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Focused Novice Driver Program - Assessment Results and Discussion

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Abstract: Skills and experiences of novice drivers do not favorably compare to motorists with significantly greater driving time and life experiences. Recent developments in driver education and training have focused on multistage instruction to take advantage of the time delay for driving privileges in Graduated Driver Licensing (GDL) systems as a means to provide additional instruction. A supplemental safe driving program tailored to address the risky behaviors of novice drivers has been developed by Clemson University Automotive Safety Research Institute (CU-ASRI) and the Richard Petty Driving Experience (RPDE). The program offers training in anticipatory safe driving strategies based on the leading causes of vehicle crashes through classroom and in-vehicle components. These programs were implemented in three states with 549 young drivers as participants. Students were evaluated using both in-vehicle instructor metrics and objective based questionnaires. The metrics assess critical driving skills and knowledge. The assessment results for 23 driving classes are presented and discussed. Overall, the students demonstrated improvement in driving skills throughout the six hour program as evidenced by skills scores during the braking, reaction time / obstacle avoidance, tailgating, and loss of control modules and an average 17.68% increase between pre- and post-test scores reflecting general knowledge.

Keywords: driver education, driver training, driver evaluation, driver skill assessment

1. Introduction

Driver fatalities have dropped significantly in the past decade, yet teens remain overrepresented in national crash statistics (National Highway Traffic Safety Administration [NHTSA], 2012a). Although there was a 46% reduction in fatal crashes from 2001-2010, for drivers in the 15- to 20-year old category, motor vehicle crashes remain the leading cause of death for U.S. teens. Furthermore, teens have the lowest rate of seat belt use among all age groups (NHTSA, 2012a). NHTSA reports the number of alcohol-impaired (BAC 0.08 or higher) teen drivers involved in fatal crashes fell from 1,444 in 2001 to 837 in 2010, however, the percentage of involvement remained unchanged at 18% in both years (NHTSA, 2012b).

The graduated driver licensing (GDL) systems in place across the country are largely credited for reducing the crash risk for novice drivers, and efforts to strengthen these systems are seen as an important step to further reductions in crashes, injuries, and fatalities (Centers for Disease Control and Prevention [CDC], 2011). GDL systems are designed to allow novice drivers to gain driving experience over time in stages from lower-risk situations to riskier situations including driving at night and driving with passengers (Insurance Institute for Highway Safety [IIHS], 2012a; CDC, 2011). Each state has its own version of the staged GDL system: initial learner stage, an intermediate or provisional phase, and full licensure. When supervised by an adult driver, often a parent, novice drivers are less likely to be involved in a crash; however, their crash rate rises significantly during the first six months they are unsupervised (NHTSA, 2012c).

The Petty Safe Driving Program (SDP) was conducted in Florida, Georgia, and North Carolina during 2010 - 2011 and targeted teen drivers. The 2011 national Youth Risk Behavior Survey (YRBS) results indicate that high school students in these states generally were similar to the national student results, although North Carolina teens were less likely to either ride with a drinking driver or drive when drinking (CDC, 2012).

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In August 2010, the Centers for Disease Control and Prevention ranked the Georgia and North Carolina GDL systems as “good” and the GDL system in Florida as “fair” (CDC, 2011).

These three state GDL systems all have a minimum age of 15 to obtain a learners permit. North Carolina requires driver education for permit applicants under age 18 and restricts permit holders from driving between 9 pm and 5 am for the first six months. Florida restricts permit holders from driving after sunset for three months and then after 10 p.m. Each state requires young drivers to hold the learners permit for at least 12 months before acquiring a license or restricted license. Georgia license applicants under age 17 must complete driver education (IIHS, 2012b).

Minimum supervised driving times differ from 40 hours (6 at night) in Georgia, to 50 hours (10 at night) in Florida, to 60 hours (10 at night) in North Carolina during the learner phase followed by 12 hours (6 at night) during the intermediate phase (IIHS, 2012b). Nighttime restrictions differed in these states as well. In North Carolina, intermediate or restricted stage drivers cannot drive between 9 pm and 5 am, while in Georgia the restriction is from midnight to 6 am and it is a secondary enforcement violation. Florida's nighttime restriction is tiered to age: 16 year-olds cannot drive between 11 pm and 6 am and 17 year-olds cannot drive between 1 am and 5 am. Nighttime restrictions may be lifted in Florida and Georgia at a minimum age of 18 and in North Carolina at age 16 years and 6 months (IIHS, 2012b).

