

RGASC Writing Initiative: Report on Funding Received for 2015-16 in JGE378H5S

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Overview of the Project

This evaluation reports on the results of writing-related, skill-building activities undertaken in **JGE378H5S Natural Hazards: Risk and Vulnerability**. For more about the course and the writing-based assignments in the course, please refer to **Appendix I**.

The activities were made possible by financial support from the RGASC Writing Initiative. Funded activities were aimed primarily at improving students' skills in scholarly writing, through enhanced tutorial activities and assignment feedback. The secondary objective of the project was to improve the skills of Teaching Assistants in marking written work. With the RGASC support, I have been able to improve the writing assignments, expand the writing help materials posted on Blackboard, devise and implement new tutorial-based activities, improve and expand feedback on students' written work, and develop TA skills.

I have requested follow-up support for writing-related activities in this course for academic year 2016-17, which would allow me to continue to offer and refine these activities.

Activities Funded by the Writing Initiative Support

I requested support from the RGASC Writing Initiative for the following purposes:

- to enhance and expand the writing instruction and supports available to students in the course, particularly through activities carried out in a small-group (tutorial) environment;
- to have the ability (and TA time) to provide additional, detailed feedback to students on their written work; and
- to provide training for TAs in the teaching and assessment of written work.

In my opinion, all of these objectives were accomplished. Specifically:

- Four TAs were able to take advantage of the training offered by RGASC on instruction and assessment of written work. Feedback from the TAs is provided in the **Evaluation** section, below.
- I spent considerable time with the TAs, discussing writing instruction approaches, assessment approaches, and benchmarking.
- I was able to give the TAs more time than I have in the past for marking of individual written submissions, allowing them to give more detailed feedback to students about their work.
- I developed several new activities for small-group writing instruction, which were delivered by the TAs through the tutorial sessions. These included:
 - Discussion in tutorial about how to choose a Case Study topic, and how to develop an analytical approach to the topic; we refer to this as the "So what?" question. Students worked together to develop their ideas. Descriptive versus analytical writing is a major theme that carries through the entire course.
 - Discussion in tutorial about how to write a scholarly proposal, and how to write an annotated bibliography.
 - Sample paragraph editing exercise, focusing on how to edit your own work. Students worked together in small groups. Part of the activity plan is attached (see **Appendix II**).
 - "Reverse Outlining" exercise, focusing on how to improve the flow and organization of your work and how to write an abstract in a scholarly format (attached – see **Appendix III**).

To summarize, with support from writing initiative funds, I was able to offer four specifically writing- focused tutorials, with new activities; enhance feedback to students on their written work; and improve TA training.

Evaluation: Impacts of the Writing-Related Activities

To evaluate the success of the course-based writing activities, I carried out a Pre-Course Writing Survey and a Post-Course Writing Survey. I also solicited feedback from the four TAs who were involved with instruction and assessment of written work in the course, and who took the training offered by RGASC.

Student Feedback: Pre- and Post-Course Writing Surveys

The surveys were voluntary and completely anonymous; students responded via Blackboard, and earned 0.25 extra credit marks towards their course Participation mark for completing the survey. At the time that they were completing the post-course survey, students did not have access to their answers from the pre-course survey.

The questions used in the Pre-Course Writing Survey are provided in **Appendix IV**; the questions from the Post-Course Writing Survey are provided in **Appendix V**.

Results of the Pre-Course Writing Survey

There were 116 responses out of a total 147 registered in the course, or **79% response rate**.

Question #1 focused on prior scholarly writing experiences at the University of Toronto. Students identified having completed the following types of writing in previous courses (in decreasing order):

| | |
|--|-------|
| referencing sources using APA-style citations | 89.7% |
| writing a term paper in a scholarly format | 83.6% |
| writing an annotated bibliography | 73.3% |
| composing a thesis statement or research question for a scholarly paper | 70.7% |
| writing a formal project proposal | 60.5% |
| writing an abstract in a scholarly format | 54.3% |
| completing a reverse outline as part of an organizational analysis of written work | 19.8% |

Question #2 focused on prior instruction in scholarly writing. Students identified having received instruction in the following writing-related skills in previous courses at UofT (in decreasing order):

| | |
|---|-------|
| how to avoid plagiarism | 91.4% |
| how to use APA-style citations | 74.1% |
| how to write a term paper in a scholarly style | 63.8% |
| how to write an annotated bibliography | 57.8% |
| how to compose a thesis statement or research question for a scholarly term paper | 55.2% |
| how to write concisely, with a scholarly tone | 50.9% |
| how to write an abstract | 44.8% |
| how to write a formal proposal | 43.1% |
| how to incorporate both descriptive and critical analytical components in your writing | 35.3% |
| how to use a reverse outline and other approaches to improve the organization of your writing | 20.7% |

Question #3 focused on self-assessment of skills in scholarly writing. Students assessed their own strengths in scholarly writing as follows:

| | |
|--|-------|
| Extremely Strong | 4.3% |
| Strong | 23.3% |
| Medium | 52.6% |
| Weak | 12.9% |
| Extremely Weak | 4.3% |
| I don't know because I have never really done any scholarly writing. | 2.6% |
| <i>Unanswered</i> | 0% |

Results of the Post-Course Writing Survey

There were 115 responses out of a 147 registered in the course, or **78% response rate**. (Almost the same number completed the Pre-Course Writing Survey; there is a close but not exact correspondence between the two sets of respondents.)

When responding to the Post-Course Writing Survey, students did not have access to their own responses to the Pre-Course Writing Survey.

