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Reducing Cognitive Load in Learning Academic Writing Online: The Case for Colours

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Abstract

Many would agree that the teaching of writing is not an easy task. As teachers teaching academic writing, when it comes to teaching academic writing online, the fear comes in many folds. Firstly, the process of giving intensive writing exercise becomes even more challenging when done online. Next, it is also difficult to teach students to organise their thoughts via online; and even more difficult to teach students to develop their writing skills via online. This current study is done to introduce yet another online teaching method to teach academic writing. This study explores a method to reduce cognitive overload among writers. This quantitative study is done to find out how learners perceive learning academic writing online. 63 respondents underwent a semester of learning academic writing online and responded to a survey with 4 sections and 5 Likert-scale. Section A are items about demographic profile. Section B has items on group work. Section C has items on graphic organisers and section D has items on colour codes. Findings reveal that learners were positive about the group work online, using graphic organisers and also colour codes to learn academic writing online. Findings has interesting implications in the teaching and learning of academic writing online.

Keywords: Academic Writing, Cognitive Overload, Group Work, Graphic Organisers, Colour Codes.

Introduction

Background of Study

As teachers teaching academic writing, when it comes to teaching academic writing online, the fear comes in many folds. Firstly, writing was traditionally taught using “pen and paper” where the students submit drafts to the teacher. Mind you, this is done face-to-face where the teacher scribbles on the draft with many comments. The students ask questions for clarifications, argues once in a while to defend their decisions. The students repair the drafts based on the scribbled suggestions. So this one-to-one interaction is now missing. How can teachers meet students to discuss their drafts? Secondly, mind maps are good starts to begin essay writing. Writing teachers used to scribble elaborated mind maps on the white

board to show students how to plan their write-up. For some writing teachers elaborated mind maps include different colours to show the different functions of different sections of the essay. Finally, traditional teaching allows writing teachers to “meet” individual/group writers at each stage of the writing process.

Many would agree that the teaching of writing is not an easy task. Almbark (201) listed some problems in teaching writing. Firstly, the process of giving intensive writing exercise becomes even more challenging when done online. Next, it is also difficult to teach students to organise their thoughts via online; and even more difficult to teach students to develop their writing skills via online. In addition to that, according to Rahmat (2019), one major difficulty to teach writing is teaching students how to write the contents and doing this online is definitely not easy.

Hence the study by Bulqiyah et al (2021) suggested that there are further researches to create new method in teaching essay and especially so in this online context. This current study is done to introduce yet another online teaching method to teach academic writing. This study explores a method to reduce cognitive overload among writers. Specifically, this study is done to answer the following research questions;

- How does group writing reduce cognitive overload in online academic writing?
- How do graphic organisers reduce cognitive overload in online academic writing?
- How do colours reduce cognitive overload in online academic writing?

Literature Review

This section presents about the challenges in the teaching of writing , the theory of cognitive load and the use of colours. Past studies are also discussed. The section ends with a presentation of the conceptual framework.

Challenges in the Teaching Writing

Online mode has added the already challenging task of teaching academic writing. Figure 1 presents a representation of the rhetorical problems in writing (Flower & Hayes, 1980). The problems that writers face can be divided into two; (a) the rhetorical situation and (b) the writer’s own goals. Firstly, problems with rhetorical situation involves the writers’ worry about the assignment and also the intended audience of the writing. Next, problems with the writer’s own goals include being concerned with the reader. The writer also worries about creating a personal or voice I the writing. Next, the writer worry about building meaning and also about producing a formal text.

