NORTH AMERICAN COUNCIL OF AUTOMOTIVE TEACHERS

NACAT News

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Congratulations, Baxter Weed!

Five public high school automotive teachers—Ken Cox and Dennis Johnson of California, David Lilly of New Hampshire, Joel Massarello of Michigan and Baxter Weed of Vermont—are among the 18 winners of the 2019 Harbor Freight Tools for Schools Prize for Teaching Excellence, the highest number of automotive winners of the prize in its three-year history. The 18 winners receive more than $1 million in prizes.

The winning automotive teachers, who are each among 15 second-place winners, include: Ken Cox of Redwood High School in Visalia, California; Dennis Johnson of Fallbrook High School in Fallbrook, California; David Lilly of Portsmouth High School in Portsmouth, New Hampshire; Joel Massarello of Oakland Science and Technical Campus Northwest in Clarkston, Michigan; and Baxter Weed of Cold Hollow Career Center in Enosburg Falls, Vermont. They, along with the 13 other winners who teach other skilled trades subjects, were each surprised in their classrooms today by representatives from Harbor Freight Tools for Schools with the news that they and their schools will receive cash awards.

First-place winners and their schools will receive $100,000: $70,000 for the high school skilled trades program and $30,000 for the teacher. Second-place winners, including the five automotive technology teachers, will each receive $50,000, with $35,000 going to their public high school skilled trades program and $15,000 to the individual teacher or team.

Baxter Weed never imagined he would be an automotive tech teacher in his hometown of Enosburg Falls. He was a computer engineering student in college and had job offers waiting for him before graduation. It was his passion for mechanical things and fixing cars that led him to work at a local independent shop. When he heard his hometown career technical center was starting an automotive program, he jumped at the opportunity to teach. Weed has built a program with national standards that dovetail with post-secondary institutions and a strong mentor program. He created an after-hours Automotive Club for interested students where they can work on fabrication, welding and performance skills. They have several long-term projects that range from building a custom motorcycle to building a lowered panel truck. Every fall Weed runs a "powersports" week, where his students work on snowmobiles, all-terrain vehicles, motorcycles and dirt bikes.

Baxter Weed was the recipient of the 2009 Gates Corporation NACAT Conference Attendance Award at the 2009 NACAT Conference held at Central Piedmont Community College (CPCC) in Charlotte, North Carolina.

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Cover Art:

Roebling Bridge between Covington, Kentucky and Cincinnatti, Ohio. Image cropped from the original by Adam Sofen, which can be found at https://live.staticflickr.com/7501/28349480881_d4b765b388_o_d.jpg.

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The Classroom Discourse Observation Protocol (CDOP): A Quantitative Method for Characterizing Teacher Discourse Moves in Undergraduate STEM Learning Environments (Part II)

By: Petra Kranzfelder, Jennifer L. Bankers-Fulbright, Marcos E. García-Ojeda, Marin Melloy, Sagal Mohammed, & Abdi-Rizak M. Warfa

Results

The CDOP Coding Scheme

The CDOP coding scheme consists of 17 codes: 15 TDM codes that we developed through an iterative process of inductive and deductive coding (**Fig 1**), one code for documenting new TDMs (other), and one code for documenting when no or non-content discourse is taking place (no content discourse) (**Table 2, page 10**). We organized the coding scheme by how observers will code observations in undergraduate STEM classrooms and classified the codes broadly into teacher-centric and student-centric groups. The first five of the 15 TDM codes (sharing, real-worlding, evaluating, linking, and forecasting) are teacher-centric in that the dominant voice in the discourse belongs to an instructor mainly talking about content. For example, the code sharing connotes instructor discourse behavior in which an instructor shares content information with students, answers student questions, or provides instructions for finding a solution. Therefore, sharing involves telling, and ultimately, signifies direct instruction. Similarly, the code evaluating is teacher-centric in that it connotes instructor discourse behavior in which an instructor repeats, accepts and/or rejects a student's response, or acknowledges that they do not know the answer to a student's question (**Table 2**). Thus, this code is used to describe the "E" in the commonly reported IRE discourse pattern [38], which occurs after a student responds to a question initiated by the instructor.

The rest of the 15 CDOP codes are student-centric in that these codes reflect TDMs in which an instructor asks students to talk about content. The 10 codes are: generative, checking-in, clarifying, connecting, contextualizing, representing, constructing, requesting, explaining, and challenging (**Table 2**). For example, generative involves the instructor asking the student to recall facts and basic concepts or related information (e.g., [34]), constructing involves the instructor asking students to build knowledge by interpreting and/or making judgments based on evidence, data, and/or a model (e.g., [41]), and requesting involves an instructor asking students to justify or explain their reasoning [42]. The common denominator in all of these TDMs is that they involve students talking about the content (**Table 2**).

