Developing Critical Readers

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Abstract: Despite its importance, critical reading is a skill that is rarely overtly taught. This article describes the design, development, and delivery of a tailor-made elective course to develop critical reading. An online course for undergraduates majoring in computer science was developed, covering 108 critical and logical thinking concepts. Armed with this knowledge, students evaluate the soundness or cogency of conclusions, based on their truth value, validity, reasoning, assumptions and supporting evidence. The early units of the course focus more on acquiring knowledge and technical terminology while the later units focus on the application of the acquired knowledge and terminology to analyze arguments. In the knowledge acquisition phase, concepts are presented in multiple modes (e.g. verbal, graphical, algebraic and numerical). To evaluate the efficacy of this course, students (n = 43) took pre- and post-tests in which they critically analyzed and annotated persuasive fallacious arguments. There was a significant substantial improvement between the pre- and post-test scores, showing that explicit tuition of logic and critical thinking enhanced their ability to analyze and describe arguments.

Keywords: critical reading, argumentation, logic

1. Introduction

To entice prospective customers and persuade voters, advertisements and political propaganda frequently carry messages that "bend" the truth (Effron, 2018; Gelfert, 2018; Jack, 2017; and Lazer et al., 2018). In a similar vein, writers of research articles use rhetorical devices and language to support their arguments and convince readers of the validity of their claims (Kuhn, 1970; Hyland and Jiang, 2019; and Rice, 2019). The bar for truth is far higher for research articles, but that does not necessarily mean that the conclusions are cogent or sound. Critical reading is therefore necessary not only to see though manipulative arguments made by advertisers, but also when reading textbooks and research articles in educational settings (Manarin, Carey, Rathburn and Ryland, 2015; Wallace and Wray, 2021). Although some researchers (Cargas. Williams and Rosenberg, 2017; Davis, 2013) argue that teaching critical thinking across and through the disciplines is a viable approach, this case study focuses on developing critical readers through a discrete course that follows an Aristotelian first principles approach (Irwin, 1988) and draws on the rhetorical appeals of ethos, logos and pathos.

In order to analyze arguments, readers need to be able to identify claims (or conclusions). Once a claim is found, the evidence upon which it is based needs to be uncovered. For deductive arguments the soundness of the conclusion is assessed, while for inductive arguments its cogency is evaluated. The evidence may be in the form of a series of premises forming a deductive argument, each of which can be evaluated for truth value, and the structure of the argument verified for validity. Alternatively, the strength of the evidence in inductive arguments can be assessed to judge the likelihood of the claim. The underlying assumptions and values of the writer and the historical context in which the text is situated

also need consideration (Eisenschitz, 2000). Meaning is extracted from texts and decoded by readers and so as meaning is constructed, the idiosyncratic interpretation of the reader needs to be considered (Kendeou, McMaster and Christ, 2016; Scholes, 1985). Take for example, simple concepts such as mountain and house. The concepts of mountain and house in the mind of the reader are based on personal experience and assumptions. For example, for readers who live at high altitude in log cabins, mountains are snow-capped and houses are log while for people living in the New Territories, houses may be three-storey villas and mountains covered in trees and shrubs.

This paper describes the development of a web-based open-access course that aims to develop critical readers through systematic introduction of logical concepts and application of those concepts to short texts. The new format of this course was piloted with one cohort of students in April 2020. Based on increases in scores between pre- and post-tests, the mean level of attainment increased dramatically over the duration of the course. The most probable cause of the increase is that students became more critical readers during the course. Although causality is not proven, the likelihood that the increase stemmed from the course itself is very high.

The remaining sections of this paper are arranged as follows. The next section defines and introduces the importance of critical reading and raises the issues of truth, facts and fake news. description of ways in which readers can develop the necessary skills. Section three describes the development of a critical reading course, detailing the context, syllabus and approach. Section four discusses the course content and the pedagogic concepts adopted and introduces an interactive tool, the argument visualizer. The background, method and results of the case study are given in section five. This paper concludes with six lessons learned in the final section.

2. Critical Reading

Critical reading has been defined in multiple ways. Critical discourse analysts are more likely to define critical reading with reference to the individual and institutional power relations realized in texts (Fairclough, 1989; Fairclough, 1995). Walz (2001) defines critical reading as an investigative critique of the validity of arguments contained within a text. Manarin, Carey, Rathburn and Ryland (2015, p.4) advocate the importance of identifying textual patterns, discriminating between ideas, evaluating their credibility and argument structure as well as making inferences in academic situations for critical reading in academic contexts. Tengberg and Scheller (2016, p.635) define critical reading functionally as being able to identify, analyze and evaluate arguments. Larking (2017, p.50) named identifying rhetorical devices and questioning the assumptions of the author as the two critical reading strategies needed for advanced learners of English. Carillo (2019) eloquently sums up the central problem: learners have been trained to extract meaning embedded in texts but the role the learner plays in co-constructing and evaluating that meaning is often ignored.