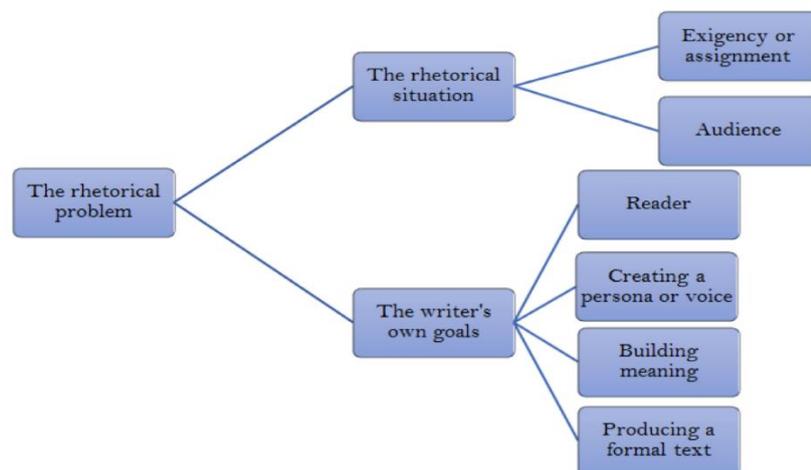


Figure 1-Rhetorical Problems in Writing (adapted from-Flower & Hayes, 1980)

According to Ali (2016), writing teachers are faced with some issues when they teach writing online. The first issue is that of motivation (Ali, 2061 & Gündoğmuş ,2018) . Learning online can be a quite struggle between the students and the online interface. This can dampen the motivation for the students. Next, the lack of knowledge on the use of technology can also add stress on the students.

Cognitive Load and the Use of Colour

Cognitive Load Theory (CLT) is an instructional design theory . According to Sweller (1988), this theory explains how information is processed (refer to figure 2). During learning the information needs to be kept in the working memory to be processed . After processing, then can the information be passed to the long term memory. However, this working memory is limited. If too much information is presented at one time, the memory becomes overwhelmed and this may cause the information to be lost.

Nevertheless, the CLT indicates that the working memory can be extended in two possible ways. Firstly, visual representation is remembered better than auditory explanation. How is that so? The mind processes visual and auditory separately. In our working memory, auditory items do not compete with visual items just like two visual items competing with each other to be stored in the working memory. So, explanatory information would not have stayed long in the working memory if it was narrated. It would stay longer if it is presented in a visual representation -for instance a diagram.

Secondly, the working memory needs to be in an active learning mode to store information longer. Learning activities that use the existing knowledge can expand the capacity of the working memory.

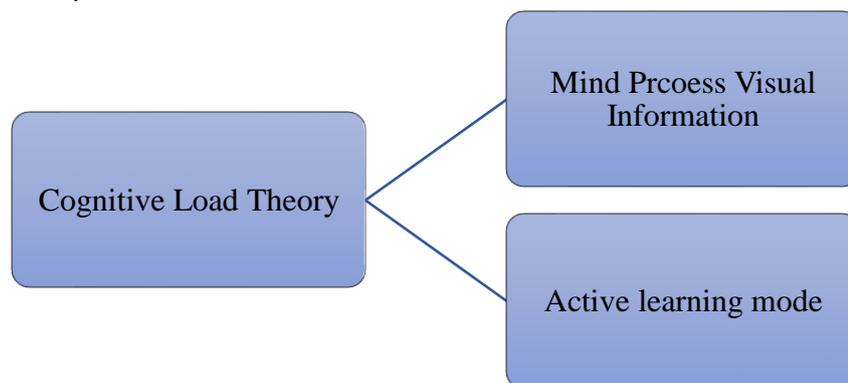


Figure 2- Cognitive Load Theory (Adapted from Sweller, 1988)

Visuals are able to be stored longer into our memory than just mere written or spoken information. According to Chang, Xu & Watt (2018), a visual design has two functions. The first is to support learners to process materials cognitively, and the other is to influence leaners' attitude and motivation towards the learning activity. In other words, the first function is to influence learners' cognition, and the second function is to influence learners' emotions. One example of good visuals is the use of colours. Colors help learners increase their attention levels on certain information, which help such information to be transferred to the long term memories

Past Studies

Bulqiyah, Mahbub, Nugraheni (2021) investigated 21 tertiary students' perspectives in what makes academic writing difficult. This explanatory research use both quantitative and

qualitative design. Data was collected from questionnaire and also semi-structure interview. Findings showed that among some problems that the students faced were affective problems such as students' and lecturers' attitude throughout the writing course. They also reported cognitive problems such as writing their viewpoint, transferring language and also language structure problems. The findings indicate the students agreed that transferring to the target language and the writing process has influenced students' writing difficulties in composing essays. Meanwhile, generating ideas before writing and revising the manuscript were also reported as students' challenges.

