

**MITIGATION OF LANE DEPARTURE CRASHES IN
THE PACIFIC NORTHWEST THROUGH
COORDINATED OUTREACH
PHASE II**

FINAL PROJECT REPORT

by

David Hurwitz and Zachary Barlow – Oregon State University
Ahmed Abdel-Rahim – University of Idaho
Nathan Belz – University of Alaska Fairbanks
Linda Ng Boyle – University of Washington
Leila Hajibabai – Washington State University

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More Hall 112, Box 352700
Seattle, WA 98195-2700

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16. Abstract There are multiple approaches available to roadway safety officials to reduce the 17,000 average annual fatalities that occur because of roadway departure crashes (FHWA 2016). One of these approaches is educating the driving public about the safety issues associated with a roadway departure through outreach efforts and public service announcements (PSAs). To engage the public in the Pacific Northwest about lane departure crashes, PacTrans supported a high school and college student competition to develop PSAs related to lane departure crashes. This deliverable constitutes Phase II of the project, which included implementation of the competition that was planned in Phase I. The competition involved high school and college students in the Pacific Northwest creating a set of PSAs in the form of a short video, a series of social media posts, and a poster. Students submitted their competition entries through the online submission website. Next, the entries were evaluated by the project team members based on the criteria presented in the competition guidelines, and prize winners were awarded at first-, second-, and third-place levels in both the high school and college categories. The entries were judged to be of high quality and demonstrated a creative understanding of this safety issue. Many of the entries highlighted the role of distracted driving as a primary cause of lane departure crashes. The materials from the entries will be distributed through various PacTrans communication outlets, including the web page, list serve, and social media accounts. The final element of this outreach project, Phase III, will expand the competition to include K-9 students and will further educate the public in the Pacific Northwest regarding the safety issue of lane departure crashes.			
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FHWA: Federal Highway Administration

PacTrans: Pacific Northwest Transportation Consortium

PSA: Public service announcement

Executive Summary

There are multiple approaches available to roadway safety officials to reduce the 17,000 average annual fatalities that occur because of roadway departure crashes (FHWA 2016). One of these approaches is educating the driving public about the safety issues associated with a roadway departure through outreach efforts and public service announcements (PSAs). To engage the public in the Pacific Northwest about lane departure crashes, PacTrans supported a high school and college student competition to develop PSAs related to lane departure crashes. This deliverable constitutes Phase II of the project, which included implementation of the competition that was planned in Phase I. The competition involved high school and college students in the Pacific Northwest creating a set of PSAs in the form of a short video, a series of social media posts, and a poster. Students submitted their competition entries through the online submission website. Next, the entries were evaluated by the project team members on the basis of the criteria presented in the competition guidelines, and prize winners were awarded at first-, second-, and third-place levels in both the high school and college categories. The entries were judged to be of high quality and demonstrated a creative understanding of this safety issue. Many of the entries highlighted the role of distracted driving as a primary cause of lane departure crashes. The materials from the entries will be distributed through various PacTrans communication outlets including the web page, list serve, and social media accounts. The final element of this outreach project, Phase III, will expand the competition to include K-9 students and will further educate the public in the Pacific Northwest regarding the safety issues of lane departure crashes.

Introduction

1.1 Introduction

This technical report summarizes the activities and outcomes of Phase II of a PacTrans outreach project that was aimed at educating the public about the safety implications of roadway departure crashes. These crashes comprise more than half of all traffic fatalities that occur in the United States (FHWA 2016). To educate the community about this significant issue regarding traffic safety, a student competition was created to engage the public, and specifically younger drivers, about the risks of lane departure crashes. Phase I of this outreach project was the research and planning phase for the student competition. Phase II was the execution and promotion of the materials generated as a result of the competition.

