. Retrieved from http://www.businessinsider.com/students-learning-education-print-textbooks-screens-study-2017-10

Allgood, S., Walstad, W. B., & Siegfried, J. J. (2015). Research on teaching economics to undergraduates. *Journal of Economic Literature*, *53*(2), 285–325.

Ambrose, S. A., Bridges, M. W., DiPietro, M., Lovett, M. C., & Norman, M. K. (2010). *How learning works: Seven research-based principles for smart teaching*. San Francisco, CA: Jossey-Bass.

Belkin, D. (2018, Mar. 22). More companies teach workers what colleges don't. Retrieved from https://www.wsj.com/articles/more-companies-teach-workers-what-colleges-don't-1521727200

Boyle, A., & Goffe, W. L. (2018). Beyond the flipped class: The impact of research-based teaching methods in a macroeconomics principles class. *AEA Papers and Proceedings*, *108*, 297–301.

Carter, S. P., Greenberg, K., & Walker, M. S. (2017). The impact of computer usage on academic performance: Evidence from a randomized trial at the United States Military Academy. *Economics of Education Review*, *56*, 118–132.

Çavdar, G., & Doe, S. (2012). Learning through writing: Teaching critical thinking skills in writing assignments. *PS: Political Science & Politics*, *45*(2), 298–306.

Chanler, M., Dye, C., Coppinger, C., Nieh, G., Maris, T., Keyser, B., McGill, K., Lewis, G., Reilly, K., Smith, J., & Ignatova, M. (2019). *2019 global talent trends*. Sunnyvale, CA: LinkedIn Talent Solutions. https://app.box.com/s/c5scskbsz9q6lb0hqb7euqeb4fr8m0bl/file/388525098383

Chew, S. L. (2011). How to study. Retrieved from https://www.samford.edu/departments/academic-success-center/how-to-study

Course Hero. (2019, Aug. 19). RESEARCH: 2019 college study habits. Retrieved from https://www.coursehero.com/blog/college-study-habits/

Credé, M., & Kuncel, N. R. (2008). Study habits, skills, and attitudes: The third pillar supporting collegiate academic performance. *Perspectives on Psychological Science*, *3*(6), 425–453.

Dimock, M. (2019, Jan. 17). Defining generations: Where Millennials end and Generation Z begins. Retrieved from https://www.pewresearch.org/fact-tank/2019/01/17/where-millennials-end-and-generation-z-begins/

Doyle, T., & Zakrajsek, T. D. (2018). *The new science of learning: How to learn in harmony with your brain* (2nd ed.). Sterling, VA: Stylus Publishing.

Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T. (2013). Improving students' learning with effective learning techniques: Promising directions from cognitive and educational psychology. *Psychological Science in the Public Interest*, *14*(1), 4–58.

Dynan, L., Cate, T., & Rhee, K. (2008). The impact of learning structure on students' readiness for self-directed learning. *Journal of Education for Business*, *84*(2), 96–100.

Goodman, M. J., Sands, A. M., & Coley, R. J. (2015). *America's skills challenge: Millennials and the future*. Princeton, NJ: Educational Testing Service. https://www.ets.org/s/research/29836/

Greenlaw, S. A., & DeLoach, S. B. (2003). Teaching critical thinking with electronic discussion. *Journal of Economic Education*, *34*(1), 36–52.

Haber, J. (2020, Mar. 2). It's time to get serious about teaching critical thinking. Retrieved from https://www.insidehighered.com/views/2020/03/02/teaching-students-think-critically-opinion

Hattie, J., Biggs, J., & Purdie, N. (1996). Effects of learning skills interventions on student learning: A meta-analysis. *Review of Educational Research*, *66*(2), 99–136.

Heckman, J. J., Jagelka, T., & Kautz, T. D. (2019). *Some contributions of economics to the study of personality* (NBER Working Paper No. 26459). Cambridge, MA: National Bureau of Economic Research. https://www.nber.org/papers/w26459

Heckman, J., Pinto, R., & Savelyev, P. (2013). Understanding the mechanisms through which an influential early childhood program boosted adult outcomes. *American Economic Review*, *103*(6), 2052–2086.

Hora, M. T., & Oleson, A. K. (2017). Examining study habits in undergraduate STEM courses from a situative perspective. *International Journal of STEM Education*, *4*(1), https://doi.org/10.1186/s40594-017-0055-6

Huber, C. R., & Kuncel, N. R. (2016). Does college teach critical thinking? A meta-analysis. *Review of Educational Research*, *86*(2), 431–468.

Hyde, T. S., & Jenkins, J. J. (1969). Differential effects of incidental tasks on the organization of recall of a list of highly associated words. *Journal of Experimental Psychology*, *82*(3), 472–481.
Jackson, C. K. (2014). *Non-cognitive ability, test scores, and teacher quality: Evidence from 9th grade teachers in North Carolina* (NBER Working Paper No. 18624). Cambridge, MA: National Bureau of Economic Research.
--------. (2018). What do test scores miss? The importance of teacher effects on non–test score outcomes. *Journal of Political Economy*, *126*(5), 2072–2107.
Johanns, K. (2019, Sep. 15). Master these 5 in-demand soft skills employers are seeking. Retrieved from https://jobs.washingtonpost.com/article/master-these-5-in-demand-soft-skills-employers-are-seeking/
Leyden, D. P. (2012). *Critical thinking in economics* (2nd ed.). Matthews, NC: Kona Publishing and Media Group.
Miyatsu, T., Nguyen, K., & McDaniel, M. A. (2017). Five popular study strategies: Their pitfalls and optimal implementations. *Perspectives on Psychological Science*, *13*(3), 390–407.
Morehead, K., Dunlosky, J., & Rawson, K. A. (2019) How much mightier is the pen than the keyboard for note-taking? A replication and extension of Mueller and Oppenheimer (2014). *Educational Psychology Review*, *31*(3), 753–780.
Moulton, S. T. (2014, Apr. 16). Applying psychological science to higher education: Key findings and open questions. Retrieved from http://harvardx.harvard.edu/files/harvardx/files/moulton_2014_applying_psychological_science_to_higher_education_april16.pdf?m=1398091141
Mulnix, J. W. (2012). Thinking critically about critical thinking. *Educational Philosophy and Theory*, *44*(5), 464–479.
Mursell, J. L. (1939, Mar.). The defeat of the schools. *Atlantic Monthly*, *163*, 353–361.
National Survey of Student Engagement (NSSE). (2020). *Engagement insights: Survey findings on the quality of undergraduate education – Annual results 2019*. Bloomington, IN: Indiana University Center for Postsecondary Research. https://nsse.indiana.edu/html/annual_results.cfm
Nonis, S. A., & Hudson, G. I. (2010). Performance of college students: Impact of study time and study habits. *Journal of Education for Business*, *85*(4), 229–238.
Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2008). Learning styles: Concepts and evidence. *Psychological Science in the Public Interest*, *9*(3), 105–119.
Pithers, R. T., & Soden, R. (2000). Critical thinking in education: A review. *Educational Research*, *42*(3), 237–249.
Rios, J. A., Ling, G., Pugh, R., Becker, D., & Bacall, A. (2020). Identifying critical 21st-century skills for workplace success: A content analysis of job advertisements. *Educational Researcher*, *49*(2), 80–89.
Ro, C. (2018, Aug. 20). Why sleep should be every student's priority. Retrieved from http://www.bbc.com/future/story/20180815-why-sleep-should-be-every-students-priority
Willingham, D. T., Hughes, E. M., & Dobolyi, D. G. (2015). The scientific status of learning styles theories. *Teaching of Psychology*, *42*(3), 266–271.

frontiers in Education

METHODS
published: 02 February 2022
doi: 10.3389/feduc.2022.770464

Addressing Study Skills, Learning Theory and Critical Thinking Skills in Principles of Economics Courses

Eric Howard and Jeffrey Sarbaum *

Department of Economics, Joseph M. Bryan School of Business and Economics, University of North Carolina at Greensboro, Greensboro, NC, United States

The *Wall Street Journal* recently noted that United States "employers say too many schools aren't teaching students the skills they need—or even basic critical thinking". This paper 1) motives the need for economics and other college educators to i) address study habits in the classroom, (ii) explain the importance of critical thinking skills, and (iii) define what critical thinking is to introductory students; and 2) provides an overview of how the authors accomplish this in their classrooms. The authors encourage readers to borrow this information to create a study skills and critical thinking module for their own students when teaching principles courses.

Keywords: study skills, critical thinking, pedagogy, teaching economics, learning theory

OPEN ACCESS

Edited by:
Ana Teresa Ferreira Oliveira, Instituto Politécnico de Viana do Castelo, Portugal

Reviewed by:
Rohmani Indah, Universitas Islam Negeri Maulana Malik Ibrahim, Indonesia
Sónia Brandão, Polytechnic Institute of Viana do Castelo, Portugal

***Correspondence:**
Jeffrey Sarbaum
jksarbau@uncg.edu

Specialty section:
This article was submitted to Higher Education, a section of the journal Frontiers in Education

Received: *03 September 2021*
Accepted: *05 January 2022*
Published: *02 February 2022*

Citation:
Howard E and Sarbaum J (2022) Addressing Study Skills, Learning Theory and Critical Thinking Skills in Principles of Economics Courses. Front. Educ. 7:770464. doi: 10.3389/feduc.2022.770464

INTRODUCTION

The *Wall Street Journal* recently noted that United States "employers say too many schools aren't teaching students the skills they need—or even basic critical thinking" (Belkin, 2018). While a recent meta-analysis found "that students make substantial gains in critical thinking during college," the study's authors went on to note that "observed gains in critical thinking appear to have deteriorated over time. . ." (Huber and Kuncel, 2016, p. 456). A survey of 202 departments of economics ranked "the ability to use critical thinking skills" first in a list of the ten most important student learning outcomes (Allgood et al., 2015, p. 290). In a recent survey of the literature on 21st century skill frameworks, sixteen articles were identified with "problem solving" or "critical thinking" skills being prioritized ten or nine times respectively out of the 16 frameworks reviewed (Rios et al., 2020). The study's authors went on to analyze 142,000 job advertisements and found "problem solving" to be the fourth most requested skill, behind oral communication, written communication, and collaboration (Rios et al., 2020). If "critical economic thinking" is defined as "effective, high-quality problem solving" (Leyden, 2012, p. 2), how can economics educators promote this skill development?

The goal of this paper is twofold: First, to motive the need for a study habits and critical thinking skills intervention by economics educators; second, to provide set of resources and research to present to students the first week of class to aid in the development of study habit and critical thinking skills.

The paper is divided into four additional sections. Section 2 provides broader motivation by reviewing the larger literature on the need, in fact, the demand among employers for graduates better equipped in critical thinking and problem-solving skills. Section 3 discuss the results of a survey on study habits conducted by the authors. Section 4 outlines the materials presented to students to promoted better studying and critical thinking skills. Finally, Section 5 provides concluding remarks.

STUDY SKILLS, LEARNING, AND THE DEMAND FOR CRITICAL THINKING

A meta-analysis of studies (N = 72,431, k = 344) examining the relationship between study habits, skills, and attitude inventories and constructs and college outcomes, found that "study habits and attitude inventories are the most predictive of performance," even when compared to a student's high school grades or standardized test scores (Credé and Kuncel, 2008). A more recent comprehensive review of the literature on study skills and their efficacy revealed that distributed practice, self-explanation, and interleaved practice, techniques often used by instructors when developing critical thinking skills, demonstrated either "high" or "moderate utility" in improving student learning across a wide range of class and student factors (Dunlosky et al., 2013). On the other hand, "summarization, highlighting, the keyword mnemonic, imagery use for text learning, and rereading" exhibited the lowest utility and were found to not consistently promote student learning (Dunlosky et al., 2013, p. 5). In other words, when study habits move away from memorization toward active problem solving, content connections, and application, learning efficacy and the development of critical thinking skills improve.

What types of study skills do students actually employ while in college? Course Hero, an online learning platform, has recently provided some informal data on their users' study habits. More than half of Course Hero users do most of their studying Monday through Wednesday and approximately 25–28 percent of their users studying takes place between 9 PM and 5 AM (Course Hero, 2019). Research has consistently shown that sleep deprivation leads to poorer learning outcomes (Doyle and Zakrajsek, 2018; Ro, 2018). Several recent studies have found that students are likely to use ineffective study habits (Nonis and Hudson, 2010; Hora and Oleson, 2017; Miyatsu et al., 2017). The National Survey of Student Engagement (NSSE), based at the Indiana University Bloomington School of Education, provides one of the most comprehensive surveys, including 531 colleges and university in the United States The NSSE survey finds that while students in 2019 are spending more time in academic preparation compared to students in 2004, there has been a decline in this preparation the last few years.

Elaborating on Huber and Kuncel's previously mentioned work, which found that students make substantial gains in critical thinking during college, but that "the observed gains in critical thinking appear to have deteriorated over time despite increased interest in fostering critical thinking skills" (2016, p. 456), Huber and Kuncel offer three potential explanations for the deterioration in the observed gains among students: 1), if "students have increasingly learned more critical thinking skills before entering college…(then)…overall gain scores should be reduced"; 2), with college enrollment increasing over time "many new students (who were previously not in the college cohort) may not be sufficiently prepared to learn more complex reasoning skills (pulling gain scores down)"; and 3), "students have become less willing or able to learn critical thinking skills over time" (2016, p. 457). Even if 1) or 2), the most encouraging potential explanations, is the reason for the college gains decline, neither resolves the fact the employers consistently report a lack of critical thinking skills in college graduates.

A recent study by the Educational Testing Service (ETS) identified what they have described as a "paradox" among Millennials, those born between 1981–1996 (Dimock, 2019), regarding their educational attainment and their corresponding achievement on several international assessments. While the Millennials are "on track to be our most educated generation ever… they consistently score below many of their international peers in literacy, numeracy, and problem solving in technology- rich environments" (Goodman et al., 2015, p. 4). Using data from the Organization for Economic Co-operation and Development (OECD) and their Programme for the International Assessment of Adult Competencies (PIAAC) survey "of nationally representative samples of adults age 16 to 65", the ETS study reported "[i]n literacy, United States millennials scored lower than 15 of the 22 participating countries" (Goodman et al., 2015, p. 4, 5, Figure 1). The ETS report closes their executive summary by noting "despite investments and reforms in K-12 education over the past decades, America continues to lose ground in terms of the developed skills of its adult population and workforce" (Goodman et al., 2015, p. 5).

Evidence of the issues highlighted in the ETS report are already making themselves felt among some sectors of the American labor market. A recent *Wall Street Journal* article found that while ever increasing numbers of students are entering and completing four-year degrees, incentivized by federal education policy and assisted with student loan subsidization, however, "technology is changing faster than colleges can keep up and employers say too many schools aren't teaching students the skills they need—or even basic critical thinking" (Belkin, 2018). This has led to an increasing demand among United States employers for specific skills over four-year degrees and to heavier investments by employers, such as AT&T which spent over $1 billion dollars to retrain approximately 100,000 employees, to meet the increasing demands of the labor market, especially in the manufacturing, technology and health-care industries (Belkin, 2018). And even more recently *Inside Higher Ed* reported that "75 percent of employers claim the students they hire after 12, 16 or more years of formal education lack the ability to think critically and solve problems" (Haber, 2020).

Acknowledging the importance of critical thinking skills to the labor market and the larger economy is one thing but defining exactly what is meant by "critical thinking" is quite another. As one group of economists have noted, critical thinking is often "not well defined" and in economics there has been "relatively little" published on this topic, despite the fact that we often strive to emphasize "the economic way of thinking" in many of our principles courses (Greenlaw and DeLoach, 2003, p. 36). Leyden (2012), in his book dedicated to developing critical thinking in economics, describes it as "all about effective, high-quality problem solving" (Leyden, 2012, p. 2). Mulnix (2012) provides a review of several definitions of critical thinking and then arrives at the following for what she feels is the preferred description of the "critical thinker":

This suggests that the fundamental skill to be acquired by a critical thinker is the ability to recognize inferential connections

holding between statements, where this would include the ability to understand the possibility that what we believe might be false and the ability to identify the sorts of evidence that would undermine our beliefs (Mulnix, 2012, p. 474).

Students that have an adequate understanding of critical thinking and can successfully employ those skills can improve their learning outcomes (Abrami, et al., 2015; Huber and Kuncel, 2016). However, as just reviewed, the larger literature indicates that students are not always ready and/or prepared to develop those skills at the post-secondary level (Pithers and Soden, 2000; Huber and Kuncel, 2016). Further, while economists recognize the importance of critical thinking skills for student learning (Allgood et al., 2015, p. 290), there is relatively little literature on the topic among economists. A recent review of the literature only identified 13 citations (see Allgood et al., 2015) dealing with "active learning" in economics (Boyle and Goffe, 2018).

While many students believe to overcome poor performance they just need to study more, research suggests that study time alone will not necessarily lead to improved learning (Nonis and Hudson, 2010; Chew, 2011; Doyle and Zakrajsek, 2018). Furthermore, many students leave exams believing they did well when this is not the case. Ambrose et al. (2010, pp. 4–6) identifies seven research-based principles to improve learning in their book *How Learning Works*:

1. Prior knowledge
2. How students organize knowledge
3. Motivation
4. Skill acquisition, interpretive practice, and appropriate application
5. Goal-directed practice
6. Level of student development and climate of the course
7. Self-directed learning, including an emphasis on meta-cognition

Without students, or educators, understanding how learning works, what critical thinking is, and what study skills are most effective, it is rather fanciful to believe students will successfully develop the critical thinking skills economics educators rank as the most important learning outcome, and that employers demand. As some recent research has demonstrated, "elements of critical thinking need to be taught *explicitly*, rather than assumed to come along for the ride when thoughtful teachers run through complex material with students" (emphasis original; Haber, 2020). The next sections of this paper provide results from study habits questions posed to students in the authors classes; followed by an example of a set of resources the authors go over in class and assign to students to help prepare them to be able to learn more effectively and think more critically.

STUDENT STUDY HABITS QUESTIONNAIRE

At the beginning of the Spring 2020 semester, the authors administered a survey to students (n~285) enrolled in their principles of micro and macroeconomics courses asking about their study habits. Some good news bad news patterns emerged. While 62% of the students reported taking notes when reading the textbook half of the time or more, only 8% reported that they always read the textbook. While 95% of the students reported taking notes in class half of the time or more, only 5% reported that they always rewrite their notes at some point after class. While 76% of the students reported studying "really hard" the night before an exam always or most of the time, only 19% reported always studying at least three days prior to an exam.

Lastly, when asked what the most important factor in successful learning is, 87% of the students reported "learning in a way that matches your learning style" or "the intention and desire to learn", while only 13% reported "Paying close attention to the material as you study" or "the time you spend studying", and less than 0.5% reported "What you think about while you study". The response to this question is of particular importance because a wide body of literature has shown that matching learning style does not correlate with gains in learning (Pashler et al., 2008; Willingham et al., 2015). And while having an intention and desire to learn is a commendable goal, it is of limited value unless time is spent studying and paying attention while doing so. In fact, of the answer choices, the single most important determinant of learning is "what you think about while studying" (Hyde and Jenkins, 1969; see also; Chew, 2011). **Table 1** provides further details of the survey results.

The conclusion from the survey is that a majority of students in the authors classes may be unaware of, or discount, behaviors that translate into successful learning and the development of critical thinking skills.

A CLASSROOM STUDY SKILLS AND LEARNING MODULE

The authors propose educators of introductory economics classes address the topic of study skills, learning theory, and critical thinking head on inside their own classrooms. What follow is a description of the resources, content, and approach the authors take.

The first week of classes, a class meeting is devoted to the topics of studying, learning, and the value of critical thinking. This not only brings awareness of the issue to students, but helps the instructor create a framework for understanding and allows students to organize the information into new learning habits to draw from (Ambrose et al., 2010). During the class a presentation of the following materials is given:

- What does it mean to study and how should you study? A casual conversation with the class to see what they think and to give students an opportunity to hear from and discuss with their peers.
- Some facts about studying and learning
  - o If you want deeper comprehension of materials print might be better than digital (Alexander and Singer, 2017).
  - o If you take longhand notes, review them, and focus on core concepts, you learn more and perform better on exams (Carter et al., 2017; Morehead et al., 2019).

TABLE 1 | Student survey results.

I Read the textbook (*n* = 309)		**I Take notes from the textbook while I read it (n = 296)**	
Always	8.41%	Always	20.95%
Most of the time	31.39%	Most of the time	27.70%
About half the time	24.27%	About half the time	13.51%
Sometimes	25.89%	Sometimes	27.70%
Never	10.03%	Never	10.14%
I take notes during class lectures (*n* = 289)		**I rewrite my class notes so that they make sense to me at some point after class (*n* = 290)**	
Always	60.55%	Always	4.83%
Most of the time	27.34%	Most of the time	15.52%
About half the time	7.27%	About half the time	13.10%
Sometimes	3.81%	Sometimes	27.24%
Never	1.04%	Never	39.31%
The night before an exam I study really hard (*n* = 287)		**I begin studying for an exam at least three days before (*n* = 283)**	
Always	47.39%	Always	18.73%
Most of the time	28.92%	Most of the time	31.10%
About half the time	11.15%	About half the time	22.26%
Sometimes	11.15%	Sometimes	21.55%
Never	1.39%	Never	6.36%
What is the most important factor in successful learning? (*n* = 278)			
The intention and desire to learn	47.84%		
Paying close attention to the material as you study	9.35%		
Learning in a way that matches your learning style	39.21%		
The time you spend studying	3.24%		
What you think about while you study	0.36%		

  - o If you cram and don't get an adequate amount of sleep you impede your ability learn, manipulate, and even recall information (Doyle and Zakrajsek, 2018; Ro, 2018).
  - o If you incorporate effect study skills you can spend less time studying and get better results, while matching your learning style doesn't help but what you think about while studying certainly does (Chew, 2011; Willingham et al., 2015).
  - o If you use critical thinking skills in college you will learn more and have better grades (Huber and Kuncel, 2016).
- How learning works –A quick walk through and explanation of Ambrose's seven points on how learning works is provided, with a particular focus on how the elements of the course relate to these principles of learning (Ambrose et al., 2010; Chew, 2011).
- What is critical thinking?—The meaning of the definitions from Leyden and Mulnix are explored, followed by a conversation that asks students why they think critical thinking is important (Leyden, 2012; Mulnix, 2012).
- What are cognitive and non-cognitive skills? The authors explain to students that "30–40 percent of the explained variance in achievement test scores across students is due to personality traits and not IQ" (Heckman et al., 2013, p. 2056). Soft skills matter (Jackson, 2014; Jackson, 2018).
- Why does all of this matter? The students are engaged in a discussion of The *WSJ* quote (Belkin, 2018), the ETS study on skill development (Goodman et al., 2015), and that employers want critical thinking and problem-solving skills (Chanler, et al., 2019; Heckman et al., 2019; Johanns, 2019; Rios, et al., 2020).

Prior to the next class meeting, students are directed to watch a series of six videos on "How to Study" (~36 min in total) developed by Samford University cognitive psychologist Stephen Chew (see Chew, 2011) the titles for which are:

- Beliefs That Make You Fail. . .Or Succeed
- What Students Should Understand About How People Learn
- Cognitive Principles for Optimizing Learning
- Putting the Principles for Optimizing Learning into Practice
- I Blew the Exam, Now What?

Chew's videos review much of the material introduced in the classroom discussion and further expand the material by

practically demonstrating how students can apply the findings from cognitive science to their class through best practices regarding note take, reading, studying for exams and how to move forward when not performing poorly on tests. Upon completing the video series, students are assigned an unlimited attempts multiple-choice assessment to enable them to correctly uncover the key point(s) of each video. The scores on the assessment were close to 100%, suggesting nearly every student took the attempts necessary to identify the main points. **Table 2** lists the questions that were asked. The next class, a brief review of the videos occurs and students are encouraged to integrate what they have learned into their own study plans.

While the authors do not formally assess the impact of their module, research has consistently demonstrated that targeted instruction can be effective in changing student study skills as long as the material is in context, within the content domain, and promotes active learning and metacognitive awareness (Hattie et al., 1996; Dunlosky et al., 2013; Miyatsu et al., 2017).

TABLE 2 | How to study videos follow-up questions.

Video 1: Beliefs That Make You Fail. . .Or Succeed (6:53)

1. All students base their study behavior on _____.
   a. the best available research
   b. their beliefs about how they learn best *
   c. their peers' study habits
   d. All the above are correct
2. To truly comprehend course material, you should _____.
   a. Highlight and memorize
   b. Quickly read and highlight
   c. Skim and memorize
   d. Carefully read and review
3. The problem with focusing on isolated facts, such as definitions of key terms, is that:
   a. You may not cover all of the course material
   b. You may get the definition incorrect
   c. You may not be able to apply the concept[a]*
   d. You may neglect reading all the course material
4. Academic success is much more a matter of _____.
   a. Hard work and time *
   b. Inborn talent
   c. Natural gifting
   d. Identifying your learning style
5. The research evidence is overwhelming that:
   a. Learning styles improve learning
   b. Most students can multitask to improve learning if they utilize technology to study
   c. The amount of time you spend studying depends on the subject
   d. We are bad at multitasking, especially for tasks requiring concentration and effort *
6. One of the key differences between successful and struggling students is:
   a. Learning styles, how you receive the content you are trying to learn
   b. Metacognition, your awareness of your level of understanding of the content *
   c. Velocity, the speed with which you can process and memorize the content
   d. None of the answers are correct

Video 2, Video 2: What Students Should Understand About How People Learn (7:15)

1. What is the most important factor in successful learning?
   a. The intention and desire to learn
   b. Paying close attention to the material as you study
   c. Learning in a way that matches your own learning style
   d. The time you spend studying
   e. What you think about while you study *
2. In the video Professor Stephen Chew discussed the research by psychologists Thomas S. Hyde and James J. Jenkins (1923-2012) which examined learning through testing subjects' ability to recall a series of 24 words. What was the main finding of the study according to Professor Chew?
   a. The group looking for the letter "e" had the best word recall rates
   b. The group evaluating how pleasant a word was to them had the best word recall rates *
   c. The control group, which tried to learn the words as best they could, had the best word recall rates
   d. The subjects that were intentional, regardless of their group, had the best word recall rates
3. All of the following do not help learning except:
   a. Motivation to learn
   b. Amount of time studied with shallow processing
   c. Amount of time studied with deep processing *
   d. Memorization of isolated facts
   e. Learning styles
   f. Multi-tasking

(Continued on following page)

TABLE 2 | (*Continued*) How to study videos follow-up questions.

4. All of the following do help learning except:
   a. Minimizing distractions; maximizing focus
   b. Developing accurate metacognition
   c. Deep, appropriate processing of critical concepts
   d. Practicing retrieval and application
   e. All of the answers are correct *

Video 3: Cognitive Principles for Optimizing Learning (5:45)

1. If you are highly motivated to learn and utilize memorization you will learn more than if you used another strategy to learn.
   a. False *
   b. True
2. Principles for achieving deep processing include all of the following except:
   a. Elaboration
   b. Distinctiveness
   c. Personal experience
   d. Appropriate retrieval and application
   e. Intentionality *
3. An example of elaboration would be:
   a. How does this concept relate to other concepts? *
   b. How is this concept different from other concepts?
   c. How can I relate this concept to my personal experience?
   d. How am I expected to use or apply this concept?
4. An example of automaticity would be:
   a. Driving a familiar route where you arrive at your destination without thinking about it *
   b. Your ability to learn in a specific way, such as being a verbal or visual learner
   c. Your awareness of your level of understanding of the course content
   d. None of these are examples of automaticity
5. Adopting some or all of these cognitive principles for optimizing your learning _____.
   a. is relatively easy for most students and takes little time
   b. is impossible for most students to achieve
   c. is a process of ongoing improvement over time *
   d. is a function of your dominant learning style
6. The advantages of overlearning information include:
   a. Prevent forgetting and making recall fast and easy *
   b. Aiding memorization and intentionality
   c. Prevent studying material in a learning style that is not your dominant one
   d. Aiding multi-tasking and your ability to skim texts better

Video 4: Putting the Principles for Optimizing Learning into Practice (9:16)

1. Good study strategies focus on _____.
   a. Comprehension and implications *
   b. Memorization and intentionality
   c. Specific information and memorization
   d. Highlighting and definitions
2. Professor Chew outlined three research-based study strategies that include all of the following except:
   a. Question generation
   b. Creating a concept map
   c. Practice retrieving the information in the way the teacher expects
   d. Memorization of definitions and key concepts *
3. Taking notes in class _____.
   a. provides a key summary of concepts, creates a set of memory cues, and engages you in the class *
   b. should be done via laptop or tablet device so you can capture all of the information, minimizes distractions, and maximizes student engagement
   c. only engages the student in shallow processing so students should use laptops and tablet devices
   d. provides a comprehensive summary of concepts, increases intentionality, and engages you in the class only if the student takes notes electronically
4. Keys to effectively taking notes include all of the following except:
   a. Get missed information right away
   b. Consider recording the lecture
   c. Borrowing notes in place of attending class *
   d. Actively organize and review notes
5. The key to deep processing while reading a textbook includes _____.
   a. Highlighting portions of the text for definitions and specific information
   b. Highlighting portions of the text for connections, distinctions and applications *
   c. Highlighting portions of the text as completely as possible so you can review it later
   d. Highlighting portions of the text using multiple colors to differentiate key concepts making sure you have most of the text covered in at least one color
6. Good highlighting requires _____.
   a. rereading and reviewing, which can be slow and effortful *
   b. extensive highlighting to minimize review time and effort
   c. selective highlighting of key terms and definitions to reduce effort and time

(Continued on following page)

TABLE 2 | (*Continued*) How to study videos follow-up questions.

d. including as much text as possible and if done correctly will not require reviewing
7. Rules of effective group study include all of the following except:
a. Set a goal and agenda
b. Set conditions for participation
c. Keep ultimate goal of learning in mind
d. Everyone can ask/answer questions
e. The group facilitator can express the group's understanding *

Video 5: "I Blew the Exam, Now What?" (7:28)

1. According to Professor Chew if students do poorly on an exam, they should first panic and then go into denial.
a. True
b. False *
2. Professor Chew identified five things that students should do if they "blew the exam". These include all the following except:
a. Reviewing your preparation
b. Comparing your errors on the exam with your note taking
c. Recopying notes without considering connections *
d. Discuss your performance with your professor
e. Develop a plan for improving your performance
3. Helpful strategies to raise your grade include all the following except:
a. Commit time and effort
b. Minimize distractions
c. Attend class
d. Space out study time, avoid cramming, and maximize review time
e. Don't give away points by failing to follow directions or skipping assignments
f. Develop a program of memorization of key definitions *

*Denotes the correct answer choice

CONCLUSION

There is a growing body of literature in economics where scholars are attempting to incorporate the findings from the cognitive and learning sciences to improve learning outcomes. This paper attempted to identify the issues involved, provide an overview of the broader literature, and describe how the authors have attempted to develop a classroom response. While it recognized that the introduction of a study skill module takes up valuable classroom time, how can a student become a better critical thinker if he or she does not have a basic understanding of effective study skills, how learning works, and what critical thinking is? On these grounds, the introduction of such a module is a most valuable use of classroom time. The authors encourage other educators to develop their own study skills and learning theory module based in part, or in whole, on the information and resources discussed in this paper.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

AUTHOR CONTRIBUTIONS

JS—Survey design, analysis, writing (50%) EH—Literature review, writing (50%)

REFERENCES

Abrami, P. C., Bernard, R. M., Borokhovski, E., Waddington, D. I., Wade, C. A., and Persson, T. (2015). Strategies for Teaching Students to Think Critically. *Rev. Educ. Res.* 85 (2), 275–314. doi:10.3102/0034654314551063

Alexander, P. A., and Singer, L. M. (2017). A New Study Shows that Students Learn Way More Effectively from Print Textbooks Than Screens. Retrieved from: http://www.businessinsider.com/students-learning-education-print-textbooks-screens-study-2017-10 (Accessed January 10, 2018).

Allgood, S., Walstad, W. B., and Siegfried, J. J. (2015). Research on Teaching Economics to Undergraduates. *J. Econ. Lit.* 53 (2), 285–325. doi:10.1257/jel.53.2.285

Ambrose, S. A., Bridges, M. W., DiPietro, M., Lovett, M. C., and Norman, M. K. (2010). *How Learning Works: Seven Research-Based Principles for Smart Teaching*. San Francisco, CA: Jossey-Bass.

Belkin, D. (2018). More Companies Teach Workers what Colleges Don't. Retrieved from: https://www.wsj.com/articles/more-companies-teach-workers-what-colleges-don't-1521727200 (Accessed August 20, 2018).

Boyle, A., and Goffe, W. L. (2018). Beyond the Flipped Class: The Impact of Research-Based Teaching Methods in a Macroeconomics Principles Class. *AEA Pap. Proc.* 108, 297–301. doi:10.1257/pandp.20181052

Carter, S. P., Greenberg, K., and Walker, M. S. (2017). The Impact of Computer Usage on Academic Performance: Evidence from a Randomized Trial at the United States Military Academy. *Econ. Edu. Rev.* 56, 118–132. doi:10.1016/j.econedurev.2016.12.005

Chanler, M., Dye, C., Coppinger, C., Nieh, G., Maris, T., Keyser, B., et al. (2019). *2019 Global talent Trends*. Sunnyvale, CA: LinkedIn Talent Solutions. Available at: https://app.box.com/s/c5scskbsz9q6lb0hqb7euqeb4fr8m0bl/file/388525098383 (Accessed May 28, 2019).

Chew, S. L. (2011). How to Study. Retrieved from: https://www.samford.edu/departments/academic-success-center/how-to-study (Accessed August 19, 2015).

Course Hero (2019). RESEARCH: 2019 College Study Habits. Retrieved from: https://www.coursehero.com/blog/college-study-habits/ (Accessed January 10, 2020).

Credé, M., and Kuncel, N. R. (2008). Study Habits, Skills, and Attitudes: The Third Pillar Supporting Collegiate Academic Performance. *Perspect. Psychol. Sci.* 3 (6), 425–453. doi:10.1111/j.1745-6924.2008.00089.x

Dimock, M. (2019). Defining Generations: Where Millennials End and Generation Z Begins. Retrieved from: https://www.pewresearch.org/fact-tank/2019/01/17/where-millennials-end-and-generation-z-begins/ (Accessed May 23, 2019).

Doyle, T., and Zakrajsek, T. D. (2018). *The New Science of Learning: How to Learn in harmony with Your Brain*. 2nd ed. Sterling, VA: Stylus Publishing.

Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., and Willingham, D. T. (2013). Improving Students' Learning with Effective Learning Techniques: Promising Directions from Cognitive and Educational Psychology. *Psychol. Sci. Public Interest* 14 (1), 4–58. doi:10.1177/1529100612453266

Goodman, M. J., Sands, A. M., and Coley, R. J. (2015). *America's Skills challenge: Millennials and the Future*. Princeton, NJ: Educational Testing Service. Available at: https://www.ets.org/s/research/29836/ (Accessed January 10, 2020).

Greenlaw, S. A., and DeLoach, S. B. (2003). Teaching Critical Thinking with Electronic Discussion. *J. Econ. Edu.* 34 (1), 36–52. doi:10.1080/00220480309595199

Haber, J. (2020). It's Time to Get Serious about Teaching Critical Thinking. Retrieved from: https://www.insidehighered.com/views/2020/03/02/teaching-students-think-critically-opinion (Accessed November 12, 2020).

Hattie, J., Biggs, J., and Purdie, N. (1996). Effects of Learning Skills Interventions on Student Learning: A Meta-Analysis. *Rev. Educ. Res.* 66 (2), 99–136. doi:10.3102/00346543066002099

Heckman, J., Pinto, R., and Savelyev, P. (2013). Understanding the Mechanisms through Which an Influential Early Childhood Program Boosted Adult Outcomes. *Am. Econ. Rev.* 103 (6), 2052–2086. doi:10.1257/aer.103.6.2052

Heckman, J. J., Jagelka, T., and Kautz, T. D. (2019). *Some Contributions of Economics to the Study of Personality*. NBER Working Paper No. 26459. Cambridge, MA: National Bureau of Economic Research. Available at: https://www.nber.org/papers/w26459 (Accessed January 10, 2020).

Hora, M. T., and Oleson, A. K. (2017). Examining Study Habits in Undergraduate STEM Courses from a Situative Perspective. *IJ STEM Ed.* 4 (1), 1. doi:10.1186/s40594-017-0055-6

Huber, C. R., and Kuncel, N. R. (2016). Does College Teach Critical Thinking? A Meta-Analysis. *Rev. Educ. Res.* 86 (2), 431–468. doi:10.3102/0034654315605917

Hyde, T. S., and Jenkins, J. J. (1969). Differential Effects of Incidental Tasks on the Organization of Recall of a List of Highly Associated Words. *J. Exp. Psychol.* 82 (3), 472–481. doi:10.1037/h0028372

Jackson, C. K. (2014). *Non-Cognitive Ability, Test Scores, and Teacher Quality: Evidence from 9th Grade Teachers in North Carolina*. NBER Working Paper No. 18624. Cambridge, MA: National Bureau of Economic Research.

Jackson, C. K. (2018). What Do Test Scores Miss? the Importance of Teacher Effects on Non–Test Score Outcomes. *J. Polit. Economy* 126 (5), 2072–2107. doi:10.3386/w22226

Johanns, K. (2019). Master These 5 In-Demand Soft Skills Employers Are Seeking. Retrieved from: https://jobs.washingtonpost.com/article/master-these-5-in-demand-soft-skills-employers-are-seeking/ (Accessed January 10, 2020).

Leyden, D. P. (2012). *Critical Thinking in Economics*. 2nd ed. Matthews, NC: Kona Publishing and Media Group.

Miyatsu, T., Nguyen, K., and McDaniel, M. A. (2017). Five Popular Study Strategies: Their Pitfalls and Optimal Implementations. *Perspect. Psychol. Sci.* 13 (3), 390–407. doi:10.1177/1745691617710510

Morehead, K., Dunlosky, J., and Rawson, K. A. (2019). How Much Mightier Is the Pen Than the Keyboard for Note-Taking? A Replication and Extension of Mueller and Oppenheimer (2014). *Educ. Psychol. Rev.* 31 (3), 753–780. doi:10.1007/s10648-019-09468-2

Mulnix, J. W. (2012). Thinking Critically about Critical Thinking. *Educ. Philos. Theor.* 44 (5), 464–479. doi:10.1111/j.1469-5812.2010.00673.x

Nonis, S. A., and Hudson, G. I. (2010). Performance of College Students: Impact of Study Time and Study Habits. *J. Edu. Business* 85 (4), 229–238. doi:10.1080/08832320903449550

Pashler, H., McDaniel, M., Rohrer, D., and Bjork, R. (2008). Learning Styles: Concepts and Evidence. *Psychol. Sci. Public Interest* 9 (3), 105–119. doi:10.1111/j.1539-6053.2009.01038.x

Pithers, R. T., and Soden, R. (2000). Critical Thinking in Education: A Review. *Educ. Res.* 42 (3), 237–249. doi:10.1080/001318800440579

Rios, J. A., Ling, G., Pugh, R., Becker, D., and Bacall, A. (2020). Identifying Critical 21st-Century Skills for Workplace Success: A Content Analysis of Job Advertisements. *Educ. Res.* 49 (2), 80–89. doi:10.3102/0013189x19890600

Ro, C. (2018). Why Sleep Should Be Every Student's Priority. Retrieved from: http://www.bbc.com/future/story/20180815-why-sleep-should-be-every-students-priority (Accessed May 23, 2019).

Willingham, D. T., Hughes, E. M., and Dobolyi, D. G. (2015). The Scientific Status of Learning Styles Theories. *Teach. Psychol.* 42 (3), 266–271. doi:10.1177/0098628315589505

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Volume 7 - 2022 | https://doi.org/10.3389/feduc.2022.770464

View all 22 Articles >

Addressing Study Skills, Learning Theory and Critical Thinking Skills in Principles of Economics Courses

Eric Howard and Jeffrey Sarbaum*

Department of Economics, Joseph M. Bryan School of Business and Economics, University of North Carolina at Greensboro, Greensboro, NC, United States

The *Wall Street Journal* recently noted that United States "employers say too many schools aren't teaching students the skills they need—or even basic critical thinking". This paper 1) motives the need for economics and other college educators to i) address study habits in the classroom, (ii) explain the importance of critical thinking skills, and (iii) define what critical thinking is to introductory students; and 2) provides an overview of how the authors accomplish this in their classrooms. The authors encourage readers to borrow this information to create a study skills and critical thinking module for their own students when teaching principles courses.

Introduction

The *Wall Street Journal* recently noted that United States "employers say too many schools aren't teaching students the skills they need—or even basic critical thinking" (Belkin, 2018). While a recent meta-analysis

Source details

Frontiers in Education

Open Access

Scopus coverage years: from 2016 to Present

Publisher: Frontiers Media S.A.