Following [beginning page 16] are excerpts of instructor and student discourse to illustrate the CDOP coding scheme and show its utility for identifying aspects of classroom discourse.

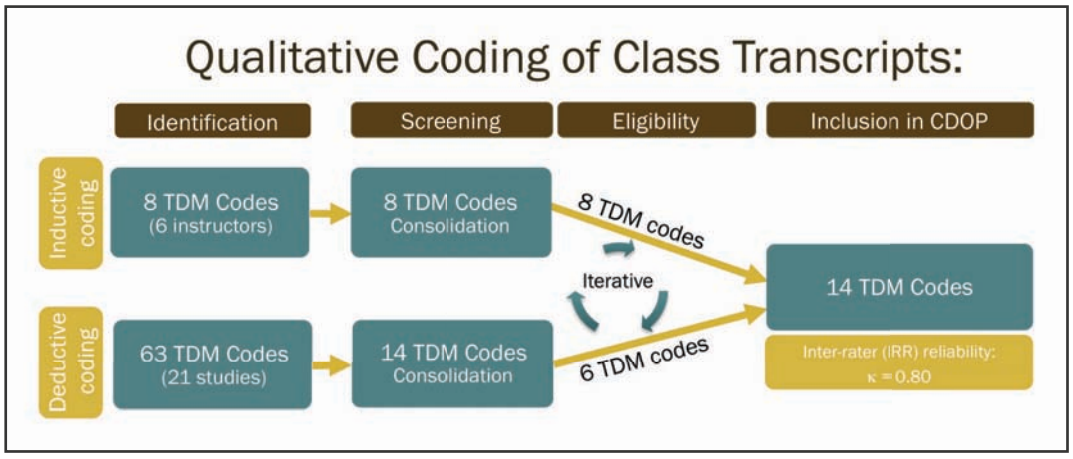

Fig 1. Flowchart of qualitative coding of class transcripts to develop CDOP coding scheme.
https://doi.org/10.1371/journal.pone.0219019.g001

Continued on page 10

A Site for Sight: The John A. Roebling Bridge!

One important engineering feature you will most likely notice while in attendance at the 2020 NACAT Conference & Expo is the skyline defining John A. Roebling Suspension Bridge. You may walk over it if you travel into Ohio, or, then again, you may enjoy the nightlife and activities at Roebling Point at the foot of the brige in Kentucky.

The John A. Roebling Suspension Bridge was originally known as the Covington and Cincinnati Suspension Bridge. It was the longest suspension bridge in the world when opened to pedestrian traffic on December 1, 1866. Formally opened on January 1, 1867, the bridge spans the Ohio River between Covington, Kentucky and Cincinnati, Ohio, with the main span being 1057 feet long. While it has also been called the Ohio Bridge, it was renamed in honor of its designer in 1983. It was the first permanent bridge spanning the Ohio River, and was the only privately funded public project in America during the U.S. Civil War.

The bridge is listed on the National Register of Historic Places and was named a National Historic Landmark in 1975. It was declared a National Historic Civil Engineering Landmark in 1983. The structure lost its notoriety as the world's longest suspension bridge when Roebling's most well known project, the Brooklyn Bridge, was completed in 1883 with its central span of 1595 feet.

For additional information on the John A. Roebling Suspension Bridge, be sure to view the following resources.

- American Society of Civil Engineers at https://www.asce.org/project/john-a--roebling-bridge/
- The Covington-Cincinnati Suspension Bridge Committee (CCSBC) at https://roeblingbridge.org/
- Kentucky Historical Society at https://explorekyhistory.ky.gov/items/show/352
- The Northern Kentucky Tribune article "Our Rich History: The John A. Roebling Bridge — 150 years young this month, THE symbol of our region" at https://www.nkytribune.com/2017/01/our-rich-history-the-john-a-roebling-bridge-150-years-young-this-month-the-symbol-of-our-region/

Chairman of the Board

Happy New Year NACAT members! It's more than a new year, it is also the start of a new decade. I remember the start to the previous decade well – I was in Orlando during the big Florida freeze of Winter 2010 (I'm sure our Florida members remember this well). This time around, it looks as if I'll be in Minneapolis this winter - what could possibly go wrong?