Florida does not have passenger restrictions during the intermediate or restricted license stage. In Georgia, the minimum age at which passenger restrictions are lifted is age 18; however, passengers (other than family members) are not allowed during the first six months with an intermediate licensee and only one non-adult passenger during the second six months. After the first year, driving with more than three passengers is considered a secondary enforcement violation. In North Carolina, the minimum age at which passenger restrictions are lifted is age 16 years and 6 months. Until then, only one passenger younger than 21 is allowed in the vehicle with the novice driver, unless they are family members (IIHS, 2012b).

GDL provides novice drivers an opportunity to obtain additional instruction in stages and can address the complexity of the driving task. Moreover, a multistage instructional design for novice driver education and training includes: (1) an initial stage involving instruction in general knowledge, rules of the road, basic vehicle handling, and safe driving procedures; (2) later stages for improving individual driver performance in increasingly more dangerous situations; and (3) more focused training and practice on risk perception and decision-making skills shown to be associated with crashes involving young drivers (Stanley & Mueller, 2009).

One such later stage safe driving program for novice drivers was developed through a partnership between Clemson University Automotive Safety Research Institute (CU-ASRI) and Richard Petty Driving Experience (RPDE). Jensen, Wagner, Switzer, Alexander, Pidgeon, and Rogich (2011) described the development of this novice driver training program which includes classroom and in-vehicle components related to visual searching, attention errors, and overall vehicle speed combined with instruction in anticipatory driving strategies.

In addition to the assessment tools discussed in Section 2, CU-ASRI researchers have planned to utilize real time vehicle operating data in the assessment process for future work in response to studies found in the international literature. Researchers in Japan have shown that the driver’s risk factor may be determined from their acceleration patterns (Naito, Miyajima, Nishino, Kitaoka, & Takeda, 2009). A follow up study ascertained the applicability of braking and steering patterns to describe a driver’s risk factor (Miyajima, Ukai, Naito, et al. 2011). Since a driver’s performance can be quantified through the classification of vehicle operation variables, a supplemental assessment method was designed for the SDP program (Clark, Wagner, Alexander, and Pidgeon, 2012). While not implemented in this study, real time vehicle operating data can be recorded, analyzed, and integrated

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into the assessment method in the future.

Operating a motor vehicle involves a series of actions through the human-machine interface as shown in Figure 1. Primary skills associated with assessing the core factors of the in-vehicle modules have been explicitly listed (Braking, Reaction Time / Obstacle Avoidance, Tailgating, and Loss of Control). To assess driver performance, both in-vehicle instructor ratings for each module and the pre- and post-test questionnaires are evaluated to calculate an overall driver rating. The remainder of this paper is organized in the following manner. Section 2 describes the driver assessment methods used in the SDP. Section 3 reviews the student results to illustrate the driving program's effectiveness. Finally, Section 4 presents the conclusions.

2. Methods

A six-hour safe driving program was developed to deliver focused driving experiences and related safety information including instruction in safe driving judgment and decision making through in-vehicle and classroom discussions and activities to the participants. Instructors accompany students throughout the program, providing coaching in order to offer immediate feedback on performance, as well as to assess driving skill during the last run for each in-vehicle module. The interested reader is referred to Jensen *et al.* (2011) for more information regarding the driver modules within the safe driving program.

2.1 In-Vehicle Modules

The in-vehicle portion of the SDP consisted of four modules: Braking, Reaction Time / Obstacle Avoidance, Tailgating, and Loss of Control. In the Braking Module, students reacted to a simulated hazard requiring them to stop their cars within a prescribed distance. Then, during the Reaction Time / Obstacle Avoidance Module participants steered their vehicles