Undergraduate students in Hong Kong, Thailand, the United Kingdom and Japan have all failed to notice basic flaws in texts presented to them in classes. Judging on personal experience there appears to be a passive acceptance that texts are correct. Yet, this is not the case. To provide a concrete example, the short text shown in Figure 1 is one of the many texts I have used to encourage learners to think critically. It should be noted that users of English as an additional language may have to focus more carefully on the grammatical structures and words to deduce the meaning than native speaking readers who tend to read for meaning rather than analyzing the grammatical and lexical components of a message.

Polar bears are most at home on the polar sea ice. The main food source was seals. However, due to global warming, polar bears now rely on penguins as their primary source of food.

Figure 1. Reading Text

When asked whether polar bears eat more or fewer penguins, almost all students answer “more” and provide “global warming” as the justification. Given that polar bears live in the Northern hemisphere

and penguins in the Southern hemisphere, it should be obvious that regardless of any global warming, polar bears cannot feed on penguins. Yet, very rarely do any students point out that real-world truth. This is in line with Bao (2019) who asserts that "[Chinese] students are more often than not, trained to accept the standpoints presented in a text without any analysis, discrimination, judgement or criticism" (p. 129). The default reading approach appears to be non-critical with little to no evaluation of the credibility of the content. One explanation could be that students are playing the game of suspended reality when teachers ask questions to which they know the answer. Another could be simply a lack of world knowledge; students may have never studied basic biogeography and almost certainly have no first-hand experience of such remote locations.

School children are not expected to read critically and are taught reverence for and primacy of knowledge in the texts. School history curriculums and sanctioned textbooks tend not to include falsities on purpose, but frequently fail to deal with atrocities and controversies in any depth. Institutional power is clearly reflected in the selection of which content to include and whose story to represent (Fairclough, 1989). This institutional sanitization of texts helps to build national identities, but in doing so raises citizens who are ignorant to events that affect international relations. The conspicuous absence of detail of the Nanjing Massacre in 1937 and the issue of comfort women in the Japanese government approved texts are cases in point (Oi, 2013).

Newspapers also need to be read critically since their content may also be misleading. The custom of playing practical jokes on April fool's day is embraced by anglophone newspaper press running fake news stories. Some of the earliest reported news stories include a story in the New York Graphic, 1878 about a machine invented by Thomas Edison that makes food from soil and wine from water. In 1931 the Los Angeles Times reported a germ that brings good health to those infected (Stairiker, 2019) and more recently the Daily Express ran a news story about supermarkets installing trampolines so customers can reach products on top shelves (Reynold, 2015).

Newspapers and political propaganda frequently mislead the public on purpose. Leaders of countries, religions and political parties have used fake news for hundreds of years (Soll, 2016). One of the most egregious newspaper stories was the Great moon hoax in which a New York tabloid reported that aliens had invaded the moon to boost sales (Soll, 2016). The use of ambiguous and misleading headlines is a frequent tactic of the tabloid press. This purposeful misdirection is purely aimed at increasing readership. Forward-referencing click-bait headlines, such as "Shocking story" aim at enticing readers by appealing to emotion. The Black Lives Movement narrative has led to newspapers, particularly in the United States, including details on the colour of victims of police shootings in news headlines; yet the colour of perpetrators of crimes is omitted in headlines. Similarly, the headlines of police shootings tend to focus on portraying the victim as a father or a son; but neglect to mention the presence of a weapon, resisting arrest or failing to follow police commands. Uncritical readers may jump to conclusions based on the headline and hook.

The rise of opiniated news delivered digitally rather than objective news (Marchi, 2012; Guess, Nyhan and Reifler, 2020) has been driven by social media news feeds that harness sophisticated algorithms (DeVito, 2017; Hosanagar, Fleder, Lee, and Buja, 2013) resulting in filter bubbles in which readers receive news based on their online behavior (DiFranzo and Gloria-Garcia, 2017; El-Bermawy, 2016). With decentralization and digitalization of news delivery, there has been a concomitant rise in fake news (Lazer et al. 2018).