1.2 Recap of Phase I

Phase I of this outreach project was described in the PacTrans Technical Report entitled *Mitigation of Lane Departure Crashes in the Pacific Northwest through Coordinated Outreach - Phase I* (Hurwitz et al. 2016). That report served as an introduction to the project and outlined the tasks completed by the participating universities to create and execute a public service announcement (PSA) competition among high school and college students in the Pacific Northwest. The PSA competition was meant to bring attention to the issue of lane departure crashes and expand PacTrans' connection with the regional community.

The report included a review of the literature that both explored the general characteristics of PSAs in the transportation field and highlighted some specific PSA programs that have been implemented by various transportation and safety organizations. The review specifically focused on the use of social media as a medium for communicating PSA materials. This included understanding the types of social media available and the formats used by PSA

campaigns to distribute PSAs. It also explored previously used methods for engaging young drivers in safety issues.

Phase I then outlined the planning of the high school and college PSA competition based on the information determined through the literature review. To solicit a diverse set of PSAs that could be shared through a variety of media, the following three components were required for each submission in the competition:

- One video approximately 20 to 30 seconds in length
- A series of five Twitter or Instagram posts that could include text, photos, or memes
- A poster (2 feet tall x 3 feet long)

A submission web page was created that provided information about the project and included a web-based form that allowed the students to submit all three elements of the deliverable and provide demographic information so that the entry could be correctly categorized and the students could be contacted regarding awards.

To inform students in the region about the competition, advertisement materials were created. In addition to the web pages on the PacTrans website describing the project, flyers were drafted (for high schools as well as colleges) that briefly explained the project and provided instructions for completing and submitting the entries. The flyers were distributed to email listserves at the university, college, and department levels. For the high school competition, the flyers were distributed to individual high school principals around the participating states for distribution to their students. The following chapters of this report describe the implementation of the competition designed in Phase I and discuss the next steps of this outreach project. Phase III will consist of a similar competition-based initiative directed to K-9 students to further connect PacTrans with the regional population.

Collection, Evaluation, and Selection of Entries

2.1 Collection of Entries

As described in the Phase I technical report, the submission vehicle for the competition entries was a web-based portal on the PacTrans website. This portal provided instructions for how the students could submit each of the three components of their competition deliverable: the video, the social media posts, and the poster. This web-based form, which remained open until the deadline for the project, also collected demographic and contact information from the submitter. On the basis of this demographic and contact information, the project team was able to sort the entries into their respective categories. As described in the advertisement material, the high school competition was divided geographically by state (Alaska, Idaho, Oregon, and Washington) in the region. Therefore, three high school winners were selected in each of the four states. For the college-level, entries would be accepted from students enrolled at any of the five universities participating in the outreach project. These included Oregon State University, University of Alaska Fairbanks, University of Idaho, University of Washington, and Washington State University. Each of these universities selected up to three award winners from the submitted entries. In total, there were nine separate competition categories for this initiative. The following table summarizes the number of entries received from each of the competition categories. In total, there were 13 entries for the competition.

Table 1 Competition entries per competition category

Number	Competition Category	Number of Entries Received
1	High School - Alaska	0
2	High School - Idaho	2
3	High School - Oregon	0
4	High School - Washington	1
5	College – Oregon State University	2
6	College – University of Alaska Fairbanks	3
7	College – University of Idaho	2
8	College – University of Washington	0
9	College – Washington State University	3

Unfortunately, the number of entries for the competition was lower than anticipated.

Therefore, some of the competition categories did not have enough entries to award the all three prizes for first, second, and third places. Some categories had no entries at all. The potential reasons for the lack of entries are discussed in subsection 4.3 Lessons Learned.

2.2 Evaluation of Entries

The collection and organization of all the submissions began after the competition deadline had passed. The next step was to evaluate the entries so that the winners could be selected. As described in the Competition Guidelines section of the PSA competition webpage (<http://depts.washington.edu/pactrans/students/competition-guidelines/>), the entries were evaluated on the basis of the following criteria:

- Creativity
- Originality
- Fulfillment of competition guidelines
- Expression of the competition theme, “Make Safety Your Focus: Mitigation of Lane Departure Crashes.”