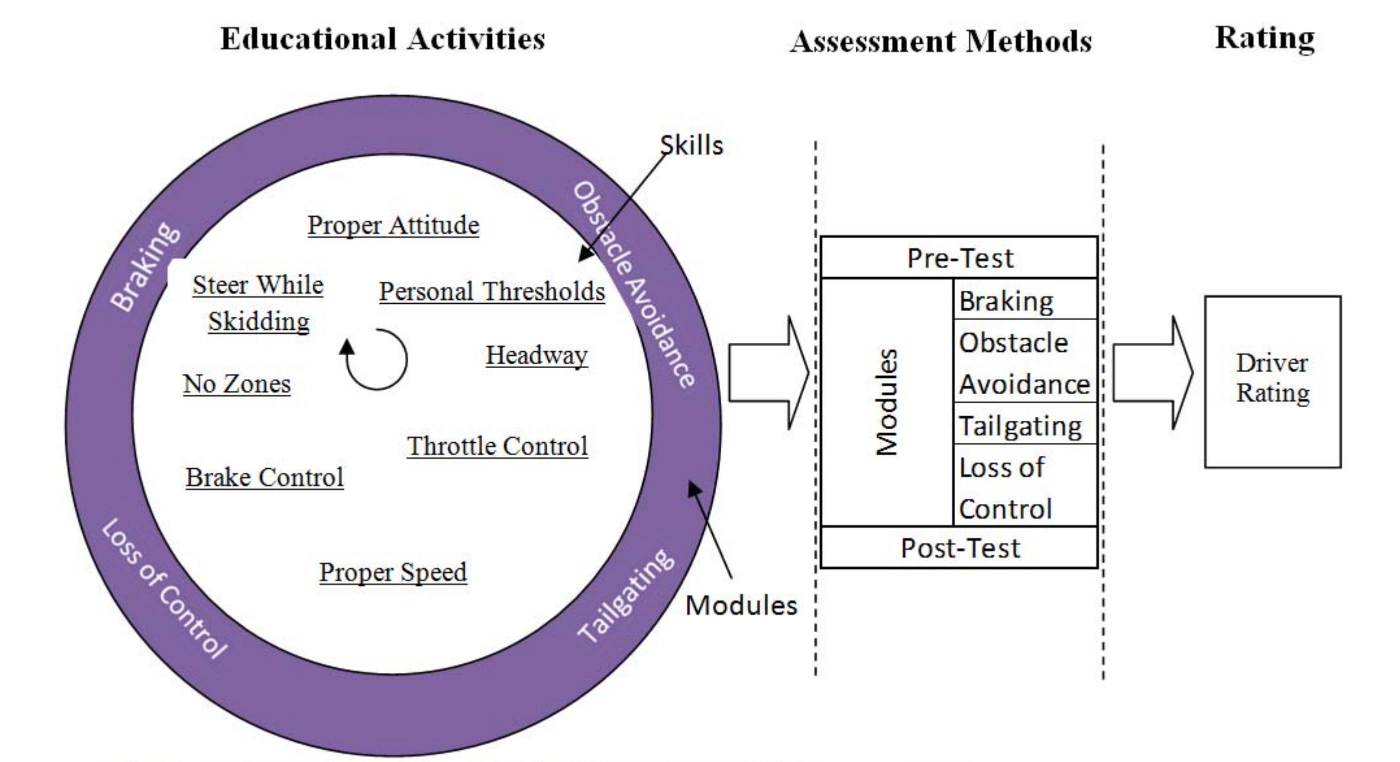

Figure 1: Overview of the safe driving program with assessment

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into the appropriately signaled lane. Next, during the Tailgating Module, students practiced proper following distances relative to a lead truck as shown in Figure 2. Finally, the Loss of Control Module allowed participants to experience the feel of their cars undergoing a wheel skid and the accompanying reduction in their ability to control and steer. Each of these modules is discussed more fully below.

Figure 2: Two students following the lead truck outfitted with the tailgating apparatus in the Tailgating Module

Braking Module: Incorrect application of base brakes when operating a vehicle can place a driver in a hazardous roadway situation. This driving module consisted of a long straightaway with three overhead traffic signals to specify where participants should stop their vehicles. Drivers were asked to bring their vehicle to the prescribed trap speed, and upon the traffic signal lighting red, stop before a specified location.

The braking assessment has the instructors observing the drivers for their operational trap speed, stopping before the stop strip, the distance from the vehicle's front end to the stop strip, braking technique, and whether the driver anticipated the maneuver.

Reaction Time / Obstacle Avoidance Module: Avoiding obstacles in a driver's lane of travel requires quick and proper application of both brakes and steering, recognition of a safe alternative to the current travel lane, and appropriate placement of the vehicle within the new lane of travel. The reaction time / obstacle avoidance course design consisted of a straightaway that splits into three parallel lanes, with the three overhead signal lights specifying the correct lane for students to occupy. Participants operated on the straightaway at the stated trap speed, and upon light change (red lights signify "closed" lanes) must quickly navigate their vehicle to the specified open lane. Instructors evaluated drivers on operating at trap speed, braking technique, steering wheel technique, lane choice, car positioning, and whether they anticipated the maneuver.

