Enhancing students’ communication skill by creating infographics using Genially in learning climate change

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Abstract. This study is aiming to investigate students’ communication skill in terms of verbal and visual on learning climate change topic as a socio-scientific issue. The communication skill attainment was assessed by incorporating infographics generated using Genially website. The research was conducted due to its significant role of the skill for students to become empowered global citizens in 21st century that requires the ability to communicate information to be easily understood and perceived concisely by the audience. The research method used is one group pre-post-test to investigate the enhancement of students’ ability before and after the experimental treatment. However, the result shows a good enhancement on average score for both verbal and visual competency areas with certain activities to sustain the whole communication skills.

1. Introduction
In the 21st century, there are certain skills need to be acquired, one of them is communication skill. Communication is defined as the capability to convey thoughts and ideas effectively using verbal and non-verbal methods in variety of forms and context [1]. Particularly, communication skill is divided into two parts: verbal communication and visual communication. Verbal communication accommodates contextual motivations, purposes, audiences as well as specific strategies to each field of inquiry. It can be developed in classroom by taking concern of disciplines to be valued. The Competent Speaker identifies eight basic verbal competencies such as choosing suitable topic to deliver; communicating specific purpose in accordance with the audience and occasion; using proper supporting material thus the oral discourse can be achieved; delivering introduction and conclusion that appropriately in line with the topic; audience, and occasion; employing appropriate language to communicate; employing appropriate variety of vocal, rate, pitch and intensity to engage the audience to the topic being delivered; speaking clearly using correct grammar and pronunciation; and representing gestures or related behavior to support the message. In more advanced verbal communication skill, it includes the coherence of knowledge, skill, and attitude that require certain levels of adaptability of behavior [2, 3].

In addition to that, there is also visual communication as a social process in which people employ visual symbols to deliver an information for others to interpret and respond to. Furthermore, visual communication is one of the requirements to be an educated person in the 21st century especially since people nowadays rely on fast access to information. In this case, every important information needs its way to connect at the same fast pace widely, no exception science information [3, 4].

Therefore, teaching visual communication to students would help them more able to interpret visual media and access extensive learning process and comprehension in education. One of the suitable
information delivery formats is infographics [5]. Infographics are increasingly utilized as a means to communicate data in relation to science, technology, engineering and mathematics thus the knowledge can be presented in readily understandable form. It can also be used to serve other purposes among others reminding the available information, showing concepts relationship, process and events transfer, arrangement of course content and information summary [6, 7]. According to Davidson [8], a good infographic should encapsulate appropriate details in one visual while still remain simple, clear, precise, and able to present complex information quickly, combining visuals and texts for information presentation, self-explanatory and attractive for the readers [9].

Considering the things mentioned, the incorporation of infographics in classroom is needed in order to enhance students’ communication skill as a milestone in preparing them to be an empowered citizen in this century. Moreover, when it is combined with the socio-scientific issue as a widely discussed topic that would encourage students’ involvement related to health and environment which relevant with the current condition [10, 11]. The topic specifically chosen is climate change. Aside from its familiarity in daily life, climate change is also considered as less concerned by students since they tend not to understand well how climate change affected the surrounding environment [24]. At the end, this study was aiming to find out how infographics would enhance students’ verbal and visual communication skill in learning climate change as socio-scientific issue.

2. Methods
This study used the one group pre-post-test method. This method allows the researcher to find the differences score attained due to the experimental treatment from pre-test and post-test result [12]. The respondents were 50 students of seven grader from private secondary school in Cimahi. The convenience sampling was used due to easy accessibility and availability [13] during the study from home.

The instrument used for this study was communication skill rubrics which specifically divided into verbal communication and visual communication. Verbal communication includes preparation component and skill component, and presentation and delivery skill component [2]. However, visual communication involves content generation and visual design generation [14, 15]. In order to measure students’ communication skill, the scoring criteria were divided into three such as: one (1) for unsatisfactory, two (2) for satisfactory, and three (3) for excellent. Additionally, this measurement was conducted to get the quantitative information [21] of students’ attained skill in learning climate change topic. In details, the climate change topic covers about greenhouse effect, global warming process, factors and impacts of global warming, and overcoming global warming.