Each submission was judged as a complete unit, and all three elements of the submission (i.e., video, social media posts, and poster) were evaluated together. The principal investigator (PI) in each state was responsible for evaluating both the high school and college submissions in his/her state. Each of the four criteria for evaluation was given equal weight in the decision process. Since there were three levels of awards, it was necessary that in the first step of the evaluation process, the PI determine the top three submissions in each category for the competition awards to be distributed fairly.

2.3 Selection of Award Winners

After all of the submissions had been evaluated, it was necessary to rank-order them so that the awards could be distributed. As stated in the advertisement material for this competition (<http://depts.washington.edu/pactrans/students/safety-competition/>), the following three prizes were available for each competition category:

- 1st prize: \$750
- 2nd prize: \$500
- 3rd prize: \$250

These awards were available for each of the nine competition categories. The PI in each state was responsible for selecting the award winners at both the high school and college category in his/her state. After the individual PIs selected the first-, second-, and third-place submissions in each of the competition categories, the competition participants were notified, and the awards were distributed. This process is explained in more detail in Chapter 4 of this report.

Content and Themes of Entries

While the competitive nature of this outreach project necessitated the collection and evaluation of submissions to select award winners, the community engagement portion of the project relies upon all the competition materials submitted by the students. This chapter examines all the submission materials that were submitted and provides a general summary of the content and themes across all of the entries.

The following three sections explore the contents of each of the three elements of students' submissions. Given the unique characteristics of each of the three elements (i.e., video, social media posts, and poster), the content of each will be described in a separate section. Section 3.1 describes the video submissions, including the style and quality of the products across the submissions. Section 3.2 explores the social media posts, including the platforms used and the types of content within the posts. Section 3.3 describes the various construction and content of the poster submissions to the competition.

Section 3.4 steps back from the specific content and characteristics of the submission elements and highlights the general themes regarding roadway departure that were presented across all submissions. This aggregation serves as a guide for discerning the students' understanding of lane departure crashes as a safety issue. This understanding can then be used to promote additional awareness of the safety issue of lane departure crashes within the broader driving community in the Pacific Northwest.

3.1 Video Submissions

Videos were the primary element of the student's PSA submissions. The videos were intended to be between 20 and 30 seconds long. The collected videos from the competition employed a variety of cinematic techniques to convey the safety awareness message. Six of the

videos took a simple approach and only included a series of still images with a background voice-over. Three others had live action film playing, and again included a background voice-over throughout the production. The most impressive, in terms of production quality, were the two videos that included live action and actors interacting and speaking in a true feature film style. Finally, one film was presented in an interview style that had individuals discuss their thoughts and opinions on lane departure crashes. Figure 1 depicts a screenshot from a high school video submission and Figure 2 depicts a screenshot from a college video submission.



