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# The impact of Web 2.0 technology on students' argumentative writing skills

Shalini Damodaran

English Language Institute of Singapore,
Singapore

Susan Gwee

English Language Institute of Singapore,
Singapore

## Abstract

This report presents the findings of the study undertaken to measure the impact of the use of online platforms on students' argumentative writing skills in Singapore. An analysis of participants' survey and interview responses suggests that the teacher and students could see the benefits of the intervention on students' argumentative writing skills. The *t*-results of students' essays indicate that gains in argumentation scores were significantly higher for the experimental group compared to the control group. The findings of this study suggest that effective use of online platforms helps students develop their writing skills.

## Introduction

The third Information and Communication Technology (ICT) Masterplan for 2009 to 2014 envisioned a greater alignment of students' learning outcomes in the syllabi, national examinations, and classroom experience to 21st century skills such as information technology skills, and the ability to communicate persuasively and collaborate effectively (Ministry of Education, 2008). Students were required to use ICT to look for information, synthesise reports, give feedback on each other's work and collaborate with peers within and outside school. In view of this vision and current literature, the impact of writing on students' construction of cogent arguments was a study worth undertaking.

The purpose of this research was to gain insight into the effectiveness of Web 2.0 technology in supporting and enabling students' argumentative writing skills. Empirical findings from the quasi-experimental research design would help educators make important decisions on whether technology could indeed overcome some of the challenges students faced in developing their argumentative writing skills.

Literature shows that students in secondary schools, junior colleges and tertiary institutions are generally known to have problems with the construction of arguments (e.g., Means & Voss, 1996). Argumentation skills that include critical thinking and critical reasoning skills are also considered to be vital to meet the demands of the 21st Century. Furthermore, given the comfort level of students in Singapore with Web 2.0 tools like *Twitter*, *Facebook* and *Second Life*, the research findings will provide teachers with greater insight into the affordances of such technology to support the teaching and learning of argumentation skills. Previous research has largely suggest-

ed that students generally have difficulty with argumentative writing skills, and the use of technology in most instances might create positive learning experiences and outcomes in students constructing cogent arguments (Chandrasegaran & Kong, 2006; Jonassen & Kim, 2010; Kuhn, 1991; Means & Voss, 1996; Reznitskaya et al., 2001).

Students have been found to experience difficulty writing persuasive essays, comprehending written arguments, differentiating between theory and evidence, and generating genuine evidence, alternative theories, counterarguments or rebuttals (Jonassen & Kim, 2010; Reznitskaya et al., 2001). A local empirical study of Singaporean students confirms the claim of Reznitskaya and his colleagues that students do not have a firm grasp of argumentative discourse. It has revealed that only 4.4% of the 159 online postings displayed the ability to produce dialectically balanced arguments with teachers complaining that students do not know how to argue (Chandrasegaran & Kong, 2006).

## Theoretical Underpinnings

Theoretical underpinnings guiding the use of online platforms in this research are informed by Garrison, Anderson, and Archer (2000), who, in their conceptual framework, identified the elements that were critical requirements for an effective online learning experience. The Community of Inquiry (COI) model assumed that learning occurred within the Community through the interaction of the three core elements highlighted below:

1. Social presence was described as "the ability of participants to project their personal characteristics into the community… as 'real people'" (Garrison et. al., 2000).
2. Teaching presence was the 'selection, organization, and primary presentation of course content, as well as the design and development of learning activities and assessment' and 'facilitation' (Garrison et al., 2000).
3. Cognitive presence was the extent to which learners were able to 'construct meaning through sustained communication' (Garrison et al., 2000).

The teachers assisting us in this research were made aware of the complexities involved in online teaching and learning prior to the data gathering phase. Their lesson plans for online work were informed by the need for the three elements stipulated by Garrison et.al. (2000) listed above.

