Global Road Safety Online Course Development

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Abstract

The Global Road Safety Online Curriculum Development project involved the adaptation of in-person classroom materials and development of new materials to be used in an online setting. A short-course format was selected to pilot the course, and four two-hour sessions were created. Zoom video conferencing was used for the virtual classroom platform, and the Canvas learning management platform was used to create a class website, host materials for download (e.g., PowerPoint files), and obtain participant feedback via online surveys. The short course was piloted with 20 participants from many locations throughout the United States and two participants from Sweden. Feedback from participants was largely positive, and the virtual classroom and website platforms worked well. Future directions will include offering the online short course on a regular basis and/or expansion of the course into a semester-long format with additional course modules.

1 Background

1.1 Global Road Safety course description

This course introduces students to the status, research, and prevention efforts related to global road safety, including fatal and non-fatal injuries. As one of the fastest growing causes of death around the world, with disproportionate risk in low-income countries, this is a topic of increasing global health priority. The course includes modules on road safety trends and culture, road safety research, human factors, and the environment, with a focus on many modes of transportation. The road safety research module includes sections on epidemiological methods, simulation research, and naturalistic approaches. The intended audience is students and professionals in areas such as public health, nursing, medicine, geography, international studies, urban and regional planning, engineering, social work, psychology, sociology, global health studies, health promotion, health studies, and leisure studies. This course primarily uses interactive and discovery-based teaching methods and limited mini-lecture formats.

1.2 Project description

The Global Road Safety course has been successful as an in-person, academic-credit-based course. However, it has previously been restricted to University of Iowa (UI) students, attending in person, in this format. Therefore, this project aimed to develop the course into an online interactive version that would be open to UI students, students from other institutions, and non-student professionals. Specifically, we intended to develop the course into a synchronous remote learning environment with the capability to keep our interactive format, such as group break-out problem-solving sessions and utilization of white boards, the internet, and word-processing, graphic, and spreadsheet software.

Our initial intent was to develop this online curriculum and course as another academic-credit-based course. However, we ran into many roadblocks to that approach, so we decided to modify the course into a certificate-based short course. Roadblocks to offering this as an academic, semester-long, course included high cost to students (both UI and non-UI), difficulties for both non-UI students and professionals to enroll (complex application and registration process), and scheduling challenges for students to commit to an entire semester (particularly among professionals). Therefore, a short-course format, with a straightforward registration process, was found to be much more successful in attracting participants. The following sections outline our curriculum and short course development and launch, as well as feedback from participants regarding their experiences in taking the course.

2 Curriculum Development

Curriculum was developed for four online sessions, each two hours long, for a total of eight hours. The following outlines what was developed for each session, including the learning objectives.

2.1 Session 1: Introduction to Burden; Data Sources

2.1.1 Learning objectives

By the end of this session you will be able to:

- Navigate the Zoom virtual classroom
- Understand the expectations and style of this training course
- Begin to describe the global burden of road traffic injuries and fatalities
- Discuss regional variations and trends in road safety issues, globally
- Identify sources of road traffic crash and injury data
- Understand differences in data collection and quality throughout the world

- Identify and define variables important to understand the causes and consequences of road traffic crashes

2.1.2 Session 1 Content

This session introduced students to the global burden of road traffic injuries and fatalities and road-safety-related data sources. The session started with course and instructor introductions and a short overview of how to use the virtual classroom (sharing screen feature, annotating, chat feature, raising your hand, and breakout rooms).

We then included an icebreaker activity, using the GeoGuessr website [1]. This website is essentially a gaming platform that shows you interactive photos of random locations throughout the world (primarily roads) and has you guess where in the world the photo is located. The purpose of this exercise was to have students start thinking about what roads and road safety look like in different parts of the world; it also served as a way to get people comfortable with talking and giving input.

Two mini-lectures were included in this session: 1) current state of global road safety and 2) data sources and coding. These gave students an introduction to the distributions and trends of global road injuries and fatalities, sources of data, and the quality and considerations surrounding data collection (or lack thereof) and coding.