E-ISSN: 2504-284X

Subject area: Social Sciences: Education

Source type: Journal

CiteScore 2021
2.0

SJR 2021
0.579

SNIP 2021
1.337

View all documents > | Set document alert | Save to source list | Source Homepage

CiteScore | CiteScore rank & trend | Scopus content coverage

¡ Improved CiteScore methodology

CiteScore 2021 counts the citations received in 2018-2021 to articles, reviews, conference papers, book chapters and data papers published in 2018-2021, and divides this by the number of publications published in 2018-2021. Learn more >

CiteScore 2021

$$2.0 = \frac{2{,}075 \text{ Citations } 2018 - 2021}{1{,}058 \text{ Documents } 2018 - 2021}$$

Calculated on 05 May, 2022

CiteScoreTracker 2022

$$2.3 = \frac{4{,}499 \text{ Citations to date}}{1{,}939 \text{ Documents to date}}$$

Last updated on 05 April, 2023 • Updated monthly

CiteScore rank 2021

Category	Rank	Percentile
Social Sciences └ Education	#594/1406	57th

View CiteScore methodology > | CiteScore FAQ > | Add CiteScore to your site

Frontiers in Education

COUNTRY

Switzerland

Universities and research institutions in Switzerland

Media Ranking in Switzerland

SUBJECT AREA AND CATEGORY

Social Sciences
└Education

PUBLISHER

Frontiers Media S.A.

H-INDEX

19

PUBLICATION TYPE

Journals

ISSN

2504284X

COVERAGE

2016-2021

INFORMATION

Homepage

How to publish in this journal

education.editorial.office@frontiersin.org

SCOPE

Frontiers in Education provides an international, scholarly forum for discussion of research-based approaches to education – particularly to PreK-16 education that leads to the flourishing of all human beings. Education is perhaps the most important human right. Not only is an intellectually stimulating education necessary for the happiness and wellbeing of the individual, it is also necessary for the progressive, democratic future of every society. As a field, Education faces multiple challenges and opportunities that are contextually specific to each setting. Students and instructors can face discrimination and limited access to opportunities based on individual markers such as race, gender, socio-economic status, language, LGBTQIA issues, religious affiliation, and cognitive and/or physical ability and so on. State and regional conditions of violence and political conflict profoundly affect education.

Quartiles

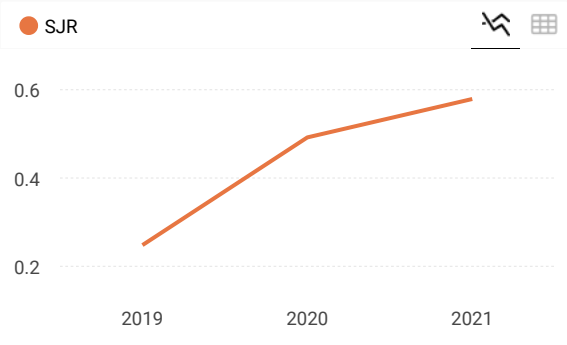
FIND SIMILAR JOURNALS

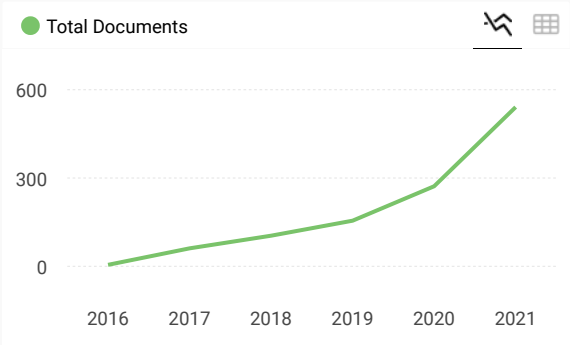
1
Educational Studies
GBR
55%
similarity

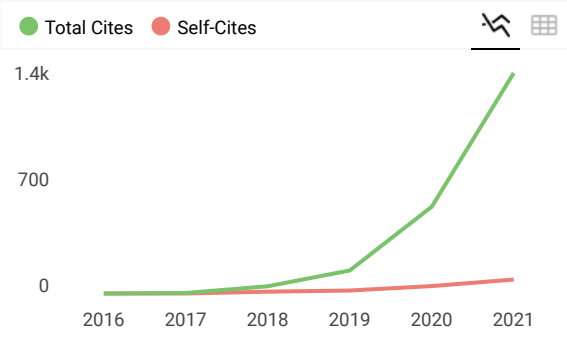
2
Studies in Educational Evaluation
GBR
55%
similarity

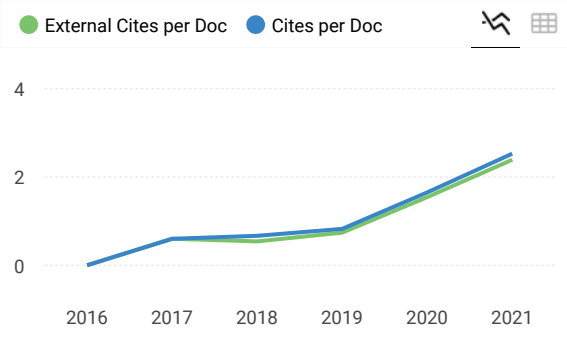
3
International Journal of Educational Research
GBR
53%
similarity

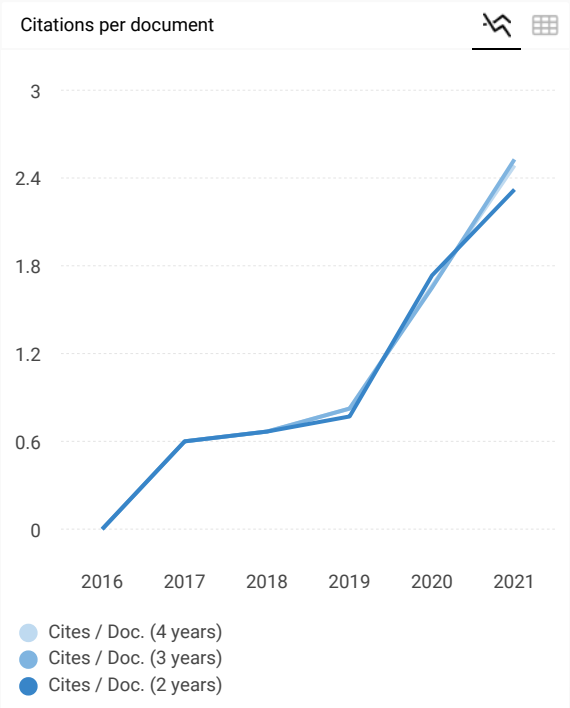
4
Educational
GBR
5
s

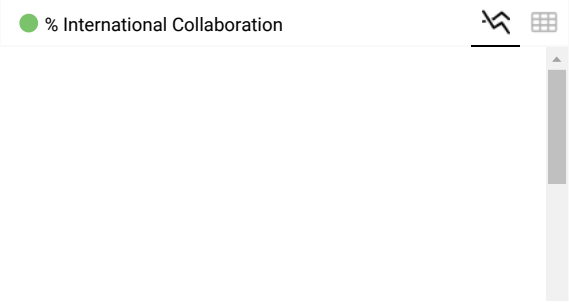


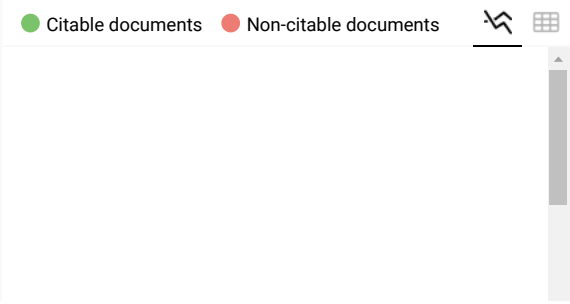


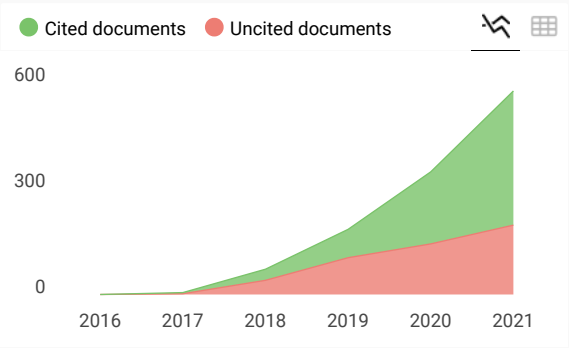












600

← Show this widget in your own website

Just copy the code below and paste within your html code:

<a href="https://www.scimag

SCImago Graphica

Explore, visually communicate and make sense of data with our **new data visualization tool**.

Metrics based on Scopus® data as of April 2022

J **Jeksen** 3 months ago

Hello,
Why this journal COVERAGE 2016-2021? Now it is 2023.
It means this journal no longer in scopus?

reply

SCImago Team

Melanie Ortiz 3 months ago

Dear Jeksen,
Thank you very much for your comment.
All the metadata have been provided by Scopus /Elsevier in their last update sent to SCImago, including the Coverage's period data. The SJR for 2021 was released on 11 May 2022. We suggest you consult the Scopus database directly to see the current index status as SJR is a static image of Scopus, which is changing every day.
The Scopus' update list can also be consulted here:
https://www.elsevier.com/solutions/scopus/how-scopus-works/content
Best Regards, SCImago Team

Akin Bulut 3 months ago

Hi,
Is the journal within 10% quartile in Q1 level?

Southern African Linguistics and Applied Language Studies - Invitation to Review Manuscript ID RALL-2020-0024

1 message

Southern African Linguistics and Applied Language Studies <onbehalfof@manuscriptcentral.com>
Reply-To: ferrifs@unisa.ac.za
To: indah@bsi.uin-malang.ac.id

Thu, May 28, 2020 at 3:06 PM

28-May-2020
Dear Dr Rohmani Nur Indah:

The above manuscript, entitled "Critical Thinking, Frequency , Informal Fallacy and Evidence in Argumentative Writing" has been submitted to Southern African Linguistics and Applied Language Studies.

I would be grateful if you would kindly agree to act as a reviewer for this paper. The abstract appears at the end of this letter.

Please let me know as soon as possible if you will be able to accept my invitation to review. To do this please either click the appropriate link below to automatically register your reply with our online manuscript submission and review system, or e-mail me with your reply.

*** PLEASE NOTE: This is a two-step process. After clicking on the link, you will be directed to a webpage to confirm. ***

Agreed: https://mc.manuscriptcentral.com/rall?URL_MASK=358297a764f44ec9b2218375656a055e

Declined: https://mc.manuscriptcentral.com/rall?URL_MASK=4536a13a3c4b48c4964b25c2b091be59

Unavailable: https://mc.manuscriptcentral.com/rall?URL_MASK=f05dee112bb742a1bfeeca10f8ef8519

Should you accept my invitation to review this manuscript, you will be sent an email with a direct link to the scoresheet, which will be made available to you. You will then have access to the manuscript and reviewer instructions in your Reviewer Center.

If you are unable to review the manuscript, click on the “decline” option to register your response. This will direct you to a screen where you will be given the opportunity to provide details of any alternative reviewers.

I realise that our expert reviewers greatly contribute to the high standards of the Journal, and I thank you for your present and/or future participation.

Sincerely,
Dr Ferris
Southern African Linguistics and Applied Language Studies Editorial Office

MANUSCRIPT DETAILS

TITLE: Critical Thinking, Frequency , Informal Fallacy and Evidence in Argumentative Writing

ABSTRACT:
The present study was an investigation of the relationship between the EFL learners’ critical thinking, the frequency, and types of informal fallacy and evidence in argumentative writing. Few studies have been conducted to investigate these issues. To this end, 356-second grade female senior state high school students in Zanjan/ from 4 senior high schools of Zanjan were selected through multistage cluster random sampling (MCRS) method and based on Cambridge placement test (2010), 130 students proved to be upper-intermediate and participated in this correlational study. The main data collection stage took place for 1 month. Then, the informal fallacies based on Johnson's definitions and four types of evidence categorized in Hoeke and Hustinkx were identified and counted within language learners' argumentative writings. The evaluation of the arguments was also conducted based on Walton, Reed, and Macagno Based on the results achieved from the first research question, there was a significant negative correlation was observed between the participants' critical thinking and the frequency of use of informal fallacies in their written

argumentation. Based on the results achieved from the second research question, there was a potential and significant correlation between the participants' critical thinking and the frequency of use of informal fallacies.

Manuscript ID RALL-2020-0024 is now in your Reviewer Center - Southern African Linguistics and Applied Language Studies

1 message

Southern African Linguistics and Applied Language Studies <onbehalfof@manuscriptcentral.com>
Reply-To: ferrifs@unisa.ac.za
To: indah@bsi.uin-malang.ac.id

Fri, May 29, 2020 at 2:31 PM

29-May-2020

Dear Dr Rohmani Nur Indah:

Thank you for agreeing to review the above manuscript, entitled "Critical Thinking, Frequency , Informal Fallacy and Evidence in Argumentative Writing" for Southern African Linguistics and Applied Language Studies. The deadline for your review is 19-Jun-2020.

You already have an account on the site. To automatically access the manuscript and complete your review, please click on the following link:

https://mc.manuscriptcentral.com/rall?URL_MASK=03f61b500abd4036ae1389816c733f79

On the review page, there is a space for "Comments to Editor" and a space for "Comments to the Author." Please be sure to put your comments to the author in the appropriate space.

If you wish to view the manuscript and the review form simultaneously, click on the HTML or PDF icons – the manuscript will open in a new window. Leave the new window open, switch back to the main window, and open the score sheet by clicking on the Score Sheet tab. Follow the instructions for reviewers provided in the ScholarOne Manuscripts site.

I strongly encourage you to elaborate on your review in the space provided. Your specific comments will offer valuable feedback to improve future work. It is essential that you click the "Save" button if you wish to exit the review before you submit it to the Editor. Otherwise, none of the information that you have entered will be saved in the system. When you have completed your review and are ready to submit it to the Editor, click on "Submit."

All communications regarding this manuscript are privileged. Any conflict of interest, suspicion of duplicate publication, fabrication of data or plagiarism must immediately be reported to me.

Please note, to log into your account on the Southern African Linguistics and Applied Language Studies ScholarOne Manuscripts site at https://mc.manuscriptcentral.com/rall at a later date, your case-sensitive User ID is indah@bsi.uin-malang.ac.id, and your password is https://mc.manuscriptcentral.com/rall?URL_MASK=c90928741e3549839946386c255e53a2.

Thank you for evaluating this manuscript.

Sincerely,
Dr Ferris
Southern African Linguistics and Applied Language Studies Editorial Office
ferrifs@unisa.ac.za

Thank you for submitting your review of Manuscript ID RALL-2020-0024 for Southern African Linguistics and Applied Language Studies

2 messages

Southern African Linguistics and Applied Language Studies <onbehalfof@manuscriptcentral.com>
Reply-To: ferrifs@unisa.ac.za
To: indah@bsi.uin-malang.ac.id

Sat, Jun 13, 2020 at 9:19 AM

12-Jun-2020

Dear Dr Rohmani Nur Indah:

Thank you for reviewing the above manuscript, entitled "Critical Thinking, Frequency , Informal Fallacy and Evidence in Argumentative Writing" for Southern African Linguistics and Applied Language Studies.

We greatly appreciate the voluntary contribution that each reviewer gives to the Journal. We hope that we may continue to seek your assistance with the refereeing process for Southern African Linguistics and Applied Language Studies, and hope also to receive your own research papers that are appropriate to our aims and scope.

Sincerely,
Dr Ferris
Associate Editor, Southern African Linguistics and Applied Language Studies
ferrifs@unisa.ac.za

/.

Rohmani Nur Indah <indah@bsi.uin-malang.ac.id>
To: reviews@webofscience.com

Mon, Jan 16, 2023 at 1:07 PM

WOS_REVIEW_ID:8384521
[Quoted text hidden]

Critical Thinking, Frequency , Informal Fallacy and Evidence in Argumentative Writing

Journal:	*Southern African Linguistics and Applied Language Studies*
Manuscript ID	RALL-2020-0024
Manuscript Type:	Original Article
Keywords:	Argumentative, Writing, Critical, Evidence, Fallacy, thinking
Abstract:	The present study was an investigation of the relationship between the EFL learners' critical thinking, the frequency, and types of informal fallacy and evidence in argumentative writing. Few studies have been conducted to investigate these issues. To this end, 356-second grade female senior state high school students in Zanjan/ from 4 senior high schools of Zanjan were selected through multistage cluster random sampling (MCRS) method and based on Cambridge placement test (2010), 130 students proved to be upper-intermediate and participated in this correlational study. The main data collection stage took place for 1 month. Then, the informal fallacies based on Johnson's definitions and four types of evidence categorized in Hoeke and Hustinkx were identified and counted within language learners' argumentative writings. The evaluation of the arguments was also conducted based on Walton, Reed, and Macagno Based on the results achieved from the first research question, there was a significant negative correlation was observed between the participants' critical thinking and the frequency of use of informal fallacies in their written argumentation. Based on the results achieved from the second research question, there was a potential and significant correlation between the participants' critical thinking and the frequency of use of informal fallacies.

Critical Thinking, Frequency, Informal Fallacy and Evidence in Argumentative Writing

Abstract

The present study was an investigation of the relationship between the EFL learners' critical thinking, the frequency, and types of informal fallacy and evidence in argumentative writing. Few studies have been conducted to investigate these issues. To this end, 356-second grade female senior state high school students in Zanjan/ from 4 senior high schools of Zanjan were selected through multistage cluster random sampling (MCRS) method and based on Cambridge placement test (2010), 130 students proved to be upper-intermediate and participated in this correlational study. The main data collection stage took place for 1 month. Then, the informal fallacies based on Johnson's definitions and four types of evidence categorized in Hoeke and Hustinkx were identified and counted within language learners' argumentative writings. The evaluation of the arguments was also conducted based on Walton, Reed, and Macagno Based on the results achieved from the first research question, there was a significant negative correlation was observed between the participants' critical thinking and the frequency of use of informal fallacies in their written argumentation. Based on the results achieved from the second research question, there was a potential and significant correlation between the participants' critical thinking and the frequency of use of informal fallacies

Keywords: Argumentative Writing, Critical Thinking, Evidence, Informal Fallacy.

Introduction

One of the most significant current discussions in the era of English language teaching and learning is writing instruction that has always been considered as a challenge for language teachers and plays a key role in learning the second or foreign language (Nagpal, 2019). Writing instruction is a reaction to the inner and outside world and development or revelation of several distinct human abilities (Hawkins, 2019). Writing is one of the most important skills that should be taught to the students from the beginning till the end of high school by teachers carefully and the main aim of teaching this skill to the students is to enable them to write many types of writings in English such as report, descriptive, narrative and argumentative, etc. Learning writing skill is very essential for students because an important part of communication is a good writing skill and the students will be able to communicate in English through writing and transfer information, knowledge and their ideas to others (Peterson, 2019).

It is clear that despite personal, social, and cultural differences between people, achieving proficiency in the writing of a foreign language is not an impossible target, but the individual variables will affect the extent of achievement in a different manner (Fishman, Graham, Harris, Houston, Lei, Ray & Wijekumar, 2019). Among these distinguishing variables, one of them which has received less attention especially in EFL contexts is learners' critical thinking (Torff, 2019).

Like the other elements of this study, critical thinking is one of the broad categories of thinking skill and it was considered to be the most important writing skill in argumentative (Yusuf, 2019). Also, students' ability to write argumentatively mainly depends on their critical thinking skills (Aziz, 2019).

Another element of this study was a fallacy. The absence or presence of fallacies and especially informal fallacies is one of the criteria in determining the quality of argumentative writings (de Swart, 2018). The fallacy was characterized by Walton (1991) as a preplanned strategy of misleading argumentation used by one person in a dialogue to 'slip up' another party. Some researches argued that the existence of high-quality argumentations and fallacy-free reasoning are among the major concerns in written discourse (Dufour, 2018; Walton 1992; Žagar, 2018) and in students' written argumentations (Graham & Seiter, 2018; Butler, Barch & Nicker[illegible], 2019; Tindale, 2007) and considered them as very important issues. Previous research demonstrated that students' problems may stem from lack of sound and logical

reasoning and persuasion along with traps such as fallacies of argumentation which at the first sight they may appear logical and convincing but at the second sight they contain mistakes in reasoning (Dufour, 2019). These issues for EFL students become even much more terrible in international proficiency examinations such as GRE and IELTS, as pointed out by the Educational Testing Service center (2009), when students are supposed to utilize essays and employ precise argumentations as an entrenched criterion of evaluation (Ben-Porath, 2019).

And finally, evidence was the last element of this research. Structure-based argumentation enables students to build up their thoughts in a reasonable organization, but this should include analyzing the relevance of the considerable number of components, whether the case is supported soundly by the evidence, to guarantee the general quality of argumentative writing (Malpique & Veiga Simão, 2019; Shi, 2018). Recognizing the significance of utilizing evidence to support one's claim in a satisfactory, applicable and sufficient manner is a fundamental part of judging argumentation (Stucki, 2018; Schlaufer, Stucki & Sager, 2018). Without well-organized evidence, the argumentative writing is circular of different repetitions of the claim without explicit purposes (Zhang, 2018). Good arguments should comprise of true, reliable, and multiple justifications (Duffield & Lauri, 2018). In other words, it is the soundness and validity of the evidence that account for the logic of argumentation (Millwood & Sandoval, 2005). However, studies examining L2 learners' actual use of evidence in writing argumentation are few.

The issue of EFL learners' critical thinking, the frequency, and types of informal fallacy and evidence in argumentative writing have received some interest in research over 20 years ago. However, in the last 5 years, in particular, the topic has rekindled both theoretical and empirical research interest and yet there is no general agreement about the relationship between the EFL learners' critical thinking, the frequency and types of informal fallacy and evidence in argumentative writing and a major problem with all of the past studies is that they have not investigated the positive or negative relationship between the EFL learners' critical thinking, the frequency, and types of informal fallacy and evidence in argumentative writings, while this current research has comprehensively focused on these issues on 130-second grade senior state high school female students in Zanjan/Iran. So far, no one has investigated the relationship between the EFL learners' critical thinking, the frequency and types of informal fallacy and

evidence in argumentative writing on upper-intermediate female students, so these issues brought novelty to the present study.

The purpose of this study was to investigate the relationship between the EFL learners' critical thinking, the frequency and types of informal fallacy and evidence in argumentative writing and the participants of this study were 130-second grade female senior high school students in Zanjan. The goal of this investigation was to answer the following research questions:

1. Is there any significant relationship between EFL learners' critical thinking and their use and types of informal fallacies in their argumentative writing?

2. Is there any significant relationship between EFL learners' critical thinking and their use and types of evidence in their argumentative writing?

Literature review

The Role of Thinking in Writing

Composing writing not only needs good language proficiency but also needs to be critical as the writer examines viewpoints, facts, and arguments and synthesize them. Langan (2013), pointed out that writing is more than a medium of communication. It is a way of remembering and a way of thinking as well. Writing makes words permanent, thus expands the collective memory of human beings from the relatively small store that we can remember. It means that when we write we use our thinking to find the idea while remembering patterns and language.

Ruggiero (1991), stated that writing is not confined to one stage of the composing process. At one stage you will think creatively, producing imaginative ideas or ways of expressing those ideas. At another stage you will think critically, evaluating the results of your creative thinking. In every stage of writing, we use our thinking to create, to investigate and to revise the idea.

Furthermore, writing can improve critical thinking skills. Writing makes you a stronger thinker. Writing reasoned paragraphs requires mental discipline and close attention to the set of logical rules. It will train your mind to think clearly and prove to be a value in every phase of your life. While writing can improve critical thinking, critical thinking is important to produce good writing (Kent 1999).

To sum up, writing is important to improve thinking skills such as critical and creative thinking. In similarity, critical thinking skill is also crucial in composing writing. It is because each process of writing requires some thinking skills. Therefore, without being able to think and also write critically, the writers cannot result in a piece of good writing.

Fallacy

The fallacy is "an error in reasoning" (Johnson, 1998, p. 251). As Johnson states, some fallacies which can be detected "by the examination of the form of the argument" are called formal fallacies while all other fallacies are called informal ones which can be detected "by the examination of the content rather than the form of the argument" (p. 251). Tindale (2007) defined a fallacy as "a particular kind of egregious error" (p. 1). He believes that it undermines the strength of an argument. Here major informal fallacies along with their relevant argumentation schemes and their matching critical questions are presented.

Iranian and international Studies on Critical Thinking, the Frequency, and Types of Informal Fallacy and Evidence in Argumentative Writing

Rahmah, Munir and Anam (2018), in their study about the role of rational application on studying critical thinking skills in argumentative writing, aimed to evaluate innovative ways to teach argumentative writing using electronic learning. This paper will focus on writing skills because through writing students can express their ideas in written form. However, critical thinking skills in the learning process sometimes make it difficult for students to express and produce their ideas in writing, as a result, they are trapped in the process of writing without being critical. Therefore, researchers promote "rational" applications as e-learning media to help students learn concepts, understand the structure of arguments, and develop reasoning skills. This paper uses a qualitative descriptive method to describe how teachers apply rational applications and how students think critically in their argumentative writing assignments. The results showed that rational application provides students not only with greater motivation to write and to involve their creativity in writing argumentative on structural elements in the Toulmin model (1953, 2008). It also explores the overall use of evidence in supporting claims.

It was found that claim and data were the basic structural elements used by Chinese EFL learners in constructing argumentative writing. The respective use of counterargument data and rebuttal was significantly correlated with the quality of argumentation. In argumentative reasoning, the types of evidence and the number of evidence used by participants were very limited. The logical analysis was found to be the most frequently used data to support claims. Less proficient learners' use of evidence was not effective or persuasive to produce valid arguments. The findings provide useful insights into the instruction of argumentative writing for EFL teachers.

Khoiri and Widiati (2017), in their study about Logical Fallacies in Indonesian EFL Learners' Argumentative Writing: Students' Perspectives, identified and discuss logical fallacies in the argumentative writing of Indonesian EFL learners. For this purpose, 40 argumentative essays written by the students of the English Department of the State University of Malang were analyzed. An FGD discussion involving students who participated in the essay writing process was organized following the identification of logical fallacies in their writing. The results of the study showed that students still produced a number of logical fallacies in their work, some of which were very basic they can actually be avoided through simple, explicit instruction.

Methodology

Design of study

This study was a quantitative one as the research analysis used categorical and nonparametric data to test the hypotheses. The participants of this study were 130-second grade senior high school female students in Zanjan which were selected through a multistage cluster random sampling method and correlational design was used in this research.

Participants

The participants of this study were 130-second grade senior high school students in Zanjan. Zanjan province has 8 cities, among these cities, Zanjan city was chosen. Zanjan city consists of two districts that the district one was randomly chosen. In 2019 in district one, there were 420 schools that among them senior high schools were randomly chosen. There were 42 senior high schools in district one that 22 of them were for girls and 20 schools were for boys. Among them state senior high schools were randomly chosen, and 12 senior high schools were for girls. The second level students of 4 senior high schools for girls included: Shahed, Farhikhtegan, Nesa and Hejab senior high schools were randomly chosen. There were 3-second grade classes in each of them and two classes of each were randomly chosen for this study.

The statistical populations of this study were 3492-second grade senior high school students in the first district of Zanjan. According to the Cochran formula, 346 participants were selected and in order to increase the accuracy and to have homogeneous groups, 10 more participants were added and totally of 356 female students participated in this study. Based on the rules of CPT (2010), out of 356 students, 130 students were proved to be upper-intermediate.

Instruments

The following instruments were employed in order to collect the required data for the present study:

Cambridge Placement Test (2010) by Cambridge University Press

California Critical Thinking Skills Test (CCTST)

The Persian Version of California Critical Thinking Skills Test

Writing Task

Pilot Study

California Critical Thinking Skills Test (CCTST) was piloted on 30 upper-intermediate students with similar educational background, in order to obtain the reliability for the tests. To be statistically acceptable, the internal consistency and reliability co-efficient were measured using Cronbach Alpha. The test-retest reliability of these tests with the one-week interval was (α =.82) which showed an acceptable reliability value. For the writing task, five topics were selected from IELTS writing tasks, in order to select the target topic of the study, all of the five topics were piloted by five experienced language instructors and then, based on their comments one topic was adopted. In topic selection, content validity was evaluated using Lawsh CVR (Content Validity Ratio) and CVI (Content Validity Index). Lawsh formula is as follows:

CVR= ((Ne-N÷2))/(N÷2)

According to the Lawsh CVR, an item should gain CVR of higher than 0.42 in order to be validated. The results of the reviewed and validated topics were included in Table 1.

Then CVI of the topics was calculated using Waltz and Bausell (1981). CVI formula is as follows:

CVI= (Number of experts who scored item 3 or 4)/(Total number of experts)

It should be mentioned that the acceptable index of CVI equals 0.79 and if there is a topic with CVI lower than 0.79, the topic should be removed. In other words, a panel of experts determined whether the selected topics are “necessary” to be included in the study based on a 4-point Likert scale. Experts indicated their opinions on each word using 1(It is not necessary), 2 (It is rather necessary), 3 (It is necessary), and 4 (It is completely necessary). The results related to CVI calculations were presented in Table 2.

Procedure

The main data collection stage took place for 1 month, based on the works of previous researchers in the field of critical thinking and argumentative writing. The Cambridge Placement Test was administered to assure the homogeneity regarding the participants' level of proficiency.

In the second stage, the students provided their answers to the excepted items from the California Critical Thinking Skills Test (CCTST) to determine their critical thinking scores. Firstly, the participants were not asked to fill out their real names, but they were asked to choose a nickname and write it on the paper. After that, they were asked to read the direction of the test. The researcher explained the direction of the test and how to answer the test. After the participants were ready, the test was started and the researcher supervised the test took place. The participants had to finish 34 questions of critical thinking test in 50 minutes.

Finally, the writing test was conducted on the same day directly after the participants finished the Critical Thinking Test. they were asked to write their nickname and read the direction. Then, the participants were asked to write an argumentative essay and to discuss their own reasons, with the length of at least 250 words. A word limit was set for the length of their essays and those essays of less than 100-word length were omitted from the sample of the study (20 out of 130 essays). The researchers by the help of the teachers were administered the test in a natural setting as possible to prevent the sensitization of students to the research objectives.

Three main paradigms were used in order to evaluate the argumentation and to identify the informal fallacies and evidence. The techniques of exposing the arguments and methods of identifying the informal fallacies were employed based on Johnson (1998), the techniques of identifying the evidence were employed based on Hoeke and Hustinkx (2003) and finally, evaluation of the arguments was done based on Walton et al. (2010) in which several critical questions accompanying a host of argumentation schemes were presented.

Then, the informal fallacies were identified based on Johnson's (1998) definitions and presented clues. Having identified the informal fallacies, each argument was also evaluated by means of evaluation schemes presented by Walton et al. (2010). Nine categories of informal fallacies that were investigated and counted within language learners' argumentative writings in

this study were: Ad hominem, Appeal to tradition, Begging the question, Faulty analogy, False dichotomy, Hasty generalization, Post hoc, Red herring, and RSA.

Additionally, four types of evidence categorized in Hoeke and Hustinkx (2003) were identified and counted within language learners' argumentative writings including a) Statistical, b) Anecdotal, c) Causal, d) Expert evidence. Anecdotal (or narrative) evidence consists of one case, whereas statistical evidence consists of numerical information about a large number of cases. Causal evidence consists of an explanation, and expert evidence consists of confirmation by an expert.

The argumentation schemes suggested by Walton et al. (2008), however, are more detailed and embrace a compendium of ninety-six schemes. While in Johnson, R.M.' model (1998), one should rely on the evaluation direction justifications to pick up an informal fallacy in the argument, Walton et al.'s model, by providing critical questions, helps the analyst to proceed step by step through answering the questions that include all possible ways the given argument could be considered as a valid argument and fallacy-free, or include a potential fallacy.Besides, in Walton et.al's (ibid) model, each argument may have different forms; hence, to pick up the related fallacy, one should go through all different related schemes. To ensure the reliability of the data coding, a third analyst worked on half of the samples selected randomly and analyzed the arguments based on the steps provided above. If there was any disagreement in the mentioned steps between the three analysts, the data would be reconsidered until an agreement was achieved.

Moreover, to improve the reliability of the evaluation and identification procedure, another rater (an ELT professor) was asked to check the identified informal fallacies and evidence types. In this regard, whenever the disagreement occurred, both the researcher and the other rater discussed the issue until they came to an agreement upon the identified fallacy or evidence.

To clarify the evaluation procedure, one example of an argument from analogy is illustrated here based on its argumentation schemes and the matching critical questions.

Walton et al. (2010) presented the following argumentation schemes for an argument from analogy (p. 315):

Similarity Premise: Generally, case C1 is similar to case C2.

Base Premise: A is true (false) in case C1.

Conclusion: A is true (false) in case of C2.

They also put forth the following critical questions on the same page to evaluate this argument:

1. Are there differences between C1 and C2 that would tend to undermine the force of the similarity cited?

2. Is A true (false) in C1?

3. Is there some other case C3 that is also similar to C1, but in which A is false (true)?

Results

the distribution method of research variables based on the most important central indexes of mean, dispersion, and standard deviation were investigated. In Table 3, the descriptive statistics of the participants' critical thinking and frequency and types of informal fallacies and evidence were demonstrated.

Data Analysis of the First Research Question

First research question was: Is there any significant relationship between EFL learners' critical thinking and their use and types of informal fallacies in their argumentative writing?

For data analysis of the null hypothesis, which was: "There is no significant relationship between EFL learners' critical thinking and their use and types of informal fallacies in their argumentative writing", and the alternative hypothesis, which was: "There is a significant relationship between EFL learners' critical thinking and their use and types of informal fallacies in their argumentative writing", a Spearman correlation was applied using SPSS software. A statistically significant negative relationship was observed between the participants' critical thinking and the frequency of use of informal fallacies in their written argumentation was ($r = -0.366$, $p < 0.01$) (See Table 4).

As Table 5 depicts, there is also a significant correlation between Iranian upper-intermediate EFL learners' critical thinking and some of the categories of informal fallacies. The obtained results are as follows: critical thinking and (1) begging the question ($r = -0.254$, $p < 0.01$), (2)

Fallacy of either/or dichotomy ($r = -0.463$, $p < 0.01$), (3) Faulty analogy ($r = -0.418$, $p < 0.01$), and (4) Red herring ($r = -0.281$, $p < 0.01$). Though, no significant relations were observed between critical thinking and (1) Ad hominem ($r=0.026$), (2) appeal to tradition ($r=-0.091$), (3) Hasty generalization ($r = 0.064$), (4) Post hoc ($r = -0.006$), and (5) RSA (-0.073).

The second research question was: Is there any significant relationship between EFL learners' critical thinking and their use and types of evidence in their argumentative writing?

For data analysis of the null hypothesis, which was: "There is no significant relationship between EFL learners' critical thinking and their use and types of evidence in their argumentative writing", and the alternative hypothesis, which was: "There is a significant relationship between EFL learners' critical thinking and their use and types of evidence in their argumentative writing", a Spearman correlation was conducted. The findings of the study suggest that there is a significant relationship between Iranian upper-intermediate EFL learners' critical thinking and the frequency of use of evidence types in their argumentative essays ($r = 0.64$, $p < 0.01$) (Table 6).

Discussion

The primary research question for this investigation was: Is there any significant relationship between EFL learners' critical thinking and their use and types of informal fallacies in their argumentative writing?

The present investigation involved 130-second grade female senior high school students in Zanjan/Iran. The students were provided their answers to the excepted items from the California Critical Thinking Skills Test (CCTST) to determine their critical thinking scores. Also, the participants were asked to write an argumentative essay and to discuss their own reasons, with the length of at least 250 words. Then, the informal fallacies were identified based on Johnson's (1998) definitions and presented clues. Having identified the informal fallacies, each argument was also evaluated by means of evaluation schemes presented by Walton et al. (2010). Nine categories of informal fallacies that were investigated and counted within language learners' argumentative writings in this study were: Ad hominem, Appeal to tradition, Begging the question, Faulty analogy, False dichotomy, Hasty generalization, Post hoc, Red herring, and RSA. The overall Weir Critical Thinking Essay Test to assess progress in critical thinking after

a year of intensive academic English instruction for 90 Japanese students enrolled in a private two-year women's junior college in Osaka, Japan. A control group received only content-based intensive English instruction, while the treatment group received additional training in critical thinking. The treatment group scored significantly higher on the test ("p" =0.000). The results imply that critical thinking skills can indeed be taught as part of academic EFL/ESL instruction.

Finally, Kealey, Holland & Watson (2005), in their study about Preliminary evidence on the association between critical thinking and performance in principles of accounting, tested whether critical-thinking skills can help explain the cross-sectional variation in student performance in principles of accounting. Prior research has used such measures as academic aptitude and demographic factors to explain performance in the principles of accounting class. We argue that success in principles of accounting also requires critical-thinking skills. We measured critical-thinking skills by using a holistic scoring process to evaluate student essays. Our results show that even after controlling for academic aptitude, our measure of critical-thinking skills contributes significantly to explaining the cross-sectional variation in student performance in an accounting principles class. Understanding the relationship between critical thinking and success in accounting may contribute not only to reducing the failure rate in principles of accounting but also to encouraging an emphasis on critical thinking in the preparation of accounting professionals.

The practical significance of this research question was to consider the effective relationship between EFL learners' critical thinking and their use and their use and types of informal fallacies in their argumentative writing the students in the second level of high school and also it can be used for different levels in different academic places.

The second research question for this investigation was: Is there any significant relationship between EFL learners' critical thinking and their use and types of evidence in their argumentative writing?

The present investigation involved 130-second grade female senior high school students in Zanjan/Iran. The students were provided their answers to the excepted items from the California Critical Thinking Skills Test (CCTST) to determine their critical thinking scores. Also, the participants were asked to write an argumentative essay and to discuss their own reasons, with the length of at least 250 words. Then, four types of evidence categorized in Hoeke and Hustinkx

(2003) were identified and counted within language learners' argumentative writings including a) Statistical, b) Anecdotal, c) Causal, d) Expert evidence. Having identified the evidence, each argument was also evaluated by means of evaluation schemes presented by Walton et al. (2010). The overall findings determined that there were potential and significant relationships between the participants' critical thinking and the frequency of use of informal fallacies within language learners' argumentative writings.

The current investigation was in line with some details with previous and similar research about the relationship between EFL learners' critical thinking and their use and types of evidence in their argumentative writing.

Firstly, Iordanou and Constantinou (2015) in their study about Supporting the use of evidence in argumentation through practice in argumentation and reflection in the context of SOCRATES learning environment, examined how students used evidence in argumentation while they engaged in argumentative and reflective activities in the context of a designed learning environment. A Web-based learning environment, SOCRATES, was developed, which included a rich database on the topic of climate change. Sixteen 11th graders, working with a partner, engaged in electronic argumentative dialogs with classmates who held an opposing view on the topic and in some evidence-focused reflective activities, based on transcriptions of their dialogs. Another sixteen 11th graders, who studied the database in the learning environment for the same amount of time as experimental-condition students but did not engage in an argumentative discourse activity, served as a comparison condition. Students who engaged in an evidence-focused dialogic intervention increased the use of evidence in their dialogs, used more evidence that functioned to weaken opponents' claims and used more accurate evidence. Significant gains in evidence use and in meta-level communication about evidence were observed after students engaged in reflective activities. We frame our discussion of these findings in terms of their implications for promoting the use of evidence in argumentation and in relation to the development of epistemological understanding in science.

Also, Monteira and Aleixandre (2016) in their study about the practice of using evidence in kindergarten: The role of purposeful observation, examined kindergarten children's (5–6 years old) engagement in scientific practices, with a focus on generating and using evidence to support claims, during a 5-month project about snails. The research questions are as follows: (1) what

meanings do kindergarteners construct for what constitutes evidence? How are those meanings reflected in the development of data into evidence? (2) Which ways of gathering empirical evidence are jointly constructed by children and teachers during the project? (3) How do children use evidence to revise their understandings? The participants are one class of Early Childhood Education children (N = 25) and their teacher. They were engaged in a project about snails, involving pursuing their own questions, carrying out experiments and purposeful observations, collecting data and drawing conclusions, under the guidance of the teacher. The results show that children developed meanings of a certain level of sophistication about evidence, that they distinguished between empirical evidence from planned experiments and from prolonged observation, which we call purposeful, and that they combined different types of evidence in the revision of their ideas about snails. We identified two levels in the development of data into evidence—closer to descriptive statements and evaluative judgments. We suggest that purposeful observation, which has a clear focus, is guided by the teacher and explicitly discussed, has affordances in early childhood science. For instance, 30 out of 57 evidence statements relate to purposeful observation. Promoting purposeful observation as a source of evidence at this age may allow studying processes both for children (biology processes) and for researchers (learning processes). The results would support Metz (2011) contention about the relevance of instructional opportunities over developmental constraints.