Tailgating Module: Following a vehicle while driving in traffic requires the driver to maintain a proper following headway while also being prepared to quickly react to a hazard by stopping and / or avoiding it. This module's roadway was a large oval course, with lanes for two separate student vehicles and a lead truck equipped with a tailgating apparatus developed by CU-ASRI and RPDE. The tailgating apparatus consisted of two arms that extend from the rear of the truck into the two student lanes, with soft material on each arm to ensure participant safety. The student vehicles follow the lead truck while maintaining a prescribed distance, and as the truck arbitrarily and abruptly brakes, the participants must stop their vehicles before contacting the flexible tailgating apparatus which features brake lamps similar to a lead vehicle in each lane. The instructors assessed the students for: proper headway, distance to lead truck once stopped, braking technique, proper acceleration and speed, and premature application of brakes.

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Loss of Control Module: The occurrence of a rear or front wheel skids can be hazardous for all drivers on degraded roadway surfaces, and requires the coordination of the throttle, brake, and steering wheel to safely recover. This module included a skid pad (80 foot diameter), and roadways. The roadway course featured S-turns and water on various surface locations. Students begin with laps on the skid pad and then proceed to the roadway. On the final run, the instructor evaluated students on trap speed, positioning of the vehicle, operating speed and technique, recognition of front and rear wheel skids, line of sight, and anticipation of the necessary maneuvers.

2.2 Program Pre- and Post-tests and Classroom Components

Student knowledge was assessed before and after the SDP through pre- and post-tests. The 14-item multiple choice tests ascertain the knowledge level of participants prior to training and measure the knowledge gained by the program conclusion. The SDP test development process began in 2008 by utilizing a representative group of experts from Clemson University and Richard Petty Driving Experience. The group included faculty and staff from education, engineering, psychology, and public health. In addition, Ph.D. graduate students from the School of Education and from the Departments of Mechanical Engineering, Industrial Engineering, and Psychology, as well as professional drivers participated. This expert panel was responsible for developing test items. The learning objectives for each of the four modules were used to identify the content domains to be tested and the test was constructed to measure specific content instructional objectives. Numerous pilot tests were completed in 2008 and 2009, and test items were analyzed to determine which items to retain, revise, or replace.

The reliability and validity of the final 14-item SDP test was assessed in several ways. First, the results from separate classes conducted in three cities during 2010 and 2011 were examined for consistent change in score. Second, an expert panel focused on content validity including both item validity and sampling validity as outlined by Gay, Mills, and Airasian (2009). In addition, numerous steps were taken to strengthen the validity of the test. The readability was measured by the Fry formula, and the reading level for test items was at the 7th grade level. Students completed the SDP pretest during the welcome session prior to any instruction and the posttest during the closing session following the completion of all four modules. To ensure standardized test administration, the same instructor delivered all the welcome and closing PowerPoint presentations that included the SDP tests and provided instruction to the students on how to use the iClickers to record their test responses. All instructors received periodic training on how to "teach to the objective, not to the test." Finally, internal consistency among the four SDP posttest dimensions was estimated with Cronbach's alpha ($\alpha = .64$).

A classroom component accompanied each module, with participants rotating between the in-vehicle and classroom portions during each module. Conducted next to the track in a large tent, classroom activities supplemented the in-vehicle experiences by emphasizing the importance of crucial driving skills and proper behavior / attitude while driving. The importance of maintaining a vehicle; awareness of commercial motor vehicle no-zones, and appreciating the dangers of driving while distracted, drunk or drowsy, and the importance of using seat belts correctly were among the topics addressed through presentations, discussions, and hands-on activities as shown in Figure 3.