Question #1 focused on a self-assessment of writing-related skills gained through course-based activities. Students reported experiencing improvements in their own skills in the following areas, as a result of writing-related activities in the course (in decreasing order):

| | |
|---|-------|
| how to write an annotated bibliography | 77.4% |
| how to write a formal proposal | 61.8% |
| how to write an abstract | 57.4% |
| how to incorporate descriptive and critical analytical components in your writing | 56.5% |
| how to use APA-style citations | 51.3% |
| how to write a term paper in a scholarly style | 50.4% |
| how to write concisely, with a scholarly tone | 49.6% |
| how to use a reverse outline and other organizational approaches | 48.7% |
| how to improve the organizational flow of your writing | 47.0% |
| how to edit your own writing | 39.1% |
| how to compose a thesis statement or research question for a scholarly term paper | 36.5% |
| how to avoid plagiarism | 34.8% |

Question #2 focused on student participation in writing-based activities offered within the course. Students reported having participated in the following activities, mostly tutorial- and assignment-based (in decreasing order):

| | |
|--|-------|
| tutorial on choosing a topic for the Individual Case Study | 91.3% |
|--|-------|

| | |
|--|-------|
| Case Study Proposal assignment | 91.3% |
| Annotated Bibliography assignment | 89.6% |
| Google Earth Map Project question on spatial analysis of disasters | 89.6% |
| Country Risk Profile assignment | 88.7% |
| tutorial on How to Write a Proposal and Annotated Bibliography | 87.0% |
| scholarly format Term Paper assignment | 82.6% |
| tutorial on editing your own writing - Sample Paragraph analysis | 79.1% |
| tutorial on Reverse Outlining and other organizational tools for writing | 76.5% |

Question #3 focused on determining which of the course writing-related activities students found to be most useful in improving their skills in scholarly writing. Students found the following activities, mostly tutorial- or assignment-based, to be most useful (in decreasing order):

| | |
|--|-------|
| Case Study Proposal and feedback | 73.0% |
| tutorial on How to Write a Proposal and Annotated Bibliography | 63.5% |
| Case Study Annotated Bibliography and feedback | 62.6% |
| Case Study Country Risk Profile and feedback | 59.1% |
| Google Earth Map Project question on spatial analysis of disasters | 59.1% |
| tutorial on Reverse Outlining and other organizational tools for writing | 47.0% |
| tutorial on choosing a topic for the Individual Case Study | 43.5% |
| tutorial on editing your own writing – Sample Paragraph analysis | 41.7% |
| Case Study Term Paper | 35.7% |

Question #4 essentially repeated Question #1 from the Pre-Course Writing Survey, asking students for a self-assessment of skills in scholarly writing:

| | |
|-------------------|-------|
| Extremely Strong | 2.6% |
| Strong | 50.4% |
| Medium | 40% |
| Weak | 3.5% |
| Extremely Weak | 1.7% |
| <i>Unanswered</i> | 1.7% |

Discussion of Survey Results

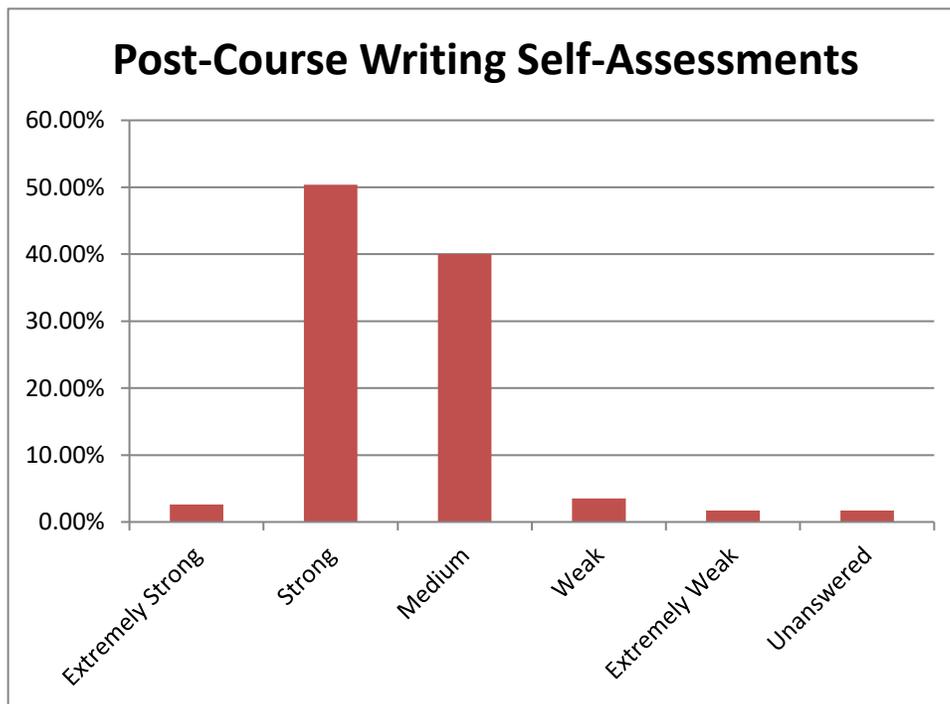
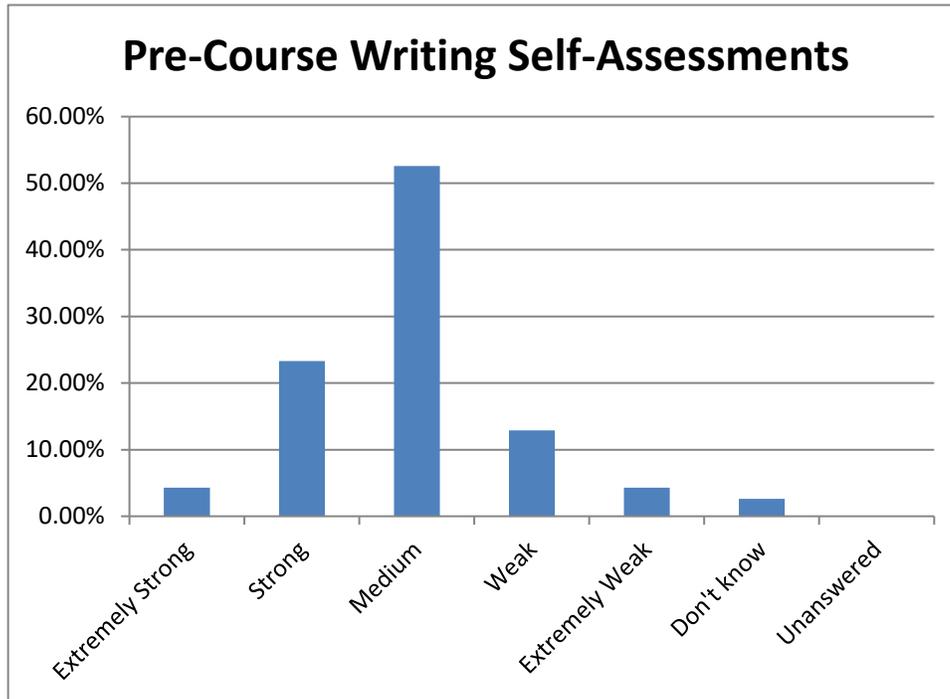
To summarize the results of the **Pre-Course Writing Survey**:

- The largest group of students (52.6%) ranked their own skills in scholarly writing as “medium,” and more than 74% of students ranked their skills in scholarly writing as medium or lower. Only 4.3% of students ranked their skills as “extremely strong,” and 2.6% reported that they have never done any scholarly writing.
- Most students reported having had prior instruction in how to avoid plagiarism (91.4%), and how to use APA-style citations (74.1%).
- Most students reported that they had not had prior instruction on how to incorporate descriptive and analytical components in their writing (only 35.5% had previous instruction), and how to use reverse outlining and other techniques to improve organization in writing (only 20.7% had previous instruction).
- Most students reported that in previous courses they had been asked to reference sources in APA style (89.7%), and they had been asked to write a term paper in a scholarly format (83.6%).
- Fewer students had been asked by previous instructors to write an abstract in a scholarly format (54.3%), and very few had been asked to reverse-outline a piece of writing (19.8%).

To summarize the results of the **Post-Course Writing Survey**:

- By the end of the course, the largest group of students (52.6%) ranked their own skills in scholarly writing as “strong.” This is a big change from the Pre-Course Writing Survey self-assessment results, in which approximately the same number ranked their skills as just “medium,” and only 23.3% ranked their skills as “strong.”
- Approximately 93% ranked their own skills as “medium” to “extremely strong” – a significant positive shift, compared to the Pre-Course Writing Survey self-assessment.
- Interestingly, only 2.6% ranked their skills as “extremely strong,” compared with 4.3% in the Pre-Course Writing Survey. It is difficult to know how to interpret this result; perhaps students became more astute at self-assessment, and realized that they still have skills to acquire in scholarly writing.
- Students who self-assess as “extremely weak” in scholarly writing skills declined (from 4.3% pre-course to 1.7% post-course).
- Student participation in writing-related activities in the course was very high, not surprisingly, as most of the activities either took place during required tutorial sessions, or as part of required course assessment items.
- Activities that students found to be most useful in improving their writing skills were the Case Study Proposal assignment and feedback (73.0%); the tutorial session on How to Write a Proposal and an Annotated Bibliography (63.5%); and the Case Study Annotated Bibliography assignment and feedback (62.6%).
- Students found the Case Study Term Paper to be the least useful activity, in terms of improving their writing skills (35.7%). This is a bit odd, since the Term Paper is the culminating piece of this scaffolded assignment; however, the low “usefulness” rating might be because students had not yet received the detailed feedback from their Term Paper submissions.

The most striking result in comparing the Pre- and Post-Course Writing Surveys is the shift in students' self-assessments from the Pre-Course to the Post-Course Survey, as shown in the following two graphs. Before the course, in the Pre-Course Writing Survey, most students ranked their own skills in scholarly writing as "medium," whereas after the course, in the Post-Course Writing Survey, more students ranked their own skills as "strong."



TA Feedback

I asked for feedback from the four TAs for the course. Specifically, I asked:

1. Was the training provided by RGASC useful in helping you to improve your skills in writing instruction and assessment?
2. Do you feel that you had the opportunity to teach students about writing-related skills in some new and interesting ways?
3. Do you feel that our discussions about marking of written work were helpful in improving your own comfort level with marking student writing assignments?
4. Did you find the benchmarking and the rubric helpful in your assessments of written work?
5. Do you feel that you had the opportunity to provide more feedback to students about their writing than you have had in the past?

From their feedback, the TAs did find the training to be very useful. They all found it to be a long day, and so much material was covered that they had information overload. They felt that they might be able to absorb more of the information if it could be offered in two 4-hour sessions, instead of an all-day intensive session.