Donald Trump used the term fake news to refer to stories that portrayed him or his administration in a negative light. Fake news is a vague term that can be broadly defined as describing information that is not true which is presented as news. Fake news, therefore, covers completely fabricated, partially false or distorted news stories and distorted or deceptive news sources. Deceptive news stories could incorporate ad hominem attacks on individuals, groups or organizations, such as describing peaceful protestors as rioters when there was no violence. In this post-truth era of fake news asserting that real news is fake, citizens need to read critically to filter out the actual fake news. To be able to see though bare-faced lies, notice weasel words and not fall victim to fallacious arguments, it is necessary to become a critical reader.

Facts and truth take a central role in any argument. Yet, as Nietzche (1910) notes that "there are no eternal facts, as there are likewise no absolute truths" (p.15). There are eight planets in our solar system, but prior to the downgrading of Pluto to a dwarf planet in 2006 there were nine. Some facts change. To understand the relationship between facts and truth, it is necessary to understand more about truth.

The two most common theories of truth are correspondence and coherence. Simply put, the correspondence theory of truth is when the truth reflects reality (David, 2015). For example, for people living near the equator daytime is light and nighttime is dark. This statement, however, is not true for those living in the polar regions. The coherence theory of truth is when a proposition does not contradict other known true propositions (Young, 2018). For example, Albert Einstein is dead. He no longer invents. The italicized proposition is true and does not contradict the first statement about his death. The above is a gross oversimplification of these two theories. However, for the purpose of critical reading it shows learners that truth value can be evaluated using both coherence and correspondence theories of truth. Coherence theory relies on world knowledge and given that each person's experience of the world differs, world knowledge varies. Education can greatly affect the depth and breadth of knowledge and this in turn affects subject-specific knowledge that, at times, may be necessary to evaluate the truth value of propositions (Nieuwland and Martin, 2011). In short, each individual may judge truth differently, particularly when other belief (e.g. religion), ideological (e.g. Black lives matter) and value (e.g. collectivism) systems come into play. Given the vested interests of the stakeholders involved in text production (e.g. financial backers, editors and authors), readers need to be able to discern logical arguments from illogical ones. This is the underlying motivation for the development of a course to develop critical readers.

3. Course Development

Courses do not exist in a vacuum and so the context at national and institution levels need to be considered (Turner, 2012). This course was developed in a small bilingual public university in northern Japan for undergraduates majoring in computer science and engineering. Despite the official bilingual nature of the institution and the requirement to take subject-matter courses in English, the English proficiency of students varies greatly from those who are proficient to some who struggle to comprehend simple sentences. This two-credit elective course aims to develop critical reading. The course is offered within the language curriculum and is primarily taught in English although, at times, some examples are provided in Japanese as well. The course comprises two 100-minute sessions held twice a week for seven weeks.

The primary focus of the course is to develop critical readers. The specific course aims are to enable students to identify arguments, the type of reasoning, the presence of formal or informal fallacies; and to evaluate whether the arguments are sound or cogent. The course is divided into three blocks: identifying arguments, identifying fallacies and evaluating arguments. A syllabus was created based on the course objectives. The syllabus is cyclical (Murphy, 2018) and so concepts are introduced and revisited multiple times. This enables a concept to be introduced in simple terms and then over the course additional levels of complexity added. An eclectic approach was adopted incorporating various concepts, such as flipped learning (Bergmann and Sams, 2012) and active learning (Bonwell and Eison, 1991).

In line with Bloom's taxonomies early units of the course focus more on acquiring knowledge and technical terminology while the later units focus on the application of the acquired knowledge and terminology to analyze arguments. Learners therefore progress to the cognitively more demanding levels of Bloom's taxonomy and move along the knowledge dimension. In the knowledge acquisition phase, concepts are presented in multiple modes (e.g. verbal, graphical, algebraic and numerical) to help address the needs of learners based on their learning preferences and styles. Critical reading is developed in the same way as reading: through practice. The first step is to develop learner awareness of the concept of critical reading. The next step is to raise their awareness of the techniques and strategies to use to identify and evaluate arguments. Students armed with a thorough knowledge of argumentation, reasoning and fallacies both formal and informal should be in a strong position to read critically.

A list of 108 concepts (Blake, 2020) to be mastered was created and sequenced into concept chains or lexical sets. As an illustrative example of concept chain, the following terms are introduced together: true, false, truth value, and declarative statement. Since only declarative statements carry truth value, and there are only two values namely true or false, these four concepts lend themselves to be taught together.

Learners are encouraged to engage with the course materials. In many cases this involves students reading or listening to source material, and then thinking about the content. This may involve activities, such as identifying, categorizing and analyzing. As an illustrative example, a simple reading task can be "activated" using an idea from Salmon (1984). Students read an excerpt from an argument such as Adventure of Blue Carbuncle (Doyle, 1992) and then discuss the claims, evidence, reasoning, validity and truth, etc. within each sentence before reading the subsequent sentence.