We then had the students do an exercise to develop a conceptual model for risk factors for road safety. First, we had students watch some short minor crash videos and think about risk factors that could have contributed to these crashes, as well as all types of factors that relate to crashes. Next, they were split into small groups using the breakout groups feature of the Zoom classroom and were asked to make a list of all the factors their group came up with and categorize them. Each group was instructed to take notes using the whiteboard feature or a document. The large group then reconvened, and each small group had a representative give a two- to three-minute presentation to share their categories. They were then broken out into small groups again and asked to

develop a conceptual model. Finally, the large group reconvened and shared their models. The activity concluded by presenting the class with the Haddon Matrix model and comparing it with the models that the groups had developed.

2.2 Session 2: Traffic Safety Culture and Policy

2.2.1 Learning Objectives

By the end of this session you will be able to:

- Understand the components that make up traffic safety culture
- Describe how traffic safety culture evolves or does not evolve over time
- Discuss the different social levels that make up safety culture
- Explain the role that policy plays in road safety
- Assess the impact and effectiveness of various policy-based road safety interventions
- Propose policy-based solutions for specific road safety problems

2.2.2 Session 2 Content

Session 2 included two mini-lectures and two activities. The first mini-lecture was on traffic safety culture and gave students an introduction to the definition of traffic safety culture, components, and how traffic safety culture can be impacted or how it can change over time. This lecture included an introduction to social ecological theory, which provides a framework for understanding the relationships between individual and environmental factors.

This mini-lecture was followed by an activity that had students apply the social ecological model to a variety of traffic photos from countries around the world (see example in Figure 2.1). First, as a class, one photo was discussed, as were features/characteristics that relate to safety. Next, the class was split into breakout rooms (groups of three or four), and each group was assigned two photos. With those pictures, they were instructed to come up with a list of two or three items for each level

of the social ecological model that describes the behaviors and features/characteristics of the pictures. They were given approximately eight minutes in the breakout groups to complete this task. Finally, the class reconvened as a large group, and each breakout group shared one item at each level of the social ecological model.

Figure 2.1 Example photo used in social ecological model activity

Next, a mini-lecture on policy related to global road safety was given, followed by a policy-based intervention activity. While working in breakout groups, students were instructed to propose a policy-based intervention approach for a road safety problem in at least one of the group members' focus countries that they chose at the beginning of the course (see Section 2.5 below).

2.3 Session 3: Epidemiology, Research Methods, and Mapping

2.3.1 Learning Objectives

By the end of this session you will be able to:

- Understand the role of epidemiology in global road safety
- Describe the most common research study designs
- Assess the advantages and disadvantages for the most common study designs

- Understand the usefulness of naturalistic studies and simulation as research approaches
- Describe the steps to consider in conducting a naturalistic study
- Describe the process and variables necessary to develop a simulation scenario

2.3.2 Session 3 Content

Session 3 followed a similar format to Session 2, with two mini-lectures and two activities. The first mini-lecture was on epidemiologic methods and included an overview of incidence, prevalence, rate calculations, and common study designs. This was followed by an activity that included a rate exercise and symbolic $100 budget. For this activity, students were broken into small groups of 3-4, via the Zoom breakout rooms function. They were then given a table containing a list of all the student focus countries and their corresponding income levels, total number of road fatalities, and three different rates of road fatalities (per population, per motor vehicle registrations, and per billion vehicle kilometers). With this information, each group was given the task to distribute a symbolic $100 to the country or countries most in need of resources for improving traffic safety.

Next, a mini-lecture on naturalistic and simulation research methods was given. This included an overview of the advantages and disadvantages of each approach, as well as examples. Finally, an interactive mapping tutorial was given, using QGIS open source desktop GIS software [2]. This tutorial introduced students to the software, using sample crash data from the Iowa Department of Transportation (Figure 2.2). Two types of maps were included in the tutorial: spot/dot and choropleth. However, time ran short, so the choropleth map was not demonstrated. A tutorial document did include step by step instructions so that students could complete the entire tutorial in a self-guided manner.