This decade will be special. In just a few years, NACAT will hold it's 50th Conference and Expo. Our industry is changing. Demand for our students continues to increase. Look at the technology which was introduced into repair shops and service bays between 2010 and 2019. I can only imagine what we will begin to see in the next few years.

I don't know if there has ever been a more valuable time to be a NACAT member. The community of automotive teachers, trainers, product manufacturers and vendors, and industry we have assembled over the past 4 decades could have a pivotal role as the workforce changes and transportation and service continue to evolve in the coming years. As a professional group, we have the synergy to share our individual experiences, skills, and passion, which in turn elevates our entire organization. There is no other group dedicated solely to automotive instructors which can duplicate what we have built.

The NACAT Board continues to forge our path forward as an organization. There are some VERY cool things which will roll out in the next few months, leading up to our 2020 Conference and Expo in Cincinnati/Northern Kentucky (no, I won't give any hints). I am very excited to see where these new ideas will take our organization and the impact they will have for our members' benefit.

If you aren't following NACAT's social media channels, you need to! The Board identified social media as a top priority this past year and hired a dedicated Social Media Manager. We have content being posted regularly, allowing you to stay up to date on all NACAT announcements. Join the conversation on Facebook (@NACAT4autoteachers), Twitter (@Official_NACAT), Instagram (@nacat_automotive), and our NACAT LinkedIn page.

There will be lots going on in the next coming months. Be sure to SHARE NACAT with a fellow instructor! Whether you have attended 15-20 NACAT Conferences or just one – you can fuel their desire to learn more about who we are and how NACAT resources can help improve their classroom. Share your NACAT experience and what drew you in. Encourage them to join as a member (only $75!) and attend a conference. Help paint the picture in their head that NACAT is an organization they can't afford not to be a part of. I challenge all members to share NACAT with one non-member this Spring. The old saying "the tide raises all ships" is certainly true; as NACAT grows, all our members will benefit.

I look forward to seeing you soon at the 2020 NACAT Conference and Expo.

Steve Gibson, Board Chair
Program Coordinator, K&N Engineering

New & Free: NACAT Student Memberships!

Any student actively enrolled in an automotive program at the high school or college level in the United States or Canada is invited to join NACAT for free. Student Membership applications require an automotive instructor sponsorship.

Student members receive electronic-only communications from NACAT.

To obtain a free student membership, simply perform the following steps.

- Download the mail-in application from http://www.nacat.org/?mdocs-file=788.
- Complete the application with your instructor sponsor.
- Mail the completed application to the NACAT office (address in box to the right).

NACAT
1820 Shiloh Road, Suite 1502
Tyler, TX 75703

NACAT President

Fellow NACAT Members,

As I sit to compose this update, the fall term is drawing to a close, winter has arrived in Chicago, and the holiday season is upon us. I hope each and every one of you has enjoyed a fulfilling semester full of positive learning experiences.

In September, I began my second term as your NACAT President with a goal of ensuring that NACAT serves its members and conference attendees in the very best way. While we have much to do, I am very excited about the progress the Board and officers are making toward the goal of refreshing the NACAT conference. As I have said before, we are not fundamentally changing who we are. We will always be "for instructors by instructors".

The 2020 conference will be a hotel-based conference at the Cincinnati Marriott at River Center. The expo will be held across the street in the Northern Kentucky Convention Center. The hotel and convention center are located in Covington, Kentucky which is across the river from Cincinnati (see the NACAT website for a map). The conference will have a slightly different schedule. These changes will allow participants to continue to receive 20 hours of training, enjoy an exciting expo and take advantage of the best travel opportunities. Look for the changes when the conference registration opens.

The 2020 conference will also feature the first use of the NACAT app. The app will replace the conference binder. Before attending the conference, the attendees will visit the app store and download the NACAT app. This fantastic tool will have all the information the attendees need to have a successful and enjoyable conference. Don't worry, if you have never used an app before, we will have a training session that will put you at ease with the technology.

In closing, I ask each of you to complete two tasks. First, renew your NACAT membership if you have not already done so. Second, share your NACAT conference experience with a fellow instructor. Your positive experience is our best advertisement.

Have a great spring term and know that you are having a positive impact on the future technicians in our industry.

Curt Ward, President

Share Updates, Submit Articles!

Do you have an update on a member you would like to share? Information on great or interesting happenings at a school, on a new restoration, congratulations that should be wished or condolences given? We want to hear from you!

Please e-mail any submissions to *nacatnews@nacat.org*. Editorial privilege is implied.