Besides, Kennison (2006), In her study about the evaluation of students' reflective writing for evidence of critical thinking, established interrater reliability of the Critical Thinking Scale (CTS), a teacher-accessible tool designed to measure the critical thinking of baccalaureate nursing students as evidenced in their reflective writing about their practice experiences. Her study was an extension of an earlier pilot test of the CTS. Graduating students from a nursing program at a small liberal arts college were asked to write about a significant practice experience encountered during their last clinical course. Three teachers used the CTS to independently evaluate the students' writing Likewise, Kelly and Takao (2002), in their study about Epistemic levels in argument: An analysis of university oceanography students' use of evidence in writing, examined university oceanography students' use of evidence in writing. Drawing from rhetorical studies of science writing and studies of argumentation in science education, a model for assessing students' arguments is proposed that considers the relative epistemic status of propositions comprising students' written texts. The study was conducted in an introductory

university oceanography course . in a large public university that utilized an interactive CD-ROM that provided geological data sets for student exploration of scientific questions. Student arguments were analyzed through a process of sorting propositions by epistemic level and identifying the explicit links within and across levels. These epistemic levels were defined by discipline-specific geological constructs from descriptions of data, to the identification of features, to relational aspects of features, to theoretically formulated assertions. This form of argumentation analysis allowed for assessment of each student's writing on normative grounds and for comparisons across students' papers. Results show promise for the argumentation model as a methodological tool. The examination of the epistemic status of knowledge claims provided ways of distinguishing the extent to which students adhered to the genre conventions specified by the task, i.e., providing evidentiary support for their argument concerning the theory of plate tectonics with real earth data.

In addition, Liaw (2007) in her study about Content-Based Reading and Writing for Critical Thinking Skills in an EFL Context reported the findings of a study examining the effectiveness of promoting learners' critical thinking skills and EFL skills with a content-based approach. Despite little argument among theorists and educators regarding the interrelatedness between thinking and language development, in the tradition and transition of L2 teaching methodology, the integration of language and thinking has been peripheral. Language as a way of thinking and learning has been more of a pedagogical catchphrase than instructional practice. The researcher also attempted to bridge the gap between theories and instructional practices through the design and implementation of a content-based junior high school EFL syllabus. Two groups of junior high school students participated in the study. A five-unit syllabus, including the subject areas of language arts, mathematics, science, and social studies, was designed and implemented. Data were collected via class assignments, a critical thinking assessment instrument, a questionnaire, and a teacher-constructed language proficiency test. The findings revealed significant gains in the students' English language proficiency test scores. Critical thinking skills and content area knowledge mastery were also found. The questionnaire results show positive responses toward the content-based EFL learning and teaching from the participating students. Based on these findings, instructional suggestions and caveats are provided.

Furthermore, Yousefi and Mohammadi (2016) in their study about Critical Thinking and Reading Comprehension among Postgraduate Students: The Case of Gender and Language Proficiency Level, aimed at probing the role of critical thinking skills in EFL learners' reading comprehension. In so doing, four hundred and forty-three male and female Iranian EFL postgraduate students in the fields of translation studies and English language teaching at Islamic Azad University, South Tehran and Science and Research branches participated in this study were selected. These students were selected based on their general English proficiency score in the MA entrance examination in Iran. Considering the normal distribution of the subjects' scores, we chose those scores one standard deviation above and below the mean to be in the sample of the study. Consequently, four hundred and forty-three of them were patterned as homogenous and selected for the purpose of this research. Watson-Glaser critical thinking questionnaire and Longman's TOEFL were used to collect data. The Pearson Correlation Coefficient was run to analyze the data. The findings of the present study demonstrated that there was a significant relationship between critical thinking and reading comprehension. Also, gender and level of proficiency could not make a statistically significant difference in this respect.

Additionally, Nikou, Bonyadi and Amirikar (2015) in their study about Investigating the relationship between critical thinking skills and the quality of Iranian intermediate TEFL students' writing intended to find out the relationship between critical thinking skills and the quality of Iranian TEFL (Teaching English as a Foreign Language) students' writing. One-hundred forty students who were homogeneous in their language proficiency were selected non-randomly. The researcher asked students to take part in a proficiency test named Nelson test (intermediate 200B) and she chose students whose level was intermediate as participants of the study. This study was an associational (correlational) study. To achieve the goal of the study California Critical Thinking Test (form B) was administered among intermediate students to measure students' critical thinking skills (analysis, evaluation, inference). Then the researcher asked the participants to write on a given topic and their writings were rated by two language teachers by following the rules of scoring in Quellmaz's scale. The inter-rater correlation across all papers calculated in order to be sure about the objectivity and reliability of scores. The Pearson-Product Moment was used to examine the relationship between variables, furthermore, multiple regressions were applied to predict the degree of their relationship. The results of the study revealed that there is a positive relationship between critical thing skills and writing

quality. Furthermore, it was proved that evaluation has the strongest degree of relationship with the quality of writing.

Also, this study was not in line with some previous studies.

For example, Stapleton (2001) in his study about Assessing Critical Thinking in the Writing of Japanese University Students: Insights about Assumptions and Content Familiarity proposed a model for assessing critical thinking in the writing of L2 learners to determine whether content familiarity plays a role in critical thinking. Findings of a study of 45 Japanese undergraduate students indicate that the quality of critical thought depended on the topic content, with a familiar topic generating better critical thinking. Results also suggested that different assumptions between the L1 and L2 culture may lead to misinterpretations of the critical thinking ability of L2 learners.

Furthermore, Zarei and Haghgoo (2012) In his study about The Relationship between Critical Thinking and L2 Grammatical and Lexical Knowledge study was conducted to investigate the relationship between critical thinking and L2 grammatical knowledge on the one hand, and the relationship between critical thinking and lexical knowledge on the other. To fulfill this objective, a 60-item vocabulary and grammar subtest of the TOEFL test and an 80–item Watson Glaser Critical Thinking questionnaire were distributed among 150 male and female Iranians studying English as a foreign language at Azad University in Takestan, Iran. Data were analyzed using the Pearson correlation procedure. The result of the data analysis indicated that the correlation between vocabulary and critical thinking was not statistically significant. The correlation between grammar and critical thinking was not statistically significant.

The practical significance of this research question was to consider the effective relationship between EFL learners' critical thinking and their use and their use and types of evidence in their argumentative writing the students in the second level of high school and also it can be used for different levels in different academic places.

Conclusion

Based on the results achieved from the first research question, there was a significant correlation between the participants' critical thinking and the frequency of use of informal fallacies. A statistically significant negative relationship was observed between the participants' critical thinking and the frequency of use of informal fallacies in their written argumentation.

Based on the results achieved from the second research question, there was a potential and significant relationship between the participants' critical thinking and the frequency of use of informal fallacies.

References

Atai, M. R., & Nasseri, M. (2010). A gender-based study of informal fallacies of argumentation: The case of Iranian advanced EFL learners' writing, *Iranian Journal of Applied Linguistics*, 13 (2), 19-45.

Ben-Porath, Y. S. (2019). Of fallacies and errors, new and repeated: a rejoinder to Butcher et al.(2018). Journal of Personality Assessment, 101(2), 129-139. DOI: https://doi.org/10.1080/00223891.2018.1522640

Dufour, M. (2019). Old and New Fallacies in Port-Royal Logic. Argumentation, 33(2), 241-267. DOI: https://doi.org/10.1007/s10503-018-9470-1

de Swart, H. H. (2018). Fallacies and Unfair Discussion Methods. In Philosophical and Mathematical Logic (pp. 489-530). Springer, Cham.

Davidson, B. W., & Dunham, R. L. (1996). Assessing EFL Student Progress in Critical Thinking with the Ennis-Weir Critical Thinking Essay Test. M.A. thesis, Retrieved time (assessed 3.5.2019).

El Khoiri, N., & Widiati, U. (2017). Logical Fallacies in Indonesian EFL Learners' Argumentative Writing: Students' Perspectives. *Dinamika Ilmu, 17*(1), 71-81. DOI: http://dx.doi.org/10.21093/di.v17i1.638

Gass, R. H., & Seiter, J. S. (2018). When Good Arguments Go Bad: An Activity for Learning about Fallacies in Reasoning. *Syllabus*, *7*(2), 1-8.

Graham, S., Harris, K. R., Fishman, E., Houston, J., Wijekumar, K., Lei, P. W., & Ray, A. B. (2019). Writing skills, knowledge, motivation, and strategic behavior predict students' persuasive writing performance in the context of robust writing instruction. *The Elementary School Journal*, *119*(3), 487-510. DOI: https://doi.org/10.1086/701720

Hawkins, L. K., Martin, N. M., & Cooper, J. (2019). Preparing Elementary Writing Teachers: An Inquiry-Driven, Field-Based Approach to Instruction. *Teaching/Writing: The Journal of Writing Teacher Education*, *6*(1), 131-160.

Hoeken, H., & Hustinx, L. (2003). The relative persuasiveness of different types of evidence. In F. H. van Eemeren, J. A. Blair, C. A. Willard, & A. F. Snoeck Henkemans (eds.),

Proceedings of the fifth conference of the International Society for the Study of Argumentation (pp. 497-501). Amsterdam: Sic Sat.

Iordanou, K., & Constantinou, C. P. (2015). Supporting use of evidence in argumentation through practice in argumentation and reflection in the context of SOCRATES learning environment. *Science Education, 99*(2), 282-311. DOI: https://doi.org/10.1002/sce.21152

Johnson, R. M. (1998). *A logic book: Fundamentals of reasoning* (3rded.). Belmont: Wadsworth Publishing Company.

Johnson, R. H., & Blair, J. A. (2006). Logical self-defense. Idea.

Kennison, M. M. (2006). The evaluation of students' reflective writing for evidence of critical thinking. *Nursing Education Perspectives, 27*(5), 269-273.

Kelly, G. J., & Takao, A. (2002). Epistemic levels in argument: An analysis of university oceanography students' use of evidence in writing. *Science education, 86*(3), 314-342. DOI: https://doi.org/10.1002/sce.10024

Kealey, B. T., Holland, J., & Watson, M. (2005). Preliminary evidence on the association between critical thinking and performance in principles of accounting. *Issues in Accounting Education, 20*(1), 33-49. DOI: https://doi.org/10.2308/iace.2005.20.1.33

Kamgar, N., & Jadidi, E. (2016). Exploring the Relationship of Iranian EFL Learners Critical Thinking and Self-regulation with their Reading Comprehension Ability. *Procedia-Social and Behavioral Sciences, 232*, 776-783. DOI: https://doi.org/10.1016/j.sbspro.2016.10.105

Lu, X. (2019). An Empirical Study on the Artificial Intelligence Writing Evaluation System in China CET. *Big data*.

Laurent, N., & Duffield, L. (2018). Queensland's broad-scale land-clearing policy debate, 1998–2006: An analysis of evidence-based arguments in news media content. *Queensland Review*, *25*(1), 70-88. DOI: https://doi.org/10.1017/qre.2018.8

Liaw, M. L. (2007). Content-based reading and writing for critical thinking skills in an EFL context. *English teaching journal, 31*(2), 45-87 DOI : 10.6330/ETL.2007.31.2.02

Malpique, A. A., & Veiga Simão, A. M. (2019). 'Does It Work?'Adapting Evidence-Based Practices to Teach Argumentative Writing. *Journal of Writing Research*, *10*(3), 527-567. DOI: https://doi.org/10.17239/jowr-2019.10.03.05

Moslemi, Z., Ghomi, M., & Mohammadi, D. (2016). The Relationship Between Critical Thinking Skills with Mental Health and Academic Achievement of Qom University of Medical Sciences Students. *Journal of Medical Education Development, 9*(23), 90-101.

Monteira, S. F., & Jiménez-Aleixandre, M. P. (2016). The practice of using evidence in kindergarten: The role of purposeful observation. *Journal of Research in Science Teaching, 53*(8), 1232-1258. https://doi.org/10.1002/tea.21259

Nickerson, R. S., Butler, S. F., & Barch, D. H. (2019). Validity and Persuasiveness of Conditional Arguments. *The American Journal of Psychology*, *132*(2), 131-147. DOI: 10.5406/amerjpsyc.132.2.0131

Nikou, F. R., Bonyadi, A., & Amirikar, N. (2015). Investigating the relationship between critical thinking skills and the quality of Iranian intermediate TEFL students' writing. *Advances in Language and Literary Studies, 6*(2), 57-64.

Nagpal, M. N. (2019). Implicit Writing Beliefs and their Relation to the Quality of Literature-related Argumentative Writing among High School Students,1-12.

Peterson, D. S. (2019). Engaging elementary students in higher order talk and writing about text. *Journal of Early Childhood Literacy*, *19*(1), 34-54. DOI: https://doi.org/10.1177/1468798417690918

Stucki, I. (2018). Evidence-based arguments in direct democracy: The case of smoking bans in Switzerland. *Evaluation and program planning*, *69*, 148-156. DOI: https://doi.org/10.1016/j.evalprogplan.2016.08.019

Stapleton, P. (2001). Assessing critical thinking in the writing of Japanese university students: Insights about assumptions and content familiarity. *Written communication, 18*(4), 506-548. Doi: https://doi.org/10.1177/0741088301018004004

Schlaufer, C., Stucki, I., & Sager, F. (2018). The political use of evidence and its contribution to democratic discourse. *Public Administration Review*, *78*(4), 645-649. DOI: https://doi.org/10.1111/puar.12923

Sandoval, W. A., & Millwood, K. (2005). The quality of students' use of evidence in written scientific explanations. Cognition and Instruction, 23, 23-55.

Shi, Y. (2018). *Joint Reflection Promotes Students' Use of Evidence in Argumentive Writing* (Doctoral dissertation, Columbia University).

Sandoval, W. A., & Millwood, K. (2005). The quality of students' use of evidence in written scientific explanations. *Cognition and Instruction*, *23*(1), 23-55. DOI: https://doi.org/10.1207/s1532690xci2301_2

Tindale, C. W. (2007). *Fallacies and argument appraisal*. Cambridge: Cambridge University Press.

Torff, B. (2019). Teaching Critical Thinking: Content Integration, Domain-Specificity, and Equity. In Handbook of Research on Promoting Higher-Order Skills and Global Competencies in Life and Work (pp. 22-36). IGI Global. DOI: 10.4018/978-1-5225-6331-0.ch002

Walton, D. (2006). *Fundamentals of critical argumentation*. Cambridge: Cambridge University Press.

Walton, D., Reed, C., & Macagno, F. (2010). *Argumentation Schemes* (2nd ed.). Cambridge: Cambridge University Press.

Walton, D. N. (1991). Critical faults and fallacies of questioning. Journal of Pragmatics, 15(4), 337-366.

Yousefi, S., & Mohammadi, M. (2016). Critical thinking and reading comprehension among postgraduate students: The case of gender and language proficiency level. Journal of Language Teaching and Research, 7(4), 802-807. DOI: http://dx.doi.org/10.17507/jltr.0704.23

Zhang, Y. (2018). A Contrastive Study on the Application of Mind Maps in Argumentative Writing Instruction for EFL Learners. *English Language Teaching*, *11*(12), 93-100. DOI:10.5539/elt.v11n12p93

Žagar, I. Ž. (2018). Between Fallacies and More Fallacies? *Solsko Polje*, *29*(3/4), 87-236.

Zarei, A. A., & Haghgoo, E. (2012). The relationship between critical thinking and L2 grammatical and lexical knowledge. *English Linguistics Research, 1*(1), 104-110. DOI: 10.5430/elr.v1n1p104

Table 1

Content Validity Ratio of Selected Topics measured by Lawsh Formula

Vocabularies	Number of experts agreed with topic	CVR	Valid
Topic 1	5	0.6	Valid
Topic 2	1	0.4	Invalid
Topic 3	5	0.6	Valid
Topic 4	4	0.4	Valid
Topic 5	1	0.1	Invalid

Table 2

Content Validity Index of Selected Topics

Vocabularies	Number of experts considered the topic completely necessary	Number of experts considered the topic necessary	CVI	Accepted or Not accepted
Topic 1	2	1	0.6	Not accepted
Topic 2	2	1	0.6	Not accepted
Topic 3	1	0	0.2	Not accepted
Topic 4	4	1	1	Accepted
Topic 5	2	0	0.6	Not Accepted

Table 3

Descriptive Statistics of Critical Thinking, Type and Frequency of Informal Fallacies and Evidence Types

	N	Minimum	Maximum	Mean	Std. Deviation
Critical thinking	130	1.00	4.00	1.9231	.92858
Frequency of fallacies	130	.00	9.00	4.9692	1.94872
Ad Hominem	130	.00	1.00	.6846	.46647
Appeal to tradition	130	.00	1.00	.4077	.49331
Begging the question	130	.00	1.00	.4385	.49812
Fallacy of either/or dichotomy	130	.00	1.00	.5769	.49596
Faulty analogy	130	.00	1.00	.6077	.49015
Hasty generalization	130	.00	1.00	.5769	.49596
Post hoc	130	.00	1.00	.5692	.49710
Red herring	130	.00	1.00	.5385	.50045
RSA	130	.00	1.00	.5692	.49710
Frequency of evidences	130	.00	4.00	2.2308	1.27309
Evidence type 1 (Statistical)	130	.00	1.00	.5615	.49812
Evidence type 2 (Anecdotal)	130	.00	1.00	.5846	.49469
Evidence type 3 (Causal)	130	.00	1.00	.4769	.50140
Evidence type 4 (Expert evidence)	130	.00	1.00	.6077	.49015

Table 4

The Results of Correlation between Learners' Critical Thinking and the Frequency of Fallacies

		Frequency of evidences
Critical thinking	Correlation Coefficient	-.366**
	Sig. (2-tailed)	.000
	N	130

Table 5 also demonstrates the results of the correlations between critical thinking and types of fallacies in students' writings.

Table 5

The Results of Correlation between Learners' Use of Nine Categories of Informal Fallacies and their Critical Thinking

	Critical thinking
Ad hominem	.026
Appeal to tradition	-.091
Begging the question	-.254**
Fallacy of either/or dichotomy	-.463**
Faulty analogy	-.418**
Hasty generalization	.064
Post hoc	-.006
Red herring	-.281**
RSA	-.073

Table 6

The Results of Correlation between Learners' Critical Thinking and the Frequency of Evidences

		Frequency of evidences
Critical thinking	Correlation Coefficient	.64**
	Sig. (2-tailed)	.000
	N	130

Table 7 shows the findings related to the potential relationships between critical thinking and categories of evidences.

Table 7

The Results of Correlation between Learners' Use of Four Categories of Evidence Types and Critical Thinking

	Critical thinking
Evidence type 1 (Statistical)	.516**
Evidence type 2 (Anecdotal)	.210*
Evidence type 3 (Causal)	.689**
Evidence type 4 (Expert evidence)	.197*

As Table 7 indicates, significant correlations were observed between the language learners' critical thinking and their use of four categories of evidence, including Statistical ($r = 0.516$, $p < 0.01$), Anecdotal ($r = 0.210$, $p < 0.05$), Causal ($r = 0.689$, $p < 0.01$), and Expert evidence ($r = 0.197$, $p < 0.05$) .

Rohmani Indah

Verified reviewer

Official record for review 3Y4exbDg

- Pre-publication review
  - Canonical URL: https://publons.com/wos-op/review/author/3Y4exbDg/
  - Code: 3Y4exbDg
  - Performed for: Southern African Linguistics and Applied Language Studies (journal)
  - Verification: YES. Verified by email receipt
- Date
  - Date of review: 2020
- Manuscript
  - Unavailable
  - Review content: Unavailable

Source details

Southern African Linguistics and Applied Language Studies

Scopus coverage years: from 2003 to Present
Publisher: Taylor & Francis
ISSN: 1607-3614 E-ISSN: 1727-9461
Subject area: Social Sciences: Linguistics and Language
Source type: Journal

CiteScore 2021
0.7

SJR 2021
0.250

SNIP 2021
0.743

View all documents > | Set document alert | Save to source list | Source Homepage

CiteScore | CiteScore rank & trend | Scopus content coverage

¡ Improved CiteScore methodology

CiteScore 2021 counts the citations received in 2018-2021 to articles, reviews, conference papers, book chapters and data papers published in 2018-2021, and divides this by the number of publications published in 2018-2021. Learn more >

CiteScore 2021

$$0.7 = \frac{76 \text{ Citations 2018 - 2021}}{104 \text{ Documents 2018 - 2021}}$$

Calculated on 05 May, 2022

CiteScoreTracker 2022

$$0.9 = \frac{97 \text{ Citations to date}}{109 \text{ Documents to date}}$$

Last updated on 05 April, 2023 • Updated monthly

CiteScore rank 2021

Category	Rank	Percentile
Social Sciences └ Linguistics and Language	#378/1032	63rd

View CiteScore methodology > | CiteScore FAQ > | Add CiteScore to your site

Southern African Linguistics and Applied Language Studies

COUNTRY

United Kingdom

Universities and research institutions in United Kingdom

Media Ranking in United Kingdom

SUBJECT AREA AND CATEGORY

Social Sciences
Linguistics and Language

PUBLISHER

Taylor and Francis Ltd.

H-INDEX

18

PUBLICATION TYPE

Journals

ISSN

16073614, 17279461

COVERAGE

2003-2021

INFORMATION

Homepage

How to publish in this journal

Johanita.Kirsten@nwu.ac.za

SCOPE

Southern African Linguistics and Applied Language Studies publishes articles on a wide range of linguistic topics and acts as a forum for research into ALL the languages of southern Africa. Original contributions are welcomed on any of the core areas of linguistics, applied linguistics, and language practice, particularly regarding matters that are relevant for the (southern) African context. Review articles and short research reports are also welcomed. Book reviews are solicited by the reviews editor. Articles in languages other than English are accompanied by an extended English summary.

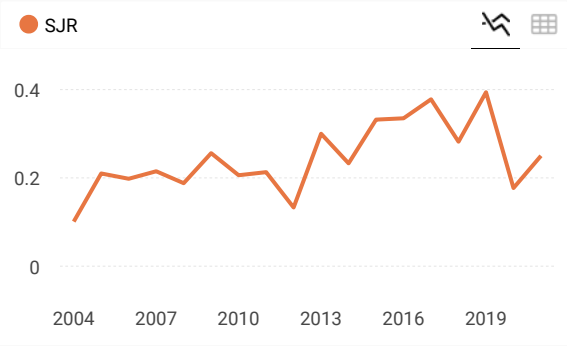
FIND SIMILAR JOURNALS

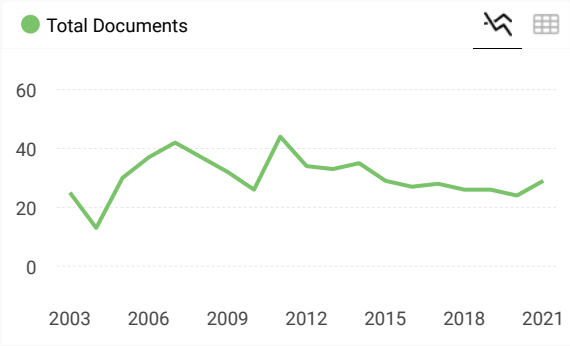
1
Stellenbosch Papers in Linguistics Plus
ZAF
48%
similarity

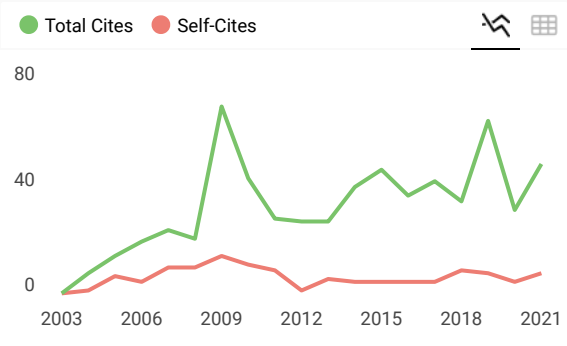
2
Language Matters
GBR
41%
similarity

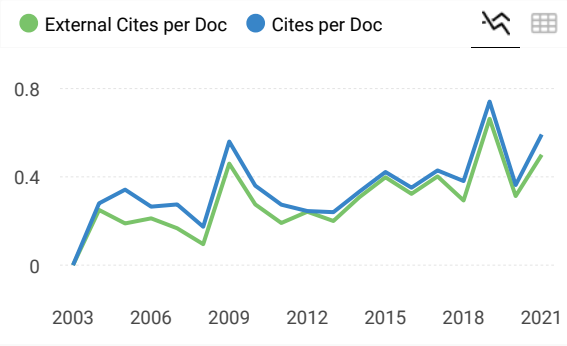
3
Journal of Research in Applied Linguistics
IRN
41%
similarity

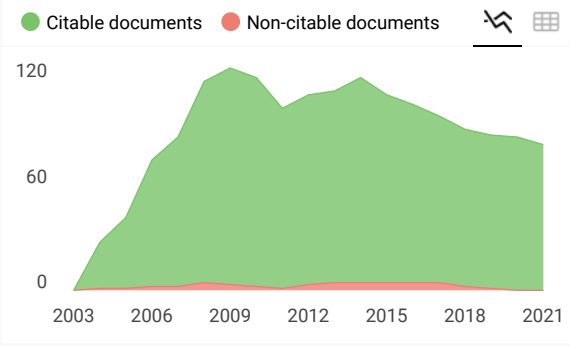
4
Asian ESP J
GBR
4
s

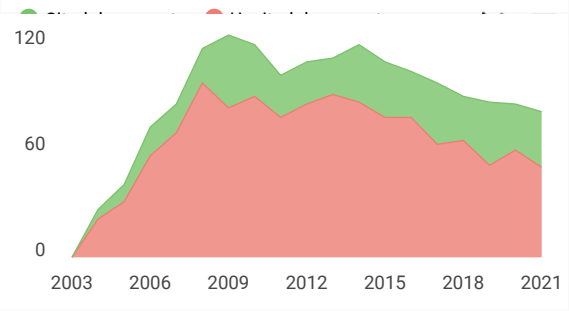












← Show this widget in your own website

Just copy the code below and paste within your html code:

```
<a href="https://www.scimag
```

SCImago Graphica

Explore, visually communicate and make sense of data with our **new data visualization tool**.

Metrics based on Scopus® data as of April 2022

Y

Yang Yang 9 months ago

Dear SCImago Team,

The link to the "Homepage" above does not go to the homepage of this journal but to the publisher.

The right link should be https://www.tandfonline.com/loi/rall20

All the best,

Yang Yang

reply

SCImago Team

Melanie Ortiz 8 months ago

Dear Yang, thank you for contacting us. We will proceed to update the journal's website information as soon as possible. Greetings from Spain and thank you for using the SCImago products, SCImago Team

S

Seyed Hassan Talebi 4 years ago

As far as my experience shows publication in this journal needs something more than patience. I sent a manuscript to be considered for publication On 13-Nov-2018 and by 29-12-2018 no processing was done on it. I sent many emails to their editor-in-chief regarding this but received no

Jordan Journal of Modern Languages and Literatures Vol.13, No. 2, 2021, pp 303-319

JJMLL

The Relationship between Critical Thinking, Frequency, Informal Fallacy and Evidence in Argumentative Writing

Nikoo Davarpanah , Siros Izadpanah[*] ,Parima Fasih
Department of English Language Teaching, Islamic Azad University,Zanjan Branch,Iran

Received on: 5-4-2020 **Accepted on: 16-8-2020**

Abstract

The present study was an investigation of the relationship between the EFL learners' critical thinking, their frequency, and types of informal fallacy and evidence in argumentative writing. Few studies have been conducted to investigate these issues. To this end, 356-second grade female senior state high school students from four schools in Zanjan were selected through multistage cluster random sampling (MCRS) method and based on Cambridge placement test (2010); 130 students proved to be upper-intermediate and participated in this correlational study. The main data collection stage took place for one month. Then, the informal fallacies based on Johnson's definitions and four types of evidence categorized in Hoeke and Hustinkx were identified and counted within language learners' argumentative writings. The evaluation of the arguments was also conducted based on Walton, Reed, and Macagno. Based on the results achieved from the first research question, there was a significant negative correlation observed between the participants' critical thinking and the frequency of use of informal fallacies in their written argumentation. Based on the results achieved from the second research question, there was a potential and significant correlation between the participants' critical thinking and the frequency of use of informal fallacies.

Keywords: Argumentative Writing, Critical Thinking, Evidence, Informal Fallacy.

Introduction

One of the most significant current discussions in the era of English language teaching and learning is writing instruction. It has always been considered as a challenge for language teachers and plays a key role in learning the second or foreign language (Abdelrahim and Abdelrahim 2020). Writing instruction is a reaction to the inner and outside world and development or revelation of several distinct human abilities(Hawkins, Martin, and Cooper 2019). Writing is one of the most important skills that should be taught to the students from the beginning till the end of high school by teachers carefully .As the main aim of teaching this skill is to enable students to write many types of writings in English such as report, descriptive, narrative and argumentative, etc. Learning writing skill is very important for students because a significant part of communication has a good writing skill and the students will be able to communicate in English language through writing and transfer information, knowledge and their ideas to others (Peterson 2019)

[*]Doi: https://doi.org/ 10.47012/jjmll.13.2.7
[*] Corresponding Author: **cyrosizadpanah@yahoo.com**

It is clear that despite personal, social, and cultural differences between people, achieving proficiency, writing in a foreign language is not an impossible target, but the individual variables may affect the extent of achievement (Graham et al. 2019). Among these distinguishing variables, one variable that has received minimal attention in EFL contexts is learners' critical thinking (Torff 2019).

Like the other elements of this study, critical thinking is one of the broad categories of thinking skill and it was considered to be the most important writing skill in argumentation (Yousefi and Mohammadi 2016). Also, students' ability to write argumentatively mainly depends on their critical thinking skills (Abdelrahim and Abdelrahim 2020).

Another element of this study was fallacy. The absence or presence of fallacies and especially informal fallacies is one of the criteria in determining the quality of argumentative writings (de Swart 2018). The fallacy was characterized by (D.N. Walton 1991)as a pre-planned strategy of misleading argumentation used by one person in a dialogue to 'slip up' another party. Some research argued that the existence of high-quality argumentations and fallacy-free reasoning are among the major concerns in written discourse (Dufour 2019); (D Walton 2006); (Žagar 2018)and in students' argumentative writing (Gass and Seiter 2018); (Nickerson, Butler, and Barch 2019); (Tindale 2007). Previous research demonstrated that students' problems may stem from lack of sound and logical reasoning and persuasion along with traps such as fallacies of argumentation which at the first sight they may appear logical and convincing but at the second sight they contain mistakes in reasoning (Dufour 2019). These issues for EFL students become even much more terrible in international proficiency examinations such as GRE and IELTS, as pointed out by the Educational Testing Service centre (2009), when students are supposed to utilize essays and employ precise argumentations as an entrenched criterion of evaluation (Ben-Porath 2019).

Evidence was the last element of this research. Structure-based argumentation enables students to build up their thoughts in a reasonable organization, but this should include analysing the relevance of the considerable number of components, whether the case is supported soundly by the evidence, to guarantee the general quality of argumentative writing (Malpique and Veiga Simão 2019). Recognizing the significance of utilizing evidence to support one's claim in a satisfactory, applicable and sufficient manner is a fundamental part of judging argumentation (Stucki 2018); (Schlaufer, Stucki, and Sager 2018). Without well-organized evidence, the argumentative writing is circular of different repetitions of the claim without explicit purposes (Zhang 2018). Good arguments should comprise of true, reliable, and multiple justifications (Laurent and Duffield 2018). In other words, it is the soundness and validity of the evidence that account for the logic of argumentation. However, studies examining L2 learners' actual use of evidence in writing argumentation are few.

Hence, what has recently attracted the scholars' attention was mainly the learners' argumentative writing since the recent trends put high emphasis on critical thinking and power of argumentation (Alagozlu 2007). Nevertheless, what actually counts is no longer the argumentation itself but the power of convincing the audience. This is why enabling the learners to judge the coming ideas in terms of their rationality (Alagozlu 2007) as well as the three standards of relevance sufficiency, and acceptability (RSA) have come to the fore (Johnson 1999) due to their determining role in proving innovative ideas and findings. To this

end, avoiding any fallacy, i.e. "error in reasoning" in (Johnson 1999, 251), to strengthen the convincing power of arguing one's claims, seems vital.

The vitality of this issue becomes much more evident when it comes to the international exams, e.g. TOEFL, IELTS, in which language learners are engaged in serious writing tasks that should be convincing enough to bring about desirable scores. Additionally, the growing changes in the criteria for publishing articles in international journals has doubled the significance of presenting fallacy-free reasoning in order to justify the findings as rationally as possible. These all have added to the significance of argumentation text type especially in academic contexts (Németh and Kormos 2001). As a result, scholars have been involved in probing the structure of argumentation and identifying argumentation schemes for years (Douglas Walton, Reed, and Macagno 2008) in order to examine the quality of language learners' argumentative essays (Helms-Park and Stapleton 2003); (Liu and Braine 2005); (Qin and Karabacak 2010).However, as its development seems to be a prerequisite to success for those wishing to pursue their studies in a new language, writing is not often prioritized in modern communicative language classrooms, (Griffiths 2008).This might be why the available literature suggests the non-native speaking students' difficulty in their studies at the college or university level in English-speaking countries (Hinkel 2003).

The issue of EFL learners' critical thinking, the frequency, and types of informal fallacy and evidence in argumentative writing has received some interest in research over 20 years ago. However, in the last 5 years, in particular, the topic has rekindled both theoretical and empirical research interest and yet there is no general agreement about the relationship between the EFL learners' critical thinking, the frequency and types of informal fallacy and evidence in argumentative writing and a major problem with all of the past studies is that they have not investigated the positive or negative relationship between the EFL learners' critical thinking, the frequency, and types of informal fallacy and evidence in argumentative writings, while this current research has comprehensively focused on these issues on 130-second grade senior state high school female students in Zanjan /Iran. So far, no one has investigated the relationship between the EFL learners' critical thinking, the frequency and types of informal fallacy and evidence in argumentative writing on upper-intermediate female students, so these issues brought novelty to the present study.

The purpose of this study was to investigate the relationship between the EFL learners' critical thinking, the frequency and types of informal fallacy and evidence in argumentative writing and the participants of this study were 130-second grade female senior high school students in Zanjan. The goal of this investigation was to answer the following research questions:

1. Is there any significant relationship between EFL learners' critical thinking, their frequency, and types of informal fallacies in their argumentative writing?
2. Is there any significant relationship between EFL learners' critical thinking, their frequency and types of evidence in their argumentative writing?

Null hypotheses

1. There is not any significant relationship between EFL learners' critical thinking and their frequency and types of informal fallacies in their argumentative writing?

2. There is not any significant relationship between EFL learners' critical thinking and their frequency and types of evidence in their argumentative writing?

2. Literature review

2.1 The Role of Thinking in Writing

Composing writing not only needs good language proficiency but also needs to be critical as the writer examines viewpoints, facts, and arguments and synthesize them. (Prihastuti, Padmadewi, and Ramendra 2020) pointed out that writing is more than a medium of communication. It is a way of remembering and a way of thinking as well. Writing makes words permanent, thus expands the collective memory of human beings from the relatively small store that we can remember. It means that when we write we use our thinking to find the idea while remembering patterns and language.

(Long, Tuzi, and Ziebart 2020)stated that writing is not confined to one stage of the composing process. At one stage you will think creatively, producing imaginative ideas or ways of expressing those ideas. At another stage you will think critically, evaluating the results of your creative thinking. In every stage of writing, we use our thinking to create, to investigate and to revise the idea.

Furthermore, writing can improve critical thinking skills. Writing makes you a stronger thinker. Writing reasoned paragraphs requires mental discipline and close attention to the set of logical rules. It will train your mind to think clearly and prove to be a value in every phase of your life. While writing can improve critical thinking, critical thinking is important to produce good writing (Greenberg 2015).

To sum up, writing is important to improve thinking skills such as critical and creative thinking. In similarity, critical thinking skill is also crucial in composing writing. It is because each process of writing requires some thinking skills. Therefore, without being able to think and also write critically, the writers cannot result in a piece of good writing.

2.2 Fallacy

Fallacy is "an error in reasoning" (Johnson 1999, 251). As Johnson states, some fallacies which can be detected "by the examination of the form of the argument" are called formal fallacies while all other fallacies are called informal ones which can be detected "by the examination of the content rather than the form of the argument" (p. 251). (Tindale 2007) defined a fallacy as "a particular kind of egregious error" (p. 1). He believes that it undermines the strength of an argument. Here major informal fallacies along with their relevant argumentation schemes and their matching critical questions are presented.

2.3 Iranian and international Studies on Critical Thinking, the Frequency, and Types of Informal Fallacy and Evidence in Argumentative Writing

(Rahmah and Saminan 2020), in their study about the role of rational application on studying critical thinking skills in argumentative writing, aimed to evaluate innovative ways to teach argumentative writing using electronic learning. This paper will focus on writing skills because through writing students can express their ideas in written form. However, critical thinking skills in the learning process sometimes make it difficult for students to express and produce their ideas in writing, as a result, they are trapped in the

process of writing without being critical. Therefore, researchers promote "rational" applications as e-learning media to help students learn concepts, understand the structure of arguments, and develop reasoning skills. This paper uses a qualitative descriptive method to describe how teachers apply rational applications and how students think critically in their argumentative writing assignments. The results showed that rational application provides students not only with greater motivation to write and to involve their creativity in writing argumentative on structural elements in the (Kneupper 1978). It also explores the overall use of evidence in supporting claims. It was found that claim and data were the basic structural elements used by Chinese EFL learners in constructing argumentative writing. The respective use of counterargument data and rebuttal was significantly correlated with the quality of argumentation. In argumentative reasoning, the types of evidence and the number of evidences used by participants were very limited. The logical analysis was found to be the most frequently used data to support claims. Less proficient learners' use of evidence was not effective or persuasive to produce valid arguments. The findings provide useful insights into the instruction of argumentative writing for EFL teachers.

(Oaksford and Chater 2020) in their study about Logical Fallacies in EFL Learners' Argumentative Writing: Students' Perspectives, identified and discuss logical fallacies in the argumentative writing of EFL learners. For this purpose, 40 argumentative essays written by the students of the English Department of the State University of Malang were analysed. An FGD discussion involving students who participated in the essay writing process was organized following the identification of logical fallacies in their writing. The results of the study showed that students still produced a number of logical fallacies in their work, some of which were very basic they can be avoided through simple, explicit instruction.

3. Method

3.1 Design of study

This study was a quantitative one as the research analysis used categorical and nonparametric data to test the hypotheses. The participants of this study were 130-second grade senior high school female students in Zanjan Province, who were selected through a multistage cluster random sampling method and correlational design was used in this research.

3.2 Participants

The participants of this study were 130-second grade senior high school students in Zanjan. Zanjan province has 8 cities, among these cities, Zanjan city was chosen. Zanjan city consists of two districts that the district one was randomly chosen. In 2019 in district one, there were 420 schools that among them senior high schools were randomly chosen. There were 42 senior high schools in district one that 22 of them were for girls and 20 schools were for boys. Among them state senior high schools were randomly chosen, and 12 senior high schools were for girls. The second level students of 4 senior high schools for girls included: Shahed, Farhikhtegan, Nesa and Hejab senior high schools were randomly chosen. There were 3-second grade classes in each of them and two classes of each were randomly chosen for this study.

The statistical populations of this study were 3492-second grade senior high school students in the first district of Zanjan. According to the Cochran formula, 346 participants were selected and in order to increase the accuracy and to have homogeneous groups, 10 more participants were added and totally of 356 female students participated in this study. Based on the rules of CPT (2010), out of 356 students, 130 students were proved to be upper-intermediate.

3.3 Instruments

The following instruments were employed in order to collect the required data for the present study:

Cambridge Placement Test (2010) by Cambridge University Press

California Critical Thinking Skills Test (CCTST)

The Persian Version of California Critical Thinking Skills Test

Writing Task

3.3.1 Pilot Study

California Critical Thinking Skills Test (CCTST) was piloted on 30 upper-intermediate students with similar educational background, in order to obtain the reliability for the tests. To be statistically acceptable, the internal consistency and reliability co-efficient were measured using Cronbach Alpha. The test-retest reliability of these tests with the one-week interval was (α =.82) which showed an acceptable reliability value. For the writing task, five topics were selected from IELTS writing tasks, in order to select the target topic of the study, all of the five topics were piloted by five experienced language instructors and then, based on their comments one topic was adopted. In topic selection, content validity was evaluated using Lawsh CVR (Content Validity Ratio) and CVI (Content Validity Index). Lawsh formula is as follows:

CVR= ((Ne-N÷2))/(N÷2)

According to the Lawsh CVR, an item should gain CVR of higher than 0.42 in order to be validated. The results of the reviewed and validated topics were included in Table 1.

Table 1: Content Validity Ratio of Selected Topics measured by Lawsh Formula.

Vocabulary items	**Number of experts agreed with topic**	**CVR**	**Valid**
Topic 1	5	0.6	Valid
Topic 2	1	0.4	Invalid
Topic 3	5	0.6	Valid
Topic 4	4	0.4	Valid
Topic 5	1	0.1	Invalid

Then CVI of the topics was calculated using (Waltz and Bausell 1981) CVI formula is as follows:

CVI= (Number of experts who scored item 3 or 4)/ (Total number of experts)

It should be mentioned that the acceptable index of CVI equals 0.79 and if there is a topic with CVI lower than 0.79, the topic should be removed. In other words, a panel of experts determined whether the selected topics are “necessary” to be included in the study based on a 4-point Likert scale. Experts indicated their opinions on each word using 1(It is not necessary), 2 (It is rather necessary), 3 (It is necessary), and 4 (It is completely necessary). The results related to CVI calculations were presented in Table 2.

Table 2: Content Validity Index of Selected Topics.

Vocabulary items	Number of experts considered the topic completely necessary	Number of experts considered the topic necessary	CVI	Accepted or Not accepted
Topic 1	2	1	0.6	Not accepted
Topic 2	2	1	0.6	Not accepted
Topic 3	1	0	0.2	Not accepted
Topic 4	4	1	1	Accepted
Topic 5	2	0	0.6	Not Accepted

3.4 Procedure

The main data collection stage took place for one month (eight sessions), based on the works of previous researchers in the field of critical thinking and argumentative writing. The Cambridge Placement Test was administered to assure the homogeneity regarding the participants' level of proficiency.