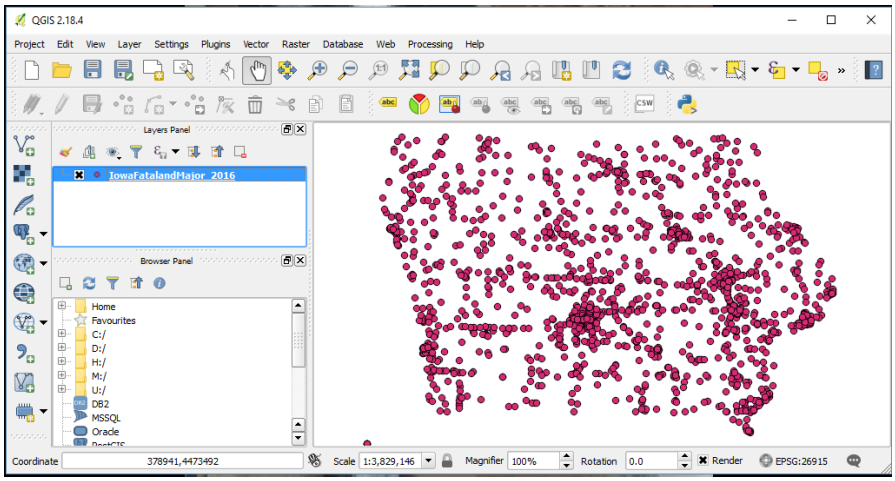

Figure 2.2 QGIS interface and sample Iowa crash data

2.4 Session 4: Intervention and Prevention Approaches

2.4.1 Learning Objectives

By the end of this session you will be able to:

- List crash factor types and their relative contribution in the chain of events
- Provide examples of intervention approaches as they relate to education, engineering, enforcement/policy, and evaluation/planning
- Describe approaches to road traffic injury prevention as they relate to Haddon's 10 countermeasures
- Understand different theories of behavior change
- Develop a communication plan for increasing road safety

2.4.2 Session 4 Content

The final session included two mini-lectures, one guest lecture, and one activity. The two mini-lectures included an overview of road safety intervention and prevention approaches and a more detailed multi-component interventions lecture. Next, a guest lecture was given on automated vehicles and road safety, including international perspectives. Finally, the students were asked to identify a driving behavior or issue related to autonomous vehicles that they would like to promote and to develop a communication plan that would lead to that action. This activity was completed in small groups in the Zoom breakout rooms, and then communication plans were shared with the large group.

2.5 Focus countries

Prior to the start of the course, we asked students to submit a list of the top three countries they would like to focus on during the class. From these submissions, we assigned one country to each student, based on their top country choices. These 'focus' countries were used during a couple of the course activities, but turned out not to be essential in this short-course format.

We used focus countries in our previously taught in-person, semester-long, academic-credit-based course. We found it worked well in that setting, but the focus countries were also tied to homework assignments and final projects, so the students were able to get a more in-depth look into those countries. In future versions of this short course, we may consider removing this element, as it did not seem to add much to the student experience.

3 Short Course Pilot

In order to pilot test our online curriculum, we developed and successfully completed a four-session short course titled "Global Road Safety Online Training." The course was offered to both students and professionals with interest in global road safety during the month of April 2017.

3.1 Participant Recruitment and Enrollment

To recruit participants for the online pilot short course, a flyer was created (Figure 3.1) and an informational page (Figure 3.2) was hosted on the University of Iowa Injury Prevention Research Center website. Recruitment was accomplished through several methods, including word of mouth, email listservs, the SaferSim electronic newsletter, and posting of the flyer.

Figure 3.1 - Flyer used to recruit participants for short course

Figure 3.2 – Snapshot of the informational web page used for course recruitment

Eventbrite, a web-based event registration website, was used for enrollment purposes [3]. This was free and very easy to use. We had 27 people register, although our final count of active participants was 22. We also had 10 people who signed up on a

waitlist. We capped enrollment at 25 students, which we felt was the maximum number we could reasonably accommodate in the virtual classroom, given the focus on interactive activities and discussion.