Next, the study by Heyandi, Said, and Herlina (2020) looked at online teaching using ICT in teaching writing skills. This mixed mode study used classroom observations, interviews, and also a questionnaire to collect data. The findings showed that the teacher used three steps in online teaching writing; Introducing, memorizing and giving feedback were the strategy in teaching online.

Hutabarat & Gunawan (2020) explored the use of genre based approach (GBA) to teach writing online. The qualitative study investigated how a teacher implemented GBA to scaffold students writing in online learning. One teacher and 20 students participated in the study. Findings showed that using GBA in online learning is less effective for online teaching. There is lacking in terms of modelling by the teacher as well as joint construction of text.

Colour has been shown to influence learning. The study by Kumi, Conway, Limayem and Goyal (2013) was done to investigate affective reaction to colour and learning outcomes in a computer-mediated learning environment. 79 participants participated in this quasi-experimental study. The participants listened to a visual presentation lecture with either blue or yellow background and then completed a survey on their affective reactions, learning attitudes, and outcomes. Findings show that colour is not neutral and may influence learning attitudes and outcomes and, hence, the colour of computer technology interface design can influence learning outcomes. Rahmat (2018) explored an alternative method for writers to learn to write paragraphs using colour codes as scaffolds. Colour codes are used to focus the learners' attention during the learning of academic writing. Modelling is used so learners can imitate the expected behaviour by the teachers. Graphic organizers are used as scaffolds for learners to write their essay. After one semester of using the techniques such as modelling, and scaffolding in the writing classroom, 32 students were asked to respond to a survey. Findings of this study show that students perceive learning ESL academic writing using the selective attention writing approach as a favourable experience

Conceptual Framework of the Study

This current study is inspired from the characteristics in cognitive load theory by Sweller (1988). Figure 3 below shows the theoretical framework of the study that reveals how to reduce cognitive overload among students learning academic writing online. Sweller (1988) mentioned that there two ways to reduce cognitive overload. The first way is by using graphic organiser -especially adding the concept of colour to enhance learning., The second way is through activities related to the learning in a group.

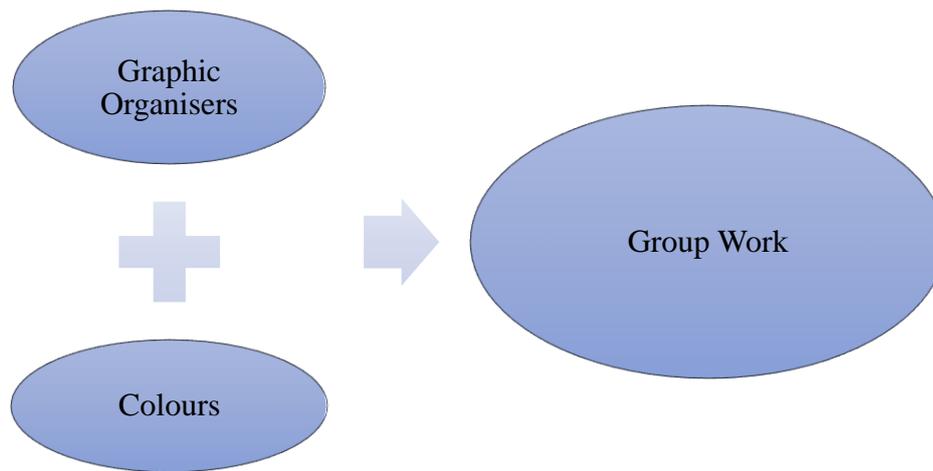


Figure 3- Theoretical Framework of the Study- Reducing Cognitive Overload for Learning Academic Writing Online (adapted from Sweller, 1988)

Methodology

This quantitative research is done to investigate how learners use cognitive and meta cognitive strategies when they learn French as a foreign language. The instrument used is a survey inspired from Sweller’s (1988) CLT. 63 respondents were purposively chosen to answer the survey. The survey has 4 main sections. With reference to Table 1, section A has items on the demographic profile. Section B has 7 items on Structure & Group Work, section C has 13 items on graphic organisers and section D has 9 items on colour codes.