In the second stage, the students provided their answers to the excepted items from the California Critical Thinking Skills Test (CCTST) to determine their critical thinking scores. Firstly, the participants were not asked to fill out their real names, but they were asked to choose a nickname and write it on the paper. After that, they were asked to read the direction of the test. The researcher explained the direction of the test and how to answer the test. After the participants were ready, the test was started and the researcher supervised the test took place. The participants had to finish 34 questions of critical thinking test in 50 minutes.

Finally, the writing test was conducted on the same day directly after the participants finished the Critical Thinking Test., they were asked to write their nickname and read the direction. Then, the participants were asked to write an argumentative essay and to discuss their own reasons, with the length of at least 250 words. A word limit was set for the length of their essays and those essays of less than 100-word length were omitted from the sample of the study (20 out of 130 essays). The researchers by the help of the teachers were administered the test in a natural setting as possible to prevent the sensitization of students to the research objectives.

Three main paradigms were used in order to evaluate the argumentation and to identify the informal fallacies and evidence. The techniques of exposing the arguments and methods of identifying the informal fallacies were employed based on (Johnson 1999) the techniques of identifying the evidence were employed based on (Hoeken and Hustinx 2009) and finally, evaluation of the arguments was done based on (Douglas Walton, Reed, and Macagno 2008) in which several critical questions accompanying a host of argumentation schemes were presented.

Then, the informal fallacies were identified based on (Johnson 1999)definitions and presented clues. Having identified the informal fallacies, each argument was also evaluated by means of evaluation schemes presented by (Douglas Walton, Reed, and Macagno 2008).Nine categories of informal fallacies that were investigated and counted within language learners' argumentative writings in this study were: Ad hominem, Appeal to tradition, Begging the question, Faulty analogy, False dichotomy, Hasty generalization, Post hoc, Red herring, and RSA.

Additionally, four types of evidence categorized in (Hoeken and Hustinx 2009) were identified and counted within language learners' argumentative writings including a) Statistical, b) Anecdotal, c) Causal, d) Expert evidence. Anecdotal (or narrative) evidence consists of one case, whereas statistical evidence consists of numerical information about a large number of cases. Causal evidence consists of an explanation, and expert evidence consists of confirmation by an expert.

The argumentation schemes suggested by (Douglas Walton, Reed, and Macagno 2008), however, are more detailed and embrace a compendium of ninety-six schemes. While in Johnson, R.M.' model (1998), one should rely on the evaluation direction justifications to pick up an informal fallacy in the argument, Walton et al.'s model, by providing critical questions, helps the analyst to proceed step by step through answering the questions that include all possible ways the given argument could be considered as a valid argument and fallacy-free, or include a potential fallacy. Besides, in Walton et., al's (ibid) model, each argument may have different forms; hence, to pick up the related fallacy, one should go through all different related schemes. To ensure the reliability of the data coding, a third analyst worked on half of the samples selected randomly and analysed the arguments based on the steps provided above. If there was any disagreement in the mentioned steps between the three analysts, the data would be reconsidered until an agreement was achieved.

Moreover, to improve the reliability of the evaluation and identification procedure, another rater (an ELT professor) was asked to check the identified informal fallacies and evidence types. In this regard, whenever the disagreement occurred, both the researcher and the other rater discussed the issue until they came to an agreement upon the identified fallacy or evidence.

To clarify the evaluation procedure, one example of an argument from analogy is illustrated here based on its argumentation schemes and the matching critical questions.

(Douglas Walton, Reed, and Macagno 2008) presented the following argumentation schemes for an argument from analogy (p. 315):

Similarity Premise: Generally, case C1 is similar to case C2.

Base Premise: A is true (false) in case C1.

Conclusion: A is true (false) in case of C2.

They also put forth the following critical questions on the same page to evaluate this argument:

1. Are there differences between C1 and C2 that would tend to undermine the force of the similarity cited?
2. Is A true (false) in C1?
3. Is there some other case C3 that is also similar to C1, but in which A is false (true)?

Results

The distribution method of research variables based on the most important central indexes of mean, dispersion, and standard deviation were investigated. In Table 3, the descriptive statistics of the participants' critical thinking and frequency and types of informal fallacies and evidence were demonstrated.

Table 3: Descriptive Statistics of Critical Thinking, Type and Frequency of Informal Fallacies and Evidence Types

	N	Minimum	Maximum	Mean	Std. Deviation
Critical thinking	130	1.00	4.00	1.9231	.92858
Frequency of fallacies	130	.00	9.00	4.9692	1.94872
Ad Hominem	130	.00	1.00	.6846	.46647
Appeal to tradition	130	.00	1.00	.4077	.49331
Begging the question	130	.00	1.00	.4385	.49812
Fallacy of either/or dichotomy	130	.00	1.00	.5769	.49596
Faulty analogy	130	.00	1.00	.6077	.49015
Hasty generalization	130	.00	1.00	.5769	.49596
Post hoc	130	.00	1.00	.5692	.49710
Red herring	130	.00	1.00	.5385	.50045
RSA	130	.00	1.00	.5692	.49710
Frequency of evidences	130	.00	4.00	2.2308	1.27309
Evidence type 1 (Statistical)	130	.00	1.00	.5615	.49812
Evidence type 2 (Anecdotal)	130	.00	1.00	.5846	.49469
Evidence type 3 (Causal)	130	.00	1.00	.4769	.50140
Evidence type 4 (Expert evidence)	130	.00	1.00	.6077	.49015

4. Result

First research question was: Is there any significant relationship between EFL learners' critical thinking and their use and types of informal fallacies in their argumentative writing?

For data analysis of the null hypothesis, which was: “There is no significant relationship between EFL learners' critical thinking and their use and types of informal fallacies in their argumentative writing”, and the alternative hypothesis, which was: “There is a significant relationship between EFL learners' critical thinking and their use and types of informal fallacies in their argumentative writing”, a Spearman correlation was applied using SPSS software. A statistically significant negative relationship was observed between the participants' critical thinking and the frequency of use of informal fallacies in their written argumentation was ($r = -0.366$, $p < 0.01$) (See Table 4).

Table 4: The Results of Correlation between Learners' Critical Thinking and the Frequency of Fallacies

		Frequency of evidences
Critical thinking	Correlation Coefficient	-.366**
	Sig. (2-tailed)	.000
	N	130

Table 5 also demonstrates the results of the correlations between critical thinking and types of fallacies in students’ writings.

Table 5: The Results of Correlation between Learners' Use of Nine Categories of Informal Fallacies and their Critical Thinking

	Critical thinking
Ad hominem	.026
Appeal to tradition	-.091
Begging the question	-.254**
Fallacy of either/or dichotomy	-.463**
Faulty analogy	-.418**
Hasty generalization	.064
Post hoc	-.006
Red herring	-.281**
RSA	-.073

As Table 5 depicts, there is also a significant correlation between Iranian upper-intermediate EFL learners' critical thinking and some of the categories of informal fallacies. The obtained results are as follows: critical thinking and (1) begging the question ($r = -0.254$, $p < 0.01$), (2) Fallacy of either/or dichotomy ($r = -0.463$, $p < 0.01$), (3) Faulty analogy ($r = -0.418$, $p < 0.01$), and (4) Red herring ($r = -0.281$, $p < 0.01$). Though, no significant relations were observed between critical thinking and (1) Ad hominem ($r=0.026$), (2) appeal to tradition ($r=-0.091$), (3) Hasty generalization ($r = 0.064$), (4) Post hoc ($r = -0.006$), and (5) RSA (-0.073).

The second research question was: Is there any significant relationship between EFL learners' critical thinking and their use and types of evidence in their argumentative writing?

For data analysis of the null hypothesis, which was: "There is no significant relationship between EFL learners' critical thinking and their use and types of evidence in their argumentative writing", and the alternative hypothesis, which was: "There is a significant relationship between EFL learners' critical thinking and their use and types of evidence in their argumentative writing", a Spearman correlation was conducted. The findings of the study suggest that there is a significant relationship between Iranian upper-intermediate EFL learners' critical thinking and the frequency of use of evidence types in their argumentative essays ($r = 0.64$, $p < 0.01$) (Table 6).

Table 6: The Results of Correlation between Learners' Critical Thinking and the Frequency of Evidences.

		Frequency of evidences
Critical thinking	Correlation Coefficient	.64**
	Sig. (2-tailed)	.000
	N	130

Table 7 shows the findings related to the potential relationships between critical thinking and categories of evidences.

Table 7: The Results of Correlation between Learners' Use of Four Categories of Evidence Types and Critical Thinking.

	Critical thinking
Evidence type 1 (Statistical)	.516**
Evidence type 2 (Anecdotal)	.210*
Evidence type 3 (Causal)	.689**
Evidence type 4 (Expert evidence)	.197*

As Table 7 indicates, significant correlations were observed between the language learners' critical thinking and their use of four categories of evidence, including Statistical ($r = 0.516$, $p < 0.01$), Anecdotal ($r = 0.210$, $p < 0.05$), Causal ($r = 0.689$, $p < 0.01$), and Expert evidence ($r = 0.197$, $p < 0.05$).

5. Discussion

The primary research question for this investigation was: Is there any significant relationship between EFL learners' critical thinking and their use and types of informal fallacies in their argumentative writing?

The present investigation involved 130-second grade female senior high school students in Zanjan/Iran. The students were provided their answers to the excepted items from the California Critical Thinking Skills Test (CCTST) to determine their critical thinking scores. Also, the participants were asked to write an argumentative essay and to discuss their own reasons, with the length of at least 250 words. Then, the informal fallacies were identified based on (Johnson 1999) definitions and presented clues. Having identified the informal fallacies, each argument was also evaluated by means of evaluation schemes presented by (Douglas Walton, Reed, and Macagno 2008). Nine categories of informal fallacies that were investigated and counted within language learners' argumentative writings in this study were: Ad hominem, Appeal to tradition, Begging the question, Faulty analogy, False dichotomy, Hasty generalization, Post hoc, Red herring, and RSA. ‘The overall Weir Critical Thinking Essay Test to assess progress in critical thinking after a year of intensive academic English instruction for 36 Japanese students enrolled in a private two-year women's junior college in Osaka, Japan (D.N. Walton 1991). A control group received only content-based intensive English instruction, while the treatment group received additional training in critical thinking. The treatment group scored significantly higher on the test ("p" =0.000). The results imply that critical thinking skills can indeed be taught as part of academic EFL/ESL instruction.

Considering the previous findings with regard to the critical thinking, it could be concluded that this type of critical thinking would seemingly predict the learners' overall proficiency (Saidi 2020), strategy use (Akbari and Hosseini 2008), and their use of informal fallacies and evidence types according to the results of this study. Nevertheless, notwithstanding the results of (Marefat 2007)who came up with no predictive role of this critical thinking for the writing scores of EFL learners, the findings of this study demonstrate the existence of a significant relationship regarding the frequency of informal fallacies and evidence types as two indicators of the quality of argumentation (Saidi 2020) which is in line with the results of some other studies in which multiple intelligences proved to be of contributing effect on the learners' writing skills (Borek 2003); (Eng and Mustapha 2010).

Finally, (Kealey, Holland, and Watson 2005), in their study about Preliminary evidence on the association between critical thinking and performance in principles of accounting, tested whether critical-thinking skills can help explain the cross-sectional variation in student performance in principles of accounting. Prior research has used such measures as academic aptitude and demographic factors to explain performance in the principles of accounting class. We argue that success in principles of accounting also requires critical-thinking skills. We measured critical-thinking skills by using a holistic scoring process to

evaluate student essays. Our results show that even after controlling for academic aptitude, our measure of critical-thinking skills contributes significantly to explaining the cross-sectional variation in student performance in an accounting principles class. Understanding the relationship between critical thinking and success in accounting may contribute not only to reducing the failure rate in principles of accounting but also to encouraging an emphasis on critical thinking in the preparation of accounting professionals.

The practical significance of this research question was to consider the effective relationship between EFL learners' critical thinking and their frequency and types of informal fallacies in their argumentative writing the students in the second level of high school and also it can be used for different levels in different academic places.

The second research question for this investigation was: Is there any significant relationship between EFL learners' critical thinking and their use and types of evidence in their argumentative writing?

The present investigation involved 130-second grade female senior high school students in Zanjan/Iran. The students were provided their answers to the excepted items from the California Critical Thinking Skills Test (CCTST) to determine their critical thinking scores. Also, the participants were asked to write an argumentative essay and to discuss their own reasons, with the length of at least 250 words. Then, four types of evidence categorized in (Hoeken and Hustinx 2009)) were identified and counted within language learners' argumentative writings including a) Statistical, b) Anecdotal, c) Causal, d) Expert evidence. Having identified the evidence, each argument was also evaluated by means of evaluation schemes presented by (Douglas Walton, Reed, and Macagno 2008)The overall findings determined that there were potential and significant relationships between the participants' critical thinking and the frequency of use of informal fallacies within language learners' argumentative writings.

With regard to the second research question, the results of the study suggest that critical thinking has relationship with and their frequency and types of evidence in their argumentative writing. The students who got high scores in critical thinking, had high scores in argumentative writing and the students who got low scores in critical thinking had low scores in argumentative writing. Therefore, the results of this study show there is a high relationship between critical thinking and students' argumentative writing. Rashid and (Abdul Rashid and Awang Hashim 2008) also present that critical thinking highly affects ESL learners' overall language proficiency.

The present findings also assert that writing skill, which is a part of general language proficiency, could be improved via making the learners aware of the principles of critical thinking. (Mujtaba, Parkash, and Nawaz 2020)also present that critical thinking strategies could be trained to the students so that they could be able to write more analytical pieces of writing. What is mostly emphasized in the literature is that critical thinking and the language skill desired to develop both should be practiced and energized through continual refreshing.

The current investigation was in line with some details with previous and similar research about the relationship between EFL learners' critical thinking and their frequency and types of evidence in their argumentative writing such as (Kennison 2006); (Monteira and Jiménez-Aleixandre 2016); (Nikou, Bonyadi, and Amirikar 2015); (Short, Van der Eb, and McKay 2020); (Yousefi and Mohammadi 2016).

Also, this study was not in line with some previous studies. For example, Stapleton (2001) in his study about Assessing Critical Thinking in the Writing of Japanese University Students: Insights about Assumptions and Content Familiarity proposed a model for assessing critical thinking in the writing of L2 learners to determine whether content familiarity plays a role in critical thinking. Findings of a study of 45 Japanese undergraduate students indicate that the quality of critical thought depended on the topic content, with a familiar topic generating better critical thinking. Results also suggested that different assumptions between the L1 and L2 culture may lead to misinterpretations of the critical thinking ability of L2 learners.

Furthermore, (Zarei and Haghgoo 2012) in their study about The Relationship between Critical Thinking and L2 Grammatical and Lexical Knowledge study investigated the relationship between critical thinking and L2 grammatical knowledge on the one hand, and the relationship between critical thinking and lexical knowledge on the other. To fulfil this objective, a 60-item vocabulary and grammar subtest of the TOEFL test and an 80–item Watson Glaser Critical Thinking questionnaire were distributed among 150 male and female Iranians studying English as a foreign language at Azad University in Takestan, Iran. Data were analysed using the Pearson correlation procedure. The result of the data analysis indicated that the correlation between vocabulary and critical thinking was not statistically significant. The correlation between grammar and critical thinking was not statistically significant.

The practical significance of this research question was to consider the effective relationship between EFL learners' critical thinking and their frequency and types of evidence in their argumentative writing the students in the second level of high school and also it can be used for different levels in different academic places.

6. Conclusion

Based on the results achieved from the first research question, there was a significant correlation between the participants' critical thinking and the frequency of use of informal fallacies. A statistically significant negative relationship was observed between the participants' critical thinking and the frequency of use of informal fallacies in their written argumentation.

Based on the results achieved from the second research question, there was a potential and significant relationship between the participants' critical thinking and the frequency of use of informal fallacies.

العلاقة بين التفكير النقدي والتكرار والمغالطة غير الرسمية والأدلة في الكتابة الجدلية

نيكو دافاربانا، سيروس إيزادباناه،بريما فاسيح
قسم تدريس اللغة الإنجليزية، جامعة آزاد الإسلامية، فرع زنجان، إيران

الملخص

كانت الدراسة الحالية عبارة عن تحقيق في العلاقة بين التفكير النقدي لمتعلمي اللغة الإنجليزية لغةً أجنبية ، وتواتر المغالطة غير الرسمية وأنماطها، والأدلة في الكتابة الجدلية. وقد أجريت دراسات قليلة للتحقيق في هذه القضايا. وتحقيقا لهذه الغاية ، تم اختيار 356 طالبة في الصف الثاني الثانوي في المدارس الثانوية الحكومية في زنجان / إيران من 4 مدارس ثانوية عليا من خلال طريقة أخذ العينات العشوائية العنقودية متعددة المراحل (MCRS) واستنادا إلى اختبار تحديد المستوى في كامبريدج (2010)، فقد أثبت 130 طالبة منهن كُنَّ فوق المتوسط وشاركن في هذه الدراسة الارتباطية. جرت المرحلة الرئيسية لجمع البيانات لمدة شهر واحد. ثم ، تم تحديد المغالطات غير الرسمية التي تستند إلى تعريفات (جونسون) وأربعة أنواع من الأدلة المصنفة في Hoeke و Hustinkx وحُسبت في كتابات متعلمي اللغة الجدلية. وقُيِّمَتْ الحجج أيضًا استناداً إلى (والتون) و(ريد) و(ماكانيو) بناءً على النتائج التي تم تحقيقها من السؤال البحثي الأول ، وقد لوحظ وجود ارتباط سلبي كبير بين التفكير النقدي للمشاركين وتواتر استخدام المغالطات غير الرسمية في حجتهم المكتوبة. وبناءً على النتائج التي تم تحقيقها من سؤال البحث الثاني ، كان هناك ارتباط محتمل وهام بين التفكير النقدي للمشاركين وتواتر استخدام المغالطات غير الرسمية.

الكلمات المفتاحية: الكتابة الجدلية ، التفكير النقدي ، الإثبات ، المغالطة غير الرسمية.

References

Abdelrahim, Azza AM, and Maha AM Abdelrahim. 2020. Teaching and Assessing Metadiscoursal Features in Argumentative Writing: A Professional Development Training for EFL Teachers. *International Journal of Applied Linguistics* 30 (1): 70-91.

Abdul Rashid, Rosyati, and Rosna Awang Hashim. 2008. The relationship between Critical Thinking and Language Proficiency of Malaysian Undergraduates. Paper presented at EDU-COM 2008. International Conference Sustainability in Higher Education: Directions for Change, Edith Cowan University, November 19-21, in Perth Western Australia.

Akbari, Ramin, and Kobra Hosseini. 2008. Multiple Intelligences and Language Learning Strategies: Investigating Possible Relations. *System* 36 (2): 141-155.

Alagozlu, Nuray. 2007. Critical Thinking and Voice In EFL Writing. *Asian EFL journal* 9 (3): 118-136.

Ben-Porath, Yossef S. 2019. Errors, New and Repeated: A Rejoinder to Butcher et al. *Journal of personality assessment* 101 (2): 129-139.

Borek, Jennifer. 2003. Inclusion and the Multiple Intelligences: Creating a Student-Centered Curriculum. *QUARTERLY-NATIONAL WRITING PROJECT* 25 (4): 24-28.

de Swart, HCM Harrie. 2018. Fallacies and Unfair Discussion Methods. *Philosophical and Mathematical Logic*: 489-530. Springer.

Dufour, Michel. 2019. Old and New Fallacies in Port-Royal Logic. *Argumentation* 33 (2): 241-267.

Eng, Looi Lin, and Ghazali Mustapha. 2010. Enhancing Writing Ability Through Multiple-Intelligence Strategies. *Pertanika Journal of Social Sciences and Humanities* 18: 53-63.

Gass, Robert H, and John S Seiter. 2018. When Good Arguments Go Bad: An Activity for Learning about Fallacies in Reasoning. *Syllabus* 7 (2).

Graham, Steve, Karen R Harris, Evan Fishman, Julia Houston, Kausalai Wijekumar, Pui-Wa Lei, and Amber B Ray. 2019. Writing Skills, Knowledge, Motivation, and Strategic Behavior Predict Students' Persuasive Writing Performance in the Context of Robust Writing Instruction. *The Elementary School Journal* 119 (3): 487-510.

Greenberg, Kathleen P. 2015. Rubric Use in Formative Assessment: A Detailed Behavioral Rubric Helps Students Improve Their Scientific Writing Skills. *Teaching of Psychology* 42 (3): 211-217.

Griffiths, Carol. 2008. *Lessons from Good Language Learners*. Cambridge University Press.

Hawkins, Lisa K, Nicole M Martin, and Jennifer Cooper. 2019. Preparing Elementary Writing Teachers: An inquiry-Driven, Field-Based Approach to Instruction. *Teaching/Writing: The Journal of Writing Teacher Education* 6 (1): 8.

Helms-Park, Rena, and Paul Stapleton. 2003. Questioning the Importance of Individualized Voice in Undergraduate L2 Argumentative Writing: An Empirical Study with Pedagogical Implications. *Journal of Second Language Writing* 12 (3): 245-265.

Hinkel, Eli. 2003. *Teaching academic ESL Writing: Practical Techniques in Vocabulary and Grammar*. Routledge.

Hoeken, Hans, and Lettica Hustinx. 2009. When is Statistical Evidence Superior to Anecdotal Evidence in Supporting Probability Claims? The Role of Argument Type. *Human Communication Research* 35 (4): 491-510.

Johnson, Robert M. 1999. *A logic book: Fundamentals of reasoning*. Wadsworth Pub.

Kealey, Burch T, Jonna Holland, and Marsha Watson. 2005. Preliminary Evidence on the Association Between Critical Thinking and Performance in Principles of Accounting. *Issues in Accounting Education* 20 (1): 33-49.

Kennison, Monica Metrick. 2006. The Evaluation Of Students' Reflective Writing for Evidence of Critical Thinking. *Nursing Education Perspectives* 27 (5): 269-273.

Kneupper, Charles W. 1978. Teaching Argument: An Introduction to the Toulmin Model. *College Composition and Communication* 29 (3): 237-241.

Laurent, Nathan, and Lee Duffield. 2018. Queensland's Broad-Scale Land-Clearing Policy Debate, 1998–2006: An analysis of Evidence-Based Arguments in News Media Content. *Queensland Review* 25 (1): 70-88.

Liu, Meihua, and George Braine. 2005. Cohesive Features in Argumentative Writing Produced by Chinese Undergraduates. *System* 33 (4): 623-636.

Long, Jim, Frank Tuzi, and Carolyn Ziebart. 2020. Critical Thinking in the Classroom. Paper presented at The All-Faculty Conference, Janunary 9, in Lynchburg, USA.

Malpique, Anabela Abreu, and Ana Margarida Veiga Simão. 2019. Does it Work?'Adapting Evidence-Based Practices to Teach Argumentative Writing. *Journal of Writing Research* 10 (3): 527-567.

Marefat, Fahimeh. 2007. Multiple Intelligences: Voices from an EFL Writing Class. *Pazhuhesh-e Zabanha-ye Khareji* 32.

Monteira, Sabela F, and María Pilar Jiménez-Aleixandre. 2016. The Practice of Using Evidence in Kindergarten: The Role of Purposeful Observation. *Journal of Research in Science Teaching* 53 (8): 1232-1258.

Mujtaba, SM, Rakesh Parkash, and Maria Waris Nawaz. 2020. Do Indirect Coded Corrective Feedback and Teachers Short Affective Comments Improve the Writing Performance and Learners Uptake? *Reading & Writing Quarterly* 36 (1): 34-47.

Németh, Nóra, and Judit Kormos. 2001. Pragmatic Aspects of Task-Performance: The Case of Argumentation. *Language Teaching Research* 5 (3): 213-240.

Nickerson, Raymond S, Susan F Butler, and Daniel H Barch. 2019. Validity and Persuasiveness of Conditional Arguments. *The American Journal of Psychology* 132 (2): 131-147.

Nikou, Farahnaz Rimani, Alireza Bonyadi, and Negin Amirikar. 2015. Investigating the Relationship Between Critical Thinking Skills and the Quality of Iranian Intermediate TEFL Students' Writing." *Advances in Language and Literary Studies* 6 (2): 57-64.

Oaksford, Mike, and Nick Chater. 2020. New Paradigms in the Psychology of Reasoning. *Annual Review of Psychology* 71: 305-330.

Peterson, Debra S. 2019. Engaging Elementary Students in Higher Order Talk and Writing about Text. *Journal of Early Childhood Literacy* 19 (1): 34-54.

Prihastuti, Luh Putu Rany, Ni Nyoman Padmadewi, and Dewa Putu Ramendra. 2020. The Effect of 'Power'as an Instructional Writing Strategy on Students' Writing Skill Across Gender. *Journal of Education Research and Evaluation* 4 (1): 17-26.

Qin, Jingjing, and Erkan Karabacak. 2010. The Analysis of Toulmin Elements in Chinese EFL University Argumentative Writing. *System* 38 (3): 444-456.

Rahmah, Siti, Rahmah Johar, and Saminan Saminan. 2020. The Development of Teacher Efforts to Improve The Mathematical Reasoning Abilities Through The Problem Based Learning. *International Journal for Educational and Vocational Studies* 1 (8).

Saidi, Mavadat. 2020. The Relationship between Iranian EFL Learners' Linguistic and Logical Intelligences and the Frequency of Fallacies and Evidence in their Argumentative Writing: A Gender-based Study. *Journal of English Language Pedagogy and Practice* 12 (25): 151-169.

Schlaufer, Caroline, Iris Stucki, and Fritz Sager. 2018. The Political Use of Evidence and Its Contribution to democratic discourse. *Public Administration Review* 78 (4): 645-649.

Short, Rachel A, Marina Y Van der Eb, and Susan R McKay. 2020. Effect of Productive Discussion on Written Argumentation in Earth Science Classrooms. *The Journal of Educational Research* 113 (1): 46-58.

Stucki, Iris. 2018. Evidence-Based Arguments in Direct Democracy: The Case of Smoking Bans in Switzerland. *Evaluation and Program Planning* 69: 148-156.

Tindale, Christopher W. 2007. *Fallacies and Argument Appraisal.* Cambridge University Press.

Torff, Bruce. 2019. Teaching Critical Thinking: Content Integration, Domain-Specificity, and Equity. *Handbook of Research on Promoting Higher-Order Skills and Global Competencies in Life and Work*, 22-36. IGI Global.

Walton, Douglas. 2006. *Fundamentals of Critical Argumentation*. Cambridge University Press. New York.

Walton, Douglas N. 1991. "Critical Faults and Fallacies of Questioning. *Journal of Pragmatics* 15 (4): 337-366.

Walton, Douglas, Christopher Reed, and Fabrizio Macagno. 2008. *Argumentation Schemes*. Cambridge University Press.

Waltz, Carolyn Feher, and R Barker Bausell. 1981. *Nursing research: Design, Statistics, and Computer Analysis*. FA Davis company.

Yousefi, Soraya, and Mojtaba Mohammadi. 2016. Critical Thinking And Reading Comprehension among Postgraduate Students: The Case of Gender and Language Proficiency Level. *Journal of Language Teaching and Research* 7 (4): 802.

Žagar, Igor Ž. 2018. Between Fallacies and More Fallacies?. *Solsko Polje* 29.

Zarei, Abbas Ali, and Elham Haghgoo. 2012. The Relationship Between Critical Thinking and L2 Grammatical and Lexical Knowledge. *English Linguistics Research* 1 (1): 104-110.

Zhang, Ying. 2018. A Contrastive Study on the Application of Mind Maps in Argumentative Writing Instruction for EFL Learners. *English Language Teaching* 11 (12): 93-100.

Source details

Jordan Journal of Modern Languages and Literatures

Scopus coverage years: from 2018 to 2022
Publisher: Yarmouk University
ISSN: 1994-6953 E-ISSN: 2304-8069
Subject area: Arts and Humanities: Literature and Literary Theory | Arts and Humanities: Language and Linguistics | Social Sciences: Linguistics and Language
Source type: Journal

CiteScore 2021
0.2

SJR 2021
0.199

SNIP 2021
0.463

View all documents > | Set document alert | Save to source list | Source Homepage

CiteScore | CiteScore rank & trend | Scopus content coverage

¡ Improved CiteScore methodology
CiteScore 2021 counts the citations received in 2018-2021 to articles, reviews, conference papers, book chapters and data papers published in 2018-2021, and divides this by the number of publications published in 2018-2021. Learn more >

CiteScore 2021

$$0.2 = \frac{21 \text{ Citations } 2018 - 2021}{112 \text{ Documents } 2018 - 2021}$$

Calculated on 05 May, 2022

CiteScoreTracker 2022

$$0.3 = \frac{44 \text{ Citations to date}}{152 \text{ Documents to date}}$$

Last updated on 05 April, 2023 • Updated monthly

CiteScore rank 2021

Category	Rank	Percentile
Arts and Humanities — Literature and Literary Theory	#435/934	53rd
Arts and Humanities — Language and Linguistics	#682/968	29th
Social Sciences		

View CiteScore methodology > | CiteScore FAQ > | Add CiteScore to your site

About Scopus

What is Scopus

Content coverage

Scopus blog

Scopus API

Privacy matters

Language

日本語版を表示する

查看简体中文版本

查看繁體中文版本

Просмотр версии на русском языке

Customer Service

Help

Tutorials

Contact us

Jordan Journal of Modern Languages and Literatures

COUNTRY

Jordan

Universities and research institutions in Jordan

Media Ranking in Jordan

SUBJECT AREA AND CATEGORY

Arts and Humanities
└ Literature and Literary Theory

Social Sciences
└ Linguistics and Language

PUBLISHER

Yarmouk University

H-INDEX

2

PUBLICATION TYPE

Journals

ISSN

19946953, 23048069

COVERAGE

2018-2021

INFORMATION

Homepage

How to publish in this journal

jjmll@yu.edu.jo

SCOPE

JJMLL is an international peer-reviewed research journal issued by the Higher Scientific Research Committee, Ministry of Higher Education & Scientific Research, Amman, Jordan. JJMLL is published quarterly by the Deanship of Research & Graduate Studies, Yarmouk University, Irbid, Jordan. The journal publishes genuinely original research articles, remarks and replies and article reviews. The journal welcomes original research on current topics in modern languages, linguistics and literatures based on recent theoretical developments and latest international scholarship.

Quartiles

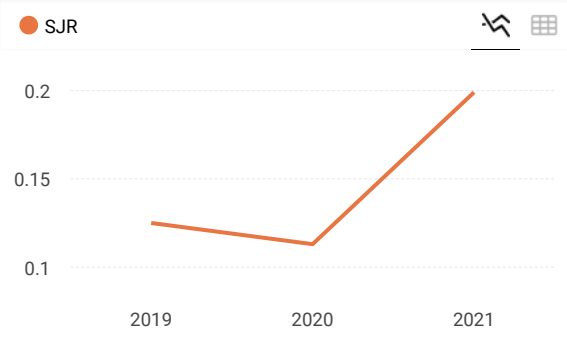
FIND SIMILAR JOURNALS

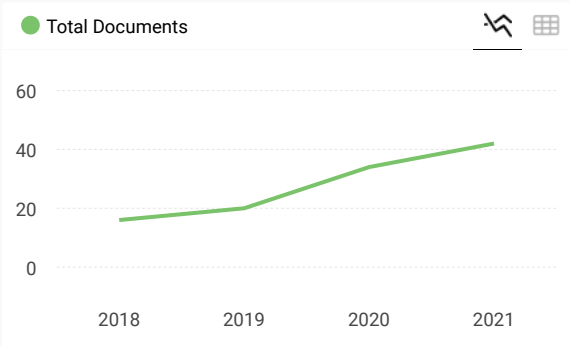
1
System
GBR
39%
similarity

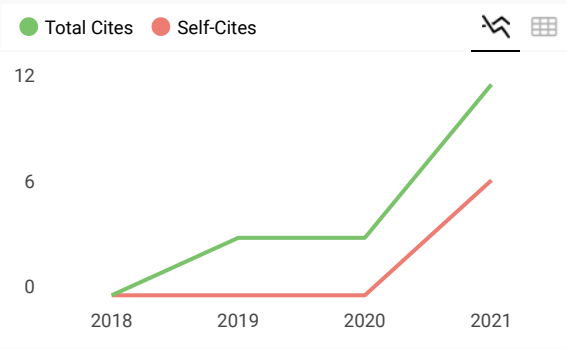
2
Teflin Journal
IDN
39%
similarity

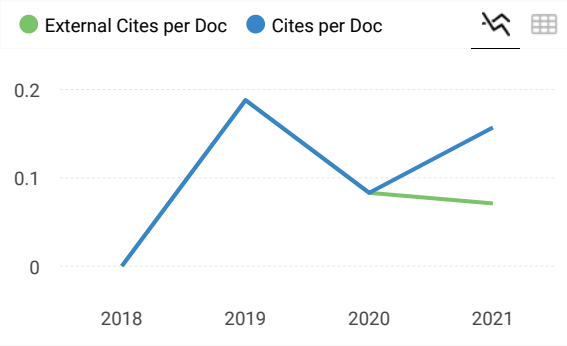
3
Innovation in Language Learning and Teaching
GBR
38%
similarity

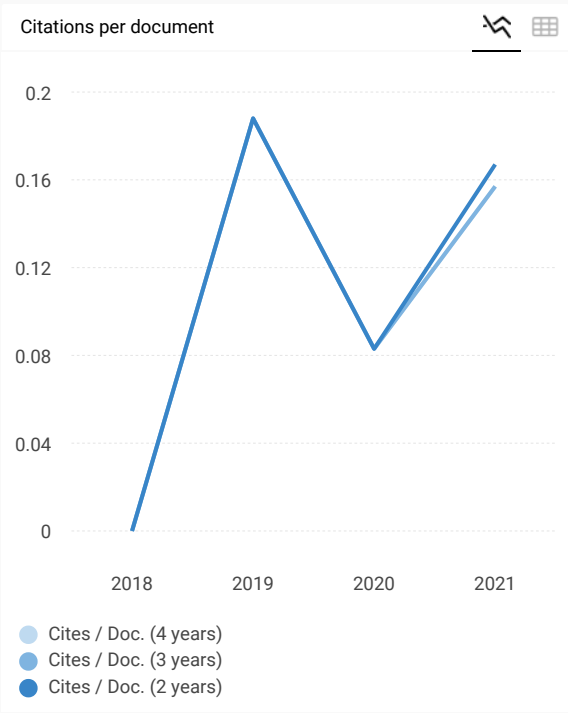
4
Elia
ESP
3
s

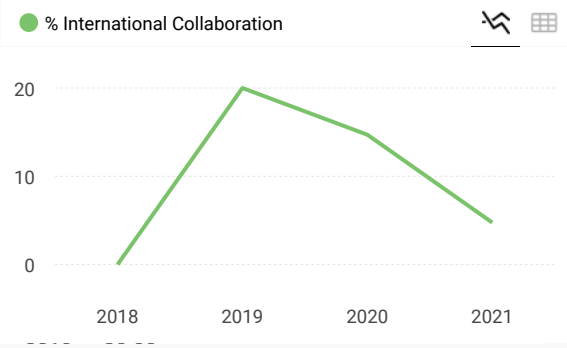


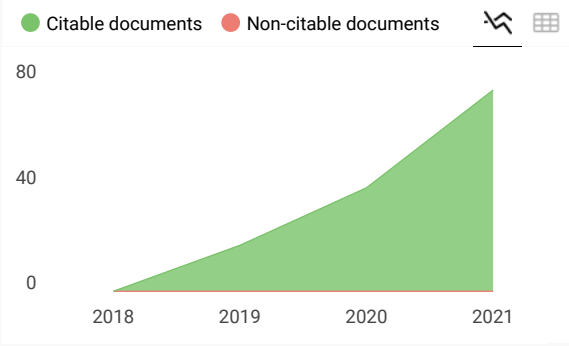


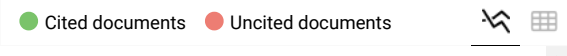


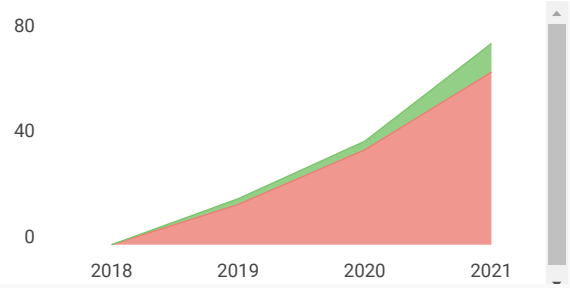












← Show this widget in your own website

Just copy the code below and paste within your html code:

```
<a href="https://www.scimag
```

SCImago Graphica

Explore, visually communicate and make sense of data with our **new data visualization tool**.

Metrics based on Scopus® data as of April 2022

Amine Salil 11 months ago

Hello,

I was wondering if the journal asks authors for a publication fee? It does not say on their official website.

Thanks,
Amine

reply

Abdulhadi 10 months ago

No, it dose not ask for publication fees. It is free.

SCImago Team

Melanie Ortiz 11 months ago

Dear Amine, thank you very much for your comment. Unfortunately, we cannot help you with your request, we suggest you contact the journal's editorial staff so they could inform you more deeply. Best Regards, SCImago Team

UINMALIKI mailbox

Rohmani Nur Indah <indah@bsi.uin-malang.ac.id>

[jotse] Article Review Request 1253

1 message

Journal of Technology and Science Education <info@jotse.org> Tue, Mar 30, 2021 at 1:39 AM
Reply-To: Dra María Martínez Martínez <rosario.martinez@upc.edu>
To: Rohmani Nur Indah <indah@bsi.uin-malang.ac.id>

Dear Rohmani Nur Indah:

I believe that you would serve as an excellent reviewer of the manuscript, "CONSTRUCTING STUDENTS' THINKING PROCESS THROUGH ASSIMILATION AND ACCOMMODATION FRAMEWORK," which has been submitted to Journal of Technology and Science Education. The submission's abstract is inserted below, and I hope that you will consider undertaking this important task for us.

Please log into the journal website in 3 days (maximum) to indicate whether you will undertake the review or not, as well as to access the submission and to record your review and recommendation. We ask you to register as soon as possible your decision in order not to delay the review process too much. The web site is http://www.jotse.org/index.php/jotse.

If you do not have your username and password for the journal's web site, you can use this link to reset your password (which will then be emailed to you along with your username).

https://www.jotse.org/index.php/jotse/login/lostPassword

The review itself is due 2021-04-12.

Submission URL:
http://www.jotse.org/index.php/jotse/reviewer/submission/1935?key=p6j9wmxi

Thank you for considering this request.

Dra María Martínez Martínez
Universitat Politècnica de Catalunya
UPC BARCELONA TECH
Phone 682383824
rosario.martinez@upc.edu

"CONSTRUCTING STUDENTS' THINKING PROCESS THROUGH ASSIMILATION AND ACCOMMODATION FRAMEWORK"

Abstract

This research aims to explore the college students' thinking process in constructing their knowledge based on the assimilation and accommodation scheme. This is due to the inability of a part of the students at the university level in constructing their thought to obtain a new knowledge through the thinking process. Piaget said that assimilation and accommodation were the adaptation process of individuals to their environment based on cognitive structures through stimulus and response. This research was conducted on 22 students of Mathematics Education at three different universities in East Java, Indonesia, then 3 students were selected to be the research subjects. The selection of research subjects was based on their oral and written communication skills related to the

thinking process carried out when completing a mathematical proving problem. The main instrument in this qualitative research was the researcher herself, assisted by mathematical proving test and interview instruments. The test instrument consisted of mathematical proving cases related to semigroups in abstract algebra. Data analysis in this research was conducted by observing the subjects' thinking process in constructing their knowledge based on assimilation and accommodation scheme. From the results of the research, it was found that the students did the thinking process to construct their knowledge based on the assimilation and accommodation scheme through 5 stages, namely the identification, determining the mathematical rules to be used, proving by means of symbol manipulation, reviewing, and justifying.

Dra María Martínez Martínez
Universitat Politècnica de Catalunya
UPC BARCELONA TECH
Phone 682383824
rosario.martinez@upc.edu
María Martínez Martínez

Journal of Technology and Science Education
https://www.jotse.org

UINMALIKI mailbox

Rohmani Nur Indah <indah@bsi.uin-malang.ac.id>

[jotse] Article Review Completed

1 message

Journal of Technology and Science Education <info@jotse.org> Mon, Apr 12, 2021 at 3:52 PM
Reply-To: Rohmani Nur Indah <indah@bsi.uin-malang.ac.id>
Cc: María Martínez Martínez <rosario.martinez@upc.edu>

María Martínez Martínez:

I have now completed my review of "CONSTRUCTING STUDENTS' THINKING PROCESS THROUGH ASSIMILATION AND ACCOMMODATION FRAMEWORK" for Journal of Technology and Science Education, and submitted my recommendation, "Revisions Required."