3.2 Incentives

Incentives were provided for participation in each session in the form of a check. Each participant received $50 per session for their active participation and feedback. We did have a few instances where we had participants log into the classroom, but had no evidence of them being there (e.g., they did not join the breakout groups, were not visible via video feed, and did not participate in discussion or chat rooms). In these cases, we did not offer incentives or count them as having participated in the session, therefore making them ineligible to receive a course completion certificate.

3.3 Virtual Classroom Platform

Zoom video conferencing was used as the platform for our virtual classroom [4]. The University of Iowa has a site license for this software, so it was readily available for us to use. Overall, Zoom worked well for this application, allowing us to have video and audio for the class sessions. We were able to share our desktops, which meant that we could show PPT slides or anything displayed on our desktop computers (e.g., a web page or video clip). This functionality was also available for students, which was useful for the ability to share notes. Zoom also has a whiteboard feature, which can be used to draw on, but we found that using existing programs, like Word or Excel, and sharing those with the class was easier.

Zoom also let us divide the class into breakout rooms for activities. This allowed us to split the class into groups of 3-5 people, giving them the opportunity to get to know each other and work in small groups.

3.3.1 Virtual Classroom Challenges

The main challenges we encountered with using a virtual classroom were really independent of the Zoom program itself. The main drawbacks experienced were that not every student was fully equipped to share audio and video, despite our attempts to stress this as a course requirement. Lack of audio or video reduced the ability of a student to fully engage in the course, as well as other students' abilities to engage with those students. This was particularly challenging in the breakout groups, as several students indicated that students who had full video and audio functionality tended to be burdened with the majority of work during the breakout sessions (leading the discussion, taking notes, etc.). Therefore, we believe it will be of utmost importance for future iterations of this course to require all students to have full audio/video capability and determine a successful method to enforce that requirement. It was difficult for us to enforce this during this pilot, given that participation was voluntary and there were not any direct consequences such as deducting points toward a grade (as would be possible if this were converted to an academic-credit-based course).

3.4 Course website

A course website was created using the University of Iowa ICON platform, which is powered by the Canvas learning management system [5].