Figure 1 High school-level video screenshot

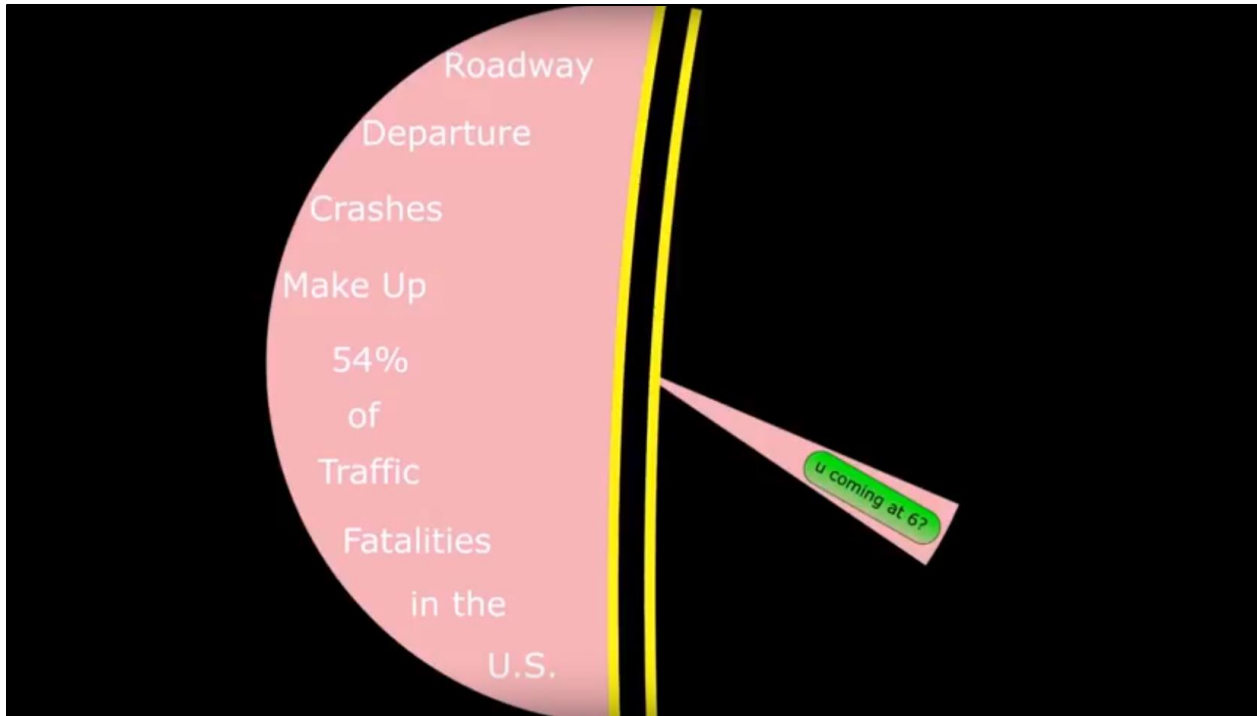


Figure 2 College-level video screenshot

While each of these films was constructed through a different approach, each one communicated about the importance of lane departure crashes as a modern transportation safety issue.

3.2 Social Media Posts

The social media post submissions were the most consistent of the three submission elements, since the platforms used for the social media posts have specific constraints. All of the competition participants produced social media posts that were intended to be posted on the social media sites Instagram or Twitter. Seven of the submissions opted for Twitter posts and four opted for Instagram posts (one submission used both Twitter and Instagram).

The Instagram posts were the most uniform, as expected because of Instagram's limited flexibility. All posts on Instagram were a single photo and an associated caption. The photos in the submissions ranged from personal photographs to Internet memes and cartoons related to

distracted driving. Figure 3 is an example of a submitted Instagram post with a photo and its caption.



Figure 3 College-level social media post

The Twitter posts had slightly more flexibility. Twitter, while it only allows 140 characters of text, allows users to attach various media to the post such as videos, Internet links, or photos. In the social media submissions intended to be posted on Twitter, two included only text. However, the other five Twitter submissions also included an associated photo. These photos included content from published charts and graphs, distracted driving graphics, and cartoons related to roadway safety. Figure 4 is an example of two Twitter posts, one with a photo attached, and one that was only text.