Reading and listening activities are eminently suited to individual study, and so the course was originally designed to follow a flipped learning approach so that face-to-face class time could be used to discuss the content of the reading and listening activities, to consolidate the knowledge of argumentation and fallacies and to practice applying the knowledge. During class, students would normally work in pairs or small groups to solve problems posed and answer questions set.

4. Course Content and Materials

This critical reading course adopts a systematic approach, with a strong focus on propositional logic. Students are expected to master the 108 concepts. Table 1 shows an extract from the mastery list. Although the mastery list contains 108 concepts, some of these concepts may be further subdivided. For example, inductive reasoning could be further subdivided to itemize seven types of inductive reasoning, such as simple induction, prediction and argument from analogy. However, based on the level and duration of the course, the number of concepts covered and assessed is limited to this number.

Table 1. Extract from Mastery List

Category	**Items**
Types of reasoning	deductive, inductive, abductive, causal
Valid propositional forms	modus ponens, modus tollens, hypothetical syllogism, disjunctive syllogism, constructive dilemma
Syllogistic fallacies	fallacy of four terms, illicit major, illicit minor, affirming a disjunct
Types of causes	root, common, rival, proximal, distal, necessary, sufficient

There are a number of critical thinking frameworks, such as the Paul-Elder Critical Thinking Framework (Paul and Elder, 2007) and the ten questions framework (Browne & Keeley, 2011) which are shared with students. However, a tailor-made twelve-step indicative guide shown below was provided to help readers critically analyze and evaluate texts. This guide enables learners to apply the knowledge gained through the course in a systematic manner.

Indicative guide to evaluate arguments

1. identify the conclusion
2. identify the premises
3. identify any assumptions
4. identify the reasoning
5. evaluate the truth of each statement
6. identify any vague or ambiguous terms
7. evaluate the strength of evidence
8. identify the presence of any formal or informal fallacies
9. name the fallacies (if any)
10. evaluate the validity of deductive arguments

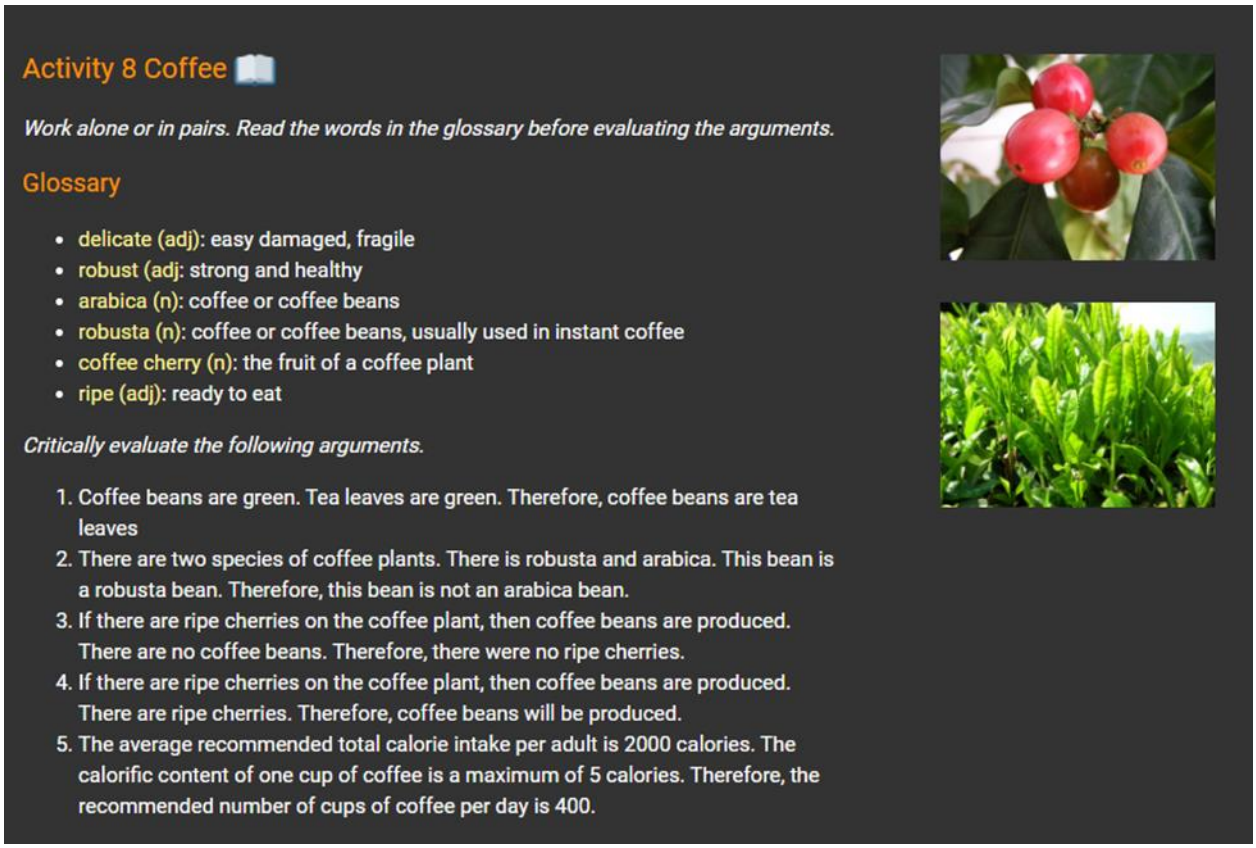
11. for valid deductive arguments name the valid propositional form
12. evaluate the soundness or cogency of the conclusion