SECTION	STAGE	No of Items
B	Structure & Group Work	7
C	Graphic Organisers	13
D	Colour Codes	9
Total number of Items		29

Table 2 presents the reliability statistics for the instrument. SPSS analysis revealed a Cronbach alpha of .963 thus showing a good internal reliability of the instrument used. Data is collected online via goggle form. Data is then analysed using SPSS version 26. Analysed data is presented in the form of percentages and mean scores to answer the 2 research questions.

Table 2- Reliability Statistics

Reliability Statistics

Cronbach's Alpha	N of Items
.963	29

Findings

Findings for Demographic Profile

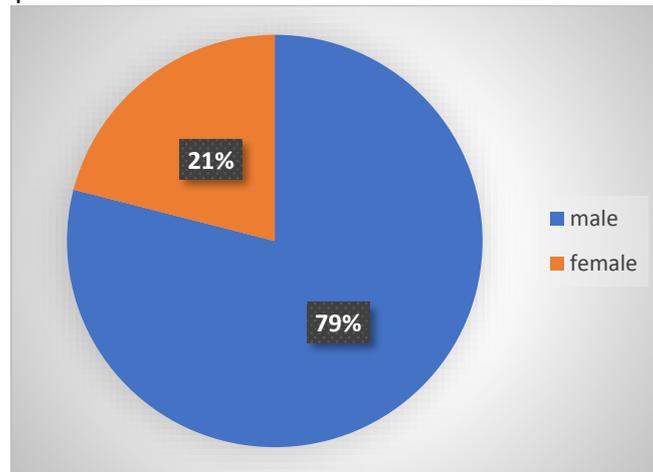


Figure 4- Percentage for Gender

Figure 4 presents the percentage for gender. 79% are male participants and 21% are female.

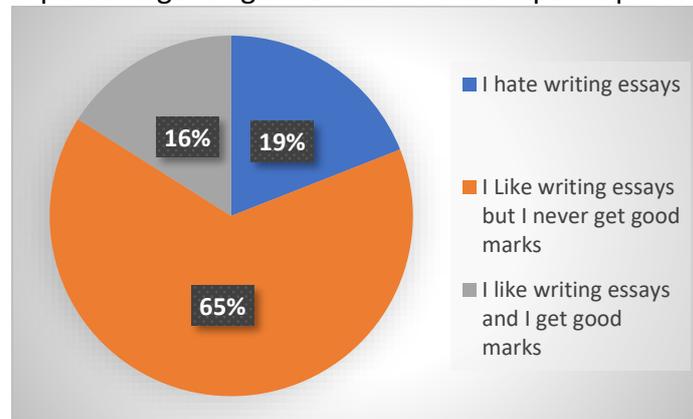


Figure 5- Percentage for Attitude towards essay writing

An analysis for respondents' attitude towards essay writing is presented in figure 5. 19% hated writing, 65% liked writing but never got good marks while 16% liked writing and gotten good marks.

Findings for Group Work

This section presents data to answer research question number 1: How does group writing reduce cognitive overload in online academic writing? This question is answered by 7 items about group work