Be certain to follow NACAT's social media activity:

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1. Teacher-centered: Instructor is talking about content

Codes	Code Source[a]	Code Description	Example Dialogue[b]
Evaluating	Hardman [33], Warfa, Roehrig [34], Rasmussen, Kwon [35], Sinclair and Coulthard [36], Mehan [37], Garton [38], Chin [32]	Instructor repeats, accepts and/or rejects student's response, or acknowledges that they don't know the answer to a student's question.	Student: Then you multiply those together and get the probability by dividing the number of fertilization events. **Instructor: Total fertilization events. Okay.**
Forecasting	Current study	Instructor associates current topics to future topic.	**Instructor: You're going to do something in lab actually focused on human population and population growth.**
Linking	Current study	Instructor associates past topic to current topic.	Student: You don't have a bigger potential as well because there's more connections, there's more access to the axon terminals? **Instructor: Well, remember, we had that summation of action potentials. We had an action potential and we had the nodes and it could split off.**
Real-worlding	Current study	Instructor relates ideas to conventional knowledge, broader perspective, and instructor's or student's personal experiences.	**Instructor: Successful genotypes-look around the room. Nothing but winner in this room, right? We have all made it to reproductive age.**
Sharing	Warfa, Roehrig [34], Krussel, Edwards [39], Pimentel and McNeill [31]	Instructor shares information, answers student question, or provides instructions for finding the solution.	**Instructor: Just think of, kind of, chromatid pairs, sister chromatid paired, it's a little easier to think of the numbers.**

2. Student-centered: Instructor asks students to talk about content

Codes	Code Source[a]	Code Description	Example Dialogue
Generative	Warfa, Roehrig [34], Lidar, Lundqvist [40], Criswell and Rushton [41], Chin [32]	Instructor asks student to recall facts, and basic concepts, or related information.	**Instructor: Those come together in fertilization to make a zygote, right?** Student: Yes.
Checking-in		Instructor asks student if they have a question or need clarification.	**Instructor: Does that make sense?; Do you have any questions?; How's it going?; Are we good?**
Clarifying	Herbel-Eisenmann, Steele [19], O'Connor, Michaels [23], MacDonald, Miller [42], Chin [32]	Instructor asks student to elaborate on condensed, cryptic, or inexplicit statement.	**Instructor: Can you say more about that? What do you mean by that? Can you give an example?**
Connecting	Current study	Instructor asks student to associate past topic to current topic.	**Instructor: Costs of sex that haven't been mentioned plus what we've been talking about for the last week.** Student: Is it overpopulation?
Contextualizing	Herbel-Eisenmann, Steele [19], Krussel, Edwards [39], Criswell and Rushton [41]	Instructor asks students to connect ideas to conventional knowledge, broader perspective, and their personal experiences.	**Instructor: Anyone have an example that they really want to hear about/talk about (referring to student responses to finding analogies between cell processes and common household items)?**
Representing	Current study	Instructor asks student to create a visual or mathematical representation of content.	**Instructor: Think about how you could draw that out, too.**
Constructing	Criswell and Rushton [41], NGSS Lead States [43]	Instructor asks students to build knowledge by interpreting and/or making judgments based on evidence, data, and/or model.	**Instructor: In your own words, what is your conclusion when you look at those data?**
Requesting	O'Connor, Michaels [23], Rasmussen, Kwon [35], MacDonald, Miller [42]	Instructor asks student to justify or explain their reasoning.	**Instructor: I'm liking what I see but explain it to me** (referring to student whiteboard work calculating the number of fertilization events that produce a specific offspring).
Explaining	Current study	Instructor asks student to explain reasoning to other students.	**Instructor: Can you explain your work to everybody else at your table so that they can figure that out?**
Challenging	Michaels and O'Connor [22], O'Connor, Michaels [23], O'Connor, Michaels [44]	Instructor asks student to evaluate another student's idea.	**Instructor: Cost of sex?** Student: Pregnancy. **Instructor: I acknowledge that it's a good point, and why is there a problem with calling pregnancy a cost evolutionarily?**

3. Other

Codes	Code Source[a]	Code Description
No content discourse	Seidel, Reggi [45]	Instructor is not talking or asking students to talk about content.
Other	Current study	TDM not described by these codes.