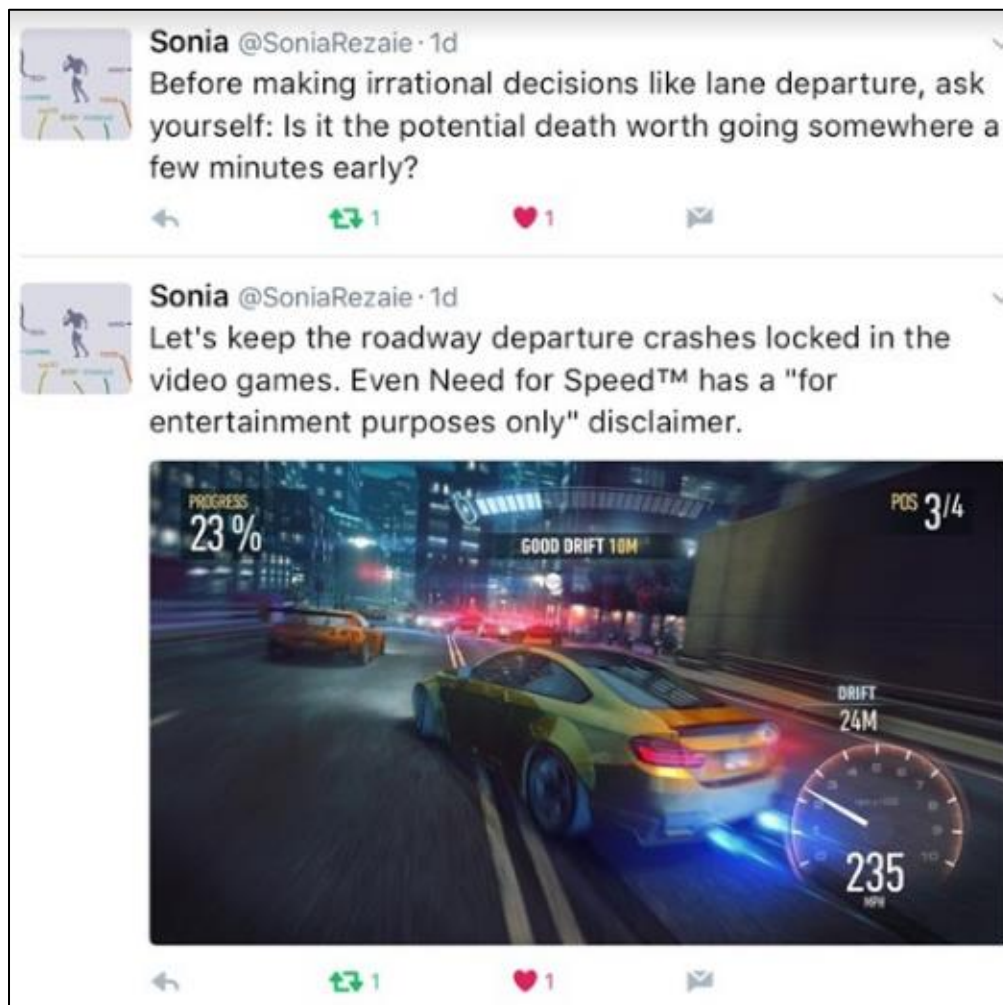


Figure 4 High school-level social media post

Both of these platforms support the use of “hashtags” that allow those terms or phrases to be identified and searched by any user of the platform. For example, if a post included a hashtag (e.g., #roadwaydeparture) on Instagram or Twitter, any user could search that hashtag and any post that used that hashtag would show up using the respective platform’s search function. The posts that were submitted used similar hashtags across the five posts, meaning they could be searched as a group to create a more comprehensive PSA.

3.3 Poster Submissions

The posters across the submissions can be divided into two primary categories: the artistic poster and the academic poster. The requirements for the poster were very open-ended, and the collection of both of these types of submissions further bolsters the breadth of outreach potential from this project. Six of the submissions were academic posters. These posters roughly followed the structure of a traditional academic research poster. They included a title and the students’ names at the top, and then had several blocks of text and images that comprised the bulk of the poster. In general, the academic posters were text heavy and contained figures, graphs, and statistics. Figure 5 depicts an example of an academic poster.