A number of pedagogical concepts were built into the course materials. An open-access course website was created to house the course materials (Blake, 2020). Previous iterations of the course were paper-based. The move away from paper-based texts enabled online resources to be hyperlinked, and video and audio clips embedded directly into the course website, meeting students' expectations for online materials to be multimodal (Hafner, Chik and Jones, 2015).

Based on access logs for the learning management system (LMS), students were found to access course materials in the evenings. To reduce eye strain, a dark theme (dark grey background with light text) was chosen for the website. Additionally, the website was designed using a mobile-first approach to ensure that users can access the content on their mobile devices. Emoticons are used to indicate the type of activities so that students can scroll down and quickly understand what they are expected to do without having to read the instructions. When students need to access resources, links are provided for convenience.

Each unit has a dedicated webpage with activities sequenced in the recommended order of completion. Each webpage begins with a section describing the learning outcomes and ends with a review section, in which learners have to check their mastery of concepts or answer questions. This review section includes a running tally of the 108 logical concepts that students have covered at that point in the course. The tally helps to show students not only how much material has been covered in the course, but how much of the course content they are expected to have mastered.

Where possible, students are engaged in a variety of receptive (reading, listening and watching) and productive activities (analyzing, speaking and writing). Figure 2 shows an example of a reading activity in which students need to evaluate five arguments.



Activity 8 Coffee

Work alone or in pairs. Read the words in the glossary before evaluating the arguments.

Glossary

- delicate (adj): easy damaged, fragile
- robust (adj: strong and healthy
- arabica (n): coffee or coffee beans
- robusta (n): coffee or coffee beans, usually used in instant coffee
- coffee cherry (n): the fruit of a coffee plant
- ripe (adj): ready to eat

Critically evaluate the following arguments.

1. Coffee beans are green. Tea leaves are green. Therefore, coffee beans are tea leaves
2. There are two species of coffee plants. There is robusta and arabica. This bean is a robusta bean. Therefore, this bean is not an arabica bean.
3. If there are ripe cherries on the coffee plant, then coffee beans are produced. There are no coffee beans. Therefore, there were no ripe cherries.
4. If there are ripe cherries on the coffee plant, then coffee beans are produced. There are ripe cherries. Therefore, coffee beans will be produced.
5. The average recommended total calorie intake per adult is 2000 calories. The calorific content of one cup of coffee is a maximum of 5 calories. Therefore, the recommended number of cups of coffee per day is 400.

Figure 2. Reading Activity

Each unit requires students to produce a digital artefact. The artefacts may be written texts, sound files, live action videos, screencast videos or annotated texts. Video artefacts have been shown to be effective teaching and assessment vehicles (Chewar and Matthews, 2016; Hansch et al., 2015). Figure 3 shows an example of a recording activity in which students need to submit an audio file describing and exemplifying one of the five valid propositional forms. The warning icon shows students that this activity is mandatory.

The footer of each webpage gives a quote related to logic and critical thinking. One example is the title of a book by Ben Shapiro (2019), an American conservative political commentator: "Facts don't care about your feelings". The quotes aim to inspire learners to read more widely and think more deeply about concepts that are only dealt with briefly during the course.