One TA also suggested that it would be beneficial if course instructors attended the training with the TAs, to “enhance cohesion and depth of application of workshop material.”

The TAs did feel that they were able to offer needed writing instruction to students. They wished for more time to be devoted to writing, but recognized that the time is constrained by the necessity of spending some tutorial time on course content, rather than focusing strictly on the writing process.

The TAs reported that they now feel more comfortable marking written work. One aspect of assessment that we talked about a lot this year is distinguishing between content and critical thought processes, and the mechanics of writing. Our assignments rubrics make this distinction, while recognizing the fundamental connections between them. The TAs appreciated this distinction. They also reported that they appreciate, more than ever, how crucial writing is to “thought organization and the scientific method.”

The TAs felt frustrated by the lack of commitment on the part of some students. I agree with that – we spent a lot of time helping the students to build their Case Study projects throughout the semester, only to have a significant number of them dash off a term paper (the culminating exercise) at the last minute. We all found that to be quite frustrating.

The TAs who marked the term paper – the major written piece – appreciated our discussions about writing instruction and assessment. We also spend some time doing benchmarking, using our very detailed term paper rubric, and the TAs reported that this allowed them to “grade the students’ work in a very consistent way.”

APPENDIX I: About the Course

JGE378H5F is a **joint Geography-Earth Science** course. It is listed as a 300/400-level course option in a large number of programs in Geography, Earth Science, Environmental Geosciences, Environmental Science, and Environmental Management, as well as the MScSM and Environment Combined Specialist programs. The complete list of programs is provided in the appendix.

The course provides an introduction to the scientific and socio-economic aspects of natural hazards, risk and hazard assessment, and disaster management. It is aimed at students in any discipline who may want to undertake a career in field related to natural hazard management or risk management, or students with a general interest in natural hazards and human adaptation to environmental change. The course also is specifically required for undergraduates who intend to seek the Association of Professional Geoscientists of Ontario (APG) Geoscientist-in-Training (GIT) certification upon graduation.

The class size is typically **150-180 students**, with two lecture hours and six tutorial sections per week. The subject matter covers a wide range of physical science and social science (management) topics. For this reason, the course can be used as either a **Science or a Social Science** course for Distribution Requirements. Consequently, the students tend to have a mix of backgrounds – some come from a science background, and others from social science.

The **Student Learning Objectives for the course** are mostly achieved through the written components of the scaffolded Case Study assignment, which is central to the course assessment scheme. From the Course Syllabus, the Learning Objectives for the course as a whole are:

After successfully completing this course, [students] should be able to:

- articulate in writing your understanding of the scientific causes and consequences of a variety of natural hazards, and the socio-economic factors that contribute to the vulnerability of individuals and communities to natural hazards;
- cite examples of significant natural disasters in human history and locate quantitative information about events using global databases;
- utilize, without aids, basic terminology with which professionals in disciplines related to hazard and risk management do their work and communicate their research findings;
- articulate in writing a specific research focus, and plan the scope (breadth and depth) of a multi-faceted research project;
- identify, summarize, and critically analyze qualitative and quantitative data from scholarly sources;
- communicate research results in writing, in a scholarly term paper format;
- communicate research results using basic mapping software in a map-based format.

About the Written Assignments

The central assignment for this course is a **scaffolded Case Study assignment** that consists of a number of written components. The ultimate goal of the assignment is for students to produce a 10-page paper in a scholarly format. The students choose a major natural disaster to focus on (each one is different), and then complete a number of items to develop their analysis of the topic, all building toward the final Term Paper.

The **central theme** of the Case Study is for students to understand and practice the differences between **descriptive writing** about the event, and more in-depth **analytical writing** about a particular aspect of the event. This theme is carried and revisited throughout the various parts of the assignment.

The parts of the Case Study assignment and their objectives are summarized here:

- **Case Study Proposal** (Objectives: To articulate a specific research focus; to delineate the depth and breadth of the topic; to summarize the proposed organizational approach to the topic; and to identify and cite appropriate scholarly resources)

- **Annotated Bibliography** (Objectives: To identify, summarize, evaluate, and cite scholarly resources in support of your Case Study research)
- **Google Earth Map Assignment** (Objectives: To explore the terrain and geographic features of the Case Study location; to learn the basics of a simple mapping software; to design several map elements; and to develop a basic understanding of how maps, map layers, and spatially referenced data can be used to portray and communicate various types of information; and to summarize, in writing, how using maps has contributed a new perspective to your understanding of the Case Study event)
- **Country Risk Profile** (Objectives: To summarize basic demographic, physical geographical, and economic data for the country in which your Case Study event occurred, in combination with historical data on natural disasters in the region; to explore online sources of quantitative and historical data relevant to natural disaster management; and to synthesize various types of information in support of your Case Study analysis)
- **Term Paper (Objective:** To practice the written communication of research results in a scholarly format; to make use of appropriate scholarly resources; to present a basic factual summary of the selected natural disaster; and to critically analyze an aspect of the event from a management perspective.)

APPENDIX II: NEW Sample Paragraph Editing Exercise: Student Work Sheet

(This was posted on Blackboard after the tutorial session – it is essentially a compilation of errors and corrections for the sample paragraph that the students considered during the tutorial session.)

JGE378H5 Tutorial February 26, 2016

Sample Paragraph Editing Exercise

Instructions:

Take a look at the sample paragraph provided here. Identify three pieces of advice that you would offer to the author if you were in charge of editing and improving the paragraph. Afterward, we will share and discuss some of your ideas, and then we will work on improving the paragraph.