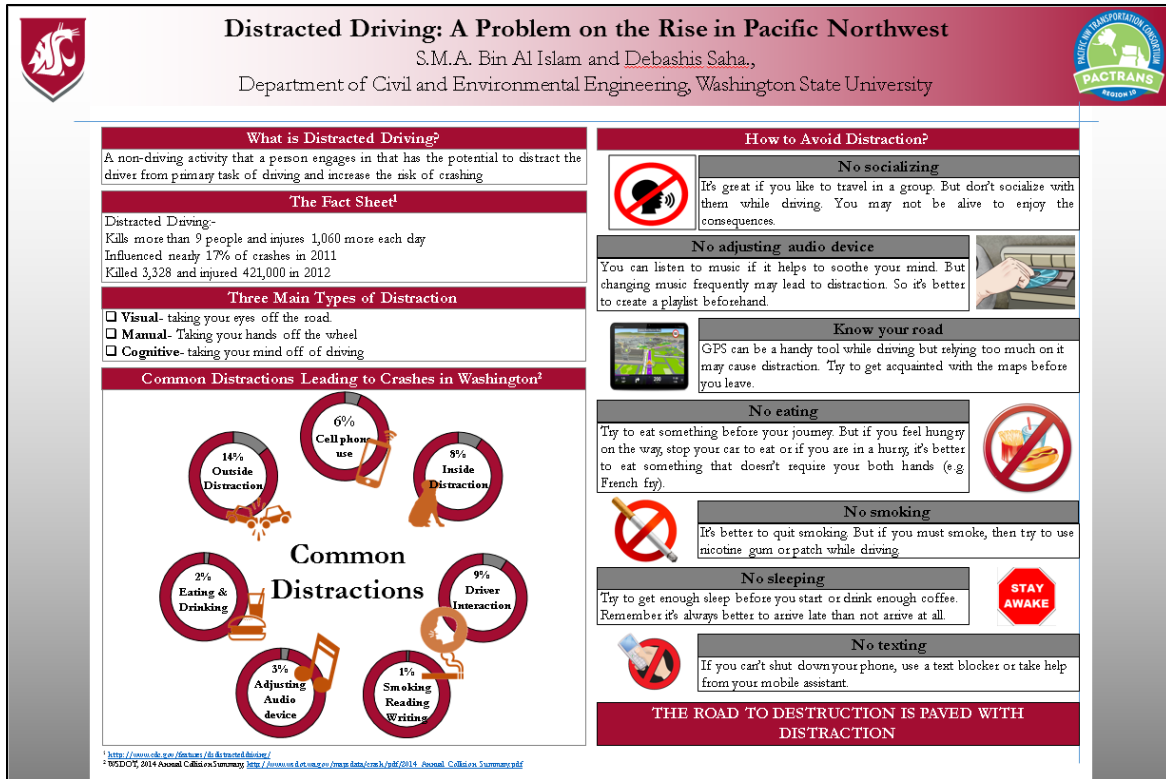


Figure 5 Academic style poster

The other six the posters took a more artistic approach to the assignment. Instead of having multiple smaller figures with related text, these posters contained a common artistic theme and simple textual messages. These PSAs were intended for a less academic audience. Figures 6 and 7 are examples of artistic posters that were submitted as a part of the competition. Figure 6 is a computer-generated example of an artistic poster, while Figure 7 is an example of a well-executed hand drawn poster.



Figure 6 High school-level poster



Figure 7 College-level poster

3.4 Overall Themes

The vast majority of the submissions mentioned and even primarily focused on driver distraction as a cause of lane departure crashes. Based on this evident theme, the students who participated in the competition clearly understood that there is a relationship between distracted driving and lane departure crashes. In particular, there were many references to cell phones being a chief distraction to drivers. Many of the videos, cartoons within the social media posts, and examples of distraction in the posters highlighted the danger of being distracted by cell phones while driving. Other distractions, such as eating, talking, and changing the radio, were also mentioned in several of the PSAs.

In addition to distraction, other contributors to lane departure crashes were also found in some of the PSA submissions. Driving under the influence of drugs or alcohol was mentioned in several of the PSAs as a potential cause of lane departure crashes. Causes such as extreme geometric alignment of the roadway and adverse weather conditions were also mentioned.

The themes that were evident across the student submitted PSAs would give the reader a firm understanding of the contributors to lane departure crashes (e.g., driver distraction) and demonstrate the importance of the issue through statements regarding the severity and frequency of these types of crashes.