Rohmani Nur Indah

Journal of Technology and Science Education
https://www.jotse.org

Commented 1253-4607-1-RV.doc
2422K

Rohmani Nur Indah <indah@bsi.uin-malang.ac.id>

[jotse] Article Review Acknowledgement

1 message

Journal of Technology and Science Education <info@jotse.org> Mon, Apr 12, 2021 at 8:44 PM
Reply-To: Dra María Martínez Martínez <rosario.martinez@upc.edu>
To: Rohmani Nur Indah <indah@bsi.uin-malang.ac.id>

Dear Rohmani Nur Indah:

Thank you for completing the review of the submission, "CONSTRUCTING STUDENTS' THINKING PROCESS THROUGH ASSIMILATION AND ACCOMMODATION FRAMEWORK," for Journal of Technology and Science Education. We appreciate your contribution to the quality of the work that we publish.

Dra María Martínez Martínez
Universitat Politècnica de Catalunya
UPC BARCELONA TECH
Phone 682383824
rosario.martinez@upc.edu
María Martínez Martínez

Journal of Technology and Science Education
https://www.jotse.org

CONSTRUCTING STUDENTS' THINKING PROCESS THROUGH ASSIMILATION AND ACCOMMODATION FRAMEWORK

Abstract

This research aims to explore the college students' thinking process in constructing their knowledge based on the assimilation and accommodation scheme. This is due to the inability of a part of the students at the university level in constructing their thought to obtain a new knowledge through the thinking process. Piaget said that assimilation and accommodation were the adaptation process of individuals to their environment based on cognitive structures through stimulus and response. This research was conducted on 22 students of Mathematics Education at three different universities in East Java, Indonesia, then 3 students were selected to be the research subjects. The selection of research subjects was based on their oral and written communication skills related to the thinking process carried out when completing a mathematical proving problem. The main instrument in this qualitative research was the researcher herself, assisted by mathematical proving test and interview instruments. The test instrument consisted of mathematical proving cases related to semigroups in abstract algebra. Data analysis in this research was conducted by observing the subjects' thinking process in constructing their knowledge based on assimilation and accommodation scheme. From the results of the research, it was found that the students did the thinking process to construct their knowledge based on the assimilation and accommodation scheme through 5 stages, namely the identification, determining the mathematical rules to be used, proving by means of symbol manipulation, reviewing, and justifying.

Keyword: Thinking process, Students, Assimilation and Accommodation

Commented [In1]:
What kind of inability that you mean?
If this fact is inferred from the result of a preliminary study, the details should be elaborated in the introduction section

Commented [In2]:
This information belongs to general knowledge on the mechanism of qualitative research design. You need to describe the function of the test and interview instead.

Introduction

The thinking process is an important component for knowing one's abilities and talents in learning mathematics (Polly et al., 2007; Uyangör, 2019). Thinking can be said as a tool for learning mathematics (As'ari et al., 2019). Students can learn facts, concepts, principles, and procedures of mathematical problem solving through the thinking process. The thinking process includes reasoning that occurs through a mental activity in the students' brain. This reasoning can occur when the students are performing algebraic operations, problem solving, decision making, critical thinking, reflective thinking, or analytical thinking. This process is not only to produce abstract mathematical numbers and concepts but also as an important skill in thinking analytically and logically, and also in reasoning quantitatively (Onal et al., 2017). Thinking is an skill needed for communication, collaboration, global awarness, mastery technology, learning, and innovation require (Arifin et al., 2020). Asking questions to the students is a communication tool to know their thinking process (Zayyadi et al., 2019) The thinking process can also be said as a tool to construct one's knowledge (Fisher, 2005).

Piaget said that the thinking process could be done through a construction process that occured based on the previous knowledge to gain a new one. This construction could have occured through five components, namely activating previous knowledge, owning and understanding a new knowledge, using the knowledge, then reflecting (Aseeri, 2020). Construction was the process of student interaction related to previously owned ideas with new ideas to understand a concept being studied. Construction could be combined with interaction because of the existence of knowledge that were being used to perform a mental activity (Guler & Gurbuz, 2018).

The mental activity of the students at university in constructing their schemes can be done through solving mathematical problems. There are two mathematical problems namely the problem of finding and the problem of proving (Baroody, 1993). A problem in mathematics will be a problem for students if they need an effort to solve it. The effort made by students in solving mathematical problems is a thinking process that occurs in their brain based on the schemes they already have. The use of knowledge schemes to solve mathematical proving problems that have never been proven before can occur intuitively or analytically (Faizah et al., 2020b). Thinking intuitively is a thinking process that occurs quickly without any reasoning (Macchi & Bagassi, 2012). Solving problems of mathematical proof by thinking intuitively may be right or wrong. In some cases, students gave a correct answer but the reason

related to the concept used was wrong, or the answer was incorrect but the concept was correct. The students can make mistakes in solving mathematical proving problems because they use their intuition. The students assume that the use of mathematical rules such as the Lagrange theorem and isomorphic are appropriate to complete the proof of subgroups in abstract algebra (Leron, 2014). The students make mistake because they use the concept of Langrange's Theorem but they are not able to give a correct conclusion.

Students are able to combine intuitive and analytical thinking to make reasoning in solving mathematical problems (Macchi & Bagassi, 2012). Intuitive and analytical thinking are two different things. Intuitive thinking is a model of thinking that occurs quickly and the process is connected to each other starting from the feeling, holistic, and natural. While the analytical thinking is a model of thinking that is done through a slow process related to mathematical rules (Rusou et al., 2013). Analytical thinking is related to situations, practices, statements, ideas, theories, and arguments (Thaneerananon et al., 2016). The process of analytical thinking starts from observation, determining the supporting rules, checking, or rejecting intuitive responses (Sternberg et al., 2008). The supporting rules act as a guarantor for the students in giving reason for each step of the mathematical proof (Faizah et al., 2020a).

The thinking process that involves reasoning can be said as thinking analytically, because analytical thinking has several categories namely modeling, reasoning, symbolizing, representing, proving, abstracting, and mathematizing (Lopez & Tancinco, 2016; Robbins, 2011). Therefore, the analytical thinking process can be interpreted as a mental activity that occurs in the brain in order to observe and determine the rules for outlining the resolution of mathematical problems. Whereas intuitive thinking is a thinking process to solve mathematical problems quickly, unconsciously, and based on the feelings that occurs naturally (Iannello & Antonietti, 2008; Leron & Hazzan, 2009; Lopez & Tancinco, 2016).

2. Assimilation and Accommodation Framework

Piaget's theory states that there are two kinds of adaptation process of each individual to their environment, namely assimilation and accommodation (Kaasila, et al., 2014). Piaget divided the intellectual growth that occured through one's mental activity into the following six steps: reflexively, obtained through a fundamental adaptation, interest on a new situation, relation to new discoveries, then combining the discoveries in mental activities (Piaget, 1965). A new scheme obtained by the students could be included in the assimilation object by organizing a new definition. The scheme on Piaget's theory contained assimilation and accommodation as a process of knowledge translation. Both of these were influenced by the development of Piaget's theory in mathematics learning (Ernest, 2003).

Assimilation was a process carried out by students in inserting a new stimulus into the existing scheme. The assimilation was a positive influence of the environment that occured on one's mental activity. At the time a new object was being assimilated into the existing scheme, then the existing scheme was getting an improvement. While the accommodation was a process of adjusting the schemes carried out by students to build a new scheme. Accommodation indicated that the process that was being done by the student was influenced by the object being transformed. In other words, assimilation and accommodation could be represented as an interaction between the subject and the object so that assimilation and accommodation were closely related (Zhiqing, 2015). At the time when assimilation is dominated by a new scheme, then the scheme is a part of the accommodation. Therefore, assimilation can occur even though there is no accommodation, but accommodation cannot occur if the assimilation has not occurred yet.

Students can construct their knowledge when doing the assimilation to form a new scheme. Assimilation and accommodation are the adaptation process to the environment based on cognitive structures. Assimilation is the process of interpreting an event by using the existing cognitive structures. While accommodation is the process of increasing knowledge by modifying the existing knowledge or cognitive structures to gain a new experience (Netti et al., 2016; Kaasila et al., 2014). Therefore, in the process of assimilation, a new stimulus is directly absorbed and integrated into the existing knowledge schemes. Meanwhile the process of accommodation on the existing knowledge structures cannot directly absorb the new stimulus; it needs a phase to integrate the stimulus. The process of assimilation

Commented [In3]:
Starting from this point of view, you need to brige it with the cases in Indonesia as the context of your study. Is it similar or is there any difference?

Commented [In4]:
Review of related literature is blended in introduction so that it supports the theoretical bases of this study.

and accommodation can be illustrated into a diagram that was able to help us in understanding the process or procedure of those two adaptation process (Subanji & Nusantara, 2016).

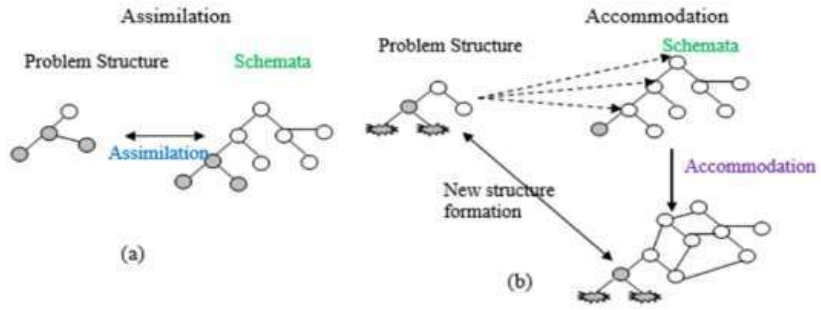


Figure 1. Assimilation and Accommodation Process

In figure 1 (a), it can be seen that assimilation occurs when the structure of the problem is in accordance with the existing scheme. It will be interpreted directly into the correct way in order to form new structures. In figure 1 (b), it can be seen that the structure of the thinking scheme does not match with the structure of the problem. When interpreting correctly, the students need to convert the new scheme with the existing schemes in order to create a new thinking structure related to the problem. Therefore, the thinking activity through the assimilation and accommodation framework in this research can be seen in Table 1.

Thinking Process	Mental Activity
Assimilation	Employing an existing scheme to solve a mathematical proof problema
Accommodation	Employing both the existing scheme and a new scheme in order to solve mathematical proof problems

Table 1. Thinking Activity

3. Research Problem

Thinking analitically is a highly necessary thinking process to solve mathematical proof problems. At the university level, these problems are formal so that an analitycal thinking capability is needed. However, there are still students who complete the mathematical proving problems related to abstract algebra intuitively (Korolova & Zeidmane, 2016). Intuitive mathematical proving is not necessarily wrong but students may use the wrong concept to solve the problems. Some students solved subgroup problems in abstract algebra by using the Langrange Theorem because they understand only the Lagrange Theorem concept and do not understand subgroups (Leron & Hazzan, 2009; Leron, 2014). Therefore, students who complete an abstract algebra proving by using only the existing knowledge need to construct their thinking process in order to accept a new knowledge scheme. The new knowledge scheme can be built by assimilation and accommodation. Thus, the question of this research is "how is the students' thinking process in solving the semigroup proving problem in abstract algebra based on the assimilation and accommodation framework?".

4. Method Framework

4.1. A Case Study Approach

Data analysis in this qualitative research was conducted by attentively observing the results of the subjects' work in written form and the results of the interview. The constructing process carried out by the subjects can be discovered from the information they gave when solving the semigroup problems. The researchers were able to explore their thinking construction by asking questions "because". The thinking process that they performed in dealing with the problem can be seen from the information conveyed by the subjects. The structure of problem-solving can be described as a series of processes in

Commented [In5]:
Missing detail information, in whose context is it? Is it from Netty et al. 2016 or Subanji & Nusantara, 2016?

Because your work is a case study, you need to elaborate the result of your preliminary analysis to strengthen the argument on the reason of choosing the research subject

Commented [In6]:
The context of their study is in Latvia. It needs further explanation on similar aspect to your research focus, for instance the student's level, the targetted mathematical proof problems, etc.

Commented [In7]:
Clarify the type of case study used, is it descriptive, analytical or explanatory?

constructing the proofs carried out by researchers (Subanji & Nusantara, 2016). Researchers can analyze the students' thinking process to find out the constructing process based on assimilation and accommodation frameworks. Students thinking process in constructing knowledge to solve mathematical proving problem can occur intuitively and analitically. Thinking process that occured intuitively can be indicated by the students' ability in revealing the result of thinking process quickly, lack of effort, and takes automatically. While thinking process that occured analitically can be indicated by the students' ability in revealing the result of thinking process slowly, mindful, and carefully.

The participant of this study was the students of Mathematics Education in fourth semester or those who passed the abstract algebra course. From 78 students in three different universities in East Java, Indonesia, it can be seen that 9 students could do assimilation without accommodation, and 13 students could do assimilation and accomodation. The students that were choosen as the research samples were those who could reveal their thinking process verbally. Table 2 shows the number of students who could construct their idea through a thinking process.

University	Number of Students	Assimilation	Assimilation and Accomodation
A	27	2	4
B	31	4	5
C	20	3	4
Total	78	9	13

Table 2. The Construction of Students Thinking Process

From the table 2, we can see that 9 students were able to do the thinking process of assimilation and 13 students were able to do the thinking process of assimilation and accomodation. In general, one out of nine students could express their mind verbally in solving problem in assimilation. Two out of 13 students could express their mind in assimilation and accomodation. In short, three students were choosen as the research subjects. The table 3 below showed the number of research subjects in this study.

Thinking Process	Number of Students	Research Subjects
Assimilation	9	1
Assimilation and Accomodation	13	2
Total number	22	3

Table 3. Selection of subjects

Table 3 shows that there were 3 students who can be the subject of this research. The 3 subjects are Dwi as subject 1 (S1), Alex as subject 2 (S2), and Dita as subject 3 (S3). They were selected as research subjects because they were able to do verbal and written communication related to the thinking process carried out in completing the abstract algebra proving test. This is due to the fact that thinking process is a form of communication between individuals and themselves based on cognitive activities they do (Sfard & Kieren, 2001; Sfard, 2012).

4.2. Research Instrument

The main instrument in this qualitative research was the researcher herself assisted with research instruments in the form of mathematical proving problem test related to abstract algebra and interview. The validity and reliability of this qualitative research is carried out by triangulation (Utami, 2018). Triangulation used in this research is the source triangulation that compares data obtained from written test results and interviews on the subjects.

The proving test of abstract algebra that were used as an instrument in this research consisted of semigroup material in abstract algebra. Semigroup is non-empty set G together with a binary operation * on G that is associative $a(bc) = (ab)c$ for all $a, b, c \in G$ (Hungerford, 2000, p. 24).

The definition of semigroup:

a. A binary operation * on a non-empty set G is a function $\mu: G \times G \to G$.

Commented [In8]:
Clarify the agents. Better use "findings" or 'previous studies", because readers may think that they are the researchers of the current study

Commented [In9]:
Use initial, for instance DW, AL, DT

Commented [In10]:
How do you administer the test?
Is the test items validated?

Commented [In11]:
What is the fuction of the interview?
When do you conduct the interview, is it before or after the test?

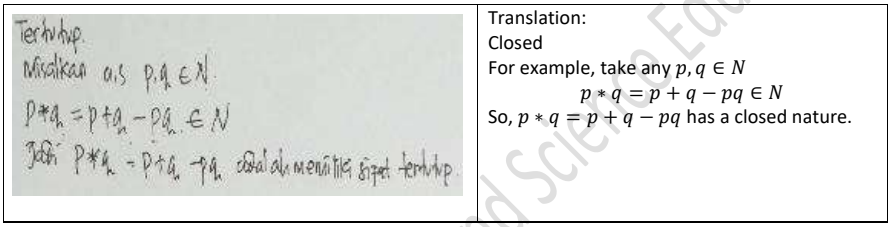
b. An operation * on a set G is associative if $(a * b) * c = a * (b * c)$ for every $a, b, c \in G$ (Rotman, 1991, p. 10)

The mathematical proving test instrument used in this research was adapted from Hungerford (2004) as follows:

"Let $p * q = p + q - pq$ with p, q elements of natural numbers in binary operations. Determine whether $p * q = p + q - pq$ is semigroup or not!"

5. Results

The research results showed that there were three students who could be made as the research subjects. The selection of three subjects was based on their oral and written communication skills in constructing knowledge to complete a mathematical proving test. The three subjects were able to complete the test by integrating the previously owned knowledge scheme with a new scheme. From the research results of Dwi as subject 1 (S1), it can be seen that initially she completed the test by the assimilation because she only used the knowledge scheme she had without using accommodation. This can be seen from Figure 2.



Translation:
Closed
For example, take any $p, q \in N$
$p * q = p + q - pq \in N$
So, $p * q = p + q - pq$ has a closed nature.

Figure 2. Answer of subject 1 on the first stage

Based on Dwi's result, in the first stage, she identified the problem to be proven by reading the information that would be proven and then she wrote that the natural numbers with binary operations at $p * q = p + q - pq$ is closed. The claim was given intuitively because she did not think of any element of the natural numbers (N). Dwi used the knowledge scheme that she had about real numbers to complete the test. She considered that natural numbers were real numbers that are closed to all types of operations of numbers in the form of addition, subtraction, multiplication, and division operation. Then in the second stage she used the associative nature to prove the semigroup.

Proving the associative nature was done by Dwi by using the existing knowledge scheme about real numbers to prove the semigroup of the natural numbers. She used the symbols $p, q, r \in R$ to prove the associative nature. Dwi performed algebraic operations by manipulating symbols. At first, Dwi assumed that on $(p * q) * r = p * (q * r)$ the associative nature was not applicable because the results of algebraic operations between the left-hand and right-hand side of the equation were not the same as in the circle sign in Figure 3.

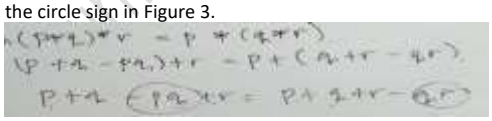
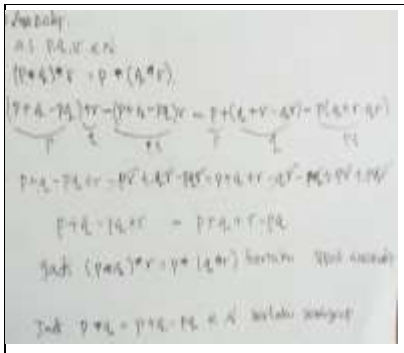


Figure 3. The initial answer of the subject before the construction process

But then she constructed her knowledge to decompose the form $(p + q - pq) + r - (p + q - pq)r = p + (q + r - qr) - p(q + r - qr)$ then assume $(p + q - pq)$ as p; r as q; $(p + q - pq)r$ as pq; p as p; $(q + r - qr)$ as q; and $p(q + r - qr)$ as pq. Then she used the property of cancellation by crossing out the same elements between the right-hand and left-hand side, so that it is obtained $(p * q) * r = p * (q * r)$ as in Figure 4.



Translation:
Take any $p, q, r \in N$

$$(p * q) * r = p * (q * r)$$

$$(p + q - pq) + r - (p + q - pq)r$$

$$= p + (q + r - qr) - p(q + r - qr)$$

$$p + q - pq + r - \cancel{pr} + \cancel{qr} - \cancel{pqr}$$

$$= p + q + r - \cancel{qr} - \cancel{pq} + \cancel{pr} + \cancel{pqr}$$

$$p + q - pq + r = p + q + r - pq$$

So, $(p * q) * r = p * (q * r)$ applies semigroup

Figure 4. The answer of subject 1 on the second stage

Based on Dwi's answer in solving the problem of semigroup proving, the closed and associative nature were applicable. At first, she assumed that $(p * q) * r$ was not associative because she obtained $(p * q) * r \neq p * (q * r)$. Then she constructed the knowledge that she had in order to obtain $(p * q) * r = p * (q * r)$ as in Figure 4. From the proving result of the closed and associative nature, Dwi concluded that $(p * q) = p + q - pq$ is a semigroup on binary operations of natural numbers. This is indicated from the interview transcript as follows:

R : Why?
S1 : Because in the beginning I did an algebraic and the result was $(p * q) * r \neq p * (q * r)$. However, after I carefully observed by decomposing it one-by-one the result showed that $(p * q) * r = p * (q * r)$

We can find out the structure of the subject 1 thinking process in completing the mathematical proving test through the following Figure 5.

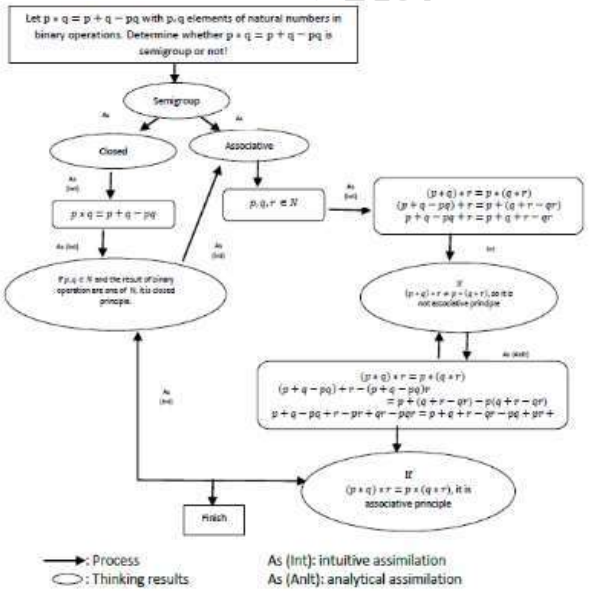
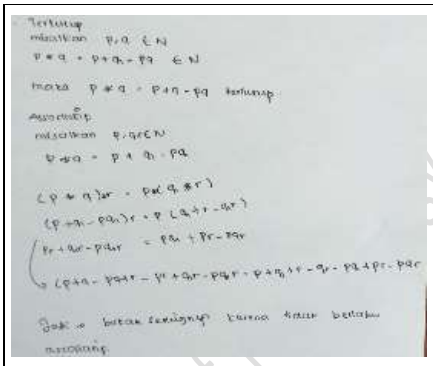


Figure 5. Thinking construction of subject 1 in solving a mathematical proving problem

From Figure 5, it can be seen that Dwi as subject 1 completed the mathematical proving test related to the semigroup by identifying the problem first. Identification of the problem is done intuitively by mentioning the semigroup conditions in the form of closed and associative nature. Then she gave a claim that $p * q = p + q - pq$ is closed on the binary operation of natural number (N). Then she proved the associative nature by using the assimilation scheme to obtain $(p * q) * r = p * (q * r)$. She proved it through symbol manipulation in algebraic operations so that it was found that $(p * q) * r \neq p * (q * r)$. After that she claimed that $p, q \in N$ with respect to binary operations on natural numbers is not associative. However, Dwi conducted a review on her result by re-checking it again. From the review, she found that the associative nature that she concluded before was wrong. Then she constructed her knowledge to perform algebraic operations again and obtained $(p * q) * r = p * (q * r)$. Therefore, Dwi justified that $p * q = p + q - pq$ for all $p, q \in N$ is semigroup of binary operations. The justification was done analytically based on the thinking construction, but the final conclusion that she gave was not right yet.

Alex as subject 2 (S2) used his previously owned knowledge scheme about semigroups proving on real numbers to prove the semigroups on natural numbers. It can be seen from the mental activity carried out by Alex in identifying the problems. He mentioned that the semigroup requiring the closed and associative nature. Then he proved and concluded that $p * q = p + q - pq$ for all $p, q \in N$ is not semigroup of binary operations because it did not fulfill the associative nature. The conclusion was correct but the steps taken in reaching the conclusion were not correct. From his proving of the closed nature, an error was seen. The right one should be like this: $p * q = p + q - pq$ for all $p, q \in N$ is not closed on binary operations.



Translation:

- Closed

For example, $p, q \in N$

$$p * q = p + q - pq \in N$$

Then

$$p * q = p + q - pq \in N$$

Are closed

- Associative

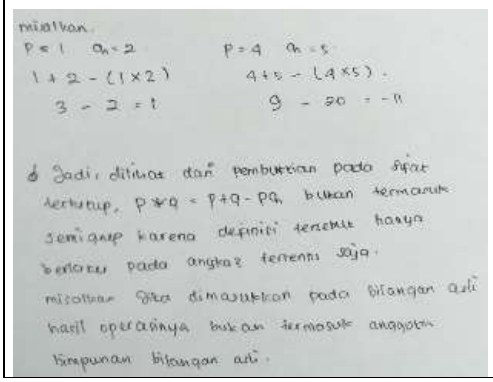
For example, $p, q \in N$

$$p * q = p + q - pq$$
$$(p * q) * r = p * (q * r)$$
$$(p + q - pq)r = p(q + r - qr)$$
$$pr + qr - pqr = pq + pr - pqr$$
$$(p + q - pq + r - pr + qr - pqr = p + q + r - qr - pq + pr - pqr$$

So, it is not a semigroup because it does not apply associative nature

Figure 6. The result of subject 2

From Figure 6, it can be seen that Alex described his proving through the closed nature and the associative nature intuitively because he only described his proving procedurally. The proving result showed that the claim was correct that the problem was not a semigroup, but the steps taken by Alex to prove it were not correct. Alex did not confidence on his conclusion because he was doubtful about the result of the associative nature proving, so that he constructed the existing knowledge to re-prove by taking any element of the set of natural numbers in the form of $N = \{1,2,4,5\}$.



Translation:
For example,

$$p = 1; q = 2$$
$$p + q - pq = 1 + 2 - (1 \times 2) = 3 - 2 = 1$$

For example,

$$p = 4; q = 5$$
$$p + q - pq = 4 + 5 - (4 \times 5) = 9 - 20 = -19$$

So, it is not closed nature, then
$p * q = p + q - pq$ is not a semigroup.

Figure 7. The results of Alex's thinking construction

Alex did the proving twice by substituted elements of the set of natural numbers (N). First, Alex considered $p = 1$ and $q = 2$ to obtain $p + q - pq = 1 + 2 - 2.1 = 1$, because 1 is an element of N as a set of natural numbers, then he claimed that $p * q = p + q - pq$ for all $p, q \in N$ is closed. Second, he did the proving by assuming p = 4 and q = 5 and then obtained $p + q - pq = 4 + 5 - 4.5 = -11$. Since the result is negative 11, he changed his claim into $p * q = p + q - pq$ for all $p, q \in N$ was not semigroup because it is not closed on binary operations in natural number.

S2 : Means that for example something like this, p = 1 and q = 2, then $p + q - pq = 1 + 2 - 2.1 = 1$ *is obtained. The result is the natural numbers, ma'am.*
For example, p = 4 and q = 5 and then $p + q - pq = 4 + 5 - 4.5 = -11$
Oh, right…. It's a no, ma'am.
So that the closed nature is not applicable, right?

The thinking process carried out by Alex in constructing the knowledge possessed to solve mathematical proof can be seen in Figure 8.

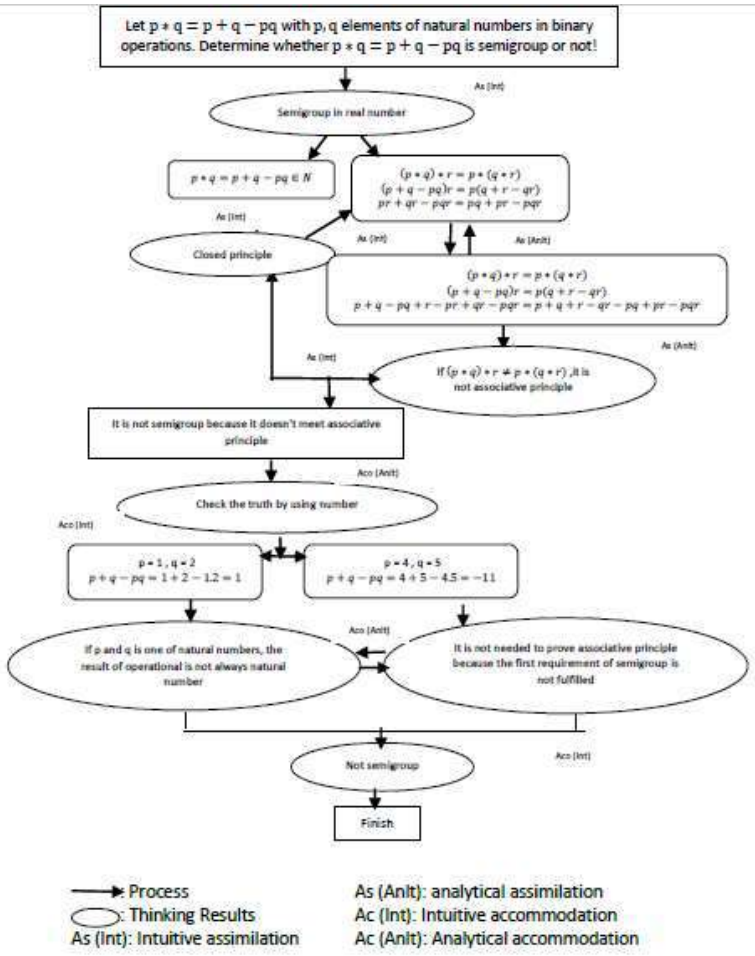


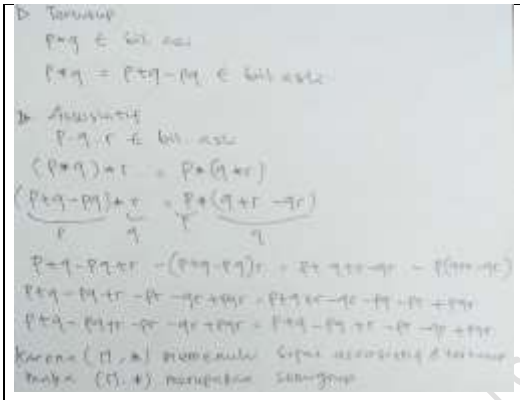
Figure 8. Thinking Construction Structure of Subject 2

From Figure 8, it can be seen that the thinking process carried out by Alex in completing the test was by identifying the problem first. The information in the problem stated that N is a set of natural numbers, but Alex used a real number scheme to prove it. This is because he only knew the semigroup proving in real numbers so that it can be said that he did an assimilation process. The proving of closed nature was done only by looking at the information in the problem then made a claim that $p * q = p + q - pq \in N$ is closed on binary operations. After that he carried out algebraic operations by manipulating symbols to prove the associative nature. Algebra operations on the proving of associative nature were performed analytically based on assimilation and accommodation scheme. From the proving of associative nature, it was obtained that $p * q = p + q - pq \in N$ was not associative on binary operations because $(p * q) * r \neq p * (q * r)$. Then Alex made a new claim that $p * q = p + q - pq \in N$ was not semigroup on the binary operations because it did not fulfill the associative nature.

Furthermore, Alex conducted a review on his own result. He checked the correctness of the claim through assimilation and accommodation by proving the problem by using numbers that the elements of natural numbers. Then he obtained the result in the form of a negative number -11 so that he changed the claim in which $p * q = p + q - pq \in N$ was not closed on binary operations because -11

was not an element of the natural numbers. From the claim, he said that proving associative nature was not needed because the first condition of the semigroup was not fulfilled. After that, he made a justification that $p * q = p + q - pq \in N$ was not semigroup on binary operations.

Furthermore, Dita as subject 3 (S3) identified the problem that would be proven in almost the same way as what subject 2 did. First, Dita identified the problem by assimilation and accommodation by using semigroup proving on real numbers and integers. Dita claimed that $p * q = p + q - pq \in N$ with $p, q \in N$ was a semigroup on binary operations because it fulfilled the closed nature and the associative nature.



Translation:

- closed

$$p * q \in natural\ numbers$$
$$p * q = p + q - pq \in natural\ numbers$$

- Associative

$$p, q, r \in real\ numbers$$
$$(p * q) * r = p * (q * r)$$
$$(p + q - pq) * r = p * (q + r - qr)$$
$$p + q - pq + r - (p + q - pq)r = p + q + r - qr - p(q + r - qr)$$
$$p + q - pq + r - pr - qr + pqr = p + q + r - qr - pq - pr + pqr$$
$$p + q - pq + r - pr - qr + pqr = p + q - pq + r - pr - qr + pqr$$

Because the natural number satisfies the associative and closed nature, so that natural number is a semigroup on the binary operations

Figure 9. The result of subject 3

From Figure 9, it can be seen that Dita did the closed nature proving only by writing $p * q = p + q - pq \in N$. She only paid attention to the shape of the symbol without paying attention to the element of the set of natural numbers, so that the proving was done intuitively. Then the associative nature proving was done through manipulation of symbols by assuming that in the left-hand side $p + q - pq = p$; $r = q$ and on the right-hand side $p = p$; $q + r - qr = q$. From this assumption, she performed algebraic operations and obtained the result $(p * q) * r = p * (q * r)$. Her mistakes in deciphering the associative nature proving resulted in errors in her claim. Dita claimed that $p * q = p + q - pq$ is a semigroup on binary operations of natural numbers. Then she constructed her knowledge by saying that the proving of semigroup of natural numbers needed not only algebraic symbols but also needed to be proven by using numbers which were elements of natural numbers. She said that it was based on the thinking process so that it was not written on the answer paper. This was revealed in the interview transcript as follows:

R : From the claim you have obtained, are you sure that $(p * q) * r = p * (q * r)$ included in semigroups on binary operations of natural numbers?

S3 : Actually, I'm not sure about that ma'am ...
Because the proving of the semigroup on original numbers will be more valid if it is to be done by using the algebraic symbols and also the numbers

R : What do you mean by that?

S3 : So, it's like this ma'am ... suppose I take p = 10 and q = 12 so we get $p * q = p + q - pq = 10 + 12 - 10.12 = 32 - 120 = -98$

Mental activities performed by Dita in constructing her knowledge to solve mathematical proof is presented in the following Figure 10.

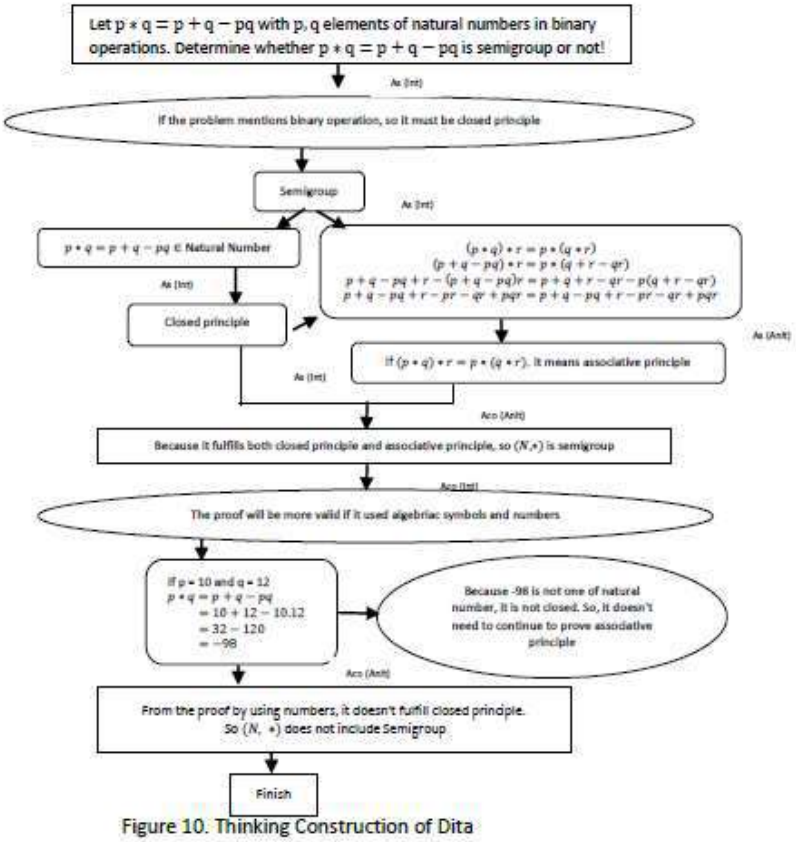


Figure 10. Thinking Construction of Dita

From Figure 10, it can be seen that Dita identified the semigroup problem by assimilation based on the known semigroup definition. She said that the semigroup contained a closed and associative nature. She did the proving of closed nature just by looking at $p * q = p + q - pq \in N$. Then she did the proving of the associative nature by performing algebraic operations through symbol manipulation. Dita said that $p * q = p + q - pq \in N$ was associative because $(p * q) * r = p * (q * r)$. Then she claimed that $p * q = p + q - pq \in N$ was a semigroup on binary operations of natural numbers because it satisfied the closed and associative nature.

Dita conducted a review of her proving that has been done. She conducted the review by constructing the existing knowledge through assimilation and accommodation schemes. She assumed that $p = 10$ and $q = 12$ then substituted into $p * q = p + q - pq$. From the substitution result, she obtained a negative number -98 so that she changed her claim by saying that $p * q = p + q - pq \in N$ was not semigroup on binary operation of natural numbers.

The research result in this article is based on research findings about the construction of students' thinking in completing mathematical proving tests related to abstract algebra. The following Table 4 will explain the constructing activities carried out by students based on the assimilation and accommodation framework.

Subject	Assimilation and Accommodation	Students' Thinking Construction
Dwi	Performed algebraic operations to get $(p * q) * r \neq p * (q * r)$ so that $p * q = p + q - pq$ with binary operations in natural number was not associative but it is closed.	Reviewed the results of the associative nature proving then performed algebraic operations through symbol manipulation. The review was carried out to change the claims that stated $(p * q) * r \neq p * (q * r)$ into $(p * q) * r = p * (q * r)$. Justified that $p * q = p + q - pq$ was semigroup to respect binary operations of natural numbers.
Alex	Identified the problem by using semigroup proving of real numbers based on his previously understood scheme. Then did the proving by manipulating the symbols.	Determined mathematical rules in the form of semigroup definitions in the set of real numbers. Then he did the proving by assuming p = 4 and q = 5.
		Gave justification by changing the claim which initially was in the form of $p * q = p + q - pq$ was semigroup to respect with binary operations in natural numbers, and then the claim became $p * q = p + q - pq$ with binary operations in natural numbers was not semigroup because it was not fulfill the closed nature.
Dita	Identified the problem that would be proven by using previous knowledge related to the proving of semigroups of real numbers and integers.	Gave a statement that to prove the semigroup was need not only the mathematical symbols, but also the numbers that were elements of natural numbers. Then substituted the natural numbers element into $p * q = p + q - pq$.
		Changed the claim with a new claim in the form of $p * q = p + q - pq$ with a binary operation in N was not a semigroup because it didn't meet the requirement of closed nature of the natural numbers.

Table 4. Thinking Construction of the Subjects

6. Discussion and Conclusion

The students performed a problem identification to solve the mathematical proving problem. The identification was done as a first step in understanding the problem to be proven (Öztürk & Kaplan, 2019). Then separated the object with its context (Sternberg et al., 2008). In this research, the students tried to understand the problem to be proven by identifying the information presented in the problem. The students mentioned that in the proving of semigroup in a non-empty set G with binary operations, the semigroup requirements in the definition need to be understood first.

The semigroup definition includes the closed and associative nature (Hungerford, 2000)**.** The students mentioned that non-empty set G could be real numbers or integers. Then the students used the scheme of knowledge about real numbers to prove the semigroup of natural numbers. The proving of closed nature happened quickly by looking at the symbols $p, q \in N$ and $p * q = p + q - pq$ without considering about the members of natural numbers set. The proving that has been done through thinking quickly and automatically is called thinking intuitively (Leron & Hazzan, 2009; Leron, 2014). After that, the students performed algebraic operations by manipulating symbols to prove the associative nature. Symbol manipulation is an activity carried out by students in solving mathematical problems related to algebra (Bleiler et al., 2014). The students performed algebraic operations to prove the associative nature of $(p * q) * r = p * (q * r)$. From the results of the closed and associative nature proving, the students gave a claim that $p * q = p + q - pq \in N$ was a semigroup on binary operations of natural numbers. Claims are statements that are often used in solving mathematical proving problems that need to be verified (Panza, 2014).

Furthermore, the students reviewed or re-checked the claims they made (Mason, 2010). The students constructed their knowledge to check the correctness of the claims (Quansah et al., 2018). The students did the thinking construction by re-considering the statements that would be proven by assimilation and

accommodation. The students said that the proving of semigroup of natural numbers was not only by using algebraic symbols but also by using numbers that are elements of a set of natural numbers. Then the students did the proving again by using numbers to get new claims: $p * q = p + q - pq \in N$ was not semigroup because it didn't meet the requirement of closed nature on binary operations of natural numbers. The students can make justification from the proving activity twice. Justification shows the confidence level of the students on the conclusions made based on the assimilation and accommodation scheme (Mason, 2010).

