



## Small TLEF Project – Final Report

Report Completion Date: (YYYY/MM/DD) 2018/01/06

### 1. PROJECT OVERVIEW

#### 1.1. General Information

<b>Project Title:</b>	Roleplaying to Enhance Student Decision-Making Skills in the Online Components of Blended Flipped Science Course ATSC 113		
<b>Principal Investigator:</b>	Prof. Roland Stull		
<b>Report Submitted By:</b>	Stull		
<b>Project Initiation Date:</b>	1 Apr 2015	<b>Project Completion Date:</b>	31 Dec 2017

#### 1.2. Project Summary (as originally proposed. Grey indicates items yet to be implemented.)

In the UBC calendar is recently-approved course ATSC 113 Applied Meteorology (Weather for Sailing, Flying, and Snow Sports). With CTLT help, we will develop common online components to be used in both blended [classroom + online] and purely online sections of ATSC 113. The initial offering in Fall 2015 was to be online only, but in fact both sections have been offered for each of the first four terms.

We will use online narrative to create weekly scenarios of deteriorating weather conditions. Each student plays a different role (skipper, passenger, regulator, weather briefer) in their group and is given different information (sailboat characteristics, distractors, warning issuance, atmospheric behavior). Group members succeed by working together to determine the right questions to ask. This flipped (inquiry-based learning) motivates their access of online resources outside of class. Each group posts online a summary of their decision with justifications. Peer critiques are posted on approved social-media, with instructor intervention to promote expert thinking.

#### 1.3. Team Members – (Please fill in the following table and include students, undergraduate or graduate, who participated in your project).

Name	Title/Affiliation	Responsibilities/Roles
Dr. Roland Stull	Prof. / EOAS Dept.	P.I. & Content creator - flying weather
Ms. Josefina Rosado	Online course designer/CTLT	Set-up course on LMS (Connect & Canvas)
Dr. Greg West	Res.Assoc./EOAS	Content creator - snow weather
Dr. Rosie Howard	Res.Assoc./EOAS	Content creator - snow weather
Ms. Samantha James	M.Sc. Student / EOAS	Content creator - sailing weather
Mr. Anthony DiStefano	MSc->PhD Student / EOAS	Head TA and web-page design consultant
Ms. Mekdes Tessema	MSc Student / EOAS	TA. Provided suggestions for improvement.
Mr. Mark Lemessurier	MSc Student / EOAS	TA. Provided suggestions for improvement.
Mr. Matt Fung	BSc Student / EOAS & Comp.Sci.	Designed & wrote new Voting App software.
Ms. Sophie Lee	BA student / Geography	Undergrad proofreader, checker, tester,



		creator of ePortfolio and its rubric
Ms. Jenny Ho	BA student / Psychology & English Lit. Now a BEd student	Undergrad proofreader, checker, tester
Ms. Laina Deer-Farris	BA student / English Lit.	Undergrad proofreader, checker, tester
Mr. Chris Jing	BSc student/ Engr. Physics	Testdriver Canvas web pages
Ms. Maggie Campbell, Ms. Brie Mackovic & Mr. Timothy Chui	MSc students / EOAS	Proofread and refined the TLEF proposal.
Many others in CTLT	CTLT	Helping to refine the concept and frame it for dist. ed. (online) delivery. Also created banner.

**1.4. Student Impact** – Please fill in the following table with **past**, **current**, and **future** courses and sections (e.g. HIST 101, 002, 2017/2018, Sep) that have been/will be impacted by your project, including any courses not included in your original proposal (you may adapt this section to the context of your project as necessary).

Course	Sections (taught as a single unified section each term)	Combined Enrolment	Academic Year	Term (Summer/Fall/Winter)
ATSC 113	101 & 99A	79	2016	Fall
ATSC 113	201 & 99C	136	2016	Winter
ATSC 113	971 & 98A	69	2017	Summer
ATSC 113	101 & 99A	179	2017	Fall
ATSC 113	201 & 99C	250	2017	Winter
ATSC 113	Will continue to	be offered as 2 sections	every term.	Summer & Fall & Winter

**2. PRODUCTS & ACHIEVEMENTS**

**2.1. Products and Achievements** – Please **update** project products and achievements as necessary. Indicate the current location of such products and provide an URL if applicable.