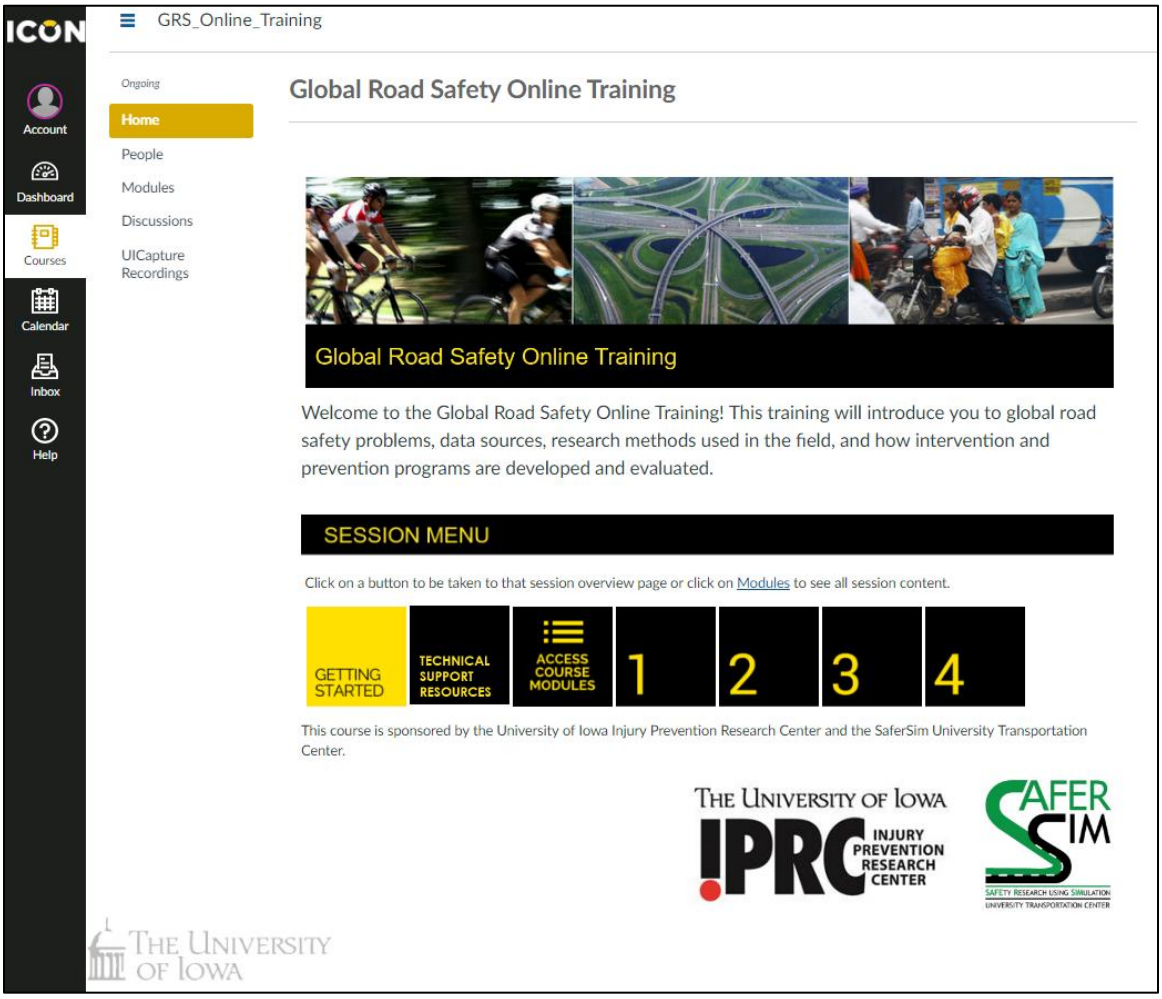

Figure 3.3 – Course website home page

All of the course content was loaded onto this web page for easy download for students. We divided the content into several sub-categories, including: Getting Started, Modules, Discussions, and Surveys. In the Getting Started section we provided instructions on technical requirements (computer, internet, video, audio), an introduction of the course instructors, a link to the pre-training survey, a forum to post questions about the course, and technical troubleshooting resource links.

3.5 Course completion and certificates

A total of 15 (68%) participants completed all four sessions, making them eligible to receive a training completion certificate. Of the remaining 32%, four participants

completed three of the four sessions, one participant completed two of the sessions, and two completed only one session.

4 Evaluation

Course evaluation was conducted via online surveys. Participants were asked to complete a pre-course survey, a survey following each of the first three sessions, and a final course survey following the fourth session, for a total of five surveys.

4.1 Pre-course survey results

The pre-course survey consisted of two basic questions: 1) How did you hear about this training course? and 2) What do you expect to learn from this training? Approximately half of the participants heard about the course via word of mouth either directly from one of the course instructors or from colleagues; the other half heard about it via email or a listserv (17%), the SaferSim Newsletter (13%), or a posted flyer (13%).

The majority of participants expressed interest in learning more about transportation safety from a global perspective and major issues in global road safety. There were also indications of wanting to learn about research methods and best practices in terms of prevention. For example, one participant said, “I expect to learn more about how road safety is approached differently around the world.” Other participants were more specific, such as, “Methods and sources to be used as arguments for road projects to include safe facilities for pedestrians and bicyclists.” The majority of responses were on track with what was taught in the course. We primarily asked about course expectations to gauge whether or not our advertisement of the course was appropriate. Based on participant responses, we believe the course advertisement aligned well with student expectations.

4.2 Session survey results

For the session surveys, we simply asked what the participants liked, what they did not like, and what they would change. This provided us with some specific feedback about the mini-lectures and activities included in each session. The main likes, dislikes, and suggested changes for each session are highlighted in the following sections.

4.2.1 Session 1 Survey

The main dislikes for Session 1 were technology-related. They were based on minor hiccups in getting both the instructors and students oriented to the classroom. There were also several comments related to the lack of audio and/or video of several of the participants.