Sample paragraph:

The gigantic tsunami off the Eastern coast of the island of Macarena in 2010 created waves generating power loss and destroying many homes, wiping out 654 km of highways and buildings due to poor construction and causing “a total of \$65 billion in damage, as well as destroying many crops”. (Myers p. 31) It is clear that researchers didn’t predict such an enormous killer tsunami, so the government had not responded quickly enough to the disaster. The tsunami was caused by an earthquake 34 km off the eastern coast. It was the most disastrous tsunamis in Macarenian history to date, and killed 43,000 people. I believe that the fact that the response efforts were so slow is what caused so much of the resulting criticism of the government that appeared in the media. Professor Li Chu in his paper in the journal Natural Hazards reported that the earthquake was caused by subducting rocks on the plate located 20 km below the surface of the ocean.

[165 words]

Problems and possible improvements:

The development of a polished paper happens primarily in the editing process. Make sure you budget enough time to do a thorough edit (not just a quick proofread for spelling and grammar, but potentially a substantive reworking of order, emphasis, and evidence in the paper). It is typical to spend at least twice as long editing a paper as writing the initial draft.

1. **Logical flow:** The author switches back and forth between describing the causes, effects, and response to the tsunami. It would make more sense and contribute to the logical construction of the argument if the author were to describe each one in turn. Each sentence should be like a link in a chain, one leading clearly to the next. It makes the most sense to start with the earthquake itself, and then move on to the tsunami and the response to the tsunami. The paragraph also is a bit repetitive; for example, the location of the earthquake (“off the eastern coast”) is described more than once.
2. **Citations:** There is only one (proper) citation in the entire paragraph. Each sentence that includes specific information or a specific argument should cite the source of the information. If all of the facts come from a single source, the information should be grouped in such a way that the source is clear. In a paragraph with a lot of factual information, like this one, there might be quite a few citations; in an analytical paragraph, there would likely be fewer citations, because it will contain more of the author’s personal perspective.

3. **APA citation style:** The citation style in the paragraph is incorrect. In APA style, the author-date citation at the end of a sentence is placed before the period. Some journals do include a page number for direct quotes, but it is always necessary to include the year. The reference to “Professor Li Chu” also is incorrect; it is not a standard APA-style citation.
4. **Verb tense:** It is standard practice in academic writing to use the present tense when referring to material from published scholarly papers (i.e., “reports” rather than “reported”). However, the event itself should (generally) be reported in the past tense. For this reason, verb tenses can get very tricky when one is reporting on an event that happened a long time ago. For example, the phrase “the government had not responded quickly enough...” is using an incorrect verb tense. Be sure to proofread carefully; the most important thing is to maintain consistency in the verb tenses.
5. **Quotations:** The sample paragraph contains a direct quote; however, it is not necessary to use direct quotes (in quotation marks) when reporting factual information. Paraphrasing and citing sources is the standard practice in academic writing. Typically, we only use direct quotations in academic writing when there is something particularly notable about how the author has phrased the point. Direct quotations break up the flow of the text, and interject someone else’s voice into the writing.
6. **Scholarly tone:** The sample paragraph contains some language that is not appropriate for a scholarly writing style (e.g., “gigantic” or “killer” tsunami). It is important to maintain a scholarly and objective tone in academic writing.
7. **Use of first person:** Contrary to popular opinion, it is sometimes acceptable to utilize the first person voice (etc. “I conclude...”). However, it is best practice to avoid using first person voice if possible, and to use it only if it becomes too awkward to avoid. In this case, the author has used the phrase “I believe that...”; this is unnecessary verbiage and should just be cut altogether.
8. **“Empty” phrases and concise writing:** The sample paragraph is generally too wordy, and contains some “empty” phrases. It is possible to communicate the same content with fewer words and greater clarity. For example, “It is clear that...” is almost always unnecessarily wordy, and only serves to make the writing fussier and lacking in clarity. Another example of an “empty” phrase that should be eliminated from the paragraph is “I believe that...”
9. **Run-on sentences:** It can be very tempting to allow sentences run on, especially when there is a lot of factual information that you want to convey. It can be helpful to make sure that the main SUBJECT and VERB in the sentence are clear. If there are multiple subjects and verbs floating around, it’s a good indication that the sentence may be a run-on. Reading the piece aloud can also be helpful in identifying sentences that are too long or too complicated. On the other hand, it is best to avoid having many choppy, short sentences, because it is jarring to the reader.
10. **Punctuation errors:** There are many punctuation errors in the sample paragraph; the most common is missing commas.
11. **Scientific misconceptions:** The final sentence of the sample paragraph mentions “subducting rocks on a plate located 20 km below the surface”; this is a misconception, or at least a miscommunication of a scientific concept. The *focus* of the earthquake was at a depth of 20 km; the subducting plates extend from the surface to much greater depth. There is also a missing

piece in the logical argument: Why did the earthquake generate a tsunami? (The words “vertical motion” would answer that question.)

12. **Typographical errors:** There are several typos in the paragraph (e.g., “eastern” doesn’t need to be capitalized in this case; and others). Please proofread carefully – again, reading the piece aloud can often help in pinpointing small errors. Even if the content is good and the writing is reasonably clear, if there are lots of little errors and typos they will detract from the overall quality.