Product(s)/Achievement(s):	Location:
Whole new course ATSC 113 Applied Meteorology (Weather for Sailing, Flying & Snow Sports)	Online
Website for weather content (hosted by EOAS dept)	<a href="https://www.eoas.ubc.ca/courses/atsc113/">https://www.eoas.ubc.ca/courses/atsc113/</a>
Website for module & quiz delivery (Canvas LMS)	<a href="https://ubc.instructure.com/courses/772">https://ubc.instructure.com/courses/772</a>
Voting App (to mimic clicker peer group interaction). CAN BE USED IN OTHER COURSES!	<a href="http://a23-217.eos.ubc.ca:9001/student">http://a23-217.eos.ubc.ca:9001/student</a>
YouTube videos (created with Camtasia) explaining how to do this course.	<a href="https://www.eoas.ubc.ca/courses/atsc113/home/getting-started.html">https://www.eoas.ubc.ca/courses/atsc113/home/getting-started.html</a>



**2.2. Item(s) Not Met** – Please list intended project products and achievements that were not attained and the reason(s) for this.

Item(s) Not Met:	Reason:
Each student plays a different role (skipper, passenger, regulator, weather briefer) in their group and is given different information	Although this might have worked for face-to-face lectures, it was too confusing to students who are working online, sometimes asynchronously. Instead, all students are the skipper/pilot/ snowboarder.
Experts invited to class to discuss their rational for go/no-go decisions regarding the weather.	We did it for the initial offerings of the course, when we still had in-class lectures as a blended course. But now we have transitioned to be a fully online course. So instead, we created a new web link called “Experts in Action” where experts discuss in a Camtasia video their reasoning as they work through a course module.
Peer critiques are posted on approved social-media, with instructor intervention to promote expert thinking.	We still plan to do this, but for peer critiques of the ePortfolios that students create. ePortfolios were not possible in Connect, but are easy for students to create in Canvas. January 2018 is the first term that students will be creating ePortfolios, so we might try implementing the peer evaluations (hopefully using one of the many existing peer-eval packages available) in Summer 2018 term.

**3. PROJECT EVALUATION**

**3.1. Project Outcomes** – Please list the intended outcomes or benefits of the project for students, TAs and/or instructors. (These are copied from the TLEF proposal. All have been met.)

**a. Learning outcomes:** By the end of this course, students will be able to...

- 1) explain meteorological fundamentals and weather-system evolution. (theory)
- 2) access and interpret relevant weather data and critically evaluate its utility and deficiencies. (tools & resources)
- 3) formulate alternative courses of action, and the consequences of each. (application of conceptual models)
- 4) select the best course of action in the face of uncertainty. (decision making)
- 5) keep a “weather eye” and anticipate weather changes based on atmospheric principles. (survival skills)

**b. Learning enhancement:** By the end of this course, students will have ...

- 1) created their own organized resource (e.g., web page) tailored for their primary activity (sailing, flying, skiing) with links to online weather maps and other source data.
- 2) devised ways to utilize approved social online media (or alternative space acceptable to UBC) for team building and information sharing.
- 3) refined their discussion and debate skills in small teams or work-groups.
- 4) created their own rubrics on what questions to ask, and how to use information to make decisions.
- 5) gained confidence in their own ability to make justifiable decisions similar to those made by experts.



**c. Long-term, Sustainable Benefits: Life skills.** By the end of this course, students will have enhanced their ability to ...

- 1) survive,
- 2) win competitions,
- 3) enjoy the weather,
- 4) think critically about information they received, and apply their knowledge to the world around them,
- 5) work with others to find solutions to important problems.

**3.2. Findings** – *Please describe the findings of your project evaluation effort: to what extent were intended project outcomes achieved or not achieved? You are encouraged to include both graphical representations of data as well as scenarios or quotes to represent key themes.*

**a. Evolution from blended course to fully online.** This course was proposed and first offered in Fall 2016 as a blended, flexible-learning course. **Flexible** in the sense that STUDENTS could decide how much they wanted to participate in the optional in-class activities (1 hour/week was scheduled for in-class activities for sections 101, 201, and 971, when the student registered for the course). These in-class activities included experts coming to class to discuss how weather affects flying, snow sports, and sailing, and it included a chance for students to work together face-to-face to answer the online quizzes. We also recorded YouTube videos of these sessions for students unable to attend in person.

Students voted with their feet. In Fall 2016, there were 49 students enrolled in the in-class section (101), and 30 students enrolled in the distance-ed section (99A). Students in both sections were encouraged to attend the optional in-class activities, but only about 70% of the students came during the first week. This diminished to about 10% of the students by the end of term.