## Research Questions

The studies reviewed above suggest that technology might help students develop their argumentation skills. Given that students are increasingly using Web 2.0 tools in their everyday lives and that the Ministry of Education in Singapore supports the use of ICT for learning, there is the need for research, particularly at the K-12 levels, to investigate the relationship between the use of Web 2.0 tools and its impact on students' argumentations skills in Singapore. Specifically, this study sought to answer the following research questions:

1. Does the use of technology have an effect on students' learning of argumentative writing skills?

    a. Are there differences in the argumentative writing skills of the experimental and control classes as a result of the use of Web 2.0 technology?
    b. Does Web 2.0 technology support students' argumentative writing skills?
        i. If yes, how does Web 2.0 technology support the teaching of argumentative writing skills?

## Methodology

Two teachers participated in the research. Each teacher taught one experimental class and one control class. This was to minimise the teacher effect. Both taught first year junior college students. First-year junior college students were used in this research to minimise any possible impact on students' performance in high stakes examinations. There were altogether four classes: two experimental classes ($n$ = 41) and two control classes ($n$ = 40).

A quasi-experimental research design was used to obtain quantitative data of the impact of Web 2.0 technology on students' learning of argumentative writing skills for the General Paper. Creswell and Plano Clark (2011) defined a quasi-experimental research design as one in which 'the researcher assigns intact groups the experimental and control treatments, administers a pre-test to both groups, conducts experimental treatment activities with the experimental group only, and then administers a post-test to assess the differences between the two groups' (Creswell & Plano Clark, 2011). Both the selected control group and selected experimental group of the two teachers covered the same content as detailed in the scheme of work to ensure parity. Each teacher used the same reading and writing materials for both groups of student participants.

The period of intervention was six weeks, at least once every week for one hour, in the classroom, during curriculum hours. The learning in class led to online discussions after school hours. The period of intervention was the first six weeks of Term 2, beginning 24 March 2014 and ending 2 May 2014, so as not to encroach on the examination period which is normally around 16 May each year.

After the six-week intervention, students in the control group who were deprived of the possible benefits of the intervention were compensated with the technological intervention in their lessons. The principal's approval and ethics clearance was sought for all student participants of all ages to participate while parents' consent was sought additionally for those below the age of 21.

Data from pre- and post-tests of students' argumentative essay writing were analysed using a $t$-test. The quality of argumentation was measured using the argumentation levels from Erduran, Simon, and Osborne's (2004) study.

An interview was designed and conducted to gain a deeper understanding of student and teacher participants' perception of the e-learning lessons the teachers conducted in supporting the teaching and learning of argumentative writing skills. Six student representatives from each intervention class were interviewed and the sessions audio-recorded. An analysis of teacher and student participants' interview responses helped explain some of the researchers' gaps in understanding the impact of Web 2.0 technology on students' argumentative writing skills.

## Results

The students in both experimental classes showed significantly higher changes in argumentation skills compared to students in the control classes, $t$ = 2.4, $p$ = 0.02. Though one teacher used *Schoology* and the other *Google Docs* as a platform to engage students in discussion, what appeared to matter was not the technology tool itself but how the Web 2.0 tool was used. The analysis of the interviews of Teacher 1 and Teacher 2 and their respective students are documented below.

### *First experimental class*

The analysis of student and teacher interviews concerning the use of *Schoology* as an online platform to develop argumentative writing skills revealed students' mixed feelings towards the use of *Schoology*. Some students felt that it was distracting because they tended to veer into social

media sites and use them in the classroom, while others felt that *Schoology* provided a great platform for them to develop argumentation skills as peer feedback gave them multiple perspectives. The following student interview revealed the importance of peer feedback:

> *Like sometimes when you give biased views, they will pinpoint out… Then they will tell me, show me the other side. Like they will argue about the other side as well. Then I will get to know, like both sides. Then I can see.*

The online experience was also perceived by one student as developing a community of learners, and providing an interesting and interactive experience:

> *It's sort of like, I would put it as Facebook but with educational purposes because what it does is that it creates a social group, a community for students to come and share their ideas and articles that are interesting. It makes it interesting to learn, rather than the old-fashioned way of studying notes and reading like newspapers and stuff. It's a bit more interesting because students can get together and discuss and it doesn't necessarily have to be in the classroom, because now they can do it on an online platform, at home, in front of a computer or on the cellphone. So it's a rather interesting and interactive learning experience and it helps, I suppose.*

The teaching presence is important as the teacher has a key role in sustaining students' interest in online discussion as well as ensuring that the discussion is constructive and develops students' argumentative writing skills. One student commented:

> *I think it does because what the teacher does is that she encourages us to argue with each other and pose constructive statements and arguments on it to develop our skills in GP (General Paper) like talk with each other, communicate properly and understand arguments and interesting articles. So I think it does help quite significantly in our ability to create constructive arguments and statements.*

Teacher 1 commented that students were more engaged in the online platform and that they responded to each other's arguments as well as providing different perspectives. Students had to weigh the pros and cons of an argument. Since students had been given guidelines for giving feedback, the feedback became more structured.