Research has shown that there are other factors that contribute to lane departure crashes that were not highlighted in the submissions. Davis et al. (2006) noted that the severity of lane departure crashes increases as speed increases. Lord et al. (2011) studied lane departure crashes in Texas and found that speed was a contributing factor, especially within curves on the road. Another major factor that can contribute to lane departure crashes is fatigue. A 2016 Insurance Institute for Highway Safety report found that 34 percent of drivers who crashed from a lane

departure were sleeping or fatigued (Cicchino and Zuby). Hence, sleep deprivation has been recognized as an important contributing factor to crashes that affect drivers' functionality through weak coordination, longer reaction times, judgment deficiency, and shortage of memory. These factors were not highlighted by the submissions. Driver distraction, which is also a significant factor to lane departure crashes, was the focus of the submissions.

Conclusions

4.1 Award Distribution

The selection of the winners in each category and the distribution of award notifications and funds were conducted by each of the PIs at each of the participating universities. For example, the PI at the University of Idaho was responsible for selecting the competition winners, notifying the participants, and distributing the awards at both the high school- and college-level competitions in Idaho. The first step was for each PI to select the winners and rank order the entries from his/her state for the high school- and college-level competitions. Next, the PIs distributed award notifications to the winning teams. A template award notification letter was distributed to each of the PIs so that consistent information was relayed to everyone who participated in the competition. In addition, the PIs purchased plaques for the competition winners. A vendor was chosen and a template plaque design was created that the PIs used to order plaques so that they would be consistent across the regional competition for the winning teams. The final step was the distribution of funds to the winning groups. Figure 8 provides an example of the university awards presented at OSU.



Figure 8 Presentation of plaques to the OSU PSA college award winners (right to left: Hisham Jashami, Zach Barlow, and Masoud Ghodrati Abadi) by Dr. Hurwitz (left)

Figure 9 shows the awards being presented for the college-level competition at the University of Alaska Fairbanks, where the first place team was presented with inscribed iPad Mini's stating the student's name and "1st Place – 2016 PacTrans Lane Departure PSA Competition."



Figure 9 Presentation of inscribed iPads to the UAF PSA college award winners (right to left: Daniel Bozone, Kirsten Loiza, Dylan Nixon-Helms, and Dylan Carpenter)

Since different schools have different requirements and processes for distribution of the project funds, each PI was responsible for ensuring the students who participated and were selected as award winners receive their award money.

4.2 Distribution and Promotion of Winning Materials

Since the purpose of this project was to engage the public and educate them about roadway safety and lane departure crashes, an important part of the outreach element of this project is to distribute and promote the PSA materials generated through this competition at both the high school and college levels. The primary avenue for PacTrans to distribute the materials is

to include them in its promotional materials and incorporate them into the organization's social media presence.

The project team produced a shortlist of some of the best individual submission elements (posters, videos, and social media posts). Each PI was responsible for selecting the best elements from their state's submissions and sending those to PacTrans to be distributed in the format PacTrans decides will be the most effective for the specific material. This will allow the competition project to not only engage the students who participated in the project, but also educate the broader public in the Pacific Northwest that engages with PacTrans.

4.3 Lessons Learned

While the quality of the submissions received was high and many materials were generated through the competition that can be used by PacTrans to promote awareness of lane departure crashes, as with any complex project, there are opportunities to improve the implementation of similar competitions in the future. Primarily, the number of entries was much lower than anticipated.

No single category received more than three entries, meaning that all completed submissions in the high school- and college-level competitions in their respective states received some award. Some categories (e.g., Oregon high school level, University of Washington college level) received no entries. Many of the competition categories only received one or two entries. The project team discussed several potential reasons for the low number of entries. These discussions highlighted some specific 'lessons learned' from this round of the PSA competition that can be considered or implemented in Phase III of this outreach project, in future PacTrans outreach projects, or by others conducting similar student competitions.