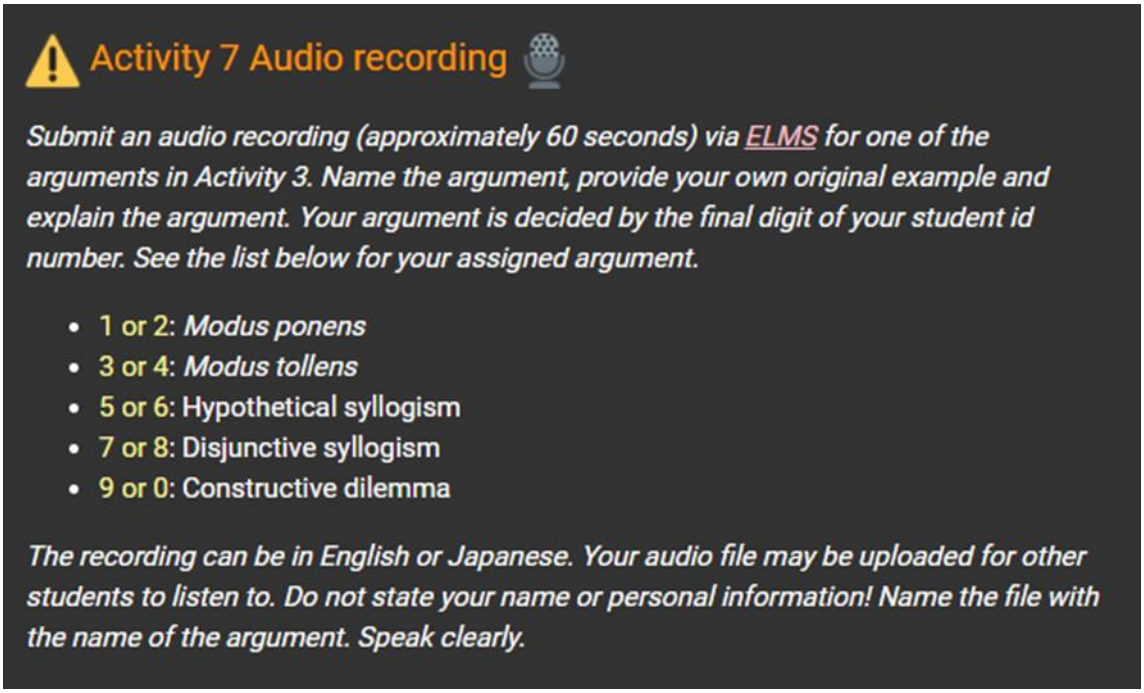


Figure 3. Audio Recording Assignment

This course makes use of the Argument visualizer (Blake, 2019), which is an online tool developed to visualized annotated arguments. The analyzer can show arguments, reasoning, formal fallacies, informal fallacies and causality in pre-annotated texts. Users can annotate their own texts or access a bank of annotated arguments via the LMS. Figure 4 shows a screenshot of the submission screen for the Argument visualizer while Figure 5 shows the output for annotated text. When the cursor is placed over an emoticon, further details are displayed in a pop-up window.