From the research results, it can be found that intuitive and analytical thinking are not two separate things because students can construct intuitive and analytical thinking processes using assimilation and accommodation schemes (Rusou et al., 2013; Iannello & Antonietti, 2008). Some of the students solved the problems of semigroup intuitively because they only used the assimilation scheme to construct their existing knowledge. Whereas the other students who were able to solve the problem intuitively and analytically because they did the process of assimilation and accommodation. At the students accepted the problems, they intuitively solved it based on their existing knowledge, even though the context of the problem was different. Therefore, the students' thinking process in constructing their knowledge to complete the proving of abstract algebra can be described as follows (see Table 5):

Steps	Thinking Process
Identifying	Mention information in the question or problem: a. $p * q = p + q - pq$ b. p, q elements of natural numbers c. Semigroup d. Binary operation
Determining rules	The semigroup can be defined as the binary operations that are closed and associative in a non-empty set G
Proving with symbol manipulation	Perform algebraic operations to prove the associative nature of $(p * q) * r = p * (q * r)$
Reviewing	Re-check the claim that has been made. If they are not sure yet, then the proving activity needs to be done again
Justifying	Make a conclusive conclusion based on the result of the review

Table 5. Steps in the students' thinking process

Based on the results of this research, it can be concluded that the students used the assimilation and accommodation schemes to carry out the thinking process through a knowledge construction. The students did the thinking process to complete the proving of abstract algebra through five stages as follows: the identification; determining the mathematical rules to be used; carrying out the mathematical proving by means of symbol manipulation, review, and justification. The students can do the steps of the thinking process through the thinking construction by using their previous knowledge schemes and their new knowledge schemes.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors received no financial support for this research, authorship, and/or publication of this article

Reference

Arifin, S., Punadi, S., Sa'dijah, C., Kuswandi, D. (2020). The effect of problem based learning by cognitive style on critical thinking skills and student retention | Arifin | Journal of Technology and Science Education. *Jotse, 2020 – 10*, *10*(2), 271–281. http://www.jotse.org/index.php/jotse/article/view/790/477

As'ari, A. R., Kurniati, D., & Subanji. (2019). Teachers expectation of students' thinking processes in written works: A survey of teachers' readiness in making thinking visible. *Journal on Mathematics Education*, *10*(3), 409–424. https://doi.org/10.22342/jme.10.3.7978.409-424

Commented [In12]:
How would you define your finding by relating to the research with similar context (Indonesian students) below:

Jayanti, W. E., Usodo, B., & Subanti, S. (2018, April). Interference thinking in constructing students' knowledge to solve mathematical problems. In *Journal of Physics: Conference Series* (Vol. 1008, No. 1, p. 012069). IOP Publishing.

Aseeri, M. M. Y. (2020). Abstract Thinking of Practicum Students at Najran University in Light of Piaget's Theory and Its Relation to Their Academic Level. *Journal of Curriculum and Teaching*, *9*(1), 63. https://doi.org/10.5430/jct.v9n1p63

Baroody, A.J. (1993). *Problem Solving, Reasoning, and Communicating, K-8. Helping Children Think mathematically*. New York: Macmillan Publishing Compani.

Bleiler, S. K., Thompson, D. R., & Krajčevski, M. (2014). Providing written feedback on students' mathematical arguments: proof validations of prospective secondary mathematics teachers. *Journal of Mathematics Teacher Education*, *17*(2), 105–127. https://doi.org/10.1007/s10857-013-9248-1

Ernest, P. (2003). Constructing mathematical knowledge: Epistemology and mathematics education. In *Constructing Mathematical Knowledge: Epistemology and Mathematics Education*. https://doi.org/10.4324/9780203454206

Faizah, S., Nusantara, T., Sudirman, & Rahardi, R. (2020a). The construction of explicit warrant derived from implicit warrant in mathematical proof. *AIP Conference Proceedings*, *2215*(April). https://doi.org/10.1063/5.0000517

Faizah, S., Nusantara, T., Sudirman, S., & Rahardi, R. (2020b). *Exploring students ' thinking process i n mathematical proof of abstract algebra based on M ason ' s framework*. *8*(June), 871–884.

Fisher, R. (2005). *Teaching children to think*. Nelson Thornes. Cheltenham: United Kingdom.

Gallian, J.A. (2010). *Contemporary Abstract Algebra, Seventh Edition*. Brooks/Cole: University of Minnestoa Duluth.

Gilbert, L. & Jimmie G. (2015). *Elements of Modern Algebra, Eighth Edition*. Cengage Learning: University of South Carolina Upstate.

Guler, H. K., & Gurbuz, M. C. (2018). Construction process of the length of (Formula Presented) by paper folding. *International Journal of Research in Education and Science*, *4*(1), 121–135. https://doi.org/10.21890/ijres.382940

Hungerford, T.W. (2000). *Algebra*. Springer: Department of Mathematics

Iannello, P., & Antonietti, A. (2008). Reciprocity in financial decision making: Intuitive and analytical mind-reading strategies. *International Review of Economics*, *55*(1–2), 167–184. https://doi.org/10.1007/s12232-007-0031-4

Kaasila, R., Pehkonen, E., & Hellinen, A. (2014). Finnish pre-service teachers' and upper secondary students' understanding of division and reasoning strategies used. *Education Studies Mathematics, 73*, 247-261. http://dx.doi.org/10.1007/s10649-009-9213-1

Korolova, J., & Zeidmane, A. (2016). Applied Mathematics as an Improver of Analytical Skills of Students. *Rural Environment. Education. Personality. (Reep)*, *9*, 323–327.

Leron, U., & Hazzan, O. (2009). Intuitive vs analytical thinking: Four perspectives. *Educational Studies in Mathematics*, *71*(3), 263–278. https://doi.org/10.1007/s10649-008-9175-8

Leron, U. (2014). Intuitve vs. Analytical Thinking: Four Theoretical Frameworks. Technion-Israel Istitute of Techonology.

Lopez, J. E., & Tancinco, N. P. (2016). Students Analytical Thinking Skills and Teachers ' Instructional Practices in Algebra in Selected State Universities and Colleges. *International Journal of Engineering Sciences & Research Technology*, *3*(6), 681–697.

Macchi, L., & Bagassi, M. (2012). Intuitive and analytical processes in insight problem solving: A psycho-

rhetorical approach to the study of reasoning. *Mind and Society*, *11*(1), 53–67. https://doi.org/10.1007/s11299-012-0103-3

Mason, J. Burton, L. & Stacey, K. (2010). *Thinking Mathematically*. Second Edition. University of Melbourne

Netti, S., Nusantara, T., Subanji, S., Abadyo, A., & Anwar, L. (2016). The Failure to Construct Proof Based on Assimilation and Accommodation Framework from Piaget. *International Education Studies*, *9*(12), 12. https://doi.org/10.5539/ies.v9n12p12

Onal, H., Inan, M., & Bozkurt, S. (2017). A Research on Mathematical Thinking Skills: Mathematical Thinking Skills of Athletes in Individual and Team Sports. *Journal of Education and Training Studies*, *5*(9), 133. https://doi.org/10.11114/jets.v5i9.2428

Öztürk, M., & Kaplan, A. (2019). Cognitive analysis of constructing algebraic proof processes: A mixed method research. *Egitim ve Bilim*, *44*(197), 25–64. https://doi.org/10.15390/EB.2018.7504

Panza, M. (2014). *Mathematical Proofs*. *June*. https://doi.org/10.1023/A

Piaget, J. (1965). *The Origins of Intelligence in Children*. International University Press: New York

Polly, D., Lock, C., & Bissell, B. (2007). Mathematical understanding: Analyzing student thought processes while completing fraction tasks. *Proceedings of the Ninth International Conference of the Mathematics Education into the 21st Century Project: Mathematics Education in a Global Community* , 535–538.

Quansah, F., Amoako, I., & Ankomah, F. (2018). Teachers' Test Construction Skills in Senior High Schools in Ghana: Document Analysis. *International Journal of Assessment Tools in Education*, 1–8. https://doi.org/10.21449/ijate.481164

Rotman, J.J. (1991). *An Introduction to the Theory of Group, Fourth Edition*. Springer-Verlag: Department of Mathematics. University of illinois

Rusou, Z., Zakay, D., & Usher, M. (2013). Pitting intuitive and analytical thinking against each other: The case of transitivity. *Psychonomic Bulletin and Review*, *20*(3), 608–614. https://doi.org/10.3758/s13423-013-0382-7

Sfard, A., & Kieran, C. (2001). Cognition as communication: Rethinking learning-by-talking through multi-faceted analysis of students' mathematical interactions. *Mind, Culture, and Activity, 8*(1). 42–76. https://doi.org/10.1207/S15327884MCA0801_04

Sfard, A. (2012). Introduction: Developing mathematical discourse-Some insights from communicational research. *International Journal of Educational Research,51-52* (3). 1-9. https://doi.org/10.1016/j.ijer.2011.12.013

Sternberg, R. J., Grigorenko, E. L., & Zhang, L. (2008). *Styles of Learning and Thinking Matter in Instruction and Assessment*, *3*(6), 486–507

Subanji, S., & Nusantara, T. (2016). Thinking Process of Pseudo Construction in Mathematics Concepts. *International Education Studies*, *9*(2), 17. https://doi.org/10.5539/ies.v9n2p17

Thaneerananon, T., Triampo, W., & Nokkaew, A. (2016). Development of a Test to Evaluate Students' Analytical Thinking Based on Fact versus Opinion Differentiation. *International Journal of Instruction*, *9*(2), 123–138. https://doi.org/10.12973/iji.2016.929a

Utami, A. D. Sa'dijah, C. Subanji, & Irawati, S. (2018). Six Levels of Indonesian Primary School Students' Mental Model in Comprehending the Concept of Integer, *International Journal of Instruction. 11*(4), 29–44.

461 Uyangör, S. M. (2019). Investigation of the mathematical thinking processes of students in mathematics
462 education supported with graph theory. *Universal Journal of Educational Research*, *7*(1), 1–9.
463 https://doi.org/10.13189/ujer.2019.070101

464 Zayyadi, M., Nusantara, T., Hidayanto, E., Sulandra, I. M., & As'ari, A. R. (2019). Exploring prospective
465 student teacher's question on mathematics teaching practice. *Journal of Technology and Science*
466 *Education*, *9*(2), 228–237. https://doi.org/10.3926/jotse.465

467 Zhiqing, Z. (2015). Assimilation, Accommodation, and Equilibration: A Schema-Based Perspective on
468 Translation as Process and as Product. *International Forum of Teaching and Studies*, *11*(12), 84–89.

Source details

Journal of Technology and Science Education

Open Access

Scopus coverage years: from 2014 to 2022

Publisher: OmniaScience

ISSN: 2014-5349 E-ISSN: 2013-6374

Subject area: Social Sciences: Education

Source type: Journal

CiteScore 2021
3.2

SJR 2021
0.454

SNIP 2021
1.596

View all documents > | Set document alert | Save to source list | Source Homepage

CiteScore | CiteScore rank & trend | Scopus content coverage

¡ Improved CiteScore methodology

CiteScore 2021 counts the citations received in 2018-2021 to articles, reviews, conference papers, book chapters and data papers published in 2018-2021, and divides this by the number of publications published in 2018-2021. Learn more >

CiteScore 2021

$$3.2 = \frac{445 \text{ Citations 2018 - 2021}}{140 \text{ Documents 2018 - 2021}}$$

Calculated on 05 May, 2022

CiteScoreTracker 2022

$$4.0 = \frac{594 \text{ Citations to date}}{148 \text{ Documents to date}}$$

Last updated on 05 April, 2023 • Updated monthly

CiteScore rank 2021

Category	Rank	Percentile
Social Sciences └ Education	#332/1406	76th

View CiteScore methodology > | CiteScore FAQ > | Add CiteScore to your site

Journal of Technology and Science Education

COUNTRY

Spain

Universities and research institutions in Spain

Media Ranking in Spain

SUBJECT AREA AND CATEGORY

Computer Science
Computer Science Applications

Social Sciences
Education

PUBLISHER

H-INDEX

13

PUBLICATION TYPE

Journals

ISSN

20136374, 20145349

COVERAGE

2014-2021

INFORMATION

Homepage

How to publish in this journal

info@jotse.org

SCOPE

JOTSE is an international Journal aiming at publishing interdisciplinary research within the university education framework and it is especially focused on the fields of Technology and Science. JOTSE serves as an international forum of reference for Engineering education. Teaching innovation oriented, the journal will be issued twice per year (every 6 months) and will include original works, research and projects dealing with the new learning methodologies and new learning supporting tools related to the wide range of disciplines the Engineering studies and profession involve. In addition, JOTSE will also issue special numbers on more technological themes from the different areas of general interest in the industrial world, which may be used as practical cases in classroom tuition and practice. Thereby, getting the working world reality closer to the learning at University. Among other areas of interest, our Journal will be focused on: 1. Education 2.General Science (Physics, Chemistry, Maths,...) 3.Telecommunications 4.Electricity and Electronics 5.Industrial Computing (Digital, Analogic, Robotics, Ergonomics) 6.Aerospatial (aircraft design and building, engines, materials) 7. Automotive (automotive materials, automobile emissions).

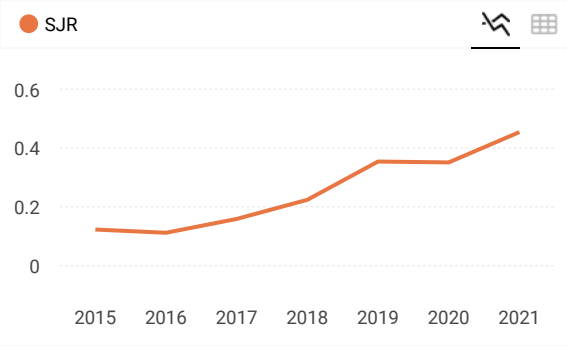
FIND SIMILAR JOURNALS

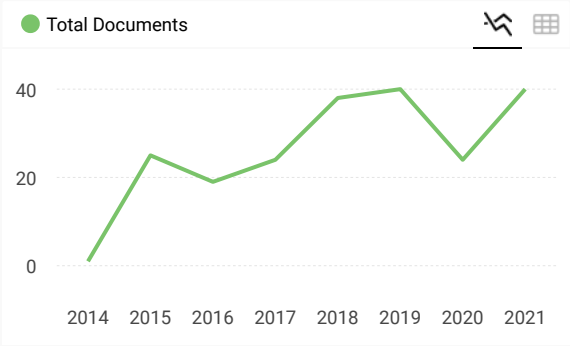
1
Education and Information Technologies
USA
65%
similarity

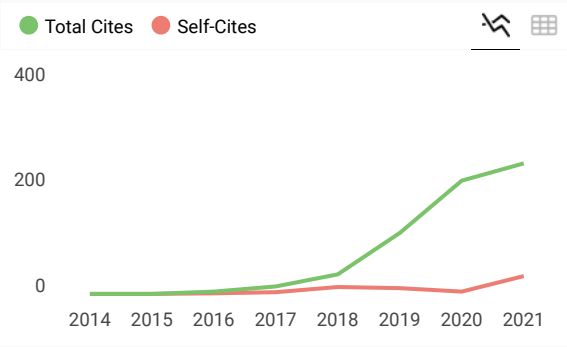
2
International Journal of Technology Enhanced
CHE
61%
similarity

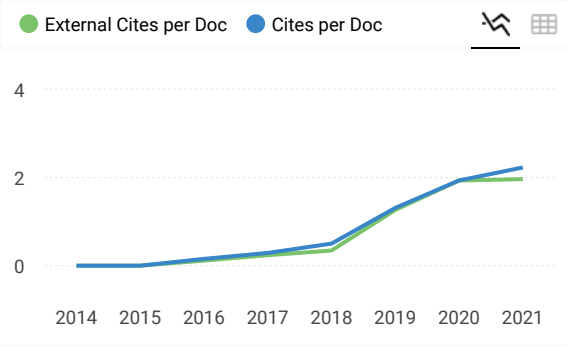
3
Journal of Educational Computing Research
USA
59%
similarity

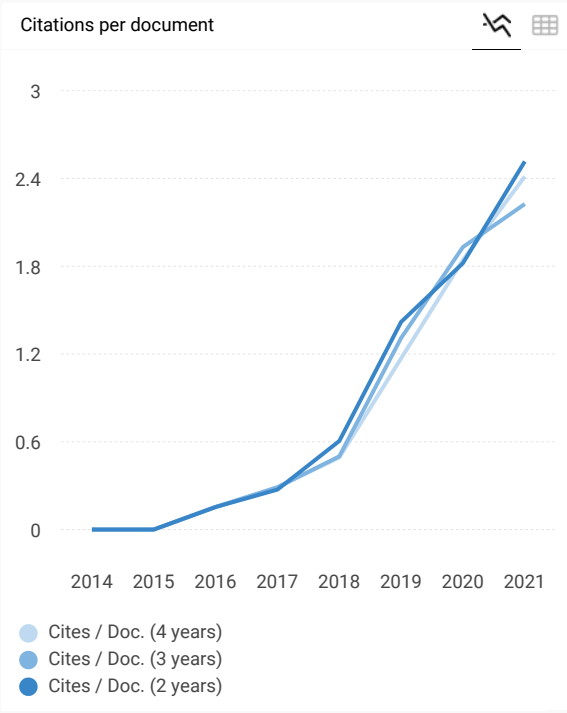
4
Internationa Learning Te
CHE
5
s

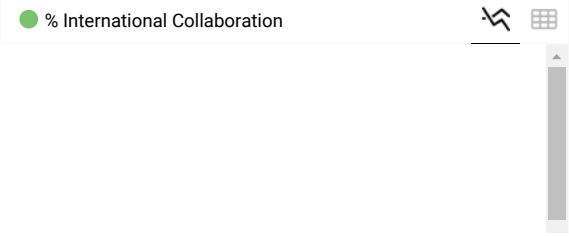


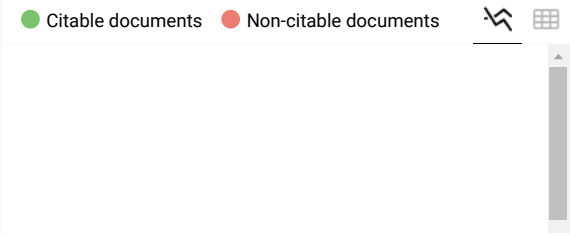


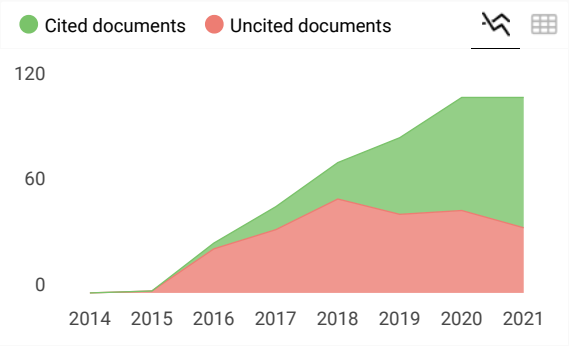












← Show this widget in your own website

Just copy the code below and paste within your html code:

```
<a href="https://www.scimag
```

SCImago Graphica

Explore, visually communicate and make sense of data with our **new data visualization tool**.

Metrics based on Scopus® data as of April 2022

FAZLI RABI 2 years ago

Hello Sir/Madam,
I hope that you will be fine. I am interested to publish my research article. Could you please tell me the process step and time frame?

regards,
Fazli rabi

reply

SCImago Team

Melanie Ortiz 2 years ago

Dear Fazli, thank you very much for your comment, we suggest you look for the author's instructions/submission guidelines in the journal's website. Best Regards, SCImago Team

N.EASHWARAMMA 3 years ago

sir
i am pursuing phd in EEE Dept
so now my purpose is ,i need to pubish in scopus or famous science journals
those pubished papers i need up to DECEMBER Month

Constructing Students' Thinking Process through Assimilation and Accommodation Framework

Siti Faizah[1*], Toto Nusantara[2], Sudirman[2], Rustanto Rahardi[2]

[1]Universitas Hasyim Asy'ari, Jombang, Indonesia, [2]Universitas Negeri Malang, Indonesia

faizah.siti91@gmail.com*, toto.nusantara.fmipa@um.ac.id, sudirman.fmipa@um.ac.id, rustanto.rahardi.fmipa@um.ac.id

Abstract: Thinking is a tool to construct knowledge in learning mathematics. However, some college students have not been fully aware of the importance of constructing their knowledge. Therefore, this study aims to explore students' thinking processes in completing mathematical proofs through assimilation and accommodation schemes. This research was conducted on students majoring in mathematics from three different universities in East Java as research subjects. The data was collected through a mathematical proof test instrument and interviews which is then qualitatively analyzed. The results of the study show that there were students who completed the test through the assimilation scheme only, and there were students who completed the test using both assimilation and accommodation schemes. Students construct their thinking processes through 5 stages, namely: identifying, determining rules to be used, proving with symbol manipulation, reviewing, and justifying. Students use the five stages of thinking to construct knowledge. However, students who use assimilation schemes made some errors in proving the mathematics problem due to their carelessness in doing the proving with symbol manipulation and reviewing stages.

INTRODUCTION

Thinking process is an important component to know someone's abilities and talents in learning mathematics (Polly et al., 2007; Uyangör, 2019). Thinking can be said as a tool for learning mathematics and a tool to construct one's knowledge (As'ari et al., 2019; Fisher, 2005). Thinking process includes reasoning that occurs through a mental activity in the students' brain. This reasoning can occur when the students are performing algebraic operations, problem solving, decision making, critical thinking, reflective thinking, or analytical thinking. This process is not only to produce abstract mathematical numbers and concepts but also as an important skill in thinking analytically and logically, as well as reasoning quantitatively (Onal et al., 2017).

Thinking analytically is a highly necessary thinking process used to solve mathematical proof problems. At the university level, these problems are formal which require analytical thinking capability. However, some students tend to complete the mathematical proving problems related to abstract algebra intuitively (Korolova & Zeidmane, 2016). Intuitive mathematical proving is not necessarily wrong but students could possibly use the wrong concept in solving the problems. Some students solved subgroup problems in abstract algebra by using the Lagrange Theorem because they understand only the Lagrange Theorem concept and unfortunately do not understand subgroups concept very well (Leron & Hazzan, 2009; Leron, 2014). Therefore, students who complete an abstract algebra proving by using only the existing knowledge, need to construct their thinking process in order to accept a new knowledge scheme. The new knowledge scheme can be built by assimilation and accommodation. Thus, the question of this research is "how does the students' thinking process in solving the algebra proving problem based on the assimilation and accommodation framework?"

This research focuses on how do the students build their knowledge in solving algebra proofing problems through constructive thinking. Piaget said that the thinking process could be done through a construction process that occurs based on the previous knowledge to gain a new one. This construction could have occurred through five components, namely activating previous knowledge, owning and understanding a new knowledge, using the knowledge, then reflecting (Aseeri, 2020). Construction was the process of student's interaction related to previously owned ideas with new ideas to understand a concept being studied. Construction could be combined with interaction due to the existence of knowledge that were being used to perform a mental activity (Guler & Gurbuz, 2018).

Assimilation and Accommodation Framework

Piaget's theory states that there are two kinds of adaptation process of each individual to their environment; assimilation and accommodation (Kaasila, et al., 2014). Piaget divided the intellectual growth that occurs through one's mental activity into the following six steps: reflexively, obtained through a fundamental adaptation, interest on a new situation, relation to new discoveries, and combining the discoveries in mental activities (Piaget, 1965). A new scheme obtained by the students could be included in the assimilation object by organizing a new definition. The scheme on Piaget's theory contained assimilation and accommodation as a process of knowledge translation. Both were influenced by the development of Piaget's theory in mathematics learning (Ernest, 2003).

Assimilation is a process conducted by students in inserting a new stimulus into the existing scheme. The assimilation was a positive influence of the environment that occurs on one's mental activity. At the time a new object is being assimilated into the existing scheme. While the accommodation is a process of adjusting the schemes conducted by students to build a new scheme based on the existing scheme. Accommodation indicates that the process which is conducted by

the student is influenced by the object being transformed. In other words, assimilation and accommodation could be represented as an interaction between the subject and the object which makes assimilation and accommodation closely related (Zhiqing, 2015). At the time when assimilation is dominated by a new scheme, then the scheme is a part of the accommodation. Therefore, assimilation can occur even though there is no accommodation, but accommodation will not occur without the existence of assimilation. For instance: students who have learnt about addition operation of natural numbers but have never learnt about the addition operation of fractions will solve the mathematics problem as follow $\frac{2}{3}+\frac{1}{2}=\frac{3}{5}$. In this process, students only perform assimilation as they only use the previous knowledge without reconstructing to gain new knowledge about addition operation of fractions. If students are able to operate addition in the form of "$\frac{2}{3}+\frac{1}{2}=\frac{4+3}{6}=\frac{7}{6}$", these students already performed accommodation as they equalized the denominators into 6 before adding the numerators into $4+3=7$.

Students can construct their knowledge when doing the assimilation to form a new scheme. Assimilation and accommodation are the adaptation process to the environment based on cognitive structures. While assimilation is the process of interpreting an event by using the existing cognitive structures, accommodation on the other hand is the process of increasing knowledge by modifying the existing knowledge or cognitive structures to gain a new experience (Kaasila et al., 2014; Netti et al., 2016). Therefore, in the process of assimilation, a new stimulus is directly absorbed and integrated into the existing knowledge schemes. Meanwhile the process of accommodation on the existing knowledge structures cannot directly absorb the new stimulus; it needs a phase to integrate the stimulus. The process of assimilation and accommodation can be illustrated into a diagram in order to help us understand the process or procedure of those two adaptation process (Subanji & Nusantara, 2016).

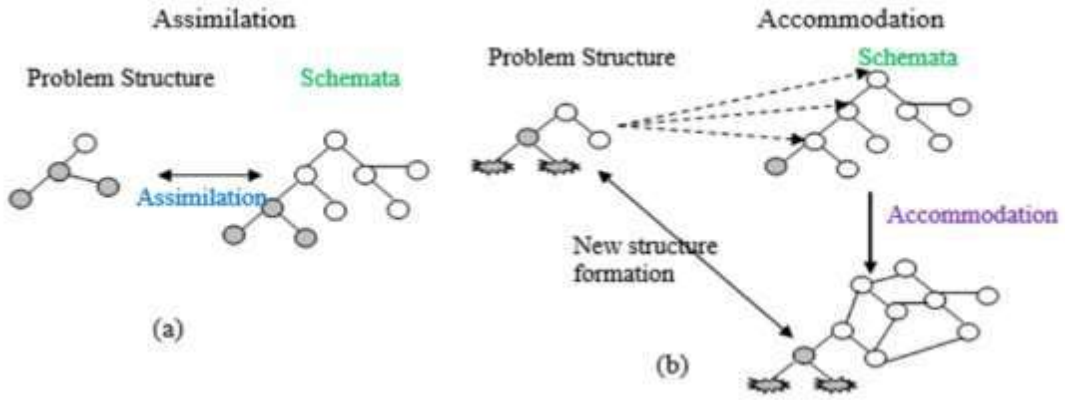


Figure 1: Assimilation and accommodation process

Figure 1 (a), shows that assimilation occurs when the structure of the problem is in accordance with the existing scheme. It will be interpreted directly into the correct way in order to form new

structures. Figure 1 (b), shows that the structure of the thinking scheme does not match with the structure of the problem. The students need to convert the new scheme with the existing schemes in order to create a new thinking structure related to the problem when they constructing correctly. Therefore, the thinking activity through the assimilation and accommodation framework in this research can be seen in Table 1.

Table 1: Thinking process based on assimilation and accomodation schemes.

Thinking Process	Mental Activity
Assimilation	Employing an existing scheme to solve the mathematical proof problem
Accommodation	Employing both the existing scheme and a new scheme in order to solve mathematical proof problems

METHOD

This research is a qualitative research with descriptive explorative. Data for this research is collected through written test and interview. The researcher is the main instrument in collecting and analyzing the data obtained from written test results and interview. This research was conducted to college students in mathematics department from three different universities. The three universities are in Jombang, Mojokerto and Malang city. The subjects were chosen based on the students' abilities in constructing their knowledge through assimilation and accommodation scheme as shown in Table 1. The participant are those mathematics students who have passed the abstract algebra course. From 78 students in three different universities in East Java, Indonesia, 9 students were able to do assimilation without accommodation, and 13 students were able to do assimilation and accommodation. The students who were chosen as the research subjects were those who were able to reveal their thinking process verbally. Table 2 shows the number of students who could construct their idea through thinking process.

Table 2: The construction of students' thinking process

University	Number of Students	Assimilation	Assimilation and Accommodation
A	27	2	4
B	31	4	5
C	20	3	4
Total	78	9	13

From Table 2, we can see that 9 students were able to do the thinking process of assimilation and 13 students were able to do the thinking process of assimilation and accommodation. In general, one out of nine students could express their mind verbally in solving problem through assimilation. Two out of 13 students could express their mind in assimilation and accommodation. In short, three students were chosen as the research subjects. Table 3 showed the number of research subjects in this study.

Table 3: Selection of subjects

Thinking Process	Number of Students	Research Subjects
Assimilation	9	1
Assimilation and Accommodation	13	2
Total number	22	3

Table 3 shows that there were 3 students who were selected as research subjects. The 3 subjects are Dwi as subject 1, Alex as subject 2, and Dita as subject 3 (pseudonym). They were selected as research subjects as they were able to do verbal and written communication related to the thinking process that have been conducted in completing the abstract algebra proving test. This is due to the fact that thinking process is a form of communication between individuals and themselves based on cognitive activities they have conducted (Sfard & Kieren, 2001; Sfard, 2012).

The main instrument in this qualitative research is the researcher assisted with research instruments in the form of mathematical proving problem test and interview. The mathematical proving test instrument used in this research was adapted from Hungerford (2000). as follows:

"Let $p * q = p + q - pq$ with p, q elements of natural numbers in binary operations. Determine whether $p * q = p + q - pq$ is semigroup or not!"

The proving test consisted of semigroup material in abstract algebra. Semigroup is non-empty set G together with a binary operation * on G that is associative $a(bc) = (ab)c$ for all $a, b, c \in G$ (Hungerford, 2000).

The definition of semigroup:

a. A binary operation * on a non-empty set G is a function $\mu: G \times G \to G$.
b. An operation * on a set G is associative if $(a * b) * c = a * (b * c)$ for every $a, b, c \in G$

The data analysis used in this research is a qualitative with the following details:

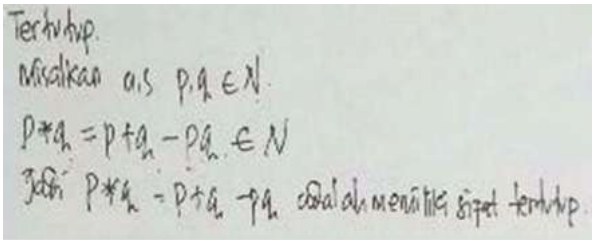
Data analysis was conducted by observing the results of written tests and semi-structured interviews. In this research, interviews were used as a triangulation to obtain valid data. Creswell (2012) stated that the validity and reliability test of qualitative research can be done through triangulation. The researcher conducted task-based interviews on subjects with the help of a tape recorder and field notes containing important points from the subjects' expressions. The results of the interviews were transcribed exactly to the subjects' answers and expressions and then reduced based on assimilation and accommodation presented in Table 1. The data is presented in matrix form as one of the methods of qualitative research data analysis (Miles et al., 2014). This matrix is a table containing the relationship between variables obtained from the results of written tests and interviews. In this research, the researcher was actively involved in designing research, collecting data, and analyzing data.

RESULT AND DISCUSSION

The results of this research showed that there were three students selected as the research subjects. The selection of three subjects was based on their oral and written communication skills in constructing knowledge to complete a mathematical proving test. The three subjects were able to complete the test by integrating the previously owned knowledge scheme with a new scheme.

Subject 1

Dwi completed the test by assimilation because she performed the procedural proving by using the existing knowledge scheme. She identified the problem by reading the information that would be proven and then she wrote that the natural numbers with binary operations at $p * q = p + q - pq$ is closed. The claim was given spontaneously because she did not think of any element of the natural numbers by symbol of N. Dwi used the knowledge scheme about real numbers to complete the test. She considered that natural numbers were real numbers that are closed to all types of operations of numbers in the form of addition, subtraction, multiplication, and division operation. This can be seen from Figure 2.



Translation:
Closed
For example, take any $p, q \in N$
$$p * q = p + q - pq \in N$$
So, $p * q = p + q - pq$ has a closed nature.

Figure 2: Answer of subject 1 on the first stage

On the second stage, subject 1 used the associative nature to prove the semigroup. She proved the associative nature by using the existing knowledge scheme about real numbers to prove the semigroup of the natural numbers. She used the symbols $p, q, r \in R$ to prove the associative nature. Dwi performed algebraic operations by manipulating symbols. Firstly, she assumed that on $(p * q) * r = p * (q * r)$ the associative nature was not applicable because the results of algebraic operations between the left-hand and right-hand side of the equation were not the same as in the circle sign in Figure 3.

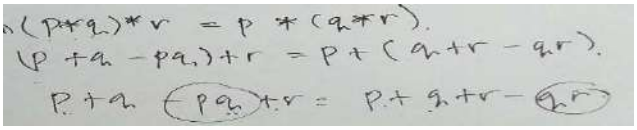
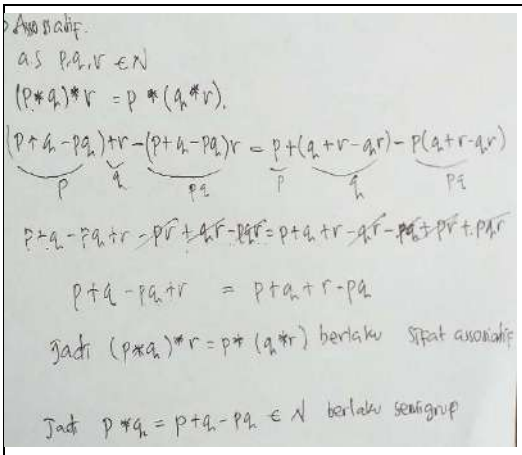


Figure 3: The initial answer of the subject before the construction process

The subject then constructed the knowledge by reproving to make sure that she got the right answer of associative proofing. She used cancellation characteristics by crossing out the same elements between the right-hand and left-hand side, so that it is obtained $(p * q) * r = p * (q * r)$ as in Figure 4.



Translation:
Take any $p, q, r \in N$

$$(p * q) * r = p * (q * r)$$
$$(p + q - pq) + r - (p + q - pq)r$$
$$= p + (q + r - qr) - p(q + r - qr)$$
$$p + q - pq + r - \cancel{pr} + \cancel{qr} - \cancel{pqr}$$
$$= p + q + r - \cancel{qr} - \cancel{pq} + \cancel{pr} + \cancel{pqr}$$
$$p + q - pq + r = p + q + r - pq$$

So, $(p * q) * r = p * (q * r)$ applies semigroup

Figure 4: The answer of subject 1 on the second stage

The subject's proving process shows that the closed and associative nature were applicable. At first, she assumed that $(p * q) * r$ was not associative because she obtained $(p * q) * r \neq p * (q * r)$. Furthermore, the subject constructed the knowledge that she had in order to obtain $(p * q) * r = p * (q * r)$ as in Figure 4. From the proving result of the closed and associative nature, Dwi concluded that $(p * q) = p + q - pq$ is a semigroup on binary operations of natural numbers. This is indicated from the interview transcript as follows:

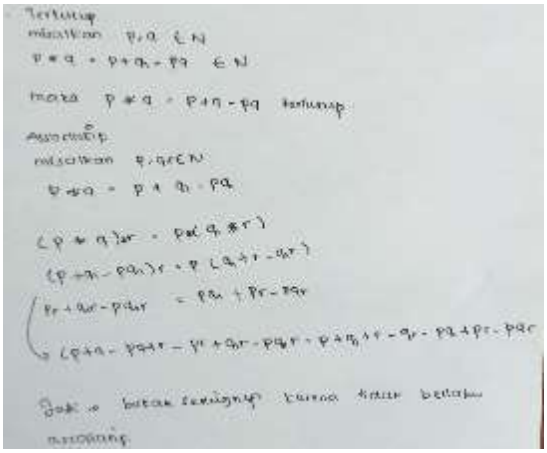
R : *Why?*
D : *Because in the beginning I did an algebraic and the result was* $(p * q) * r \neq p * (q * r)$. *However, after I carefully observed by decomposing it one-by-one, the result showed that* $(p * q) * r = p * (q * r)$

Dwi as subject 1 completed the mathematical proving test related to the semigroup by first identifying the problem. Identification of the problem is done spontaneously by mentioning the semigroup conditions in the form of closed and associative nature. Then she gave a claim that $p * q = p + q - pq$ is closed on the binary operation of natural number (N). Then she proved the associative nature by using the assimilation scheme to obtain $(p * q) * r = p * (q * r)$. She proved it through symbol manipulation in algebraic operations and obtained $(p * q) * r \neq p * (q * r)$. After that she claimed that $p, q \in N$ with respect to binary operations on natural numbers is not associative. However, Dwi conducted a review on her result by re-checking it again. From

the review, she found that the associative nature that she previously concluded was incorrect. Then she re-constructed her knowledge to perform algebraic operations again and obtained $(p * q) * r = p * (q * r)$. Therefore, Dwi justified that $p * q = p + q - pq$ for all $p, q \in N$ is semigroup of binary operations. The justification was done analytically based on the thinking construction, but the final conclusion that she gave was incorrect. Dwi performed procedural proving as she only explained the proving of semigroup in natural number as in the proving procedure for real number. Although she had written N in her proving, she did not realise that N is a natural number. Thus, she only performed assimilation without accommodation as she did not reconstruct her previous knowledge to conduct the proving of N as natural number.

Subject 2

Alex used his previous knowledge scheme about semigroups proving on real numbers to prove the semigroups on natural numbers. It can be seen from the mental activity performed by Alex in identifying the problems. He mentioned that the semigroup requiring the closed and associative nature. Then he proved and concluded that $p * q = p + q - pq$ for all $p, q \in N$ is not semigroup of binary operations because it did not fulfill the associative nature. The conclusion was correct but the steps taken in reaching the conclusion were not correct. From his proving of the closed nature, an error was seen. The right answer should: $p * q = p + q - pq$ for all $p, q \in N$ is not closed on binary operations.



Translation:

- Closed

For example, $p, q \in N$

$$p * q = p + q - pq \in N$$

Then

$$p * q = p + q - pq \in N$$

Are closed

- Associative

For example, $p, q \in N$

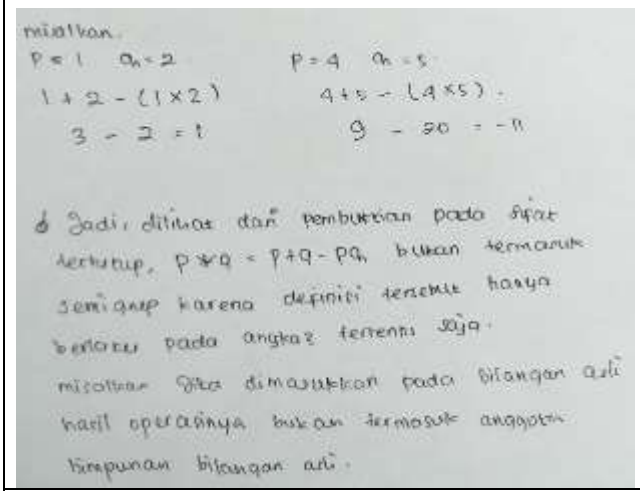
$$p * q = p + q - pq$$
$$(p * q) * r = p * (q * r)$$
$$(p + q - pq)r = p(q + r - qr)$$
$$pr + qr - pqr = pq + pr - pqr$$
$$(p + q - pq + r - pr + qr - pqr = p + q + r - qr - pq + pr - pqr$$

So, it is not a semigroup because it does not apply associative nature

Figure 5: The result of subject 2

Figure 5, shows that Alex described his proving through the closed nature and the associative nature was performed spontaneously as he only described it procedurally. The proving result showed that the claim was correct that the problem was not a semigroup, but the steps taken

by Alex to prove it were incorrect. Alex was doubtful about the result of the associative nature proving, so that he constructed the existing knowledge to be re-prove by taking any element of the set of natural numbers in the form of $N = \{1,2,4,5\}$ as in Figure 6.



Translation:
For example,

$$p = 1; q = 2$$
$$p + q - pq = 1 + 2 - (1 \times 2) = 3 - 2 = 1$$

For example,

$$p = 4; q = 5$$
$$p + q - pq = 4 + 5 - (4 \times 5) = 9 - 20 = -19$$

So, it is not closed nature, then
$p * q = p + q - pq$ is not a semigroup.

Figure 6: The results of Alex's thinking construction

Alex did the proving twice by substituted elements of the set of Natural Numbers (N). First, Alex considered $p = 1$ and $q = 2$ to obtain $p + q - pq = 1 + 2 - 2.1 = 1$, because 1 is an element of N as a set of natural numbers, then he claimed that $p * q = p + q - pq$ for all $p, q \in N$ is closed. Second, he did the proving by assuming that p = 4 and q = 5 and then obtained $p + q - pq = 4 + 5 - 4.5 = -11$. Since the result is -11, he changed his claim into $p * q = p + q - pq$ for all $p, q \in N$ was not semigroup because it is not closed on binary operations in natural number.

A : Means that for example something like this, p = 1 and q = 2, then $p + q - pq = 1 + 2 - 2.1 = 1$ *is obtained. The result is the natural numbers, ma'am.*
For example, p = 4 and q = 5 and then $p + q - pq = 4 + 5 - 4.5 = -11$
Oh, right…. It's not, ma'am.
So that the closed nature is not applicable, isn't it?