The primary explanation for the lack of entries was a limited number of effective advertising and marketing strategies. Various techniques were used in different states to inform eligible students about the competition. These methods, at the college level, included dissemination of the information through school and department email listserves, as well as advertising posters and booths in some locations. At the high school level, advertisement took place primarily by contacting school principals who then distributed the information at their discretion. While the advertising methods were varied, they may not have reached the attention of all students. In particular, contacting principals at high schools may have been a step too far removed from the students to effectively reach them in a timely manner. It is not known how many principals actually distributed the competition advertisement material to the students. A more effective strategy may have been to inform specific teachers about the PSA competition (as took place in Pullman High School in eastern Washington state). Also, starting the advertising earlier may have increased participation by giving students more time to complete the submissions.

Another possible reason is that the prize levels did not provide sufficient incentive for students to participate in the project. These issues were discussed with respect to the number of required components for this competition. Students may have felt the time investment to produce the video, social media posts, and poster was not worthwhile for the prize point. The advertised prizes were \$750 for first place, \$500 for second place, and \$250 for third place. Either increasing the prize money, increasing the number of prizes, or decreasing the number of required deliverables for the project may have helped to secure more entries.

An unfortunate technical issue also may have contributed to a lack of entries. The online entry form contained a strict size limit, and the entire submission would be rejected if the file

size for any of the project elements was too large. The issue was that for part of the competition submission period, the submitters were not given a message that their submission had failed or succeeded. Therefore, it is possible that some students submitted projects that were not accepted, and there was no record of who those students might have been or even if they existed. The issue was fixed for the latter period of the submission period. This issue could have particularly affected high school entries, since their deadline was earlier than the college student deadline.

4.4 Phase III

Phase III of the PacTrans Lane Departure Outreach Project commenced in January of 2018. The goal of Phase III is to execute another iteration of the PSA competition that expands the population of engagement to K-9 students. The goal of this phase of the competition is to reach an even larger audience of students about the broader concept of automobile and driver safety. Another objective is to encourage younger students to think about, at early stages of their lives, the causes as well as significant impacts of car crashes. This will include exploring topics such as “What is a car crash?” and “What causes a car crash?” in a competition format that is appropriate for the targeted age group, which is younger than the targeted student population in Phase I and Phase II. The lessons learned from the competition that was run for Phase I and Phase II of this outreach project will be considered during the development of Phase III of the outreach project in order to solicit more participation from across the region. Achieving a higher level of participation in the competition will help fulfil the outreach project’s overall goal of engaging the public in the Pacific Northwest regarding the safety issue of lane departure crashes.

References

- Cicchino, J. and Zuby, D. (2016). "Prevalence of Driver Physical Factors Leading to Unintentional Lane Departure Crashes." Insurance Institute for Highway Safety, Arlington, VA.
- Davis, G.A., Davuluri, S., and Pei, J. (2006). "Speed as a Risk Factor in Serious Run-off-Road Crashes: Bayesian Case-Control Analysis with Case Speed Uncertainty." *Journal of Transportation and Statistics*, Vol. 9, No. 1. Research and Innovative Technology Administration, U.S. Department of Transportation, Washington, DC. P. 17-28.
- Federal Highway Administration (FHWA). 2016. "Roadway Departure Safety." Online. Available: <http://safety.fhwa.dot.gov/roadway_dept/>. Accessed January 2017.
- Hurwitz, D., Barlow, Z., Abdel-Rahim, A., Belz, N., Boyle, L., Hajibabai, L. (submitted 2016). "Mitigation of Lane Departure Crashes in the Pacific Northwest through Coordinated Outreach (Phase I)." Pacific Northwest Transportation Consortium (PacTrans), Seattle, WA.
- Lord, D., Brewer, M., Fitzpatrick, K., Geedipally, S., and Peng, Y. (2011). "Analysis Of Roadway Departure Crashes On Two-Lane Rural Roads In Texas." Report No. FHWA/TX-11/0-6031-1. Texas Transportation Institute, College Station, TX.