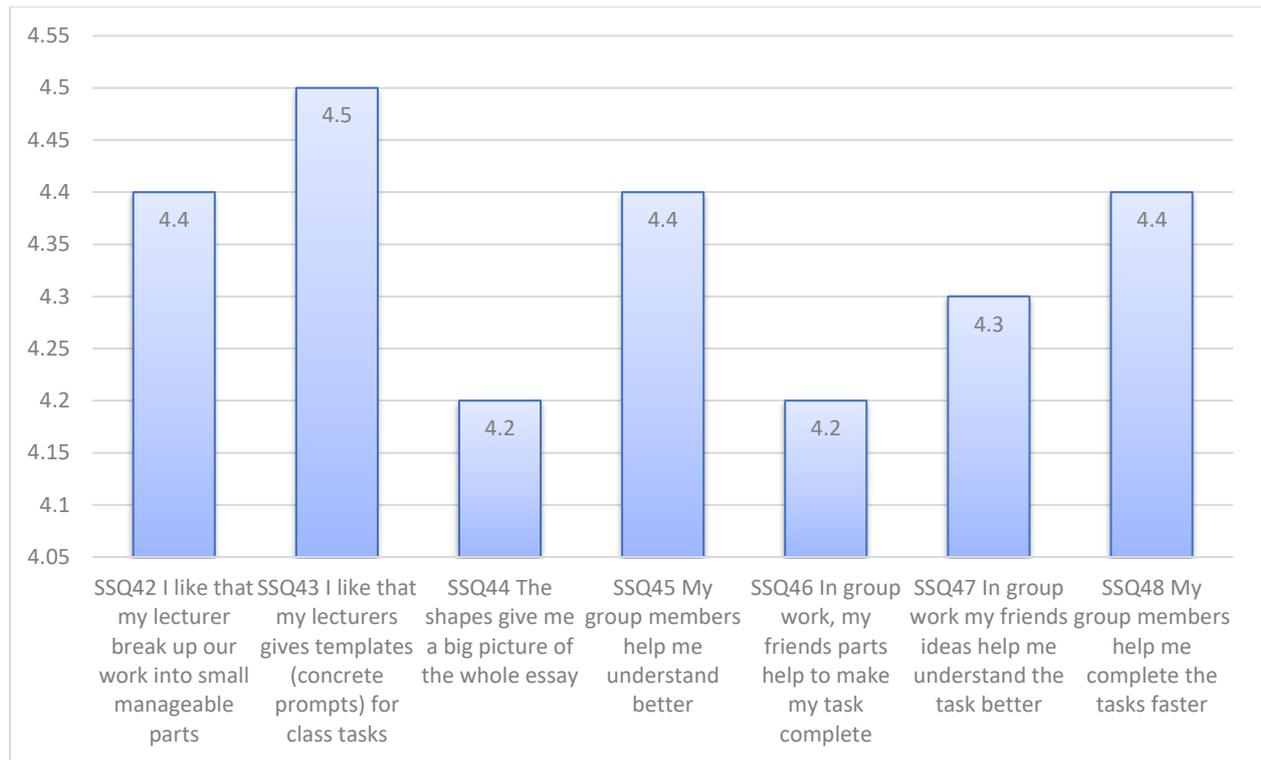


Figure 6- Mean for Group Work

Figure 6 presents the mean score for group work. The highest mean (4.5) is for the item “liked that my lecturer gave templates”. Three items had the same mean of 4.4 and they are “liked that the lecturer broke up the work in small manageable parts”, “group members helped to understand better” and also “group members helped to complete tasks faster”. Respondents also reported that (mean=4.3) “group members’ ideas helped them understand better”.

Findings for Graphic Organisers

This section answers research question 2: How do graphic organisers reduce cognitive overload in online academic writing? 13 items were used to answer this question.