Possible re-write of the paragraph (30% fewer words, compared to the original):

In 2010, an earthquake located 34 km off the eastern coast of Macarena triggered a destructive tsunami that killed 43,000 people (Li, 2011). The earthquake occurred along a subduction zone plate boundary, with a focal depth of 20 km (Sanchez, 2012). Vertical motion along the fault generated the large tsunami, which destroyed crops, buildings, and highways, resulting in an estimated \$65 billion in damage (Myers, 2012). Li (2011) argues that the damage was particularly severe because researchers had not accurately predicted the impacts of a tsunami of this magnitude. The government was unprepared for such a large event; consequently the reaction was inadequate and slow. This generated a lot of criticism in the media.

[114 words]

APPENDIX III: NEW Tutorial Exercise on Abstracts and Reverse Outlining

JGE378H5 Natural Hazards

Writing Tutorial: Reverse Engineering an Outline

This excerpt is modified from a paper by Xu and colleagues (2015), published as a “short communication” in the journal *Natural Hazards* (vol. 79:2181–2187).

For the purpose of this “reverse engineering” writing exercise, I have stripped out all of the figures, graphs, and tables, as well as abstract, section headings, reference list, most of the citations, and the title, leaving nothing but the text itself. I have added a few paragraph breaks and made some very minor changes in wording to smooth out the gaps caused by removing those materials from the paper. If you would like to read the original paper, you can find it online through the UTM Library, and I will post a link to it on our course Blackboard site.

For this tutorial session:

1. Read through the piece on your own.
2. In a small group, consider the sections and their headings. What is the purpose of each section? What heading would you give to each of the sections? Consider both the content of each section, and its purpose in the paper.
3. Can you identify the main argument, position, or conclusion of the paper? Is it stated close to the beginning, close to the end, or both?
4. Now look at each paragraph. With your partner or small group, make a note of the following two things, and jot them under the appropriate section heading for each paragraph:
 - a. the content of the paragraph (i.e., describe what’s in it); and
 - b. the purpose or role of the paragraph (i.e., analyze the function of the paragraph in the section and in the overall construction of the argument).
5. When you are finished, you will essentially have an outline that you have “reverse engineered” from the paper (rather than setting up the outline first, and developing the text from it). Doing this allows us to take apart, analyze, and critique the structure of the paper.
6. On the basis of this outline, do you think the paper is well organized? Have the authors developed the argument fairly logically, with each paragraph performing its function and contributing to the conclusions, overall? Are there any major gaps?
7. The paper currently has no title. Titles are important – they convey the content and (often) the main conclusions, and they set the readers’ expectations for the paper. What title would you give this paper?
8. The paper also has no Abstract (of course, the original paper does, I stripped it off for this exercise; the original will be posted on Blackboard after the tutorial sessions). Based on the reading and analysis you have done, write an abstract of 100-150 words for this paper. Consult the document *How to Write an Abstract*, posted on Blackboard under *Weekly Course Materials > Week X > Tutorial* (also posted under *Assignments > Additional Writing Resources*). Compare your abstract with the original. We might not have time to do this in the tutorial – you can complete it on your own.

Section 1

Gravity erosion is the mass failure of steep slopes triggered by their own weight, in contrast to other soil erosion types that require the physical impetus of wind or water. Its forms include landslide, avalanche, earth flow, creep, and so on. Presently, serious gravity erosion occurs in nearly all areas of China, and the most severe areas are those provinces located in the west. Mass failures had resulted in approximately 1000 fatalities per year over the past 20 years in China. On May 19 and August 12, 2015, two hazardous mass failures struck Tuban and Shanyang of the Loess Plateau, respectively. The two disasters caused more than 70 fatalities and caught public attention. Thus, evaluating the behaviors and triggers of collapse disasters has significant implications for mitigating such failures.

Factors that induce gravity erosion fall into the following two main categories: (a) internal factors that have decisive effects on landslides, i.e., geology, geomorphology, soil property, vegetation cover, flow distribution and fractures; and (b) external factors that trigger sudden landslides, such as rainfall, earthquake and flood. Most mass failures are triggered by slope cutting and heavy rainfall. The scale of a rain-induced failure event depends on the intensity, areal extent, position and duration of the triggering rainstorm, whereas antecedent rainfall has relatively little influence. The erosional history and the consequent morphology are also much more important, except for the trimming induced by occasional very large runoff events.

In addition, human engineering activities have become more intensive and more influential with rapid economic development. Residents in an area might cut terraces to build their houses near a loess slope for example, which results in the instability of the side slopes and can induce landfall. Poorer communities are often located on steeper, less stable slopes, and residents in these areas can experience a higher proportion of fatalities when landslides occur. Poverty creates poor households that are unable to maintain needed protective works or to restore resources; at the same time, that natural hazards such as drought and soil loss further degrade these natural resources. As a result, an earthquake can lead to mass failures on steep slopes. Repetitive seismic activity renders slopes unstable and more vulnerable to failures. Degree of damage depends on the intensity of the seismicity and the distance from the epicentre.

Because gravity erosion is affected and constrained by so many factors, quantifying it is complicated and difficult to achieve. Furthermore, gravity erosion is a stochastic, non-continuous process, and it usually occurs as a combination of soil transportation with sheet flow and mass failure on steep slopes. Here, using the recent avalanche in Tuban, China as a case study, we analyze the causes of the mass failure and attempt to determine how to control the hazards that occur so widely in the rural areas of the Loess Plateau, China.