[a]Sources of the deductive codes were 23 peer-reviewed, observation-based studies of TDMs from secondary or undergraduate STEM classrooms (see reference list). The inductive codes (current study) were those that emerged from our coding of class transcripts and videos using the Strauss and Corbin [30] grounded theory approach.
[b]The instructor portion of the dialogue associated with the CDOP code is shown in bold font. The student portion of the dialogue is shown for context.

https://doi.org/10.1371/journal.pone.0219019.t002

Table 2. CDOP coding scheme.
https://doi.org/10.1371/journal.pone.0219019.t002

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DriveShare by Hagerty is Now Available to Canadian Drivers Visiting the United States

Hagerty, the world's largest membership, insurance and media organization for enthusiast vehicles and owners, announced on December 9, 2019 that it has expanded DriveShare by Hagerty to allow rentals to licensed Canadian drivers visiting the U.S.

Launched by Hagerty in 2017, DriveShare is a one-of-a-kind, peer-to-peer car-sharing service that gives car fans the chance to drive cool and classic cars for any occasion. Previously, only U.S. licensed drivers could rent from DriveShare. Canadian and other international drivers will now automatically receive liability and physical damage coverage as a part of the rental fees.

"This is a big deal for both car fans north of the border visiting the States and for U.S. car owners who rent out vehicles on the app," said Steve Haas, senior manager of DriveShare. "We've had a lot of inquiries from Canadian travelers who were disappointed that they couldn't rent on the platform yet. We're thrilled to finally be able to tell them, 'Now you can!'"

According to export.gov, 21.5 million Canadians visited the U.S. in 2018, spending an estimated $22.1 billion, up three percent from 2017.

Considered the Airbnb of classic cars, DriveShare now boasts more than 2,000 vehicles across the U.S., from classic cars and trucks to modern muscle cars, luxury vehicles and SUVs. Drivers can plan their trip online at driveshare.com or by using Hagerty's free Android or iOS apps.

International drivers are required to create a profile on DriveShare.com, where their driver's license will be verified prior to rental. International drivers interested in renting should contact support@DriveShare.com in advance of their planned rental. Drivers must be at least 25 years of age and meet DriveShare's renter eligibility requirements. Non-driving rentals are also available for display and special events.

Word Search: Car Brands

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C U Z R U S O G B H E W X T B O O D O H N E
Y B T P W B E P E T O Y O T A F L F G B Z O
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IIHS Prepares to Launch New, More Challenging Side Crash Test

The Insurance Institute for Highway Safety's side crash test has led to lifesaving improvements in occupant protection since it was introduced in 2003. There's just one problem: The program has been so successful that the current side ratings no longer help consumers distinguish among vehicles or point the way toward further improvements.

Test vehicle is struck by a movable barrier in a side impact research crash test

An updated test should help. IIHS researchers and engineers have been weighing potential changes. A new test program with a higher impact speed and a heavier, more realistic movable barrier representing a more modern striking vehicle is expected to be launched next year.

In addition to identifying things that should change, the research has also clarified what aspects of the current evaluation work well. Measures collected from the test were found to correlate closely with fatality risk. Thus, the new test will likely use the same dummies and collect similar information as the current one.

"This is an opportunity to build on what we've learned in more than 15 years of side testing," says IIHS Senior Research Engineer Becky Mueller. "We'll update the things that need updating, but we don't need to throw out the things that still work well."

Crash test history

When IIHS developed its current side crash test, it filled a need that had emerged with the rise in popularity of SUVs. At the time, the National Highway Traffic Safety Administration (NHTSA) was conducting side tests as part of its consumer information program, using a movable barrier with the height of a car. That test, still part of NHTSA's ratings, doesn't reflect the much greater risk of head injury from impacts with taller vehicles.

NHTSA barrier, shown in yellow, superimposed over taller IIHS barrier

The IIHS test proved more challenging than the NHTSA test because the Institute's movable barrier mimicked the height and shape of the front end of the typical SUV or pickup on the road at the time. IIHS also used dummies representing a small woman or 12-year-old child. The combination of these two things meant that the barrier struck the vehicle at about the height of the dummies' heads.

To achieve a good rating in the test, automakers strengthened side structures and equipped vehicles with head-protecting side airbags ahead of a federal regulation that made them essentially mandatory. Only about 1 in 5 vehicles tested earned good ratings in the beginning. Today, 99 percent of rated vehicles earn a good rating, and the remainder are acceptable.

The improvements translated into lives saved. A 2011 study of 10 years' worth of crash data found that a driver of a vehicle rated good is 70 percent less likely to die in a left-side crash than a driver of a vehicle rated poor.

But despite overwhelmingly good ratings for today's vehicles, people continue to die in side crashes. Side impacts accounted for 23 percent of passenger vehicle occupant deaths in 2018.