Figure 3: Students are instructed to properly maintain their motor vehicles in the tent module which accompanies the Reaction Time / Obstacle Avoidance Module

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3. Results

A case study consisting of 23 safe driving classes with 549 student participants during the 2010 and 2011 calendar years are presented. The majority of students were male (55%) and two-thirds were under age 17. According to the 530 students who reported their age, 135 (25%) were age 15, 217 (41%) were age 16, 94 (18%) were age 17, and 84 (16%) were age 18 or older. Additional data collection about student driving experience began in May 2010. More than two-thirds (68.67%) of the 371 respondents reported driving with a learners' permit or provisional license. In addition, 142 (83.04%) of 171 participants who completed the SDP between November 2010 and November 2011 reported they first began driving at age 15.

Students were assessed through knowledge tests, which were administered at the beginning and end of the entire class, and by in-vehicle instructors during the four modules. The instructor assessment scores from the four modules were converted into an overall rating for the entire class. All the SDP instructors were professional drivers and had teaching experience through previous RPDE program offerings. Instructor training was designed and conducted by CU-ASRI faculty and senior RPDE personnel.

The class averages from the knowledge pre- and post-tests are presented in Table 1. Knowledge of key concepts taught during the SDP was evaluated by comparing the difference between pre- and post-test scores. Each class's pre-test versus post-test scores showed an increase in comprehension, with an average gain of 17.70% and ranged from 6.40% to 29.20% as shown in Table 1. Twenty-three classes were assessed including five (21.70%) classes with post-test scores less than 75%; sixteen (78.30%) classes with post-test scores of 75% or higher; and two (8.70%) with post-test scores above 85%. The difference between knowledge pre-test and post-test scores generally indicates that instructors were able to teach to the course objectives and students learned new information.

The five classes with post-test scores below 75% were conducted

Date	Location	Class	AM/ PM	Pre-test	Post-test	% Improvement
Feb. 2010	Charlotte, NC	1	AM	62.10%	72.00%	9.90%
		2	PM	55.90%	62.30%	6.40%
		3	AM	65.10%	78.70%	13.60%
March 2010	Atlanta, GA	4	AM	61.10%	66.40%	5.30%
		5	PM	63.10%	74.30%	11.20%
May 2010	Orlando, FL	6	AM	62.10%	78.60%	16.50%
		7	PM	53.70%	63.40%	9.70%
		8	AM	60.10%	77.50%	17.40%
July 2010	Charlotte, NC	9	AM	61.90%	89.00%	27.10%
		10	PM	64.10%	85.60%	21.50%
Aug. 2010	Atlanta, GA	11	AM	55.50%	80.30%	24.80%
		12	PM	62.30%	80.00%	17.70%
		13	AM	60.20%	84.20%	24.00%
Nov. 2010	Charlotte, NC	14	AM	59.60%	82.70%	23.10%
		15	PM	58.20%	80.70%	22.50%
Dec 2010	Atlanta, GA	16	AM	60.20%	83.00%	22.80%
		17	PM	55.60%	77.90%	22.30%
Dec. 2010	Orlando, FL	18	AM	63.20%	80.30%	17.10%
		19	PM	60.00%	83.10%	23.10%
March 2011	Charlotte, NC	20	AM	48.70%	77.90%	29.20%
		21	PM	60.30%	79.50%	19.20%
Nov. 2011	Charlotte, NC	22	AM	54.70%	77.90%	23.20%
		23	PM	60.80%	75.20%	14.40%
Mean Scores		-	-	60.21%	77.89%	17.68%

Table 1: Average knowledge scores from Petty Safe Driving programs offered between February 2010 and November 2011 where all scores are rated out of 100%

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between February and May 2010. Two classes held 10 days after the full day instructors' training in July 2010 recorded post-test scores above 85%, and more than 20% improvement between the pre- and post-test. For the remainder of the study period, only five of 15 classes scored below 80% on the post-test and four of these classes occurred more than six months after instructor training. The data suggests including regularly scheduled instructor classes either as an introduction to new instructors or as a refresher for experienced instructors.