In January 2017, students in section 201 also had to schedule the 1 hour/week when they registered. As before, students in both sections 201 and 99C were encouraged to attend. Only about 40% came in the first week, diminishing to just a few students by the end of term. The trend continued in Summer 2017 term.

By the end of summer, we realized that **the course had evolved into a purely online course.** So, for Fall 2017 and subsequent terms, we are offering this as a purely online course -- students do not need to fit any in-class meeting into their schedule when they register. It still has two sections/term that are taught as a single unified online course: Sections 101, 201, and 971 are for students who can write the final exam **on** the UBC campus; Sections 99A, 99C, and 98A are for students who are truly distant (need to write the final exam **off campus**).

This Fall 2017, as a purely online course, we advertised to the students that we would hold 4 optional in-class workshops. The first one was held during the first week of term, to help students get started with the course and to meet other students. Only 1 student showed up, out of 179 enrolled (of which 144 are on-campus students). This reinforced my decision to evolve this course into a purely online course.

I am not a psychologist, but this outcome seems to be exactly in line with the attitudes and motivations of "iGen" students. I encourage you to read *The Atlantic* magazine article by psychologist Jean M. Twenge called "[Have Smartphones Destroyed a Generation?](#)" (excerpted from her book "[iGen](#):"



[Why Today's Super-Connected Kids Are Growing Up Less Rebellious, More Tolerant, Less Happy—and Completely Unprepared for Adulthood—and What That Means for the Rest of Us.](#)").

Regardless of whether it is good or bad, or right or wrong, the iGen students indeed have these attitudes. It is a fact of life that we at UBC must face for the cohort of new undergrads. That is why I am evolving the ATSC 113 course to try to maximize the learning of meteorology by iGen students.

After I read that book, I realized that I could make the course more appealing/comfortable to iGen students. As teenagers before entering university, these students have sought reassurance in the form of feedback via online social media. So, I provide instant online feedback/reassurance in every quiz question that the students answer, in the form of a kudo for each right answer, and a formative hint/link to online topics for each wrong answer. (This is not a new concept, but is one that iGen students desire.)

**b. Online peer interaction and the Voting App.** We knew that we wanted to encourage peer interaction among the online students, analogous to the peer interaction when groups of in-class students discuss the best answer to a clicker question. The original course proposal included the development of an application to encourage such peer interaction for online students. Students would need to work in teams to make go/no-go decisions regarding their activities vs. the weather. The grade that a student would get would depend not only on whether he/she got the right answer, but also on how many of her/his peers in groups of online students made the same decision. Because of the inadequacy of Connect, we arranged for the peer interactions to be on the Slack application.

After consulting with CTLT and with the EOAS Dept IT staff, neither of those organizations had the desire and/or manpower to develop the new application. So, I pushed one of our undergrad assistants to write the application in haste during late summer 2016 -- that application became the first iteration of the Voting App. Unfortunately, it was buggy and crashed repeatedly when running on our EOAS dept servers. After struggling with it for 2 weeks, I finally pulled the plug and terminated use of the Voting App. Thus, for most Fall 2016 term, and all of Winter 2016 and Summer 2017, students earned their go/no-go grade based on only their own decision, which they did via answering a quiz question on Connect. They were still encouraged to discuss the go/no-go decision with peers on Slack before they made their own decision.

Surprisingly (to me), that activity devolved to the point where most students (except for several keeners) were NOT having peer discussions, and instead were reaching their decisions independently. But we were stuck with that situation for the whole first year the course was offered.

But I never gave up. In summer 2017, I arranged for the undergrad assistant (double major in computer science and atmospheric science) to spend the whole summer writing a new version of the Voting App from scratch. It was well thought out and well-designed this time, as a web-based application. We implemented it this Fall 2017, and it works well. It is efficient enough that we are using one of our iMacs as the application server. Out of the 9 possible marks that students can earn for each week's case study, 5 marks are for the correct decision, and up to 4 more marks can be earned depending on the number of additional students who make the same correct decision, out of each peer group of 10 students. One additional mark is earned by the student telling us how she/he reached that decision. Thus, students can maximize their course grade by interacting with peers online via Slack. This worked wonderfully.