Comparing rating criteria to real-world outcomes

One question is whether the current side test measures the right things. To answer it, IIHS researchers conducted another study of real-world side crashes. This time they examined how well each of the test measurements that feed into the ratings correlate with death risk.

The study included 1999-2016 model year passenger vehicles with standard head-protecting side airbags that had been rated by IIHS for side protection. The researchers looked at the rate of driver deaths per left-side crashes for each model. They compared these rates with 10 specific measures of intrusion and injury that go into the ratings, finding that each one was correlated with driver death risk in left-side crashes.

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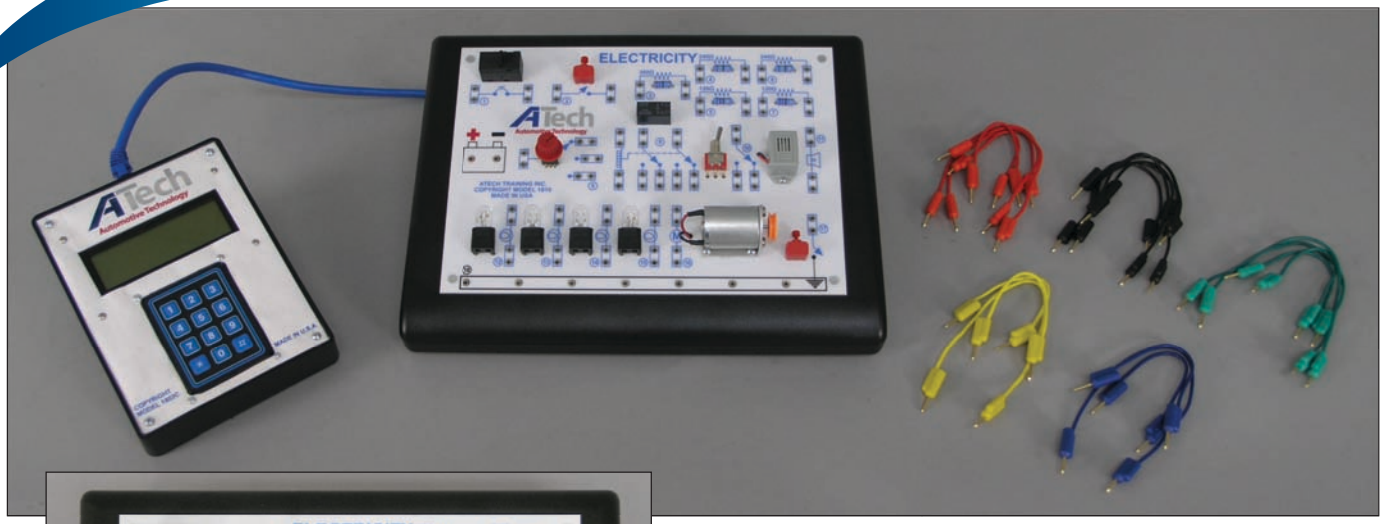
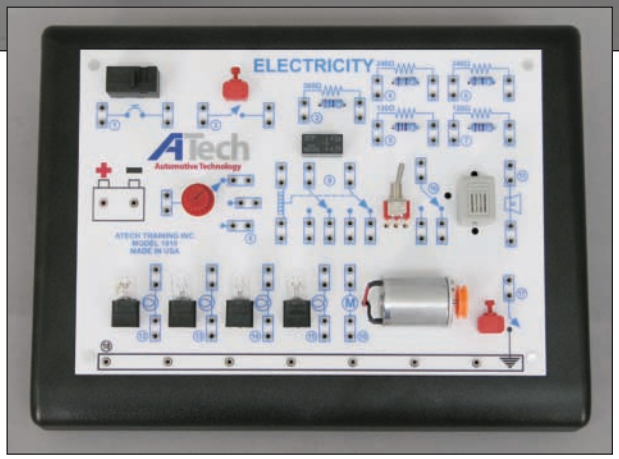
model 1810





The Electricity Trainer (model 1810) is a hands-on study of basic automotive electricity. The trainer features real fixed components, wire terminals, 15-Volt power supply. Fault insertion capability with optional Keypad (model 1802) or with Class Management Program (CMP) and CBI. Includes Instructor Guide and Student Manual (on a USB Drive with an on-site copy license).

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The Electric and Hybrid Electric Vehicle Corner

By Curt Ward

Electric and hybrid electric vehicles are one of the fastest growing segments in the automotive industry today. The growth is being driven by the success of vehicles like the Chevrolet Bolt and the Tesla 3. As this segment of the industry grows, how are you preparing your students to be successful as they enter the workplace? Have you considered adding electric and hybrid electric vehicles to your program? This is the first in a series of articles that will chronicle the success our students have experienced when we added an electric and hybrid electric vehicle option to our automotive program.