The class averages for the in-vehicle skills portion of each module are presented in Table 2. The overall results from the four skills modules of the safe driving program culminate as the mean skill score. For the 23 classes, eight earned mean skill scores under 75% and fifteen scored between 75% and 85%. Four classes with mean skill scores under 75% were conducted prior to the July 2010 instructor training. Three of the four remaining classes with scores under 75% just missed the cutoff with scores ranging from 74.11% to 74.85%. While instructors received extensive training on how to complete the SDP skill evaluation sheet, a need exists to also have a

Date	Location	Class	AM/PM	Braking	Obstacle Avoidance	Tailgating	Loss of Control	Mean Skill Score
Feb. 2010	Charlotte, NC	1	AM	61.28%	81.15%	75.15%	77.92%	73.88%
		2	PM	65.50%	78.34%	82.64%	79.62%	76.53%
		3	AM	57.42%	84.31%	82.75%	73.25%	74.43%
March 2010	Atlanta, GA	4	AM	52.68%	64.15%	81.40%	70.93%	67.29%
		5	PM	65.63%	62.03%	79.91%	75.28%	70.71%
May 2010	Orlando, FL	6	AM	71.63%	84.70%	87.46%	92.29%	84.02%
		7	PM	75.46%	86.58%	83.92%	90.92%	84.22%
		8	AM	76.52%	83.13%	87.73%	90.54%	84.48%
July 2010	Charlotte, NC	9	AM	77.03%	86.33%	82.65%	83.66%	82.42%
		10	PM	86.11%	82.96%	86.64%	76.82%	83.13%
Aug. 2010	Atlanta, GA	11	AM	84.28%	84.71%	84.03%	80.58%	83.40%
		12	PM	88.14%	80.15%	85.22%	76.23%	82.44%
		13	AM	85.49%	85.00%	89.74%	83.64%	85.97%
Nov. 2010	Charlotte, NC	14	AM	86.53%	79.48%	81.62%	85.37%	83.25%
		15	PM	76.01%	74.52%	77.74%	83.13%	77.85%
Dec. 2010	Atlanta, GA	16	AM	73.93%	68.96%	79.71%	75.98%	74.65%
		17	PM	81.13%	73.87%	79.31%	67.87%	75.55%
Dec. 2010	Orlando, FL	18	AM	64.80%	85.54%	72.00%	*	74.11%
		19	PM	76.53%	75.00%	77.12%	*	76.22%
March 2011	Charlotte, NC	20	AM	69.63%	79.10%	69.10%	81.58%	74.85%
		21	PM	69.30%	84.10%	76.67%	76.63%	76.68%
Nov. 2011	Charlotte, NC	22	AM	60.60%	75.44%	80.21%	85.42%	75.42%
		23	PM	46.26%	80.00%	77.13%	71.51%	68.73%
Mean Scores		-	-	71.82%	79.11%	80.86%	79.96%	77.9%

*Data not collected during this module at these events in Orlando, Florida

Table 2: Average skill scores from Petty Safe Driving programs offered between February 2010 and November 2011 where all scores are rated out of 100%

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greater focus on inter-rater reliability in future programming efforts.

The Braking Module results show twelve classes with scores under 75%, seven with scores between 75% and 85%, and the remaining four with scores over 85%. The scores ranged from 46.26% to 88.14%. Overall, drivers earned an average score, of 71.82% for this module. The Braking Module is the first in-vehicle experience in the SDP and the generally overall low module score in comparison to other modules may in part be attributed to students' (1) inexperience in the program-supplied vehicle, and (2) unfamiliarity with both the instructor and assessment process.

However, in nine of the 23 classes, students scored higher in the Braking Module than in the Reaction Time / Obstacle Avoidance Module, with the difference between the two module scores ranging from 0.49% to 7.99%. Three classes (#12, #14, and #17) had a difference averaging 7.33% while the remaining six classes (#5, #10, #13, #15, #16, and #19) only averaged a difference of 2.54%. In addition, two classes (#11 and #20) had higher scores in the Braking Module than in the Tailgating and / or Loss of Control Modules.

Increased comfort level and familiarity with the vehicle, instructor, and track layout may account for the overall improvement of 7.29% in student scores observed between the Braking Module and the Reaction Time / Obstacle Avoidance Module, as shown in Table 2. The Reaction Time / Obstacle Avoidance Module results show five classes with scores under 75%, fifteen with scores between 75% and 85%, and three with scores above 85%. The scores ranged from 62.03% to 86.33%. The students achieved an average score of 79.11% in this module. Students obtained a higher score in the Reaction Time / Obstacle Avoidance Module than in at least one of the later modules - Tailgating and/or Loss of Control - in 13 classes included in this case study. In three classes (#7, #18, and #20), the Reaction Time / Obstacle Avoidance Module score was higher than that in the Tailgating Module but lower than that in the Loss of Control Module; while in four classes (#10, #12, #13, and #17), the Reaction Time / Obstacle Avoidance Module score was higher than the Loss of Control Module score but lower than the Tailgating Module score.