Section 2

At 8:27 p.m. local time on May 19, 2015, an avalanche struck at Yimin New Village in Tuban Town, Linxian County, in northwest China's Shanxi Province. The avalanche buried nine people by engulfing 33 houses and caused a direct economic loss of more than 1 million yuan RMB. Twenty-one hours later, the rescue teams sent by the local government had extricated all residents who had been buried in ruined rooms, although unfortunately, seven residents died. This study's authors trekked into the site of the accident to carry out geophysical investigations on May 22, 26 and 27. We hoped to obtain additional information about the disaster and identify effective measures to control the congeneric hazards in the area.

Researchers estimated that some 5000 m³ of loess fell and formed an accumulation with a maximum thickness of 20 m. Field measurement showed that the maximum width and height of the failure block were 50 and 40 m, respectively. The incident was only a small-scale loss event because the failure bulk was less than 10⁴ m³, according to the standard of classification for geological disasters published by the Ministry of Land and Resources of the People's Republic of China. Nevertheless, based on the number of dead and the financial losses, the avalanche was considered more serious, a moderate loss event. In other words, although the collapse was small in size, the death toll and financial losses were shocking. It appears that the

defense capability was fragile in the area.

Section 3

The event happened on the Loess Plateau of northwestern China, which is covered by loess with the presence of macropores, well-developed vertical jointing and susceptibility to water infiltration. The area is prone to avalanches and landslides, and it exhibits the greatest environmental vulnerability to human activities.

The phenomenon of soil suddenly toppling, fragmenting, and rolling down fully separate from a sloped face is termed avalanche, fall, or collapse. Different from other types of gravity erosion, e.g., landslide or mudslide, an avalanche is completely separated from a sloped face, and the avalanche block is fragmentized and scattered on the down slope or gully after the mass failure. Avalanches occur on steep hillsides as violent mass failures. Once released, they may move quite rapidly downhill. In this case, no distinct sliding trace was left on the failure scar, and the failure block was completely fragmentized. In conclusion, all indications suggested that the accident was a dangerous avalanche.

In addition to the local steep topography, the principal factors that might have contributed to the accident include (a) high antecedent water content caused by rainfall, (b) disturbance triggered by earthquake, and (c) destabilization from human activities. An important correlation has been found between the occurrence of geological disasters and the accumulated rainfall 10 days before. Inferred from the statistical data, intraday rainfall-induced landslides accounted for 71.3% of the total of 1414 landslides in Zhejiang Province in China, and landslides related to rainfall events with duration above 10 days were below 3% of total landslides. Data from Shaanxi Province, an adjoining area on the Loess Plateau, also suggest that the influence of rainfall vanishes gradually as evaporation increases over time, and change water content would not trigger gravity erosion after 7 days. Earthquake magnitude is also a significant variable that affects mass failure. From a worldwide set of landslides, the smallest local earthquake magnitude (M_L) that was likely to cause landsliding was estimated as $M_L \approx 4.0$. Nevertheless, a small earthquake, if near enough, could have been sufficient if the hill had been primed to fall.

Precisely what triggered the deadly avalanche in this case remains a mystery. Little rainfall occurred in the period of 15 days before the avalanche in Linxian County, except for a rainfall event on May 10 that brought only 23.7 mm of precipitation in a day. Thus, antecedent rainfalls did not play a conclusive role in the initiation of the collapse. As mentioned above, a slight vibration might have been sufficient if the hill had been primed to fall. Poorly sited excavation on natural slopes can destroy the slope equilibrium reached by long-term slope processes and result in ground deformation and slope instability. This has become one of the principal triggering factors for the instability of loess slopes. Field investigations reveal that subsidence and foundation settlement were widespread and frequent because of coal mining, a mainstay industry in the area. The collapse case of May 19 in Tuban happened on a slope with a gradient of 80–90 degrees and with no preventative or slope stabilization measures installed. The disaster invaded the village at night, when there was neither human nor animal activity nearby.

It is possible, though speculative, that unrecorded micro-geological activity could have triggered this collapse because the failure of the slope was imminent. Data from the China Earthquake Networks Center show that 5 h after the collapse, a magnitude 2.8 earthquake struck Shenmu, 87 km from Tuban. Hence, geological activity in the area was present during the period of the avalanche. In a similar case, a massive landslide buried Barangay Guinsaugon, a mountain village in the southern Philippines, on February 17, 2006; under this circumstance also, a magnitude 2.6 temblor struck several minutes after the landslide.

All in all, however, adverse destabilization from human activities may be the chief culprit in the incident. The exposed steep slope shows a clear trace created by artificial excavation. Slope cutting disrupted the natural stress balance, increased shear stress from the upslope, and resulted in relaxed fissures parallel to the slope. In most areas of the Loess Plateau, especially rural regions, people usually build settlements near

unprotected cliffs. The present survey found that in the last 3 years, four avalanches happened in Linxian County, killing 12 residents and injuring four others. Thus, in certain areas, avalanches are a widely distributed and urgent problem.

Section 4

From a technology perspective, controlling gravity erosion on loess slopes is not difficult. In fact, the protection practices that are commonly used on the slopes of the expressway and other public building in the area are safe and reliable. Most of the sliding victims lived in rural houses that had no revetment. The slope had been cut very steep to make way for building houses, but in order to save money, scarcely any protection elements were constructed.

Using a system for slope protection based on the barefoot doctor system in China, disasters caused by gravity erosion could be greatly reduced in poor rural areas of the Loess Plateau. Barefoot doctors were farmers who received minimal basic medical and paramedical training and worked in rural villages in China. Their work effectively reduced healthcare costs and provided primary care treatment to the rural farming population. The World Health Organization regarded barefoot doctors as a successful example of solving medical service shortages in rural areas.