On the first day of class, the students were asked "what they hoped to get out of the class?" The answers varied, but included responses such as "How do we work on these cars and not get killed". When surveyed, about one-half of the class had driven a hybrid electric vehicle and none of the students had driven an electric vehicle. This was the first class I have taught in the last ten years where I did not have to solicit questions. The students were engaged and eager to learn and had lots of questions. The class was a joy to teach and I believe we were able to meet or exceed every student's expectations in the class.

One of the first questions I am asked when discussing our program is "what vehicles are in your training fleet?" Our training fleet consists of a 2007 Mercury Mariner Hybrid (the same as a Ford Escape Hybrid), a 2008 Prius, a 2008 Honda Civic Hybrid, and a Nissan Leaf. These vehicles provide us two strong hybrids (One with a traditional belt driven air conditioning compressor and one with a high voltage electric compressor.), a mild hybrid (A high voltage stop-start system.) and a fully electric vehicle. All four of the vehicles are very classroom friendly and easy to teach with. We have also been able to collect a wide variety of hybrid and electric vehicle components to use as well.

The second question I am always asked is what tools and equipment the program had to purchase. The perception is that this is a huge expense. In reality, the expense was not great. We contracted with a company the college was already using to provide and test our high voltage gloves. We purchased several meg-ohm meters, a milli-ohm meter, and a small assortment of insulated tools. We also obtained the safety equipment that was required by our insurance or was recommended by the specific vehicle manufacturers. All the other tools we needed were already available in the program. At the end, the total investment in tools was significantly less than we had anticipated.

During the first week of class we covered safety. As part of the class we taught the students how to determine what their glove size was so they would fit appropriately. As the students were using a sewing tape measure to measure their hand they were surprised to learn they were a size nine or ten or whatever it happened to be. The only gloves they had ever previously purchased were from a department or discount store and were sized as small, medium, large, or extra-large. I had no idea the highlight of the safety day was students being excited about learning their glove size.

In future articles I will discuss the specific topics we covered in the class. Obviously we covered the high voltage systems, but just as importantly we discussed the other systems on the vehicle that were impacted or changed as a result of the hybrid or electric configuration. One topic that was a huge hit was preventative maintenance. This is an often overlooked item on hybrid electric and electric vehicles. The students were able, in many cases, to begin this type of work in their jobs immediately.

At the conclusion of this series of articles I believe you will agree with me, this is an important topic that needs to be added to the any program. Hybrid and electric vehicles are becoming a major financial player in the aftermarket repair industry. The addition of this topic to any program will enhance the student's skills and allow them to earn more when they enter the workplace. Hopefully, I can provide you some insight that will make the process easier for you to add the topic to your program.

If you find this topic interesting: I will presenting a seminar at the 2020 NACAT Conference on this topic called ***Hybrid and Electric Vehicles for the Gasoline Instructor***. I hope to see you there!

"I am not a teacher, but an awakener."
– Robert Frost

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Instructor A: Sample excerpt containing teacher-centered and student-centered codes.
In the excerpt below, CDOP codes are in parentheses and bold type. Students have been instructed to work in small groups on a worksheet that is introducing hematocrits (the ratio of the volume of red blood cells to the total volume of a blood).

1.1 Instructor: How are you guys doing? (**Checking-in**)
1.2 Student: Good. Well, I don't really know the steps.
1.3 Instructor: Okay. Well you can look at them. So, what's happening in the first picture? (**Generative**)
1.4 Student: Kind of just giving the blood draw.
1.5 Instructor: He's just getting a blood draw. (**Evaluating**) Second picture? (**Generative**)
1.6 Student: I didn't know if you wanted us to be more specific.
1.7 Instructor: Yeah, it can just be that. So, first you get some sample taken, (Sharing) then what is the point of this step? (**Generative**)
1.8 Student: Just to separate all parts of the blood.
1.9 Instructor: Yeah, (**Evaluating**) we're just separating it based on weight and then basically, we're measuring how much of each part we have. (**Sharing**)

The dialogue shown in this excerpt above contains two teacher-centric codes, *evaluating* and *sharing*, and two student-centric codes, *checking-in* and *generative*. *Checking-in* (line 1.1: "How are you guys doing?") is operationalized in the CDOP as a TDM in which an instructor asks students if they have questions or need a clarification (**Table 2**). This was a routine move that we observed the instructors use during small group instruction. We consider this student-centric in the sense that the instructor asks students if they need help understanding content. The other student-centric TDM in this dialogue–*generative*–is shown in lines 1.3, 1.5, and 1.7. In line 1.3, the instructor asks, "So, what's happening in the first picture?" This forces students to talk about the content of the picture (line 1.4: "Kind of just giving the blood draw.") and relate or recall information about the content. Thus, as operationalized in the CDOP, the purpose of a *generative* move is to force students to recall facts, basic concepts, or related content information (**Table 2**).