In the first half of the SDP class, all students participate in the Braking Module first and then proceed to the Reaction Time / Obstacle Avoidance Module. The track layouts for these modules are very similar. However, during the second half of the SDP class, the Tailgating and Loss of Control Modules are run simultaneously so some students start with the Tailgating Module and then proceed to the Loss of Control Module, while others start with the Loss of Control Module and finish with the Tailgating Module. In addition, these two track layouts are very different from one another. This module schedule may account for the difference in scores (7.29%) between the Braking and Reaction Time / Obstacle Avoidance Modules, and explain why a significantly smaller difference (0.9%) is observed between the Tailgating and Loss of Control Modules.

The Tailgating Module results show two classes with scores under 75%, fourteen classes with scores between 75% and 85%, and seven classes with scores over 85%. The overall average for the Tailgating Module was 80.86%. Similarly, the Loss of Control Module results show four classes with scores under 75%, twelve classes with scores between 75% and 85%, and five classes with scores over 85%. The overall average score for the Loss of Control Module was 79.96%. Two classes held in December 2010, in Orlando, Florida piloted new features for the Loss of Control Module and assessment run results were not compiled for use in the case study. The overall student skill performance is much higher for these later modules with the Loss of Control exercise highly favored by the students per their written comments. The increase in overall scores from Table 2, for the in-vehicle modules show that students' skill scores typically improved as the program progresses.

Instructors provided feedback to each student after each track

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run and in their notes it appears that students do show improvement between the first run through of the module skill and the final run (generally each student drives the track course 4-5 times per module). Currently, assessment of driving skill was measured by only one track run (typically the final run). Ideally, instructors should rate both the first and last runs of the module exercise to better document improvement. However, the time restraints of the existing SDP made it difficult to include a second assessment run in each module, and the first run through of the track course is now designed to demonstrate the basic maneuvers and explain the purpose and expected outcomes of the exercise. While the assessment form was not long, doubling its length for each student would require instructors to spend less time interacting with students. It is possible that a recorded in-vehicle data system developed by CU-ASRI and noted in Section 1 could be used to collect data from multiple runs. When coupled to an integrated visual notification system in the vehicle this device, could be used by the instructor to supplement student evaluation. Results from the data acquisition system could also be analyzed after the event to verify change in driving scores.

Rater reliability among PSD instructors could be further validated with the in-vehicle data system. Miyajima, Hiroki, Naito et al. (2011) observed some correlation between evaluation results based on acceleration, deceleration, and steering behavior from drive recorders and those scored by risk consultants. Once instructors received additional training after class #8, it appears the post-test scores from each class tended to trend more closely with the mean skill scores and suggests students obtained more knowledge about safe operating procedures and skills to control the vehicle while recognizing and avoiding potential hazards.

Although this case study was carefully prepared, there were limitations and shortcomings. All participants enrolled on-line, paid a fee, and attended one of the SDP events. A portion of the novice teen drivers population was likely precluded from participating in the SDP due to the registration process; As a result, the findings may not be transferable to all novice teen drivers. In addition, the SDP intervention and assessment may not be of sufficient duration or rigor to capture meaningful change in knowledge and skill.

4. Conclusion

The safe operation of motor vehicles by novice drivers requires them to have both good judgment and skills. In this paper, a supplemental driver education program was assessed. Objective pre- and post-test questionnaires along with instructor observations were used to assess driver proficiency. The SDP was conducted 23 times in three states with 549 participants. The module results showed that many students in all classes improved their driving skills and significantly increased their scores on a driving knowledge test.

A number of improvements to the SDP can be suggested from these discussions. First, a need exists to increase the amount of pre- and in-service instructor training with an emphasis on collaboration among the instructors to improve not only assimilation of curriculum content, but also instruction and student achievement. Second, consideration should be given to improving inter-rater reliability for driving skill data collection by in-vehicle instructors. Third, regarding the assessment of driving skill, instructors should collect data from at least two in-vehicle runs in each module. This can be done either manually by the instructor or by piloting in-vehicle devices to collect data for analysis on or off-site. Advantages of the latter approach include no reduction in instructor and student interaction time as well as providing a means to validate instructor reliability. Finally, it is important to include follow-up assessment with SDP participants and their parents to determine whether lessons learned were retained over time.

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