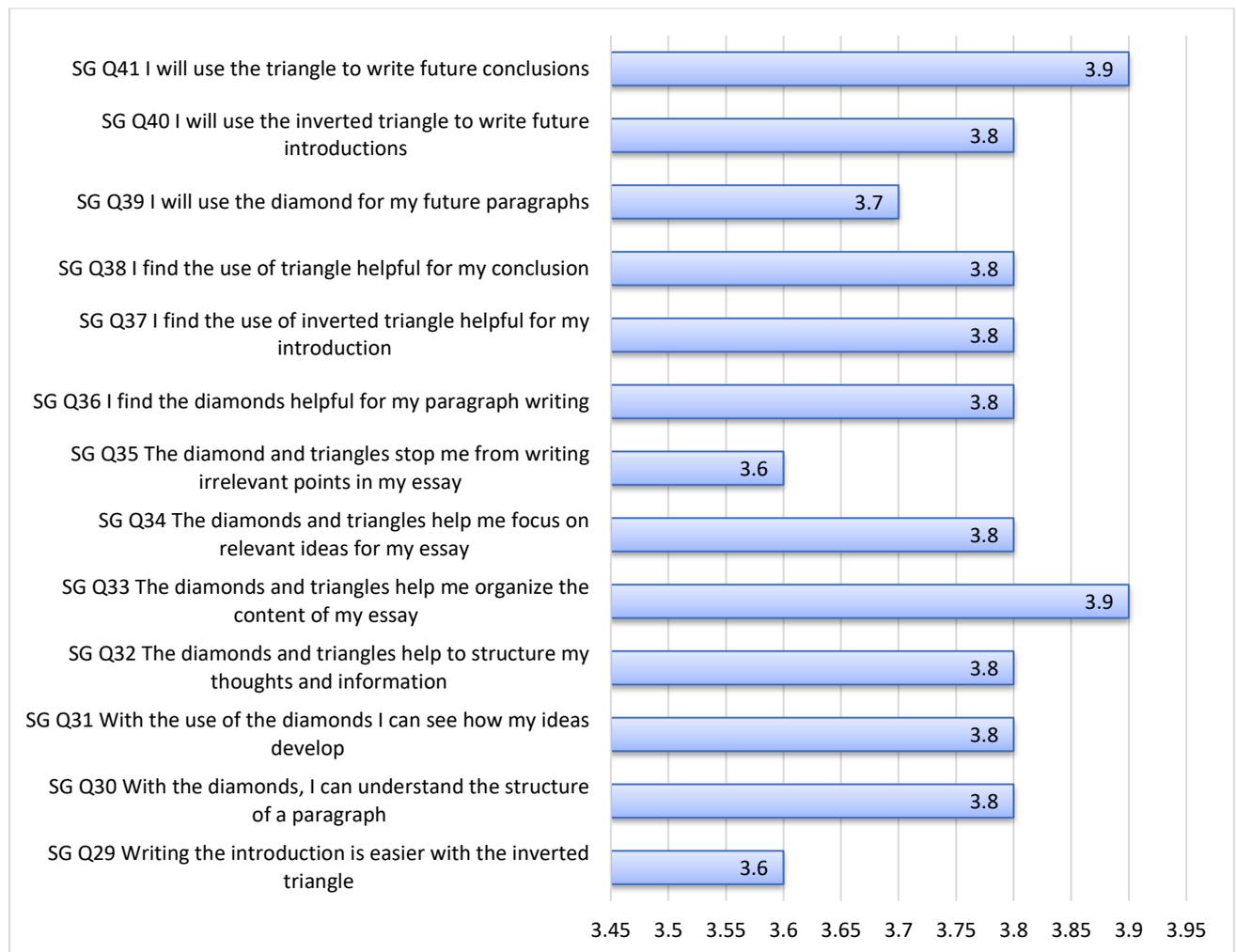


Figure 7 -Mean for Graphic Organisers

Figure 7 shows the mean for graphic organisers. Two items had the highest mean (3.9) and they are ‘the diamond and triangles helped to organise the content of the essay’ and also ‘they will use triangle to write future conclusions’. Seven items obtained a mean of 3.8 and they are ‘With the diamonds, I can understand the structure of a paragraph’, ‘With the use of the diamonds I can see how my ideas develop’, ‘The diamonds and triangles help to structure my thoughts and information’, and ‘The diamonds and triangles help me focus on relevant ideas for my essay’, ‘I find the diamonds helpful for my paragraph writing’, ‘find the use of inverted triangle helpful for my introduction’, ‘find the use of triangle helpful for my conclusion’ and ‘will use the inverted triangle to write future introductions’.

Findings for Colours

This section answers research question no 3: How do colours reduce cognitive overload in online academic writing? 9 items are used to answer the question.