The SoTL support that we received starting in Fall 2017 is to conduct studies to determine the effectiveness of the Voting App in helping students learn meteorology, encourage peer interaction, and develop behaviors that lead to good decision making. It took longer than we expected to learn how to



write a successful BREB ethics proposal, but it was finally approved in Dec 2017. We had hoped to start this study in Jan 2018. However, the implementation of this study was affected by other factors. One, we wanted to ensure privacy (FIPPA issues), so we attempted to switch from **Slack** (hosted in the USA) to **Mattermost** (hosted at UBC). But, the Voting App, which was written to play well with Slack, was not able to play at all with Mattermost. For the study, we also wanted to divide the class into 3 separate sections to evaluate and compare their usage of the Voting App. Although LT-Science was primed to do this splitting of the class, we had to cancel at the last minute because we still couldn't get Mattermost working with the Voting App. As a result: (1) the SoTL research study on Voting App efficacy will be delayed until Summer or Fall 2018; and (2) we are using Slack again for Spring 2018 (which is working smoothly).

**c. Playing catch-up.** As I am not one to sit around and watch the grass grow, I pushed for the first offering of this course in Fall 2016, even before all the content was created. We just barely kept ahead of the students in creating online content on the EOAS server, and in creating online assignments and quizzes in Connect. We were fixing bugs, broken URL links, missing figures, and typos as we went along.

Many of the desired options in the course were still missing, so we added these during Winter 2016 term -- still playing catch-up. We also hired the 3 undergrad humanities majors to proofread the content and offer suggestions on typos, clarity, and fidelity in focusing on the learning goals. Summer 2017 was compressed into 6 weeks, so even though there was only a little further evolution of the course, that compressed term was so intense that we wanted to breathe a sigh of relief when it ended.

No such luck, because I had volunteered (and was accepted) for ATSC 113 to be one of the first courses to be converted to Canvas. So, the last half of summer 2017 was spent in intense activity moving the course from Connect to Canvas. **Josefina Rosado (CTLT) was outstanding in her work on this course, and should get bonus.** Canvas lacked some of the capabilities of Connect, so we were forced to move some of the Connect content onto our own departmental servers. As of the end of Fall 2017 -- we are using Canvas and the new Voting App, and things are looking good.

With permission from Jeff Miller, we continued the project thru 31 Dec 2017 to implement the following three enhancements. One, we will utilize the ePortfolio feature in Canvas, which students can continue to use even after the course ends. We will use this tool for students to create their own content with links to their favorite weather web sites, which was one of the plans in the original course proposal. January 2018 term is the first course offering where we are using an ePortfolio as a capstone project. Undergrad student employee Sophie Lee created a wonderful sample ePortfolio and grading rubric. Two, we added feedback info to the students when they answer quiz questions incorrectly, and are trying to utilize the rubric capability in Canvas (which unfortunately doesn't work for quizzes). Three, Sophie Lee used online tools to check (and fix if needed) figures to improve accessibility for colourblind students. These three additional projects were successfully completed.

**d. Thinking like experts.** In the original course proposal, we had planned for experts to come to class and work through a case-study module with the students to discuss how the experts approached weather-related problem solving for sailing, flying, and snow sports. Now that this course has evolved into an online course, we had to re-think how to get the novice students to think like experts, as promoted by Carl Wieman.

Each module has a section on the web page written by experts regarding the outcome of the case study, what could have been done differently, and what sources of information are available. But all this



was "after the fact", after the actual outcome of the case study was revealed to the students. It was also not very different from a professor stating what was right and wrong.

But we still needed a way for students to see the thought process of experts as they are making a decision. Our first attempt is an "Experts in Action" link on our website, where an expert works through a new module and discusses his/her thoughts and concerns (as recorded to video via Camtasia).

<https://www.eoas.ubc.ca/courses/atasc113/experts/> . It is still a work in progress.

**3.3. Data Collection and Evaluation Methods** – *Please describe the data collection strategies used, how the data was analyzed, and perceived limitations. Note: Please attach copies of data collection tools (e.g. surveys and interview protocols) and any additional data or other relevant items.*

We were so busy creating the course, that we were not able to do adequate and appropriate studies of the effectiveness of our methods. Some superficial statistics are that enrolments are growing rapidly, student grades are reasonable, and the content has a rigor and depth appropriate of a university-level survey course.