The teacher also commented that students in the experimental class participated more on the online platform compared to when they were in the classroom and that she realized that students were able to do more than she had initially observed in the classroom.

The teacher also reported the importance of the teacher's role in the implementation of an online discussion so that students could take part in discussions regularly, not just in the classroom but outside the classroom. She remarked that she had to show students how to give feedback before setting them the task of giving feedback.

In addition, the teacher reported that the students' content had improved as well as their argumentation. She found that there was more evidence of reasoning and structure in the essays and that the quality of students' comments improved.

### *Second experimental class*

While Teacher 1 used *Schoology* with the experimental class, Teacher 2 used *Google Docs*. She used the 'See, Wonder and Think' scaffold as a tool in a pre-writing activity for students to generate ideas in both the control group and experimental group. While the experimental group carried out their talk online in class, the control group carried out the 'See, Wonder and Think' activi-

ty with pen and paper individually. A comparison of the 'See, Think and Wonder' online and pen and paper student responses revealed some stark differences in quality. The online student responses were more probing and thoughtful than the pen and paper responses of the control group. For example, a student's response to the question: 'Was life for young people in Singapore better in the past than it is today?' was as follows online:

> 'What is considered a better life? In terms of living conditions, education, convenience?'
>
> 'The assumption is that there is a difference and that all young Singaporeans would have similar experiences'.

While a student in the control group responded thus on pen and paper to the same question:

> **See**:
>
> 'Young people' – teenagers included, under the age of 25
>
> 'Better' – more convenient? Simpler? Happier?
>
> 'Past' many years back was before the 20th Century etc.
>
> **Think**:
>
> Shows comparison; lives of young people in different times. Since better is a subjective term the topic allows for some degree of freedom depending on how one defines it and interprets the question.
>
> **Wonder**:
>
> Against the motion,
>
> 1) Used to be more rigidly controlled by parents – unquestionable authority, rigid rules
> 2) Led more comfortable lives…

The student in the control group responded to the question by looking at definitions and meanings of words whereas the student in the experimental group was more coherent and approached the question at the global level. The structure of the question was also clear and well-constructed. There seemed to be a greater sense of audience in the (online) public sphere compared to the student in the control group who approached the writing as a private activity. The collaborative element in the online activity might have encouraged the student to understand the question clearly at the conceptual level and express himself more coherently for his peers' understanding in particular. More importantly, it is evident that the teacher played a vital role in putting in place the rules of engagement online to prevent casual, truncated and highly abbreviated language so as to encourage clear and coherent expression online.

Both the experimental and control classes then received feedback from the teacher. Though the teacher's pen and paper feedback to students appeared useful it seemed to have little impact on the revisions students made to the writing. Students did not seem to have worked on the feedback. Missing counterarguments and rebuttals, contradictory claims and assertions and a lack of relevance remained issues with a number of students in the control group, evident from the con-

tent analysis of their writing.

The experimental class, on the other hand, which received the feedback online, not just from their teacher but from their peers as well, appeared to have worked on the feedback. Students' revisions showed an attempt to make improvements by inserting more convincing examples, for instance, to beef up their arguments. The online teaching presence made a difference as the teacher prepared her students to give meaningful feedback to their peers. Though the teacher was not always happy with the quality of feedback provided by her students, she felt the very attempt might have helped them to sharpen their understanding of the requirements for effective argumentation.

The students in the experimental group may also have made better progress in argumentation skills compared to the control group because the teacher engaged her students in collaborative activities. They got to read, write and respond to the perspectives of their peers and teacher online.