The thinking process conducted by Alex in completing the test was by identifying the problem first. The information in the problem stated that N is a set of natural numbers, but Alex used a real number scheme to prove it. This is because he only knew the semigroup proving in real numbers in which it can be said that he did an assimilation process. The proving of closed nature was done only by looking at the information in the problem then made a claim that $p * q = p + q - pq \in N$ is closed on binary operations. After that he performed algebraic operations by manipulating symbols to prove the associative nature. From the proving of associative nature, it was obtained that $p * q = p + q - pq \in N$ was not associative on binary operations because $(p * q) * r \neq p *$

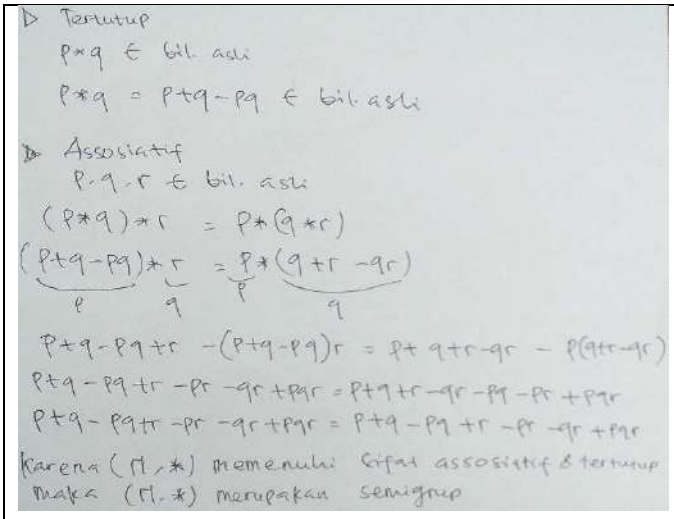
$(q * r)$. Then Alex made a new claim that $p * q = p + q - pq \in N$ was not semigroup on the binary operations because it did not fulfill the associative nature.

Alex conducted a review on his own result. He checked the correctness of the claim by proving the problem using the elements of natural numbers. Then he obtained the result in the form of a negative number (-11) so that he changed the claim in which $p * q = p + q - pq \in N$ was not closed on binary operations because -11 is not an element of the natural numbers. From the claim, he said that proving associative nature was not needed because the first condition of the semigroup was not fulfilled. After that, he made a justification that $p * q = p + q - pq \in N$ was not semigroup on binary operations.

Based on the result of exploration to subject Alex, it is known that he conducted procedural proving as he used real numbers to proof close property of natural numbers which resulted in incorrect conclusion. However, Alex tried to re-examine the statement in the test and presupposed the element of natural numbers in the form of N = {1,2,4,5} to perform the close property proving. Thus, Alex actually performed assimilation but obtained the incorrect conclusion. He then reconstructed his knowledge by presupposing any element of natural numbers so as to say that he performed accommodation.

Subject 3

Dita identified the problem that would be proven in almost the same way as what subject 2 did. First, Dita identified the problem by using semigroup proving on real numbers and integers. Dita claimed that $p * q = p + q - pq \in N$ with $p, q \in N$ is a semigroup on binary operations because it fulfilled the closed nature and the associative nature.



Translation:

- closed

$p * q \in natural\ numbers$

$p * q = p + q - pq \in natural\ numbers$

- Associative

$p, q, r \in real\ numbers$

$(p * q) * r = p * (q * r)$

$(p + q - pq) * r = p * (q + r - qr)$

$p + q - pq + r - (p + q - pq)r = p + q + r - qr - p(q + r - qr)$

$p + q - pq + r - pr - qr + pqr = p + q + r - qr - pq - pr + pqr$

	$p + q - pq + r - pr - qr + pqr$ $= p + q - pq + r - pr$ $- qr + pqr$ Because the natural number satisfies the associative and closed nature, so that natural number is a semigroup on the binary operations

Figure 7: The result of subject 3

From Figure 7, it can be seen that Dita did the closed nature proving only by writing $p * q = p + q - pq \in N$. She only paid attention to the shape of the symbol without paying attention to the element of the set of natural numbers, it is to say that the proving was done spontaneously. Then the associative nature proving was done through manipulation of symbols by assuming that on the left-hand side $p + q - pq = p;\ r = q$ and on the right-hand side $p = p;\ q + r - qr = q$. From this assumption, she performed algebraic operations and obtained the result of $(p * q) * r = p * (q * r)$. Her mistakes in deciphering the associative nature proving resulted in errors in her claim. Dita claimed that $p * q = p + q - pq$ is a semigroup on binary operations of natural numbers. Then she reconstructed her knowledge by saying that the proving of semigroup of natural numbers needed not only algebraic symbols but also needed to be proven by using numbers which were elements of natural numbers. She said that it was based on the thinking process so that it was not written on the answer paper. This was revealed in the interview transcript as follows:

R : *From the claim you have obtained, are you sure that* $(p * q) * r = p * (q * r)$ *included in semigroups on binary operations of natural numbers?*
Di : *Actually, I'm not sure about that ma'am ...*
Because the proving of the semigroup on original numbers will be more valid if it is to be done by using the algebraic symbols and also the numbers
R : *What do you mean by that?*
Di : *Let me explain this ma'am ... suppose I take p = 10 and q = 12 so we get* $p * q = p + q - pq = 10 + 12 - 10.12 = 32 - 120 = -98$

Dita identified the semigroup problem by assimilation based on the known semigroup definition. She said that the semigroup contained a closed and associative nature. She did the proving of closed nature just by looking at $p * q = p + q - pq \in N$. Then she did the proving of the associative nature by performing algebraic operations through symbol manipulation. Dita said that $p * q = p + q - pq \in N$ is associative because $(p * q) * r = p * (q * r)$. Then she claimed that $p * q = p + q - pq \in N$ is a semigroup on binary operations of natural numbers because it satisfied the closed and associative nature. This claim existed because she performed procedural proving without paying attention to the element of natural numbers.

However, Dita conducted a review of her proving that has been done. She conducted accommodation by reconstructing the existing knowledge schemes. She assumed that the natural numbers are $p = 10$ and $q = 12$ which are then substituted into $p * q = p + q - pq$. He obtained -98 as the result of the substitution while -98 is not a natural number. Therefore, she changed her claim by saying that $p * q = p + q - pq \in N$ was not semigroup on binary operation of natural numbers as it doesn't apply the close property.

Based on the exploration process done to all subjects, it is obtained that the construction of students' thinking in completing mathematical proving tests related to abstract algebra can be simplify as shown in Table 4. The following Table 4 will explain the constructing activities conducted by students based on the assimilation and accommodation framework.

Table 4: The thinking process of the subjects.

Subjects	Schemes	Mental Activities	Students' Construction
Dwi	Assimilation	Performed algebraic operations to get $(p * q) * r \neq p * (q * r)$ so that $p * q = p + q - pq$ with binary operations in natural number is not associative but it is closed.	Reviewed the results of the associative nature proving then performed algebraic operations through symbol manipulation. The review was conducted to change the claims that stated $(p * q) * r \neq p * (q * r)$ into $(p * q) * r = p * (q * r)$. Justified that $p * q = p + q - pq$ is semigroup to respect binary operations of natural numbers.
Alex	Assimilation and accommodation	Identified the problem by using semigroup proving of real numbers based on his previously understood scheme. Then did the proving by manipulating the symbols.	Determined mathematical rules in the form of semigroup definitions in the set of real numbers. He then performed the reconstruction by presupposing the element of natural number in the form of p=4 and q=5.
			Gave justification by changing the claim which initially was in the form of $p * q = p + q - pq$ is semigroup to respect with binary operations in natural numbers, and then the claim became $p * q = p + q - pq$ with binary operations in natural numbers is not semigroup because it doesn't fulfill the closed nature.
Dita	Assimilation and accommodation	Identified the problem that would be proven by using previous knowledge related to the proving of semigroups of real numbers and integers.	Gave a statement that to prove the semigroup does not only need the mathematical symbols, but also the numbers which are elements of natural numbers. Then substituted the natural numbers element into $p * q = p + q - pq$.

			Changed the claim with a new claim in the form of $p * q = p + q - pq$ with a binary operation in N is not a semigroup because it didn't meet the requirement of closed nature of the natural numbers.

Students first constructed their knowledge from assimilation and then performed accommodation. The students' thinking construction began by conducting problem identification to solve the mathematical proving problem. The identification was done as a first step in understanding the problem to be proven (Öztürk & Kaplan, 2019). Then separated the object with its context (Sternberg et al., 2008). In this research, the students tried to understand the problem to be proven by identifying the information presented in the problem. The students mentioned that in the proving of semigroup in a non-empty set G with binary operations, the semigroup requirements in the definition need to be understood first.

The semigroup definition includes the closed and associative nature (Hungerford, 2000). The students mentioned that non-empty set of G could be real numbers or integers. Then the students used the scheme of knowledge about real numbers to prove the semigroup of natural numbers. The proving of closed nature happened quickly by looking at the symbols $p, q \in N$ and $p * q = p + q - pq$ without considering about the members of natural numbers set. The proving that has been done through thinking quickly and automatically is called thinking intuitively (Leron & Hazzan, 2009; Leron, 2014). After that, the students performed algebraic operations by manipulating symbols to prove the associative nature. Symbol manipulation is an activity conducted by students to solve mathematical problems related to algebra (Bleiler et al., 2014). The students performed algebraic operations to prove the associative nature of $(p * q) * r = p * (q * r)$. From the results of the closed and associative nature proving, the students gave a claim that $p * q = p + q - pq \in N$ was a semigroup on binary operations of natural numbers. Claims are statements that are often used in solving mathematical proving problems that need to be verified (Panza, 2014).

Furthermore, the students reviewed or re-checked the claims they made (Mason, 2010). The students constructed their knowledge to check the correctness of the claims (Quansah et al., 2018). The students did the thinking construction by re-considering the statements that would be proven by assimilation and accommodation. The students said that the proving of semigroup of natural numbers was not only by using algebraic symbols but also by using numbers that are elements of a set of natural numbers. Then the students did the proving again by using numbers to get new claims: $p * q = p + q - pq \in N$ was not semigroup because it didn't meet the requirement of closed nature on binary operations of natural numbers. The students can make justification from the proving activity twice. Justification shows the confidence level of the students on the conclusions made based on scheme (Mason, 2010).

The result found that intuitive and analytical thinking are not two separate things because students can construct intuitive and analytical thinking processes using assimilation and then accommodation schemes (Rusou et al., 2013; Iannello & Antonietti, 2008). Some of the students solved the problems of semigroup intuitively because they only used the assimilation scheme to construct their existing knowledge. Whereas the other students who were able to solve the problem intuitively and analytically because they did the process of assimilation and accommodation. At the students accepted the problems, they intuitively solved it based on their existing knowledge, even though the context of the problem was different. Therefore, the students' thinking process in constructing their knowledge to complete the proving of abstract algebra can be described as follows (see Table 5):

Table 5: students' thinking process based on assimilation and accommodation schemes

Steps	Activity
Identifying	Mentioning information in the question or problem
Determining rules	Using definition concept.
Proving with symbol manipulation	Performing algebraic operations to prove
Reviewing	Re-checking the claim that has been made. If they are not sure yet, then the proving activity needs to be done again
Justifying	Make a conclusive conclusion based on the result of the review

Students are able to combine intuitive and analytical thinking to make reasoning in solving mathematical problems (Macchi & Bagassi, 2012). Intuitive and analytical thinking are two different things (Rusou et al., 2013). Intuitive thinking is a model of thinking that occurs quickly, spontaneously, automatically (Leron, 2014). Meanwhile, analytical thinking is a model of thinking which is conducted through a slow process related to mathematical rules. Analytical thinking is related to situations, practices, statements, ideas, theories, and arguments (Thaneerananon et al., 2016). The process of analytical thinking starts from observation, determining the supporting rules, and checking or rejecting intuitive responses (Sternberg et al., 2008). The supporting rules act as a guarantor for the students in giving reason for each step of the mathematical proof (Faizah et al., 2020a).

CONCLUSION

Based on the result of this research, it can be concluded that accommodation happens when students re-construct their knowledge based on the assimilation scheme through 5 steps of thinking process. The five steps are the identification; determining the mathematical rules to be used; carrying out the mathematical proving by means of symbol manipulation, review, and justification.

Therefore, the finding of this research can be used as a tool to develop students' knowledge in solving the mathematical proving problems through assimilation scheme and accommodation scheme to ensure that the proving is not conducted spontaneously. Students should understand the

meaning of each symbol presents in the question to avoid misconception to the result of the proving that have been performed.

References

[1] Aseeri, M. M. Y. (2020). Abstract Thinking of Practicum Students at Najran University in Light of Piaget's Theory and Its Relation to Their Academic Level. *Journal of Curriculum and Teaching*, *9*(1), 63. https://doi.org/10.5430/jct.v9n1p63

[2] As'ari, A. R., Kurniati, D., & Subanji. (2019). Teachers expectation of students' thinking processes in written works: A survey of teachers' readiness in making thinking visible. *Journal on Mathematics Education*, *10*(3), 409–424. https://doi.org/10.22342/jme.10.3.7978.409-424

[3] Bleiler, S. K., Thompson, D. R., & Krajčevski, M. (2014). Providing written feedback on students' mathematical arguments: proof validations of prospective secondary mathematics teachers. *Journal of Mathematics Teacher Education*, *17*(2), 105–127. https://doi.org/10.1007/s10857-013-9248-1

[4] Creswell, J. W. (2012). *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research (4rd ed.).* Thousand Oaks, CA: Sage.

[5] Ernest, P. (2003). Constructing mathematical knowledge: Epistemology and mathematics education. In *Constructing Mathematical Knowledge: Epistemology and Mathematics Education*. https://doi.org/10.4324/9780203454206

[6] Faizah, S., Nusantara, T., Sudirman, & Rahardi, R. (2020a). The construction of explicit warrant derived from implicit warrant in mathematical proof. *AIP Conference Proceedings*, *2215*(April). https://doi.org/10.1063/5.0000517

[7] Fisher, R. (2005). *Teaching children to think*. Nelson Thornes. Cheltenham: United Kingdom.

[8] Guler, H. K., & Gurbuz, M. C. (2018). Construction process of the length of (Formula Presented) by paper folding. *International Journal of Research in Education and Science*, *4*(1), 121–135. https://doi.org/10.21890/ijres.382940

[9] Hungerford, T.W. (2000). *Algebra*. Springer: Department of Mathematics

[10] Iannello, P., & Antonietti, A. (2008). Reciprocity in financial decision making: Intuitive and analytical mind-reading strategies. *International Review of Economics*, *55*(1–2), 167–184. https://doi.org/10.1007/s12232-007-0031-4

[11] Kaasila, R., Pehkonen, E., & Hellinen, A. (2014). Finnish pre-service teachers' and upper secondary students' understanding of division and reasoning strategies used. *Education Studies Mathematics, 73*, 247-261. http://dx.doi.org/10.1007/s10649-009-9213-1

[12] Korolova, J., & Zeidmane, A. (2016). Applied Mathematics as an Improver of Analytical Skills of Students. *Rural Environment. Education. Personality. (Reep)*, *9*, 323–327.

[13] Leron, U., & Hazzan, O. (2009). Intuitive vs analytical thinking: Four perspectives. *Educational Studies in Mathematics*, *71*(3), 263–278. https://doi.org/10.1007/s10649-008-9175-8

[14] Leron, U. (2014). Intuitve vs. Analytical Thinking: Four Theoretical Frameworks. Technion-Israel Istitute of Techonology.

[15] Macchi, L., & Bagassi, M. (2012). Intuitive and analytical processes in insight problem solving: A psycho-rhetorical approach to the study of reasoning. *Mind and Society*, *11*(1), 53–67. https://doi.org/10.1007/s11299-012-0103-3

[16] Mason, J. Burton, L. & Stacey, K. (2010). *Thinking Mathematically*. Second Edition. University of Melbourne

[17] Miles, M. B., Huberman, A. M., & Saldana, J. (2014). *Qualitative Data Analysis: A Methods Sourcebook* (Third Edition). SAGE Publications, Inc.

[18] Netti, S., Nusantara, T., Subanji, S., Abadyo, A., & Anwar, L. (2016). The Failure to Construct Proof Based on Assimilation and Accommodation Framework from Piaget. *International Education Studies*, *9*(12), 12. https://doi.org/10.5539/ies.v9n12p12

[19] Onal, H., Inan, M., & Bozkurt, S. (2017). A Research on Mathematical Thinking Skills: Mathematical Thinking Skills of Athletes in Individual and Team Sports. *Journal of Education and Training Studies*, *5*(9), 133. https://doi.org/10.11114/jets.v5i9.2428

[20] Öztürk, M., & Kaplan, A. (2019). Cognitive analysis of constructing algebraic proof processes: A mixed method research. *Egitim ve Bilim*, *44*(197), 25–64. https://doi.org/10.15390/EB.2018.7504

[21] Panza, M. (2014). *Mathematical Proofs*. *June*. https://doi.org/10.1023/A

[22] Piaget, J. (1965). *The Origins of Intelligence in Children*. International University Press: New York

[23] Polly, D., Lock, C., & Bissell, B. (2007). Mathematical understanding: Analyzing student thought processes while completing fraction tasks. *Proceedings of the Ninth International Conference of the Mathematics Education into the 21st Century Project: Mathematics Education in a Global Community* , 535–538

[24] Quansah, F., Amoako, I., & Ankomah, F. (2018). Teachers' Test Construction Skills in Senior High Schools in Ghana: Document Analysis. *International Journal of Assessment Tools in Education*, 1–8. https://doi.org/10.21449/ijate.481164

[25] Rusou, Z., Zakay, D., & Usher, M. (2013). Pitting intuitive and analytical thinking against each other: The case of transitivity. *Psychonomic Bulletin and Review*, *20*(3), 608–614. https://doi.org/10.3758/s13423-013-0382-7

[26] Sfard, A., & Kieran, C. (2001). Cognition as communication: Rethinking learning-by-talking through multi-faceted analysis of students' mathematical interactions. *Mind, Culture, and Activity, 8*(1). 42–76. https://doi.org/10.1207/S15327884MCA0801_04

[27] Sfard, A. (2012). Introduction: Developing mathematical discourse-Some insights from communicational research. *International Journal of Educational Research,51-52* (3). 1-9. https://doi.org/10.1016/j.ijer.2011.12.013

[28] Sternberg, R. J., Grigorenko, E. L., & Zhang, L. (2008). *Styles of Learning and Thinking Matter in Instruction and Assessment*, *3*(6), 486–507

[29] Subanji, S., & Nusantara, T. (2016). Thinking Process of Pseudo Construction in Mathematics Concepts. *International Education Studies*, *9*(2), 17. https://doi.org/10.5539/ies.v9n2p17

[30] Thaneerananon, T., Triampo, W., & Nokkaew, A. (2016). Development of a Test to Evaluate Students' Analytical Thinking Based on Fact versus Opinion Differentiation. *International Journal of Instruction*, *9*(2), 123–138. https://doi.org/10.12973/iji.2016.929a

[31] Uyangör, S. M. (2019). Investigation of the mathematical thinking processes of students in mathematics education supported with graph theory. *Universal Journal of Educational Research*, *7*(1), 1–9. https://doi.org/10.13189/ujer.2019.070101

[32] Zhiqing, Z. (2015). Assimilation, Accommodation, and Equilibration: A Schema-Based Perspective on Translation as Process and as Product. *International Forum of Teaching and Studies*, *11*(12), 84–89.

Source details

Mathematics Teaching-Research Journal

Scopus coverage years: from 2006 to 2022
Publisher: City University of New York
E-ISSN: 2573-4377
Subject area: Social Sciences: Education | Mathematics: General Mathematics
Source type: Journal

CiteScore 2021
0.2

SJR 2021
0.145

SNIP 2021
0.211

View all documents > | Set document alert | Save to source list | Source Homepage

CiteScore | CiteScore rank & trend | Scopus content coverage

¡ Improved CiteScore methodology

CiteScore 2021 counts the citations received in 2018-2021 to articles, reviews, conference papers, book chapters and data papers published in 2018-2021, and divides this by the number of publications published in 2018-2021. Learn more >

CiteScore 2021

$$0.2 = \frac{22 \text{ Citations } 2018 - 2021}{97 \text{ Documents } 2018 - 2021}$$

Calculated on 05 May, 2022

CiteScoreTracker 2022

$$0.5 = \frac{61 \text{ Citations to date}}{124 \text{ Documents to date}}$$

Last updated on 05 April, 2023 • Updated monthly

CiteScore rank 2021

Category	Rank	Percentile
Social Sciences └ Education	#1277/1406	9th
Mathematics └ General Mathematics	#374/391	4th

View CiteScore methodology > | CiteScore FAQ > | Add CiteScore to your site

Mathematics Teaching-Research Journal

COUNTRY

United States

Universities and research institutions in United States

Media Ranking in United States

SUBJECT AREA AND CATEGORY

Mathematics
└Mathematics (miscellaneous)

Social Sciences
└Education

PUBLISHER

City University of New York

City University of New York in Scimago Institutions Rankings

H-INDEX

3

PUBLICATION TYPE

Journals

ISSN

25734377

COVERAGE

2006-2021

INFORMATION

Homepage

How to publish in this journal

bczarnocha@hostos.cuny.edu

SCOPE

Information not localized

Quartiles

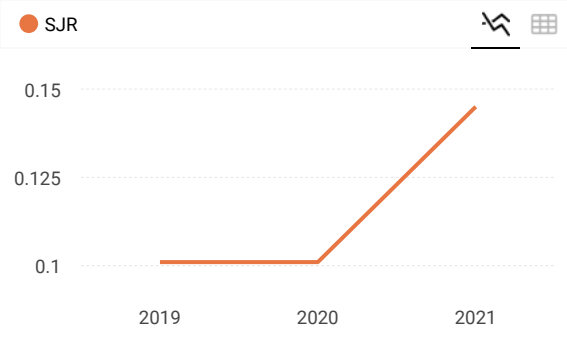
FIND SIMILAR JOURNALS

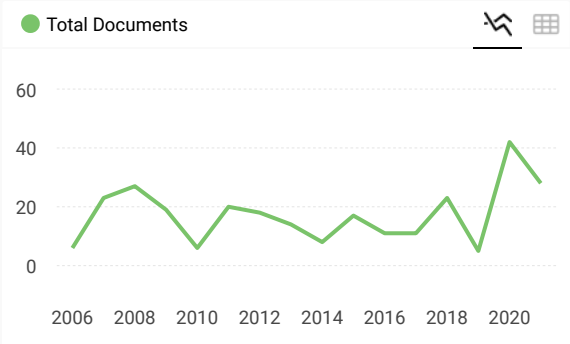
1
International Journal of Mathematical Education in
GBR
47%
similarity

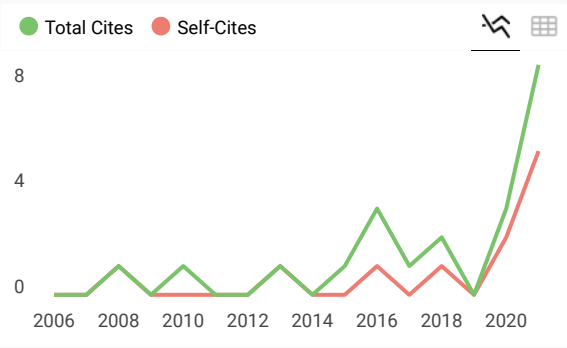
2
ZDM - International Journal on Mathematics Education
DEU
44%
similarity

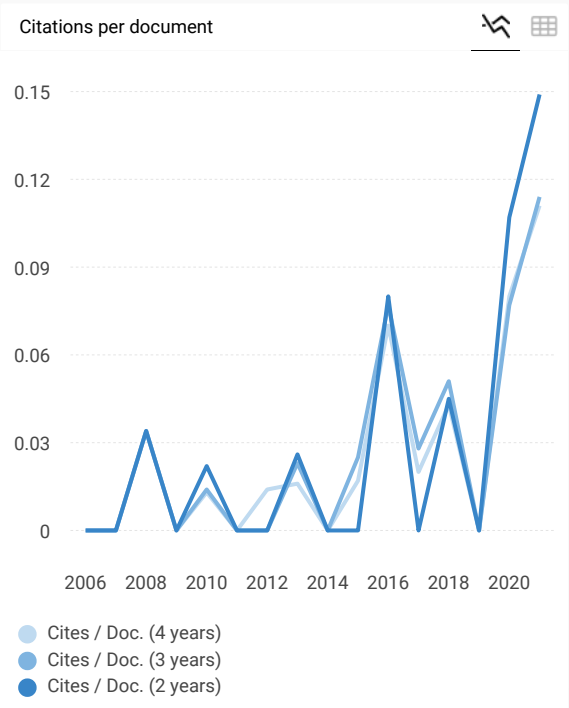
3
Teaching Mathematics and its Applications
GBR
36%
similarity

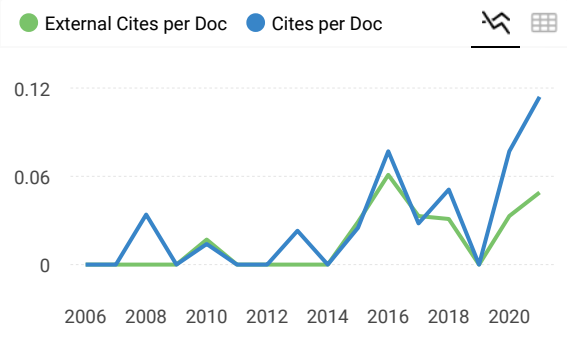
4
Mathematic Research Jo
NLD
3
s

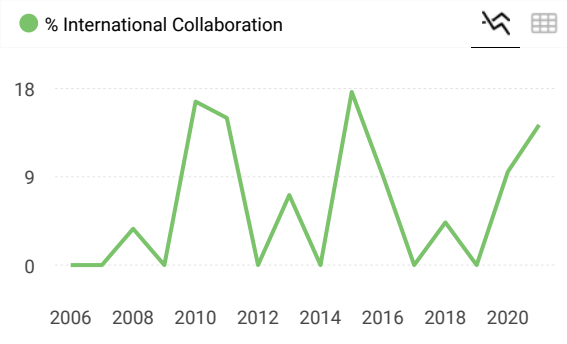


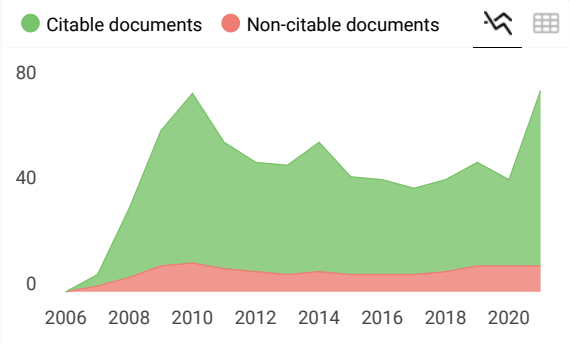


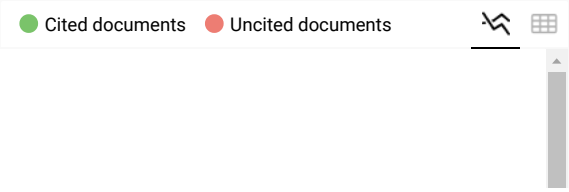








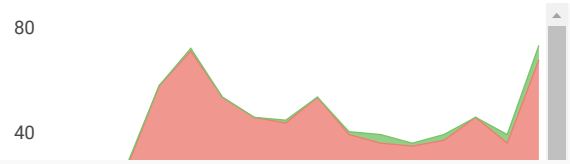




Show this widget in your own website

Just copy the code below and paste within your html code:

<a href="https://www.scimag



Metrics based on Scopus® data as of April 2022

Leave a comment

Name

Email
(will not be published)

I'm not a robot

Submit

The users of Scimago Journal & Country Rank have the possibility to dialogue through comments linked to a specific journal. The purpose is to have a forum in which general doubts about the processes of publication in the journal, experiences and other issues derived from the publication of papers are resolved. For topics on particular articles, maintain the dialogue through the usual channels with your editor.

UINMALIKI mailbox

Rohmani Nur Indah <indah@bsi.uin-malang.ac.id>

Invitation to referee for the Language, Culture and Curriculum

1 message

Language, Culture and Curriculum <onbehalfof@manuscriptcentral.com> Mon, Mar 1, 2021 at 10:55 PM
Reply-To: RLCC-peerreview@journals.tandf.co.uk
To: indah@bsi.uin-malang.ac.id
Cc: d.gorter@ikerbasque.org, durk.gorter@gmail.com

Dear Dr Indah,

Re: LCC-2379 entitled "Linguistics study and critical thinking: two sides of the same coin?"

The paper above has been submitted for consideration by Language, Culture and Curriculum, and we would be very grateful if you could referee it for us. The abstract appears at the end of this email.

Please let us know as soon as possible whether or not you are happy to referee this paper, by clicking on the appropriate link below.

If you accept our invitation to referee this manuscript, you will receive another email telling you how to access our instructions for referees and the paper itself. You will be given a deadline of three weeks, but if you need more time just let Rizah Lilang know (RLCC-peerreview@journals.tandf.co.uk) and they will arrange an extension of that deadline.

To assist you with the review of this paper, you will be provided with 30 days complimentary access to our peer reviewed content via Taylor & Francis Online.

LCC and Taylor and Francis are grateful for the support of all their referees.

Yours sincerely,

Durk Gorter, Editor
Language, Culture and Curriculum

*** PLEASE NOTE: This is a two-step process. After clicking on the link, you will be directed to a webpage to confirm. ***

Agreed: https://mc.manuscriptcentral.com/mm-lcc?URL_MASK=90ee7b9369c344d2b0c0ccd2db6749d1

Declined: https://mc.manuscriptcentral.com/mm-lcc?URL_MASK=760aa849c57a41f8b38d64c21bd0d1b6

Unavailable: https://mc.manuscriptcentral.com/mm-lcc?URL_MASK=66b89e9e984b4d34834ddc77a2c834b8

MANUSCRIPT DETAILS

TITLE: Linguistics study and critical thinking: two sides of the same coin?

ABSTRACT: From a linguistic perspective it seems intuitive that a strong link would exist between the study of linguistics and critical thinking (CT). After all, linguistics is about making sense of language analysis, and CT enables meaningful analysis. Yet this link has virtually never been clearly defined or made explicit, nor emphasized in introductory linguistics textbooks nor, consequently, in linguistics teaching and learning. This paper explores the influence of CT on students' learning of English Linguistics and the contribution of English Linguistics courses to students' CT development from the perspectives of undergraduate English Linguistics students and their lecturers, with a view to improving both students' linguistics study and their CT. Drawing on data collected in questionnaires and interviews at a public university in Vietnam, the findings of the study reveal a range of aspects of linguistics tasks and classroom activities where the link is significant as well as a range of specific CT skills and dispositions that are related to linguistics teaching and learning. The study also suggests the use of problem-solving tasks and open-ended questions for fostering this reciprocal relationship.

UINMALIKI mailbox

Rohmani Nur Indah <indah@bsi.uin-malang.ac.id>

Manuscript ID LCC-2379 now in your Referee Centre - Language, Culture and Curriculum

1 message

Language, Culture and Curriculum <onbehalfof@manuscriptcentral.com> Tue, Mar 2, 2021 at 2:41 PM
Reply-To: RLCC-peerreview@journals.tandf.co.uk
To: indah@bsi.uin-malang.ac.id

Dear Dr Indah,

Thank you for agreeing to review Manuscript ID LCC-2379 entitled "Linguistics study and critical thinking: two sides of the same coin?" for Language, Culture and Curriculum. We would be very grateful if you could submit your report by 23-Mar-2021. If you need more time, just let me know and I shall extend your deadline.

You can access the manuscript through this link:

https://mc.manuscriptcentral.com/mm-lcc?URL_MASK=abff3dc3c0404c7eb0a2be8c41115d8e

You will find the manuscript under the “Review” tab, listed under “Review and Score”. You can view the manuscript by clicking on "View Submission". To view referee instructions and access the score sheet, click on the "Perform Review" button.

If you wish to view the manuscript and the review form simultaneously, click on the HTML or PDF icons and the manuscript will open in a new window. Leave the new window open, switch back to the main window, and open the score sheet by clicking on the Score Sheet tab. Follow the instructions for reviewers provided in the ScholarOne Manuscripts site. It is essential that you click the "Save" button if you wish to exit the review before you submit it to the Editor. Otherwise, none of the information that you have entered will be saved in the system. When you have completed your review and are ready to submit it to the Editor, click on "Submit".

You may want to write your comments for the author in a word document and then upload it to the ScholarOne Manuscripts website: this will protect you from power cuts/computer failures, and make the information more accessible to the authors.

In your review, please answer all questions. On the review page, there is a space for "Comments to Editor" and a space for "Comments to the Author." Please be sure to put your comments to the author in the appropriate space. These comments will be used to provide feedback for the author if their paper is rejected, or to suggest revisions to make the paper publishable.

To assist you with the review of this paper, please accept 30 days complimentary access to our peer reviewed content via Taylor & Francis Online, a resource we hope you will find useful when considering your response to this submission. Simply follow this link to activate access to this content: http://www.tandfonline.com/r/revieweraccess

You will first be asked to sign in or register. If you are already registered on Taylor & Francis Online, please sign in. To register, click the ‘Register' button at the top of the screen and follow the instructions.

On behalf of Taylor & Francis and the Editors, we thank you for donating your time and expertise to the peer review process, and we hope that you will be happy to review further manuscripts for us in the future.

Best wishes,

Rizah Lilang
Language, Culture and Curriculum Editorial Office

UINMALIKI mailbox

Rohmani Nur Indah <indah@bsi.uin-malang.ac.id>

Thank you for submitting your review of Manuscript ID LCC-2379 for the Language, Culture and Curriculum

1 message

Language, Culture and Curriculum <onbehalfof@manuscriptcentral.com> Fri, Mar 19, 2021 at 10:50 AM
Reply-To: RLCC-peerreview@journals.tandf.co.uk
To: indah@bsi.uin-malang.ac.id

Dear Dr Indah,

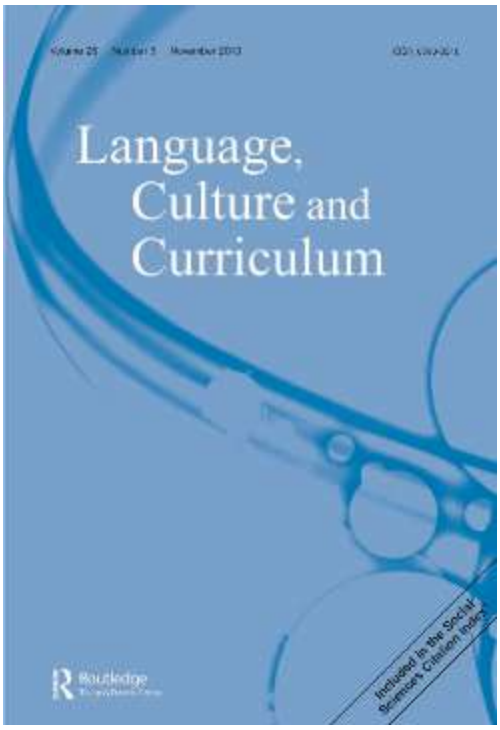
Thank you for refereeing manuscript LCC-2379 entitled "Linguistics study and critical thinking: two sides of the same coin?" for Language, Culture and Curriculum.

Your valuable comments are greatly appreciated and we thank you for your continued support.

To make sure that we only ever send you papers appropriate to your areas of expertise, do please keep us updated. You can enter and update up to five keywords within your account in ScholarOne at https://mc.manuscriptcentral.com/mm-lcc by selecting "User ID and Password" from the drop-down menu next to your name in the banner at the top of the screen. Thank you.

Best wishes,

Rizah Lilang
Language, Culture and Curriculum Editorial Office



Linguistics study and critical thinking: two sides of the same coin?

Journal:	*Language, Culture and Curriculum*
Manuscript ID	LCC-2379
Manuscript Type:	Paper
Keywords:	Vietnam, English, Tertiary education, Linguistics teaching, language and cognition, teaching methods
Abstract:	From a linguistic perspective it seems intuitive that a strong link would exist between the study of linguistics and critical thinking (CT). After all, linguistics is about making sense of language analysis, and CT enables meaningful analysis. Yet this link has virtually never been clearly defined or made explicit, nor emphasized in introductory linguistics textbooks nor, consequently, in linguistics teaching and learning. This paper explores the influence of CT on students' learning of English Linguistics and the contribution of English Linguistics courses to students' CT development from the perspectives of undergraduate English Linguistics students and their lecturers, with a view to improving both students' linguistics study and their CT. Drawing on data collected in questionnaires and interviews at a public university in Vietnam, the findings of the study reveal a range of aspects of linguistics tasks and classroom activities where the link is significant as well as a range of specific CT skills and dispositions that are related to linguistics teaching and learning. The study also suggests the use of problem-solving tasks and open-ended questions for fostering this reciprocal relationship.

Linguistics study and critical thinking: two sides of the same coin?

ABSTRACT

From a linguistic perspective it seems intuitive that a strong link would exist between the study of linguistics and critical thinking (CT). After all, linguistics is about making sense of language analysis, and CT enables meaningful analysis. Yet this link has virtually never been clearly defined or made explicit, nor emphasized in introductory linguistics textbooks nor, consequently, in linguistics teaching and learning. This paper explores the influence of CT on students' learning of English Linguistics and the contribution of English Linguistics courses to students' CT development from the perspectives of undergraduate English Linguistics students and their lecturers, with a view to improving both students' linguistics study and their CT. Drawing on data collected in questionnaires and interviews at a public university in Vietnam, the findings of the study reveal a range of aspects of linguistics tasks and classroom activities where the link is significant as well as a range of specific CT skills and dispositions that are related to linguistics teaching and learning. The study also suggests the use of problem-solving tasks and open-ended questions for fostering this reciprocal relationship.

Keywords: Linguistics study; Critical thinking; Reciprocal relationship; Problem-solving tasks; Open-ended questions

Introduction

The study of linguistics can play a key role in professionalising the communication of people working in a wide range of professions, not least the profession of language teaching (Another author & Co-author, 2012; Edge, 1988; Macaulay & Syrett, n.d.). However, many language students find studying linguistics very difficult, even daunting, and they argue that it is too abstract. Many lecturers, no matter how passionate they are about teaching linguistics, find it very challenging to teach it effectively, to show that the discipline is worthwhile, and to help students

enjoy learning it. The following passage vividly describes the type of feelings students and lecturers in linguistics courses might easily have:

> In my experience, the waste involved in these courses can be prodigious: the wasted time and effort of the lecturers, who complain of the apathy or stupidity of their students; the wasted time and effort of the students, who complain of the irrelevance and jargonized complexity of the subject, as well as of the indifference to language teaching of their lecturers. Worst of all is the waste of potential – the continuing alienation of generations of language teachers from an area of knowledge which should be a source of constant support to them. (Edge, 1988, p. 9)

From a linguistic perspective, there is potentially a strong link between linguistics study and CT, in which CT underlies effective teaching and learning of linguistics and vice versa. This potential link basically lies in the development of linguistic thought – "Western thinking about language, meaning and communication" (Harris & Taylor, 1997, p. i), linguistic theories "as complex networks of more or less sophisticated arguments and counter-arguments" (Kertész & Rákosi, 2014, p. 4), and "the connection between logic and linguistics" (Gregory, 2015, p. 7).

The link between linguistics study and CT, however, remains under-researched in spite of its great importance to both fields. In the existing literature, although many studies have been conducted on either linguistics or CT in language teaching and learning, there are "very few on explicitly teaching linguistics through core research in the discipline" (Pappas, Taboada, & Alexander, 2019, p. e340) and clearly even fewer on the relationship between linguistics study and CT. Thus, this paper contributes to the literature on the teaching and learning of both linguistics and CT, seeking to understand how linguistics study and CT interact with each other with a view to improving both students' linguistics study and their CT skills.

The remainder of the paper is organized as follows: The second section examines the relevant literature on the relationship between linguistics study and CT. The third section describes the study's research methodology. The findings of the study are reported and discussed in the fourth and fifth sections respectively, before concluding remarks are provided.

Literature review and research question

Linguistics study and the importance of critical thinking to linguistics study

Linguistics is "the study of human language" (Fromkin et al., 2018, p. xvi). As a discipline, it provides "knowledge about language and languages" and "an important sense of humanity – what it actually means to be human, as opposed to some other form of animal life" (Co-author, 2007). In linguistics, students learn about many aspects of human language, including sounds, words, sentences, meaning, the origins of language, the nature of human language, the psychology of language (i.e. language acquisition and language processing), and language and society (i.e. language in society, language change, language and culture) among others (Fromkin et al., 2018; Yule, 2020).

According to Macaulay and Syrett (n.d.), linguistics programs are "organized around different aspects of the field". Although undergraduate linguistics programs in different countries and different universities may vary in their emphases, structures and approaches, they often share broad common purposes, similar requirements and standard textbooks. In many undergraduate programs, linguistics courses often comprise an introductory course in linguistics, phonetics and phonology, morphology, syntax, semantics, pragmatics, systemic functional grammar and discourse analysis, among others (Macaulay & Syrett, n.d.). These linguistics courses provide students with knowledge of the core areas of linguistics, enhancing and enriching their

understanding of how language is used and developed over time.