We conducted End-of-Term (EoT) Surveys each term, in addition to the standard Instructor and TA evaluations. Sadly, other than quickly looking over the results, we haven't had time to do any quantitative analytical studies on the survey results. Luckily, Science of Teaching and Learning (SoTL) specialist Simon Ho is helping analyze these surveys, and to design further surveys, interviews, and web analytics as part of the SoTL supported research on the Voting App.

Attached is a summary of the EoT surveys from the first 3 terms, compiled by our head TA Anthony DiStefano. It contains some surprising, but preliminary, results.

**3.4. Dissemination** – *Please provide a list of past and future scholarly activities (e.g. publications, presentations, invited talks, etc.) in which you or anyone from your team have or intend to disseminate the outcomes of this project.*

None. However, Anthony DiStefano (Head TA) and Prof. Stull recently won a Science of Teaching and Learning (SoTL) award in late summer 2017 for this ATSC 113 course. With this support, we will conduct surveys and interviews and analyze analytics from the web pages and Voting App to measure the effectiveness of this course in achieving the learning goals. This will allow us to make improvements to the course.

When these studies are completed, they will hopefully lead to a publication or poster, for which we will acknowledge support from TLEF and from UBC students.

**4. TEACHING PRACTICES** – *Please indicate if your teaching practices or those of others have changed as a result of your project. If so, in what ways? Do you see these changes as sustainable over time? Why or why not?*

My teaching practices have changed, in that I have a better understanding of the motivations of iGen students, and am providing much more feedback/ stimulation/ awards to students online. Both my understanding of iGens and my teaching practices continue to evolve.



I doubt that any other research professor would be willing to spend the hours needed to create an online course similar to this. I was lucky that I have a large research team (18 scientists) who could carry on while I was busy creating and modifying this new course. Teaching professors, instructors, and sessionals could likely be successful in building online courses similar to ATSC 113, because they are rewarded more for doing so.

Our TA, Anthony DiStefano, is greatly improving his understanding of teaching practices. He already had a minor in education from McGill University when he came to UBC. I think he will become an outstanding, award-winning teacher as he matures and gains more experience.

**5. PROJECT SUSTAINMENT** – *Please describe the sustainment strategy for the project components. How will this be sustained and potentially expanded (e.g. over the next five years). What challenges do you foresee for achieving the expected long-term impacts listed above?*

Our EOAS dept is happy with the revenue generated by the large and growing enrolments, so our department Head is providing continued instructor and TA support. We will continue to offer the course every term.

**6. RECOMMENDATIONS.**

**a. Divorce the concept of an online course from a distance ed course.** An online course is just a "normal" course, like any other course. It marks one side of the spectrum of blended courses (100% -> 0% in class blended with 0% -> 100% online).

**b. Allow students of any course (in class, blended, or online) to write final exams OFF campus.** When students register for a course, put an extra box on the registration form where students can mark "X" to indicate that they want an off-campus exam. Charge them for this extra service -- it can be a revenue source for UBC. With that simple change, there is no need to designate any course as a "distance-ed" course, because the only difference between a distance-ed course and a "normal" course is where the student writes the final exam.

(Note, UBC is effectively already giving some on-campus students this option, since 90% of students in our existing "dist ed" courses are actually normal on-campus students. This is unfair to the other on-campus students who don't have that off-campus-final-exam option for their normal courses.)

**c. Provide MUCH more advising/tutor support for online students.** Watch this video from our competition: <https://www.youtube.com/watch?v=quX7YkP0d8o> and see their other videos at <http://www.snhu.edu/student-experience/online-student-experience> .

**d. Greatly expand the UBC offerings of online courses.** CTLT is making great strides, but we are still lagging behind the competition (see the link in 6c above). It is a way to educate more students (and bring more revenue to UBC) without spending as much on bricks and mortar.





**e. Fix the bureaucracy that supports summer terms at UBC.**

For departments that offer both in-class and online sections of the same course, we want students in both sections to write the final exams on the same day, to reduce the chance of early-exam students sharing answers with later-exam students. That is currently broken at UBC in summer, where first-summer-term dist-ed students write their final exam in August while the in-class students in the same course write their exam in June invigilated at UBC. Get your act together. (If recommendation 6b above is adopted, then please ensure same-day final exams for the on- and off-campus students in any course.)

**7. THANKS to TLEF.** The ATSC 113 course would not have existed without TLEF support.

Also, thanks for the extensions to Dec 2017.

**APPENDIX A.** The final budget will come later.

(Still waiting for the last pay statements and invoices to clear from the end of Dec 2017.)