3. Result and Discussion

3.1. Verbal communication skill
The first objective of this study was to investigate students’ verbal communication skill score enhancement after the implementation of infographic using on learning climate change topic. Students’ verbal communication skill attainments are shown in Figure 1 with the details of each activity in Table 1.

![Figure 1](image-url)
Figure 1 shows the average enhancement score of students’ verbal communication skill. In this study, students’ verbal communication skills were assessed from their performance in presenting the generated infographics on climate change topic. In general, students’ verbal communication skill post test result is increased by all activities from pretest result. The details for each activity and the score resulted are shown in Table 1 below.

Table 1. Students’ communication skill result on verbal communication activities

| Label | Activities                                                                 | Average Score | Pretest | Posttest |
|-------|---------------------------------------------------------------------------|---------------|---------|----------|
|       | **Preparation and Component**                                             |               |         |          |
| a     | Chooses and narrows a topic appropriately for the audience and occasion   | 2.00          | 2.78    |          |
| b     | Communicates the thesis/specific purpose in a manner appropriate for the audience and occasion | 2.00          | 2.68    |          |
| c     | Provides appropriate supporting material                                 | 2.40          | 2.86    |          |
| d     | Use an organizational pattern appropriate to the topic, audience, occasion, and purpose | 1.38          | 2.60    |          |
|       | **Presentation and Delivery**                                             |               |         |          |
| e     | Uses language appropriate to the audience and occasion                    | 2.10          | 2.80    |          |
| f     | Uses of vocal variety in rate, pitch and intensity (volume) to heighten and maintain interest appropriate to the audience and occasion | 1.74          | 2.76    |          |
| g     | Uses pronunciation, grammar, and articulation appropriate to the audience and occasion | 2.22          | 2.84    |          |
| h     | Uses physical behaviour that support the verbal message                   | 2.10          | 2.54    |          |

Table 1 shows that students’ attainment in “preparation and component” are all enhanced. The score that remained high is activity “c” (2.40 to 2.86 as satisfactory). This activity defines students’ capability in providing appropriate supporting material for their explanation [2]. In this competency, students were able to add and organize supplementary information aside from their textbooks related to climate change topic. It is a good improvement, because on pretest students’ presentation contents were more rigid and textual. This result is in line with the theory that if students are facilitated with verbal communication-based task, it will motivate them to explore and discover more about the relevant findings from various sources related to the topic being delivered because they are intended to generate something that requires to be understood clearly and concisely by the audience [19]. In addition to that, in “presentation and delivery”, students’ attainment that needs to be highlighted is activity “g” which increased to 2.84 as satisfactory. Activity “g” defines students’ ability in using acceptable articulation with good pronunciation and few grammatical errors [2]. In this competency, students developed the ability to deliver the information clearly. This might also be resulted because it was conducted virtually that students had the opportunity to selectively review the performances before uploading the final presentation online.

Communication is an important skill needs to be acquired by students nowadays since it can be considered as a demanded competency for scientific literacy, especially when it is integrated with environmental-related issue such as climate change. Communication skill covers the proficiency to articulate various thoughts, ideas, and contexts. [16, 17, 25]. If this skill is continued to be developed in the classroom, it will lead students to be more sophisticated, have the ability to develop problem solving, management of stress and risk taking [18]. Furthermore, it is appropriate to be more concern on involving verbal communication elements in classroom so that all of the activities from both skill components can be moderately improved to excellent criteria especially by incorporating info-graphics for another socio-scientific issue since the related topic will support students’ critical thinking as well [22]. Additionally, this skill needs to be trained and supported with constructive feedbacks so that
students would know both of their advantages and disadvantages points from their presentation. The test and type of instruments can also be made more details to attain better output.