The asynchronous discussion forum allowed both teachers to follow up with considered feedback more easily than they would have with oral or pen and paper discussions in the classroom. Both *Schoology* and *Google Docs* provided both teachers with opportunities to track student posts through discussion threads between teacher and student, and student and student. The teachers and students were thus able to get a view, at global and individual levels, of the students' understanding of the topics. The interview with Teacher 2 highlighted some of the affordances of the online discussion forum. They included convenience and speed.

Students who were interviewed generally felt that reading and writing online helped them to sharpen their argumentative writing skills mainly because it gave them an opportunity to read the varied perspectives held by their peers. It helped them to read with a purpose to support their point of view.

> Student 1: *I can open a new tab and like research more so that I can see other people's point of view. So that helps in the argumentative essay… I can probably do some research on my own and then fit it in.*
>
> Student 2: *For example, my GP teacher, she asked us to write our essay outline on Google Doc and then share with the whole class. So after I do my essay outline, I like look at others. So I can know which point is missing and I can learn from others. Maybe like modify it and add into my answer. After that, normally when we write out on paper the answer, the teacher is like ask us to meet her and explain to us where we have gone wrong. If you use Google Doc and then the teacher can leave the comment at the side. So it is easier for me to keep in mind what she said. If it's one-to-one consult, then whatever the teacher say, sometime I might forget due to the heavy content. If she writes it at the side of it in the Google Doc, I can break it down one by one and try to arrest the problem myself. And after I do that, she can give some comments like, 'Good job' and stuff. Then it really encourages me to like the subject more.*

Students who were interviewed also appreciated the opportunity the online writing provided to revise their work easily after receiving feedback from their peers and teacher. In some cases, reading their peers' writing gave them ideas on writing style and better examples to beef up their argument.

Though the students who were interviewed could see the merit in writing online, some of them felt that they preferred face-to-face discussions with the teacher and peers. One student also spoke about how such online teaching and learning might not be very socially equitable as it favoured those who could afford smart phones and Wi-Fi at home.

## Discussion

Students in both experimental classes did better in argumentation skills while the language mark did not show significant improvement. This is consistent with our understanding that the quality of teaching presence in the online platform did make a difference to students' writing mainly because students were given opportunities in the e-learning space to express their own opinions on issues and read and respond to other perspectives on the topic being discussed. The teacher's presence in the online space as moderator and arbitrator further supported student learning as they provided students with scaffolds based on Toulmin's (1958) Argumentation Pattern, prompting students with sentence stems to familiarise students with the argumentation discourse. Teacher 2 got students to do Jigsaw reading activities online by putting them into mixed ability groups. She also prepared them to give meaningful feedback to their peers by presenting and explaining a set of rubrics to help students assess the effectiveness of the argument presented. In spite of her efforts, Teacher 2 was still not satisfied with the quality of her students' feedback. She felt that she should have done more modelling of giving feedback.

As reported in the student interviews, fellow students provided cognitive support by offering multiple perspectives and by critiquing their peers' arguments. The teaching presence described in the Community of Inquiry model was particularly important in this study as the teacher had to design the online experience of her students, facilitate student discussion, give appropriate feedback and sustain students' interest in the discussion. Students also reported feeling a social presence as there was a community of learners who came together to share online their perspectives on different issues. The three elements of teaching, social, and cognitive presence contributed to students having a meaningful experience of learning how to express their opinions, giving evidence to support them and evaluating the evidence. All these resulted in students achieving better scores on content and argumentation.

The teaching, cognitive, and social presence should be carefully planned and built into instructional design so that students are able to learn effectively both within and outside the classroom. The role of the instructor as designer of the learning experience, and as mediator guiding the learning is essential in order for students to learn how to write well-reasoned arguments.

There are several limitations to this investigation. One is related to one of the common issues with classroom-based research: the lack of random assignment to experimental or control groups, which could have led to non-equivalent groups. Another is the small sample size.

## Conclusion

This study provides support for the hypothesis that having students use Web 2.0 technologies to generate and critique arguments results in a significant increase in the quality of argumentative writing skills in student essays. However, it is also evident that teachers must be aware of their critical role online as designers and facilitators of the learning experience providing students with activities to make meaning, express their unique views and be part of a social community.

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