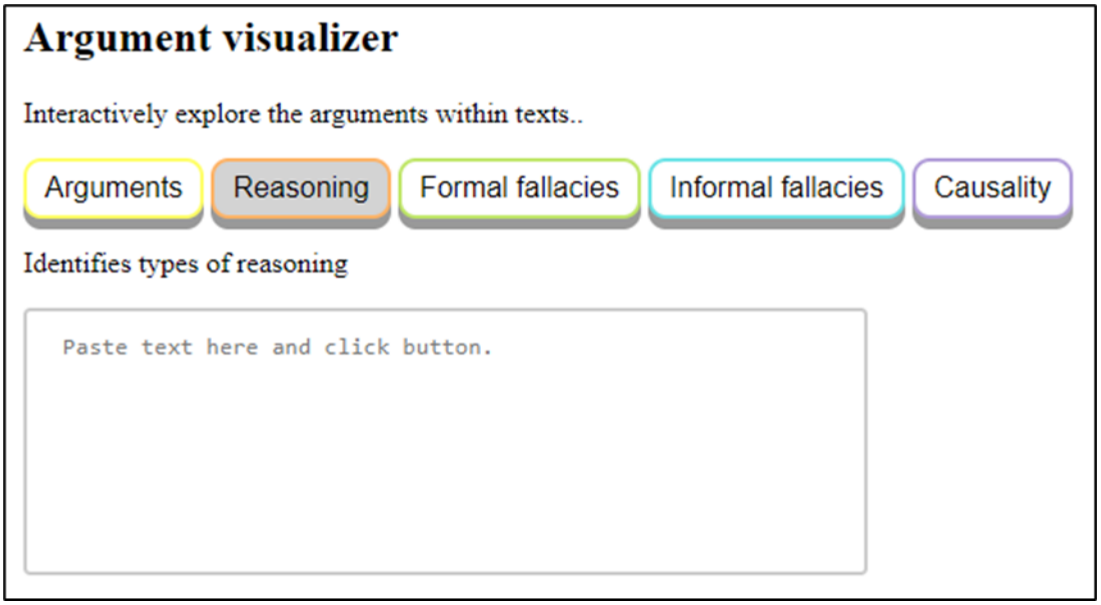


Figure 4. Screenshot of Argument Visualizer

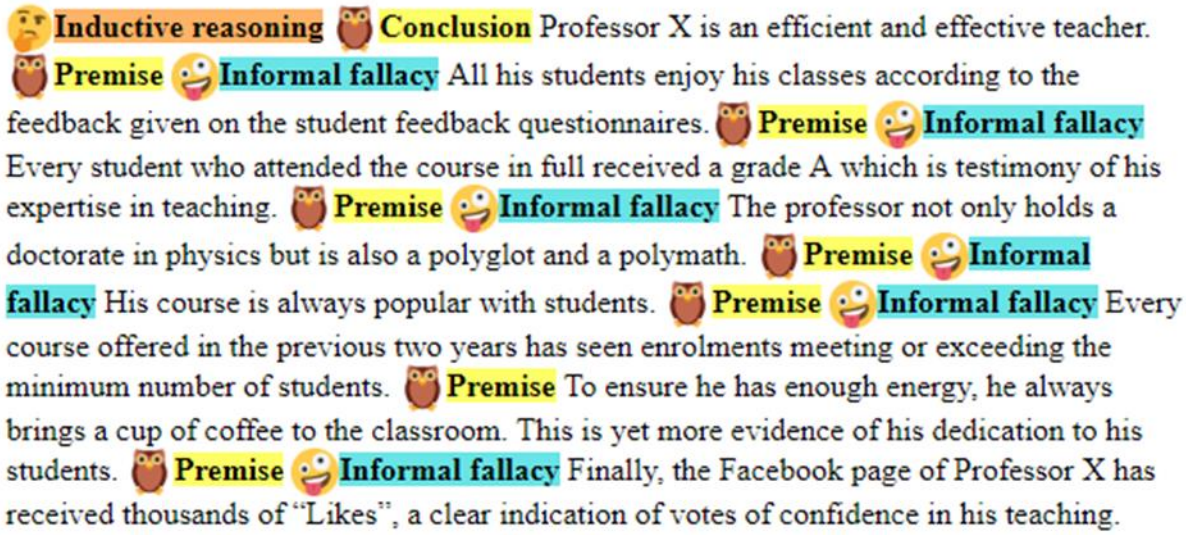


Figure 5. Output Generated by Argument Visualizer

5. Case Study

Forty-eight undergraduate students were registered for the critical reading course in the first quarter of the Japanese academic year. All enrolled students were Japanese nationals. Almost all were in their third year of studies and had full academic schedules. The corollary of this is that students tend to dedicate more of their self-study time to compulsory core computer science courses rather than language courses.

The course delivery was abruptly switched to fully online in response to the coronavirus crisis just before the first class. Video conferencing was not used, but students were encouraged to communicate directly with the teacher via discussion forums or chat on the LMS. Many students live together in dormitories on campus and so those students chose to work face-to-face. Students working in pairs or groups selected their preferred social network service (SNS) for communication. The official LMS provided discussion forums and a chat feature, but these were used far less than Line, the most popular messaging app in Japan.

A test-teach-retest approach was adopted. Should there be an increase in the mean scores when comparing the results of the pre- and post-tests, it can be deduced that there has been an improvement in the ability to critically analyze a text. If only a few students increase their scores, it could be argued that the increase may not be due to the course. Axiomatically, "correlation does not imply causality" (Kornbrot, 2005); but a lack of correlation may rule out causality. However, if many students increase their scores, the likelihood that the course is the primary reason increases. Additionally, since the course is so intensive that there is just a seven-week window between the pre- and post-tests, this also decreases the probability of the role other any confounding factors.

For both the pre-test and post-test, students critically evaluated an argument. In both cases the arguments were flawed for numerous reasons. Both texts were comparable in terms of the number of concepts to identify. Figure 6 shows the exact text given in the pre-test. The evaluations were submitted online via the official LMS.

> Professor X is an efficient and effective teacher. All his students enjoy his classes according to the feedback given on the student feedback questionnaires. Every student who attended the course in full received a grade A which is testimony of his expertise in teaching. The professor not only holds a doctorate in physics but is also a polyglot and a polymath. His course is always popular with students. Every course offered in the previous two years has seen enrolments meeting or exceeding the minimum number of students. To ensure he has enough energy, he always brings a cup of coffee to the classroom. This is yet more evidence of his dedication to his students. Finally, on the Facebook page of Professor X has received thousands of "likes", a clear indication of votes of confidence in his teaching.