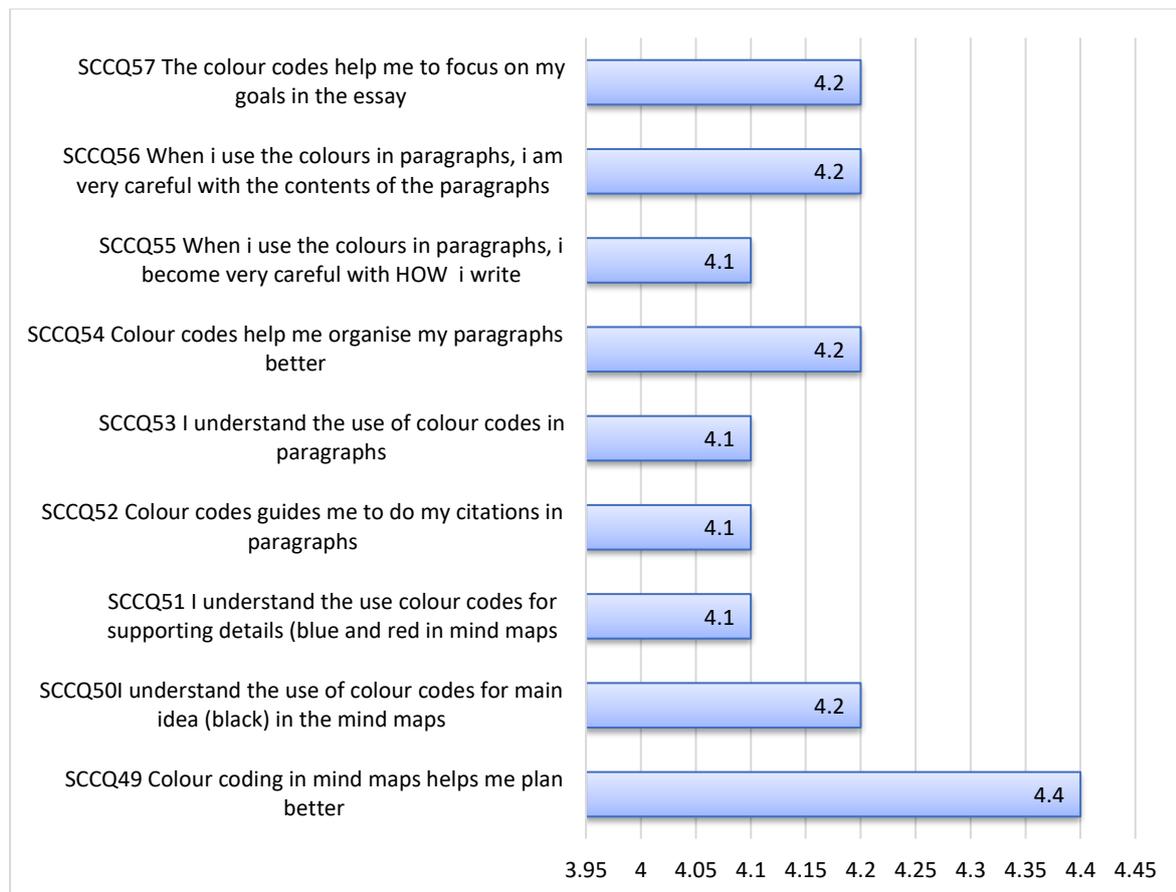


Figure 8- Mean for Colour Codes

Figure 8 reveals the mean for colour codes. The highest mean of 4.4 is for “Colour coding in mind maps helps me plan better”. Next, four items had the same mean of 4.2 and they are “understand the use of colour codes for main idea (black) in the mind maps”, “Colour codes help me organise my paragraphs better”, “When I use the colours in paragraphs, I am very careful with the contents of the paragraphs”, and “The colour codes help me to focus on my goals in the essay”.

Conclusion

Summary of Findings and Discussion

A summary of the findings reveals interesting discovery in terms of group work, graphic organisers and also colour codes. Group work for online writing is favourable because learners liked using the given templates. They were positive about writing from manageable parts. They appreciated that their group members helped to improve their understanding and also completed the task faster. Sweller (1988) also suggested that active learning in the form of activities helped to enhance learning. Graphic organisers helped students organise the content of the essay, as well as understand the structure of the paragraph. The graphic organisers also helped learners structure their thoughts and information and also focus on relevant ideas for the essay. Sweller (1988) also reported that visuals helped to store the information in the long term memory. Colour codes placed in mind maps helped learners plan better. Colour codes also helped learners organise their paragraphs better. This finding is in accordance with the study by Kumi, Conway, Limayem and Goyal (2013) who found that there

are affective reaction to colours during learning. In addition to that, Rahmat (2018) found an agreed that colours helped writers learn to write paragraphs using colour codes as scaffolds.

Pedagogical Implications and Suggestions for Future Research

Teaching writing is tough enough without the pressure of online learning. Teaching writing online requires hours of planning on the part of the teacher. To get more interaction in an online class, activities that involve group interaction would help to create the activity oriented atmosphere. The use of scaffolds in terms of colour-coded templates would help learners see the progression of the academic writing activity even if they are not communication face-to-face. Future research could look into the comparison of teaching academic writing online versus face-to-face. Data can be collected via interviews and open-ended questions.

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