Comprehensive avalanche control would combine structural, vegetative, and managerial measures, to ensure human safety with less investment. Moreover, as part of the capacity-building efforts in avalanche control, an exclusion zone is also needed near the brink of scarps, to prevent any human activity from aggravating the geologic hazard. In addition to the above measures, both public awareness of disaster prevention and early warning systems before hazards are considered as important factors for controlling loess collapses.

Section 5

Gravity erosion is a serious and widely distributed disaster that occurs frequently in the extensive rural areas of the Loess Plateau. The avalanche in Tuban on May 19, 2015, was mainly caused by human excavation and might have been directly triggered by unrecorded slight geological activity. Effective, low-cost measures are expected in the near future.

Some terminology that might be unfamiliar to you:

- stochastic = randomly determined or with a random pattern
- loess = a fine-grained, wind-blown sedimentary deposit, common in Northern China
- macropores = large spaces in a rock or sediment
- jointing = fracturing in a rock or coherent sediment deposit
- intraday = within one day
- gravity erosion = mass wasting

APPENDIX IV: Pre-Course Writing Survey Questions

Students were asked to complete an anonymous survey, via Blackboard to self-assess their skills in scholarly writing, prior to the start of the course. Students understood that the survey would be completely anonymous and not linked to their identities in any way, except to earn 0.25 extra-credit marks towards the fulfillment of the 5% participation mark in the course.

The questions posed in the Pre-Course Writing Survey were:

1. Which of the following writing-related tasks have you completed before this course, as part of your coursework at the University of Toronto? Choose all that apply.

- A. writing a formal project proposal
- B. writing an annotated bibliography
- C. writing an abstract in a scholarly format
- D. writing a term paper in a scholarly format
- E. referencing sources using APA-style citations
- F. completing a reverse outline as part of an organizational analysis of written work
- G. composing a thesis statement or research question for a scholarly paper

2. For which of the following writing-related skills have you received specific instruction, during previous courses at the University of Toronto? Choose all that apply.

- A. how to write an abstract
- B. how to write a term paper in a scholarly style
- C. how to write concisely, with a scholarly tone
- D. how to write a formal proposal
- E. how to write an annotated bibliography
- F. how to use APA-style citations
- G. how to use a reverse outline and other approaches to improve the organization of your writing
- H. how to avoid plagiarism
- I. how to compose a thesis statement or research question for a scholarly term paper
- J. how to incorporate both descriptive and critical analytical components in your writing

3. How would you rate your own skills and strength in scholarly writing, on a scale of 1 to 6?

- 1. Extremely strong
- 2. Strong
- 3. Medium
- 4. Weak
- 5. Extremely Weak
- 6. I don't know because I have never really done any scholarly writing.

APPENDIX V: Post-Course Writing Survey Questions

Students were asked to complete an anonymous survey, via Blackboard to self-assess their skills in scholarly writing, after the due date for the culminating writing assignment in the course. Students understood that the survey would be completely anonymous and not linked to their identities in any way, except to earn 0.25 extra-credit marks towards the fulfillment of the 5% participation mark in the course.

The questions posed in the Post-Course Writing Survey were:

1. We addressed the following writing-related skills in this course, primarily through the Individual Case Study Assignment and tutorial-based instruction.

Do you feel that you learned some new things or improved in any of these skills, as a result of the work you did in this course? Please choose all skills in which you think you have improved - even a little bit - or learned something new.

- A. how to write an abstract
- B. how to write a term paper in a scholarly style
- C. how to write concisely, with a scholarly tone
- D. how to write a formal proposal
- E. how to write an annotated bibliography
- F. how to use APA-style citations
- G. how to use a reverse outline and other organizational approaches
- H. how to improve the organizational flow of your writing
- I. how to compose a thesis statement or research question for a scholarly term paper
- J. how to incorporate both descriptive and critical analytical components in your writing
- K. how to avoid plagiarism
- L. how to edit your own writing

2. Which of these activities or tasks did you participate in or complete, as part of your work in this course? Choose all that you completed.

- A. tutorial on choosing a topic for the Individual Case Study
- B. tutorial on How to Write a Proposal and Annotated Bibliography
- C. tutorial on Reverse Outlining and other organizational tools for writing
- D. tutorial on editing your own writing - Sample Paragraph analysis
- E. Case Study Proposal assignment
- F. Annotated Bibliography assignment
- G. Country Risk Profile assignment
- H. Google Earth Map Project question on spatial analysis of disasters
- I. scholarly format Term Paper assignment

Post-Course Writing Survey Questions, *continued*

3. Which of these activities do you think were useful to you, in improving your writing skills through your work in this course? Please choose any that you found to be useful or a helpful exercise for improving your writing skills.

- A. tutorial on choosing a topic for the Individual Case Study
- B. tutorial on How to Write a Proposal and Annotated Bibliography
- C. tutorial on Reverse Outlining and other organizational tools for writing
- D. tutorial on editing your own writing - Sample Paragraph analysis
- E. Case Study Proposal and feedback
- F. Case Study Annotated Bibliography and feedback
- G. Case Study Country Risk Profile and feedback
- H. Google Earth Map Project question on spatial analysis of disasters
- I. Case Study Term Paper

4. How would you rate your own skills and strength in scholarly writing, on a scale of 1 to 6?

- 1. Extremely strong
- 2. Strong
- 3. Medium
- 4. Weak
- 5. Extremely Weak