The things most liked about this session were its interactive nature (e.g., “how interactive it was!”; “the classroom feeling even though it was virtual”). There was also positive feedback for the GeoGuessr activity (“Class had a great start by showing those paved roads and asking us to guess where it is…”). There were also positive comments related to the technology and format (“The group activities were a great way to understand how to use the program and meet fellow classmates”; “the transition to the breakout groups worked really well and the chat function was cool for those of us in shared rooms”).

Suggested changes included recording the class for people to watch later, including some readings/homework before or after the session, and having a short break during the two-hour block. There was also some feedback related to wanting more in-depth information. This is not surprising given the wide array of participant backgrounds. It is not surprising that the content may have been considered very introductory by some of the more advanced students.

4.2.2 Session 2 Survey

The main dislikes in Session 2 were related to running out of time and feeling rushed and also non-participation of some of the participants in the breakout groups. Main likes included both the activities: 1) photo activity and 2) policy activity.

The main changes suggested included having more advanced discussions, more time, and more examples. There were also suggestions about how to organize the breakout groups. Specifically, participants suggested that group roles (notetaker, spokesperson, etc.) be assigned by instructors, rather than having the groups choose.

In this survey we also asked about barriers to audio/video capability and/or technological issues. The majority of respondents did not report any technical difficulties, although the most common was weak internet connection. There was also the issue that some participants were using computers in shared offices, so lack of audio/video use was related more to not disturbing office mates than to lack of access to audio/video.

4.2.3 Session 3 Survey

The main dislikes of this session were that the GIS tutorial time was too short. It is true that this session ran short of time, so more time will be allocated for future iterations. There was also some confusion/dislike of the symbolic $100 activity. We believe this may also have been largely due to limited time for explanation and discussion afterward. These are things that can be addressed in the future. There was also dislike of some non-participation of certain students in the breakout groups. Non-participation of some students was a common feedback theme in all the session surveys and something we will strive to address in future sessions through some type of penalty/reward system.

Session 3 also received positive feedback regarding the QGIS tutorial, with caveats that it would have been better with more time (we were not able to make it through the whole tutorial in the allotted time, although a written tutorial document was provided for self-study). There was also good feedback regarding the breakout groups and

discussion, and several people said they enjoyed learning more about different research methods.

The main suggested changes included allocating more time to the GIS tutorial or making it more of a homework assignment to review in a later session. There were also suggestions to split this session into multiple sessions—one on epidemiologic methods, one on study designs, and one on GIS. There were also suggestions to shorten the amount of time spent on the Rate/$100 Budget activity.

4.3 Overall course survey results

A total of 16 participants (73%) completed the overall course survey. All (100%) of survey takers reported that they would recommend the course to others. Fifty percent said they would be willing to pay to take the course, and, among those, the amount they would be willing to pay ranged from $150 to $300.

The majority of participants (75%) reported that they would take this course for academic credit if it was converted to a semester-long course, and 100% said they would take this course for continuing education credits. The types of continuing education credits sought included: civil engineering, safety and asset management, American Planning Association, and Professional Engineering License for transportation engineers.

Just over half (53%) of participants reported that there were topics not covered that they would have like to learn about. Topics suggested to add or expand upon included: human factors, traffic planning, traffic flow, road design, policy development and implementation, emergency response strategies for different countries, and comparison of how safety is approached by different disciplines. These could likely be addressed with more sessions or a longer course overall. In terms of time and number of sessions, the majority (75%) of students reported that the length of the sessions was ‘Just right,’ and 69% reported there were too few sessions.

Nearly 90% of survey respondents were very satisfied or somewhat satisfied with the Zoom virtual classroom platform and the ICON/Canvas learning management system used for the course website (Figure 4.1). A small number of people (18%) reported having technical issues with Zoom. These issues included sound or video lag, trouble getting Zoom to work on a regular browser (vs. using the mobile version), and instable connections. It is likely these issues were internet-connection-related or computer-specific, rather than Zoom-related.

The majority (87.5%) were also satisfied with the course website content. Suggested changes included: 1) more clearly indicating which items on the website were for reference versus which items were meant to be discussed in class, and 2) adding more examples with photos or videos.