Figure 6. Text Used for Pre-test

Forty-three out of four-eight students took both the pre-test and post-test. On the pre-test only three students (approx. 7%) were able to identify any fallacious reasoning in the pre-test and no students were able to name any specific fallacies. Forty students (approx. 93%) were convinced that Professor X is an efficient and effective teacher. None of the fallacies were mentioned. In fact, almost all submissions mentioned evidence in the text to support the conclusions. Students fell victim to appeal of popularity, red herring arguments, appeal of authority and misleading statistics. Thirty-five students (approx. 81%) argued that as the teacher is popular and classes are enjoyable, the teacher must be efficient and effective while five students did not substantiate their evaluation.

On the post-test one out of forty-three students (approx. 2.3%) incorrectly concluded that the conclusion was true and valid. The same student was unable to describe the argument using logical terminology or identify the presence of any fallacies. Forty-two students (approx. 97.7%), however, correctly concluded the text was fallacious and the conclusion was false. The accuracy and detail in the evaluation varied considerably with twelve students (approx. 28%) being able to label most of the fallacies present accuracy and describe the arguments using logical terminology. Thirty students (approx. 70%) identified the flaws in the argument but were unable to label them accurately. This may be an indicator of the difficulty to absorb the knowledge needed and learn how to apply that knowledge within such a tight timeframe. Most students in their third year, study between 10 and 15 credits in the first academic quarter and so only a small percentage of their total study time is dedicated to this elective course.

In the pre-test only 1/43 students were able to identify fallacious reasoning while in the post-test 40/43 students could do so. In the pre-test no students could use logical terminology to name the type of argument, reasoning or the fallacies while in the post-test 36/43 were able to use some logical terms to describe and evaluate the argument. There was a sea change in the ability of students to read critically. The initial naïve uncritical reading approach transformed over seven weeks into a more rigorous critical approach.

To sum up, forty-three students took pre- and post-tests in which they critically analyzed and annotated persuasive fallacious arguments. There was a substantial improvement between the pre- and post-test

scores, showing that explicit tuition of logic and critical thinking enhanced their ability to analyze and describe arguments.

6. Lessons Learned

Six lessons were learned from the development and delivery of this web-based critical reading course. Each of the lessons are detailed below.

Lesson 1: Cost-benefit calculation
The upfront time cost in terms of planning, preparation and creation of materials is high, and so it is essential to consider whether it is worthwhile to invest such time in course creation. If the course is only going to be delivered once for a small cohort of learners, cost-benefit is unlikely to be achieved.

Lesson 2: Course website simplifies transition to fully online delivery
Like many educational institutions, we were required to convert all courses to be delivered fully online with very little notification. It was an easy switch to transform a flipped learning course into fully online. The input activities were already online, and so most development time was dedicated to creating output activities and ways to encourage interaction with materials and between students. Extensive use was made of wikis, discussion rooms and chat forums.

Lesson 3: Benefits of quantifying course content
In terms of course approach, breaking the course content down into concepts to master was extremely time-consuming. However, despite this, the benefit far outweighed the effort. Because each concept has been identified and named, specific teaching materials and activities can be created to help students with each individual concept. Prior to the creation of the mastery list, both students and teacher were unaware of exactly how many concepts students were expected to learn.

Lesson 4: Importance of aligning aims, activities and assignment
During the early stage of development of the course, it became clear that the aims, activities and assignments were not always aligned. Over the course incremental changes were made to reduce the gaps. One way of ensuring the aims and activities relate to the assignment is by providing detailed assessment criteria. If the criteria do not relate to the aims, then the assignment may need revising.

Lesson 5: Multifarious pedagogic uses of digital artefacts
When students create a digital artefact (e.g. a text or video file) and give permission for its use, that artefact can serve many purposes. For example, a text containing a simple argument can be used as: (1) a model of an argument, (2) a practice activity for students to identify the elements with the argument, or (3) a practice activity for students to evaluate the cogency of soundness of the argument. If the digital artefacts contain logical or critical thinking errors, students can complete tasks, such as identifying, describing, explaining or correcting the errors.

Lesson 6: Adopting a standard file naming convention for digital submissions
With approximately 500 digital submissions, renaming files became a laborious task. Prescribing an easy-to-follow naming convention for all submissions is advised. Digital files were submitted via the LMS and so regardless of file name each submission is associated with its submitter. I choose to use a system which named the unit, content and language, e.g. 1_rainbow_jp This made repurposing and comparing artefacts more manageable.

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