3.2. Visual communication skill
The second objective of this study is to investigate students’ visual communication skill on the topic embodied on climate change. Figure 2 informs the average score enhancement generally on students’ attainment of visual communication by generating infographics.

![Figure 2. Students’ communication skill result on visual communication skill](image)

Figure 2 shows the brief graph on students’ enhancement on visual communication skill on pretest and posttest. The results are attained by considering two main skill components in visual communication, those are content generation and visual design generation [14, 15] which then specified into eight activities for assessing the infographics that generated by students using Genially website. Table 2 provides with more details data in order to discover more particulars average score attained for every activity.

| Table 2. Students’ communication skill result on visual communication activities |
| --- |
| **Label** | **Activities** | **Average Score** | **Pretest** | **Posttest** |
| **Content Generation** | i | Chooses the topic to be informed | 2.18 | 2.72 |
| | j | Chooses type of infographics template | 1.80 | 2.40 |
| | k | Uses of layout to present the information | 1.66 | 2.54 |
| | l | Organizes the flow of information | 2.30 | 2.78 |
| | m | Cites the references | 1.00 | 1.16 |
| **Visual Design Generation** | n | Uses of objects or other elements to support the information delivery | 2.02 | 2.04 |
| | o | Uses of data visualization | 1.76 | 2.34 |
| | p | Uses of fonts for the writing | 1.72 | 2.88 |

Table 2 informs the attainment of students’ visual communication skill which assessed by their product of infographics. In “content generation”, students’ lowest attainment is in activity “m” which lies on unsatisfactory criteria for both pretest and posttest. From this result, it can be gained that students were not adjusted to provide appropriate bibliographic citations [14, 15] for all included sources in the infographics. In this case they did not realize yet the importance of information sources is from. Meanwhile the highest posttest average score is attained in activity “l” (2.30 to 2.78 in satisfactory criteria). From this activity, it can be resulted on how students were able to utilize categorization of information in their infographics based on LATCH (location, alphabetical, timeline, category or hierarchy) that allows the reader to understand better [14]. They categorized the information in infographics using boxes or different color charts to be easily noticed. However, in “visual design generation”, activity “g” is increasing well from 1.72 in unsatisfactory to 2.88 in satisfactory. The ability
to use appropriate fonts in data and information visualization cannot be underestimated since it will determine the complementary of the content to be easily read by the readers [14]. In this activity, students already able to choose the appropriate fonts that would suit best with the topics being delivered in the infographic beginning from the font type, size and color.

In accordance to the result, infographic can be taught more in class as a project for students since nowadays they have important role in not only consuming information but also creating it. The creating process of infographic will prompt them to be informatively literate since they have to engage to the contents meaningfully [23] and lead them to various using of digital tools and technologies in order to create creative contents. Besides, students would also develop the ability to effectively use appropriate communicative written language, symbols and texts to illustrate an information better [3, 15]. Furthermore, teaching visual communication efficiently to students would help them more able to interpret visual media and access extensive learning process and comprehension in education. The effective teaching will lead students to be visually literate and enable them to generate various information in visual form. Students need to be fostered to comprehend and deliver information in various formats thus they can become successful learners, creative and confident individuals, active and informed citizens [5].

4. Conclusion
In general, students’ communication skill on learning climate change topic is enhanced by incorporating infographics. Furthermore, it can be inferred that students performed better in verbal communication competency area. In addition to that, students’ communication skill for both verbal and visual should be improved in a balanced way so that they would be able to clearly communicate and effectively express ideas. The fact that communication skill has become increasingly a vital thing in communicating science too has been a sufficient encouragement for teachers to facilitate students with the relevant learning process to support improving communication skills. By advancing communication skill, students would not only be able to understand the knowledge but process it in meaningful way, valuing the information and even having the ability to participate in decision-making process in real life. Additionally, in the effort to increase communication skill, as in line with the previous related research [20], incorporating infographics would be a proper decision since by generating it students would have a chance to think the possible strategic choices about the collected information and extend their thinking on how to appropriately visualize it using images or symbols to tell an informative and captivating story.

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