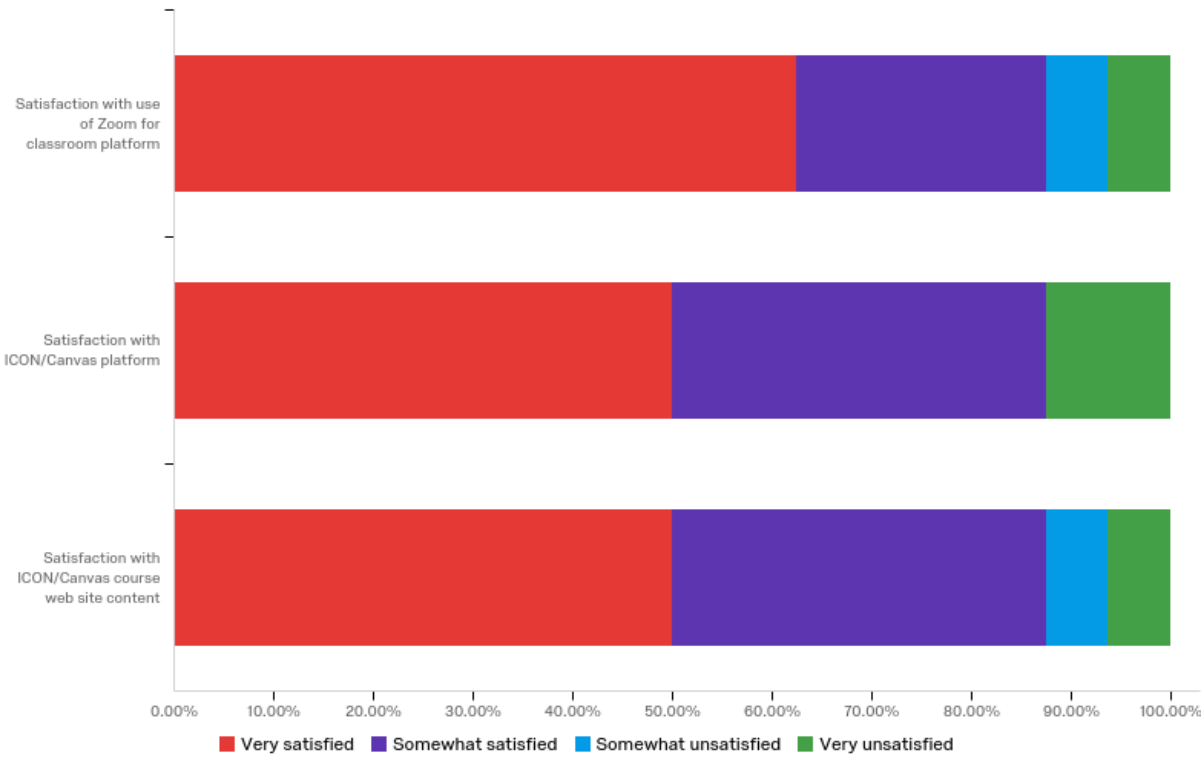

Figure 4.1 Satisfaction with technology platforms used in the course

Overall, the main things that people reported liking most about the course were its interactive delivery approach, broad range of topics, and small group exercises (e.g., “The interactive part of the course was really good.”; “The course was a great overview of some of the main issues and opportunities related to road safety. The small group exercises were a valuable part of the course.”)

The main dislikes were that the course was too short, but some also said that the individual sessions were too long. There were also concerns reported about lack of participation of some people in the small groups.

The most useful things that people reported learning included: types of studies and different research methods, different policies and road safety issues around the world, the definition of safety, QGIS software, and more about autonomous vehicles.

Overall, the course was well received, and the pilot went smoothly. We also obtained a lot of good feedback from students regarding ways to improve the course for future iterations. The new and adapted (from in-person format) curriculum worked well in the online format. Future directions include continuing to improve this short-course, certificate-based format, possibly adding a couple more sessions, and developing a more in-depth online, semester-long, academic-credit-based course.

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