In recent years, research in teaching linguistics has shed some light on the importance of CT to linguistics study. For example, Anderson (2016) conducted a think-aloud study of undergraduates in an introductory linguistics course to understand how they learned to reason scientifically about phonology. As Anderson (2016) explained, "A core element of scientific reasoning in linguistics is the ability to think about language as observable data and to draw conclusions from one's empirical observations" (p. e274). The study provided insights into novice phonology students' mental representations of key linguistic concepts and made recommendations for instructors of introductory linguistic courses to help students cross "the threshold to linguistic thinking" and develop the ability to reason scientifically about language (p. e274). In the Vietnamese context, Nguyen and Nguyen's (2017) action research, although not focusing exclusively on CT, shows the positive influence of explicit higher-order thinking skills instruction and assessment on students' learning of linguistics "in terms of the learning process, performance in assessment, creativity, and motivation to learn" (p. 113). As far as CT is concerned, the findings of the study indicated, "As their analytical and critical thinking skills were improved, students gradually constructed the strategies to make the best of themselves in learning tasks, even though those were the demanding tasks in such a theoretical subject as linguistics" (p. 126).

Critical thinking, its linguistic factors and the contribution of linguistic courses to the development of critical thinking

CT is a complex concept which can be traced back to "the teaching practice and vision of Socrates 2500 years ago" (Paul, Elder, & Bartell, 1997, p. 8). In the existing literature, the term "critical thinking" has been looked at from different perspectives and defined in different ways (Davies,

2015). In one of the most widely used definitions of CT, it is defined as "reasonable reflective thinking focused on deciding what to believe or do" (Ennis, 1989, p. 4). This kind of thinking hints at the importance of CT skills and dispositions. Davies (2015) brings together the most important of these which have been identified by key scholars in the field. He notes that CT skills, though related, are quite varied: They include analysing arguments, claims or evidence; judging or evaluating arguments; making decisions or problem-solving; inference-making; predicting; reasoning verbally; interpreting and explaining; identifying assumptions; defining terms; asking questions for clarification; and thinking about thinking (Davies, 2015, p.53). As for CT dispositions, Davies notes that they include respect for alternative viewpoints; inquisitiveness; open-mindedness; fair-mindedness; the propensity or willingness to seek or be guided by reason; a desire to be well-informed; tentativeness, scepticism, tolerance of ambiguity, and appreciation of individual differences; seeing both sides of an issue; intellectual humility, intellectual courage, integrity, empathy, perseverance (Davies, 2015, p. 56).

The question of how CT can be taught has long been subject to debate between the 'generalists' and the 'specifists'. Fostering students' CT in linguistics courses seems to achieve a happy balance between these two views. The generalists find it helpful to "teach CT abilities and dispositions separately from the presentation of the content of existing subject-matter offerings" (Ennis, 1989, p. 4). It is interesting to note that language is an essential component of CT skills and an indispensable part of CT teaching according to the generalist view. In learning CT, students will be taught, for example, the language of reasoning, the patterns of reasoning, the difference between language in which arguments are presented and language in which explanations are offered, and ways of clarifying and interpreting expressions and ideas (Fisher, 2011). This is, in fact, what students can learn from linguistics courses, especially from courses in syntax, semantics,

and discourse analysis.

The specifists, by contrast, hold that CT is subject specific (see, for example, McPeck, 1981). The existing literature has looked into the incorporation of CT into subject-matter instruction in linguistics courses. For example, CT can be fostered through a problem-based learning approach (Filimonova, 2020) or a writing-intensive approach (Pappas et al., 2019) in linguistics courses. Welch and Shappeck (2020) have also identified how a signature assignment in linguistics aligns in both pedagogy and content with key competencies, among which CT "tends to be especially salient" (p. e66). These studies show evidence that linguistics courses provide a stimulating environment with different subject areas and a variety of activity types for students to think critically in. The findings of these studies support the position taken by McPeck (2016), who expresses the view that "thinking is always thinking about something" and that "critical thinking always manifests itself in connection with some identifiable activity or subject area and never in isolation" (p. 5).

Research question

Despite a growing body of research on CT in linguistics teaching and learning, scant attention has been paid to the two-way relationship between them. This study seeks to address this gap by answering one research question: What is the link between linguistics study and CT as perceived by undergraduate students and lecturers in English Linguistics?

Research methodology

Data collection

This research was conducted in an English Linguistics undergraduate programme of a large public university in Vietnam, where linguistics courses are offered in the curriculum and CT is encouraged in its professional and dynamic learning environment. At the beginning of the project, invitations were sent to five lecturers who were experienced in teaching English Linguistics and all senior full-time undergraduate students who were taking an English Linguistics course in the programme. Four lecturers and twelve students were able to arrange their time to take part in the study on a voluntary basis. The lecturers (named L1 to L4) were qualified with Master's and PhD degrees in TESOL, Linguistics or Applied Linguistics, or an EdD degree, all of which had been obtained in Australia or the United States of America (USA). Three of the lecturers were Vietnamese faculty staff, and the other[1] was an invited foreign lecturer from a Western university. All the students (named S1 to S12) had taken some or all of the English Linguistics courses. Research ethics approval was obtained from [name] before the study commenced.

This study forms part of a larger research project on CT in English language teaching (ELT). In the larger project, the participants were first invited to complete a questionnaire. There were two versions of the questionnaire, one for lecturers and the other for students. The students then did two CT tasks. Following the completion of the questionnaires and the responses to the CT tasks, the students were invited to take part in follow-up semi-structured interviews. The lecturers, for their part, evaluated the students' CT tasks responses for evidence of CT before being invited for semi-structured interviews. The purpose of the interviews was to gain a better understanding of the data previously obtained. Each interview, which lasted about 30-45 minutes, was audio

[1] The invited foreign lecturer, for whom English was a second language, started teaching English at the age of 15. They are denoted as L4 (Lecturer 4) in this study.

recorded to enable an accurate transcription. As the participants' competence in English was adequate for the research activities, all the data were collected in English.

For the purposes of the current paper, responses to relevant items in the questionnaires and interviews, which seek information about the relationship between linguistics study and CT, were collated and analysed. The relevant questionnaire items solicited information about the perceptions of the definition and description of CT, examples when students' CT skills were nurtured in an English Linguistics classroom, the role of CT in the programme and in linguistics courses, experiences with CT being integrated in English Linguistics teaching and learning, and the importance of English Linguistics courses in developing students' CT skills. During the interview, the participants were asked to further share their perceptions and experiences of integrating CT in English linguistics teaching and learning. For example, the lecturers were asked questions about the need for CT in English Linguistics courses, the role of CT in their daily lesson plans and the challenges they face in implementing CT in the classroom. The students were asked questions about whether they need good CT skills, what role CT had and whether they were conscious of being a critical thinker in their linguistics study.

Data analysis

Inductive thematic analysis (Braun & Clarke, 2006) was employed in this study. The audio recordings were transcribed and during the analysis, triangulated through data comparison to responses to relevant questionnaire items to ensure reliability. The data were subjected to a "recursive process, where movement is back and forth as needed", throughout six phases, namely "familiarizing [ourselves] with [our] data", "generating initial codes", "searching for themes", "reviewing themes", "defining and naming themes", and "producing the report" (Braun & Clarke,

2006, p. 87). Three overarching, and often overlapping, themes formed by the combination of either different codes or sub-themes became evident: (1) the importance of CT in English Linguistics study, (2) the usefulness of English Linguistics courses for developing students' CT, and (3) how best to foster the link between linguistics study and CT.

Findings

This section reports on the main findings about the relationship between linguistics study and CT from the perspectives of both undergraduate students learning English Linguistics and their lecturers.

The importance of CT in learning English Linguistics

The majority of the participants (except S10) emphasized the importance of CT in the study of English Linguistics, as one typical quote reveals:

> If you don't have CT skills, you cannot learn, you cannot be a good learner in linguistics. (S3)

To illustrate their responses, the participants discussed various reasons why CT, in terms of skills and dispositions, was desirable in English Linguistics courses.

First, many students perceived that CT was important in English Linguistics study because it helped them understand the lessons and perform different kinds of linguistics exercises, tasks and assignments, from analysing sentences, especially ambiguous sentences, and drawing tree diagrams in English Syntax to interpreting words and sentences in English Semantics, or from interpreting a certain utterance in light of situations where it is used in English Pragmatics to analysing conversations in Discourse Analysis. Many of them could not go further in explaining

why CT was needed for those exercises and assignments. Two of them, however, could explain it more clearly:

> Such analysis is to give the learner a deep understanding of sentences and their uses; if they have knowledge from analysing those sentences, they can use the language more appropriately and correctly. (S2)
>
> First, the teacher will give a lot of rules for me to study, but then, language has a lot of exceptions, and with those rules, we can apply to most of the cases, but to some cases, we cannot apply [them]. And with just the basic rules, we cannot analyse all of the language, so we have to think critically, and we have to do more research and discussion and then analyse the language better. (S3)
>
> We have to analyse the structures so we can understand the meanings of sentences, and then we can know what lies behind the basic language elements, and what are the meanings and the content behind the language. (S3)

This sub-theme, i.e. the necessity of CT in enhancing the understanding of linguistics and in facilitating the doing of linguistics exercises, tasks and assignments, was brought into greater focus in the lecturers' discussions. The lecturers indicated that students needed to have CT or be trained in CT to have a good understanding of English Linguistics. The reason for this was that all the subjects were "very theoretical" for students (L3) or because linguistics (Semantics, for example) had a lot of theories, which could sometimes be "very subjective" (L2). The lecturers even emphasized that it would be "hard enough" for lecturers to "just make [students] understand the textbook" (L3), or that "basically the students have to be thinking critically about everything we teach" in order to apply the concepts that were taught by their lecturers (L4).

In addition, the student participants talked about other aspects of the influence of CT skills and dispositions on linguistics study, with much clearer expression of their views. For example, they discussed the following four main points:

First, the CT skills of making judgements, interpreting and explaining, and reasoning verbally are needed when performing correcting exercises. For example, S1 reported that in their English Syntax classes, the teacher usually invited several students to write their answers on the blackboard and asked other students to explain why they thought an answer was correct or incorrect. In this way, the students had to make judgements and think of supporting ideas to support their answers.

Second, the CT disposition of looking at an issue from different perspectives and the CT skill of making decisions offer an advantage for reading. One of the students (S5) said that thinking critically when reading could help students identify what was true and what was not true in articles. Another student (S6) explained that some linguistics books, such as the Morphology and Syntax coursebooks, were difficult to read because the authors did not get directly to the point from the beginning, but discussed different issues and different alternative viewpoints instead. Thus, students needed to "consider the problems in different ways" when reading rather than accepting "one truth". Also, this skill and this disposition enable students to choose what to believe from multiple sources of knowledge. For example, S12 said, "The knowledge that we learn comes from a lot of books, a lot of sources, so we will have to choose that which is believable."

Third, analysing, recognising and making arguments are also necessary in dealing with different sources of information. For example, one participant stated that "the teacher is also one of the sources of information, but sometimes he or she can be wrong, so we need to argue" (S12). Another participant pointed out that "in an article, the author says a, b, c, and then e and d", and students had to "recognize that sequence to know what the author means" (S7).

In addition, the quest for linguistic knowledge requires students to have the CT disposition

of inquisitiveness or curiosity. As S4 put it, "Being critical will keep students curious and want to know more about the subjects. When they have an inquisitive mind, they can widen their knowledge."

Some of these key aspects were emphasised and carefully explained by the lecturer participants. For example,

> I think [CT skills] help students to be more logical in their reasoning, and to avoid fallacies when arguing a point and to recognize the fallacies in other people's arguments. (L1)
>
> The students may not agree with some of the points in the textbook or in the lecture, so they can raise their concern as well. […] Also, because different books may talk about the same thing differently, the students may raise a lot of questions because they say "So, which one is correct?" That is when I think you should point out that it's very important to consider something in context, for example, and so they can look at that more critically, and not just believing in what the textbook says. (L2)
>
> CT is there from level 1. Even when [students] start the Introduction to Linguistics, their learning comes from a lot of problems that they have to analyse […]. They have to have good arguments. (L4)

In sum, the majority of participants acknowledged the crucial influence of CT on students' learning of English Linguistics. This contributes to the confirmation of the wide-ranging effects that CT can have on students' linguistics study.

The usefulness of English Linguistics courses for developing CT

The majority of the participants (except S10 and S12), through their examples and their ranking of the courses, put a lot of emphasis on the usefulness of English Linguistics courses for developing students' CT.

The participants first gave examples when CT was nurtured in an English linguistics

classroom. The student participants' examples could be classified into two categories. The first category consisted of examples that focused on exercises, tasks and assignments given, for instance the exercise of drawing tree diagrams in a Syntax class or that of analysing the transitivity of clauses in a Systemic Functional Grammar class. The second category included those examples that paid attention to classroom activities, for instance answer justification and peer feedback in exercise correction, recognition of errors in a coursebook, group discussion, and problem-solving activities. S11 gave an example:

> In Semantics class, the teacher gave some questions or raised some problems, and then required my class to think and give our own opinions about those things. Since that, I learned how to think and link to my knowledge, experience, and information that I read, and told everyone about my ideas. (S11)

As for the lecturers, they wrote about classroom activities where students were asked to "agree or disagree with the suggested answers in the textbook" (L2), to compare between English and Vietnamese (L3), to "argue in favour of one structure versus another", and to "provide arguments" (L4). Two of the lecturers were very explicit in stating that

> In my Semantics class, when my students learn the politeness principle and the relationship between politeness and indirectness, I usually ask them whether "Would you like to come in?" or "Come on in" is more polite. I also ask them to think of directness in Vietnamese in comparison with English and whether Vietnamese is less polite than English. The comparison between English and Vietnamese can be culturally thought-provoking for my students. (L3)

> Definitely, definitely, […] the students will learn to be critical also in linguistics […]. The students have to evaluate arguments, so you know, we give them linguistic arguments … (L4)

The participants ranked English Linguistics courses offered in the programme in the order of importance for developing students' CT skills. According to the student participants' responses, *Introduction to English Linguistics* and *English Phonetics and Phonology* were generally ranked the lowest while *Semantics (which includes English Pragmatics)*, *Systemic Functional Grammar*

and *Discourse Analysis* were generally ranked the highest. The ranking of *English Morphology and Syntax* somewhat varied, from the most important to the least important, but was mostly positioned at the middle level.

Introduction to English Linguistics was ranked the lowest because it was the very first linguistic course introducing students to basic linguistic concepts, theories and practice. Notably, however, S7 ranked this course the highest, explaining that it was "the fundamental course for all [English major] students to explore more in Linguistics". They added that promoting CT in this course would not only "help students in the learning process but also boost their CT skills and synthesising skills". *English Phonetics and Phonology* was ranked the lowest for the following reasons: learning how to produce sounds and practising transcribing words do not contribute much to the development of an ability to judge, phonetic and phonological rules are quite clear and unchangeable, and the study of sounds is "less controversial".

By contrast, *Semantics*, *Systemic Functional Grammar* and *Discourse Analysis* were generally the highest ranked courses for the following reasons:

> English Semantics is the subject where I learn how to analyse the meanings. This depends on different situations, people, countries and cultures. (S11)
>
> [For Systemic Functional Grammar], the teacher did not follow […] the main course materials. He taught with his understandings and pointed out how they were different and more reasonable compared to those of the books. […] It gave us a chance to compare between what he taught and what was written in the books. (S12)
>
> As for Discourse Analysis, which is an inter-disciplinary area of research, there are various schools of thought. Learners need CT skills to understand, question and apply knowledge from this field. (S9)

The lecturers' opinions, which were mixed, shared several fundamental similarities with the students'. L1 ranked *English Morphology and Syntax*, which "require a great deal of analysis", the highest, and *English Phonetics and Phonology*, which "put more emphasis on description than analysis, the lowest. L2 ranked *Discourse Analysis* the highest because it was "an advanced course for senior students", and *Introduction to English Linguistics* the lowest because it was "a foundation course". The opinions of L3, who also took account of students' motivation in addition to the course content, stood in contrast to L2's. L3 believed that among the three linguistics courses that they taught, *Introduction to English Linguistics* was the most important for developing CT skills while *Discourse Analysis* was the least important. L3 commented:

> [Introduction to English Linguistics] is covering a wide range of issues with comparison of different languages in the world. Also, this course is for juniors at my school, and they are still eager to learn. (L3)
>
> [Discourse Analysis] is very theoretical, to cover what is in the course material is hard enough. It is possible if teachers can integrate CT skills in their lesson plans. This course is for seniors, so they have lost some of their zest for learning and most of the time they try to cope with the course while doing some part-time job. (L3)

However, according to L4, these courses could not be ranked and should equally develop CT because all of them dealt with data. They explained that linguistics was a "data-driven science", and CT in linguistics meant "data solving" and "data analysis". As L4 put it:

> Linguistics is a science and should be taught as a "discovery" process for students. […] All courses ought to develop CT as they apply the new concepts (as opposed to repeat concepts). (L4)

Strategies to foster the link between linguistics study and CT

The participants suggested a few strategies to foster the link between linguistics study and CT, among which the two most notable types were problem-solving tasks and open-ended questions.

First, the development of CT is linked to an emphasis on problem-solving tasks. L1 noted that a problem-solving assignment "looks like a mathematics problem", and recalled, "When I studied linguistics in Australia, obvious assignments are like problems which we have to solve". Some student participants, for example S11, reported that the linguistic problems that their lecturers raised in class enabled students to think critically and connect linguistic knowledge in different areas of investigation to sources of data, their personal experiences, their beliefs and their prior knowledge, in order to come up with sensible answers.

The lecturers focused on the design and the use of problem-solving tasks in English Linguistics classes. One of the lecturers (L4), who was highly experienced in designing and giving students problem-solving tasks in their linguistics courses, shared helpful ways for dealing with these issues. According to this lecturer, there are two ways to teach linguistics: The first way is "to teach ABC, repeat ABC", and the second way is that "you teach ABC, or even better, have [students] discover ABC, and then apply ABC to data where they need to pick, okay, it's an A, it's a B, it's a C." They stated that the responsibility of lecturers was to find and give students data to think about. For them, data came from books written in various languages, and what they did was "pick a book, look at some data, and then invent a problem from the data". Sometimes they found data that could be adapted into good problems for their students when reading a journal article. They explained, "I don't want [to use] that solution because it's too advanced, but [my students] can play with the data, and see how [what] they can do." They noted that the problems given to students should require answers that they should not be able to access on the Internet, and that as

students had to argue for and against possibilities to decide the best analysis, they should be taught the way of constructing an argument and the style of argumentation first.

In the Vietnamese tertiary context, when asked about the possibility that problem-solving tasks might lead to low scores among students, a lecturer commented,

> At the beginning, yes, but we need to sacrifice something [i.e. high scores] in order to help students in the long term way. I think at the beginning, they will suffer something, but then they will get used to it and make progress and will be better in CT. (L1)

Another strategy for fostering the link between linguistics study and CT is an emphasis on open-ended questions. According to the participants, open-ended questions could exist in various forms. They could be either questions that students ask themselves when reading linguistics books or listening to others or questions that they ask their lecturers and their classmates in group or class discussions. They could also be questions that lecturers raised during their lectures or in the form of tasks for students' discussions and written assignments. For example, L3 encouraged students to ask questions regarding what they had read or what was going on in class. In a different way, L2 explained,

> … normally, you should ask students not just, for example, true or false, but why true, why false. Or if they provide an answer, then "Why do you think this is the best answer?", for example. So I think if you keep asking why, then they have to think. (L2)

As seemingly different as open-ended questions may be from problem-solving tasks in terms of types of exercise or activity, these questions are, as demonstrated in the lecturers' and students' responses, actually a technique that can be used to scaffold students' CT learning and assist students to deal with their problem-solving tasks. Students in L2's English Linguistics classes did not have to agree with everything: L2 normally encouraged their students to "disagree

with something" as they thought that way of teaching was preferred by the students. They believed that the use of open-ended questions in exercises and activities would help students "raise their voice". However, as lecturers encouraged students to ask a lot of questions, they had to be prepared to answer those questions as well, which could be "challenging for teachers sometimes" (L2):

> … because you cannot prepare everything, because it depends on what the students say, and what the answers or the questions are. But I think if you know enough about the field and about the theory, then you will be able to answer the questions. (L2)

Discussion

This paper has reported on an exploratory study about the perceptions of undergraduate students and lecturers in English Linguistics regarding the link between linguistics study and CT. If we put the first set of findings about the extent to which students in these courses need good CT skills side by side with the second set of findings about the extent to which English Linguistics courses develop students' CT skills, it is interesting to note that frequent similarities, overlaps, and even combinations can be found between the examples, explanations, and comments provided as evidence to support the participants' viewpoints on the two issues, which suggests an intimate link between linguistics study and CT. In other words, examining the importance of CT in learning English Linguistics is one way to look at the link, and investigating the usefulness of English Linguistics courses in developing CT is an alternative way to look at it. Such a strong link could be attributed to the nature of linguistics as a science as noted above by one of the lecturers. The following argument from Crystal (2005) provides further clarification on the inseparability of linguistics study and CT:

> Linguistics shares with other sciences a concern to be objective, systematic, consistent, and explicit in its account of language. Like other sciences, it aims to collect data, test hypotheses, devise models, and construct theories. Its subject matter, however, is unique: at one extreme it

> overlaps with such 'hard' sciences as physics and anatomy; at the other, it involves such traditional 'arts' subjects as philosophy and literary criticism. (Crystal, 2005, p. 481)

Extending the existing literature, the first set of findings shows multiple dimensions by which CT is important to linguistics study. To return to the CT skills and dispositions that Davies (2015) brought together in order to develop a model of CT in higher education, although not all of them were specifically mentioned in the participants' discussions, many of the skills and dispositions could be clearly identified. What is interesting to note is that these skills and dispositions took on additional dimensions, which were particularly emphasized in linguistics study, when being viewed in different contexts of linguistics teaching and learning, and seen through different 'prisms' of the discipline. For instance, the immersion in a topic area in linguistics requires a competent but questioning understanding of different theories; doing linguistics exercises and assignments involves taking a position on the topics and their related theories.

The second set of findings provides important insights into the usefulness of English Linguistics courses in developing CT. First, the participants' responses confirmed that these courses could provide a good environment for students to practice thinking critically, supporting McPeck's (1981) viewpoint on the manifestation of CT in a subject area. The responses also showed, though not as clearly as in the previous finding, that the courses enabled students to use language properly to express their thoughts, thus contributing to the development of CT. In addition, the findings about the participants' ranking of English Linguistics courses and the reasons that they gave for their highest and lowest ranking could serve as a reference point and a practical guideline for lecturers to integrate CT into their courses and for students to monitor and improve their own learning behaviours. Although there might be several explanations for the differences in

the rankings of the participants, four explanations that emerged most clearly from the findings were the course content, lecturers' instruction, students' motivation and the participants' subjective perceptions. The element of subjectivity, which is inevitable, should also be taken into proper account in the teaching and learning of linguistics. As noted by one linguist:

> What happens in phonology, and why, seems to me less mysterious than what happens in syntax (a field that I know less about), and much less mysterious than what happens in morphology (a field that I know more about but still do not understand well). That is a subjective reaction. (Carstairs-McCarthy, 2011, p. 25)

The third significant set of findings relates to how problem-solving tasks and open-ended questions can be instrumental in moving lecturers towards productively integrating CT into English Linguistics courses and moving students towards thinking critically in their studies. These findings shed some light on what underlines the reflections on practice in Bauer (2011) and Chung (2011), among other teacher-scholars who contributed valuable ideas about teaching linguistics subjects in Kuiper (2011). Reflecting on his experience of teaching morphology, Bauer (2011) emphasized that English morphology "does present us with enough data to train students in many of the problems of morphological analysis" (p. 33). Chung (2011), in relation to teaching syntax, found it helpful to guide students "through a combination of structured problem sets and Socratic interaction in the classroom" (p. 36). As she described,

> Instead, the instructor provides a problem set which students solve outside of class, either alone or – better – collaborating with one another. Students write up their solutions in essay-style format and submit them at the beginning of the next class. Class time is devoted to discussion of their solutions, with the instructors guiding students to assess the merits of each solution and settle on one solution as superior. (Chung, 2011, p. 36)

These findings also help us understand why in the latest edition of Fromkin et al. (2018, p. xvi) the authors note that they "have provided many new exercises and problem sets in this edition so that students can apply their knowledge of linguistic concepts to novel data" and added "more research-oriented exercises […] for those instructors who wish their students to pursue certain topics more deeply". As these exercises are very important for students learning linguistics, they should not be ignored, as may often be the case. On the contrary, they should receive careful attention in the teaching of this discipline.

Conclusion

This paper set out to show how CT benefits and animates English Linguistics courses and, in return, how these courses can foster students' CT. Addressing this aim, the study's findings have made explicit the strong link between linguistics study and CT, which was perceived by English Linguistics students and their lecturers to be manifested in various linguistics exercises, assignments and teaching/learning activities. The evidence from this study suggests that if English Linguistics courses are to be taught and learned in an effective way, then the influence of CT on students' learning and the contribution of these courses to students' CT development appear to be two different ways of looking at the same issue or, in other words, "two sides of the same coin". While it may be true that there is no one right way to integrate CT into English Linguistics courses, the use of problem-solving tasks and open-ended questions have been suggested to enable English Linguistics students to become better linguistics learners and more competent critical thinkers. It is hoped that this study will make a useful contribution to considerations of teaching and learning in the discipline of Linguistics in general and in English Linguistics in particular.

Disclosure statement

No potential conflict of interest was reported by the authors.

References

Anderson, C. (2016). Learning to think like linguists: A think-aloud study of novice phonology students. *Language, 92*(4), e274-e291.

Another author & Co-author (2012).

Bauer, L. (2011). Teaching morphology. In K. Kuiper (Ed.), *Teaching linguistics: Reflections on practice* (pp. 27-34). London: Equinox.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology, 3*(2), 77-101.

Carstairs-McCarthy, A. (2011). Learning phonology as a way to learn how theories are improved. In K. Kuiper (Ed.), *Teaching linguistics: Reflections on practice* (pp. 13-26). London: Equinox.

Chung, S. (2011). Teaching syntax. In K. Kuiper (Ed.), *Teaching linguistics: Reflections on practice* (pp. 35-39). London: Equinox.

Co-author (2007).

Crystal, D. (2005). *How language works*. London: Penguin Books.

Davies, M. (2015). A model of critical thinking in higher education. In M. B. Paulsen (Ed.), *Higher education: Handbook of theory and research 30* (pp. 41-92). New York: Springer International Publishing Switzerland.

Edge, J. (1988). Applying linguistics in English language teacher training for speakers of other languages. *ELT Journal, 42*(1), 9-13.

Ennis, R. H. (1989). Critical thinking and subject specificity: Clarification and needed research. *Educational Researcher, 18*(3), 4-10.

Filimonova, V. (2020). Problem-based learning in introductory linguistics. *Language, 96*(1), e1-e21.

Fisher, A. (2011). *Critical thinking: An introduction* (2nd ed.). Cambridge: Cambridge University Press.

Fromkin, V., Rodman, R., Hyams, N., Amberber, M., Cox, F., & Thornton, R. (2018). *An introduction to language* (9th ed.). South Melbourne, Victoria: Cengage Learning.

Gregory, H. (2015). *Language and logics: An introduction to the logical foundations of language*. Edinburg: Edinburgh University Press.

Harris, R., & Taylor, T. J. (1997). *Landmarks in linguistic thought 1: The Western tradition from Socrates to Saussure* (2nd ed. Vol. 1). London and New York: Routledge.

Kertész, A., & Rákosi, C. (2014). *The evidential basis of linguistic argumentation*. Amsterdam: John Benjamins Publishing Company.

Kuiper, K. (2011). *Teaching linguistics: Reflections on practice*. London: Equinox

Macaulay, M., & Syrett, K. (n.d.). Why major in linguistics. *Linguistic Society of America*. Retrieved from https://www.linguisticsociety.org/content/why-major-linguistics

McPeck, J. E. (2016). *Critical thinking and education*. Oxford: Martin Robertson & Company Ltd.

Nguyen, T. M. T., & Nguyen, T. T. L. (2017). Influence of explicit higher-order thinking skills instruction on students' learning of linguistics. *Thinking Skills and Creativity, 26*, 113-127.

Pappas, P. A., Taboada, M., & Alexander, K. (2019). Teaching linguistic argumentation through a writing-intensive approach. *Language, 95*(3), e339-e363.

Paul, R. W., Elder, L., & Bartell, T. (1997). *California teacher preparation for instruction in critical thinking: Research findings and policy recommendations*. Sacramento, California: California Commission on Teacher Credentialing.

Welch, K., & Shappeck, M. (2020). Linguistics in general education: Expanding linguistics course offerings through core competency alignment. *Language, 96*(2), e59-e75.

Yule, G. (2020). *The study of language* (7th ed.). Cambridge: Cambridge University Press.

> Linguistics study and critical thinking: two sides of the same coin?

Referee Affiliation
Universitas Islam Negeri Maulana Malik Ibrahim Malang Indonesia, English Literature
Manuscript ID:
LCC-2379
Manuscript Type
Paper
Keywords
Vietnam, English, Tertiary education, Linguistics teaching, language and cognition, teaching methods
Date Assigned:
02-Mar-2021
Date Review Returned:
18-Mar-2021

Recommendation

Accept

Would you be willing to review a revision of this manuscript?

Yes

Confidential Comments to the EIC

This article has succeeded in presenting a representative data analysis regarding the link between critical thinking and linguistics in the context of English as a foreign language, or in multilingual speakers.

The implications for the curriculum are also quite clear because it can provide recommendations regarding the implementation of critical thinking in the courses of tertiary education not only in Vietnam but also in South East Asia countries which have similarities in language and cultural contexts with Vietnam.

But unfortunately for global readers this article has not been enriched with a basic overview of how the context of critical thinking learning has been given at the primary and secondary education levels in Vietnam. In the introduction, this issue needs to be touched upon to provide an overview of the dynamics of critical thinking of Vietnamese students before taking tertiary education

However in general this manuscript can be accepted for publication in the journal Language, Culture and Curriculum with the addition of the latest references

Comments to the Author

This article has succeeded in presenting a representative data analysis regarding the link between critical thinking and linguistics in the context of English as a foreign language, or in multilingual speakers.

The implications for the curriculum are also quite clear because it can provide recommendations regarding the implementation of critical thinking in the courses of tertiary education not only in Vietnam but also in South East Asia countries which have similarities in language and cultural contexts with Vietnam.

For global readers this article has not been enriched with a basic overview of how the context of critical thinking learning has been given at the primary and secondary education levels in Vietnam. In the introduction, this issue needs to be touched upon to provide an overview of the dynamics of critical thinking of Vietnamese students before taking tertiary education.

Files attached

Do you want to get recognition for this review on Publons?

Yes

Author's Response
Files attached

Language, Culture and Curriculum
Routledge Taylor & Francis Group

Referee View Manuscripts

0 Review and Score
1 **Scores Returned**
Invitations
Legacy Instructions

Scores Returned

ACTION	COMPLETED	ID/TITLE	STATUS
Select...	18-Mar-2021	LCC-2379 Linguistics study and critical thinking: two sides of the same coin?	Reject – manuscript is unsuitable (20-Mar-2021) Assignments: ADM: Lilang, Rizah

Source details

Language, Culture and Curriculum

Scopus coverage years: from 1988 to Present
Publisher: Taylor & Francis
ISSN: 0790-8318
Subject area: Arts and Humanities: Language and Linguistics | Social Sciences: Linguistics and Language | Social Sciences: Education
Source type: Journal

CiteScore 2021
3.1

SJR 2021
0.889

SNIP 2021
1.592

View all documents > | Set document alert | Save to source list | Source Homepage

CiteScore | CiteScore rank & trend | Scopus content coverage

¡ Improved CiteScore methodology

CiteScore 2021 counts the citations received in 2018-2021 to articles, reviews, conference papers, book chapters and data papers published in 2018-2021, and divides this by the number of publications published in 2018-2021. Learn more >

CiteScore 2021

$$3.1 = \frac{305 \text{ Citations 2018 - 2021}}{97 \text{ Documents 2018 - 2021}}$$

Calculated on 05 May, 2022

CiteScoreTracker 2022

$$4.6 = \frac{479 \text{ Citations to date}}{104 \text{ Documents to date}}$$

Last updated on 05 April, 2023 • Updated monthly

CiteScore rank 2021

Category	Rank	Percentile
Arts and Humanities Language and Linguistics	#81/968	91st
Social Sciences Linguistics and Language	#92/1032	91st
Social Sciences		

View CiteScore methodology > | CiteScore FAQ > | Add CiteScore to your site

Language, Culture and Curriculum

COUNTRY

United Kingdom

Universities and research institutions in United Kingdom

Media Ranking in United Kingdom

SUBJECT AREA AND CATEGORY

Social Sciences
- Education
- Linguistics and Language

PUBLISHER

Taylor and Francis Ltd.

H-INDEX

36

PUBLICATION TYPE

Journals

ISSN

07908318

COVERAGE

1988-2021

INFORMATION

Homepage

How to publish in this journal

yongyanzheng@fudan.edu.cn

SCOPE

Language, Culture and Curriculum is a well-established journal that seeks to enhance the understanding of the relations between the three dimensions of its title. It welcomes work dealing with a wide range of languages (mother tongues, global English, foreign, minority, immigrant, heritage, or endangered languages) in the context of bilingual and multilingual education and first, second or additional language learning. It focuses on research into cultural content, literacy or intercultural and transnational studies, usually related to curriculum development, organisation or implementation. The journal also includes studies of language instruction, teacher training, teaching methods and language-in-education policy. It is open to investigations of language attitudes, beliefs and identities as well as to contributions dealing with language learning processes and language practices inside and outside of the classroom. Language, Culture and Curriculum encourages submissions from a variety of disciplinary approaches. Since its inception in 1988 the journal has tried to cover a wide range of topics and it has disseminated articles from authors from all continents.

Quartiles

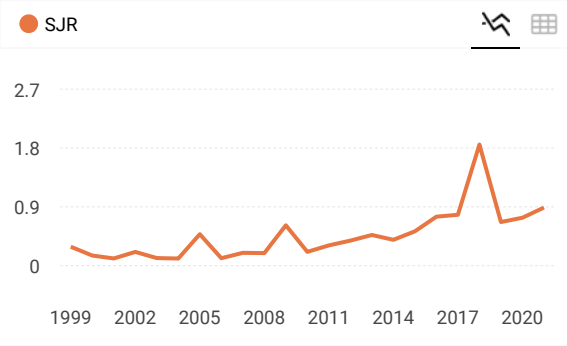
FIND SIMILAR JOURNALS

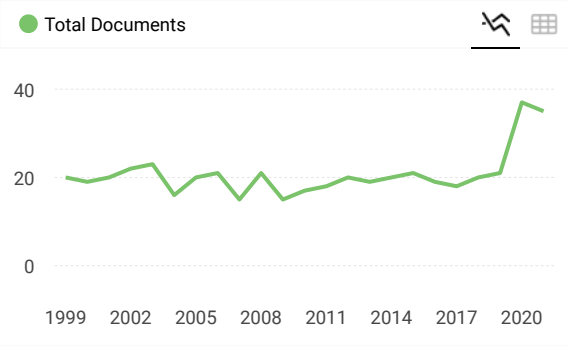
1
International Journal of Bilingual Education and
GBR
51%
similarity

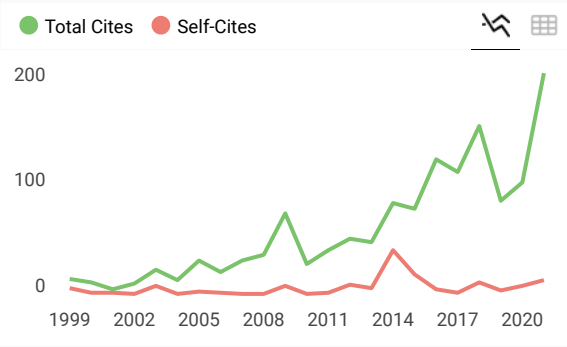
2
Language and Education
GBR
48%
similarity

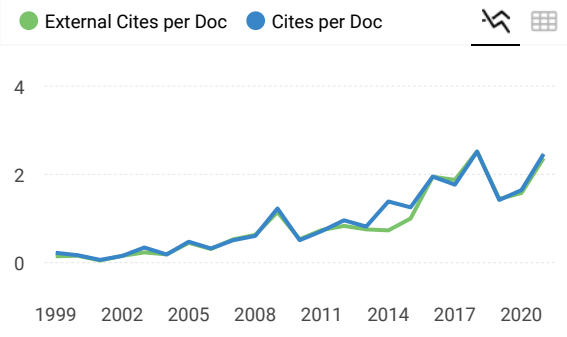
3
Journal of Language, Identity and Education
GBR
45%
similarity

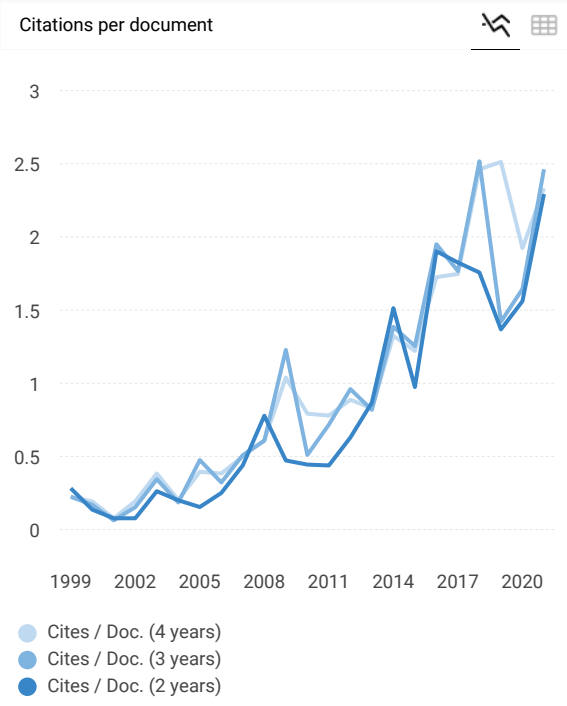
4
Journal of M Multicultura
GBR
4
s

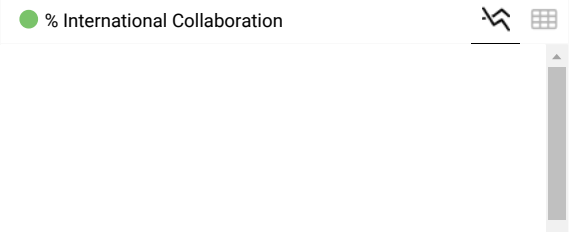


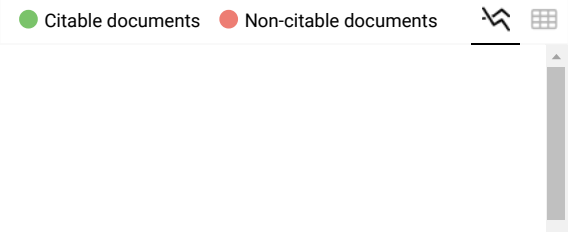


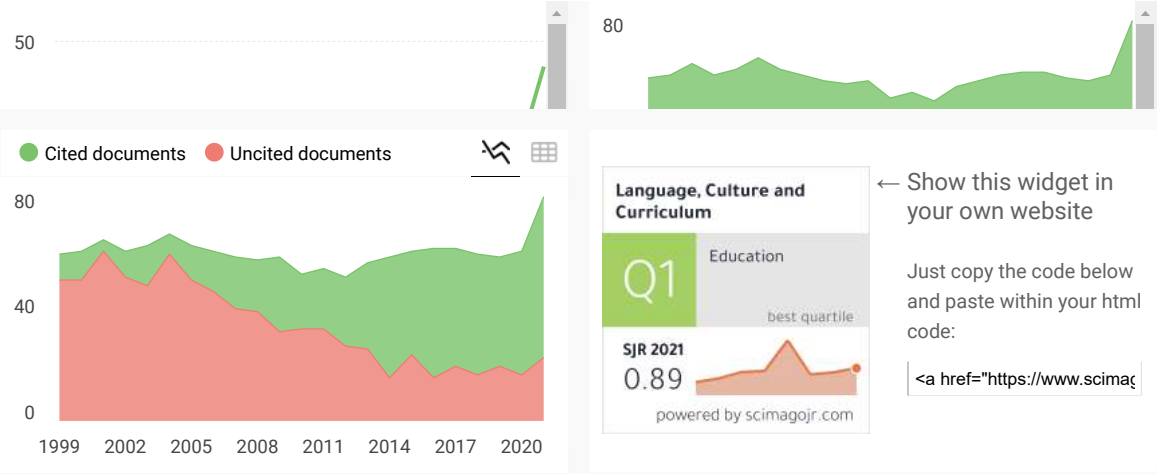












SCImago Graphica

Explore, visually communicate and make sense of data with our **new data visualization tool**.

Metrics based on Scopus® data as of April 2022

Abdo 9 months ago

1- How many times a year does the journal "Langugae, culture and curriculum' is published?
2- how much is the publication fees?
3- can an author send the artilce by email if he/she runs intion techencal difficulties in sending it via the system?

reply

SCImago Team

Melanie Ortiz 9 months ago

Dear Abdo,
Thank you for contacting us.
We suggest you visit the journal's homepage or contact the journal's editorial staff , so they could inform you more deeply.
Best Regards, SCImago Team

Lili Chabibah 3 years ago

good

reply