In contrast to the student-centric moves, teacher-centric TDMs in the CDOP focus on teacher acts. For instance, in lines 1.5 and 1.9, we see the instructor evaluating student responses either by repeating what the student said (line 1.5: "He's just getting a blood draw.") or with a simple agreement of yes (line 1.9: "Yeah."). In an *evaluating* move, such as shown in lines 1.5 and 1.9, an instructor repeats, accepts, or rejects student responses or simply acknowledges they do not know the answer to a students' question. This discourse move is as a means to assess student understanding of a concept or confirm the correctness of their response. For example, the simple utterance of "Yeah" in line 1.9 confirms the correctness of the student response in (line 1.8: "Just to separate all parts of the blood."). In this instance, we see the instructor followed the *evaluative* move in line 1.9 by sharing with the student information related to how that separation is achieved ("we're just separating it based on weight and then basically, we're measuring how much of each part we have."). We code all moves in which an instructor relays content information to students as sharing. *Real-worlding* is the other CDOP code that involves an instructor sharing content information; but it is differentiated from sharing since by using this move the instructor relates ideas to conventional knowledge, broader perspectives, and/or personal experiences (**Table 2**).

Instructor B: Sample excerpt containing mostly student-centered codes.
In the following excerpt, the CDOP codes are in parentheses and bold type. Students have been instructed to open an online worksheet and work in small groups to create a logical/mathematical rule for determining the number of unique fertilization events that will produce a specific genotype in the offspring.

2.1 Instructor: Explain to me what you did. (**Requesting**)
2.2 Student 1: So, essentially, in each case, this is first column and for heterozygous possibilities. Essentially, we saw how many different combinations for the square genes we can get the right allele combination and how many times we can possibly get the right circle combination? Then you multiply those together and get the probability by dividing the number of fertilization events.
2.3 Instructor: Total fertilization events. Okay. (Evaluating) And how did you do it for this one? (**Requesting**)

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2.4 Student 1: Well, this one is similar, except that there's only one possibility for each because in each case there's a homozygous which provides the same allele every time, and then there's only one—there's a possible combination to make a black, white and black, white, so there's one times one. There's only one out of four, and four's the number that we got—four's the number of fertilization events we got based on the fact that only two of these have two gene choices, and these are just one so to speak.
2.5 Instructor: And which genotype were you looking for? Was it the double heterozygous? (**Clarifying**)
2.6 Student 1: Yes, double heterozygous.
2.7 Instructor: Okay. Good. (Evaluating) In both cases? (**Clarifying**)
2.8 Student 1: This one, yes. Double heterozygous.
2.9 Instructor: Okay. Do you agree (to Student 2)? Does that make sense? (**Challenging**)

This instructor used mostly student-centric CDOP codes, including *requesting* (lines 2.1 and 2.3), *clarifying* (lines 2.5 and 2.7), and *challenging* (line 2.9) along with one teacher-centric CDOP code (*evaluating*). In the first move of this excerpt, the instructor asks students to explain their reasoning (line 2.1, requesting) and a student responds by explaining how they calculated the number of fertilization events. Next, the instructor evaluates the student response (line 2.3: "Total fertilization events.") and confirms their reasoning with a simple "okay" and makes a second *requesting* move for another problem (line 2.3: "And how did you do for this one?"). In line 2.5, we see a *clarifying* move ("Which genotype were you looking for? Was it the double heterozygous?"), which is described in the CDOP as a move asking students to elaborate on condensed, cryptic, or inexplicit statement. The other student-centric CDOP code shown in line 2.9 is *challenging*. This TDM describes an instructor asking a student to evaluate another student's idea, which is exemplified when the instructor asks a second student in the small group, "Do you agree? Does that make sense?" *Challenging* represents a TDM where an instructor asks students to go to another level with their content knowledge by engaging with others' reasoning (**Table 2**).

Sample CDOP matrix data.
The analysis conducted on the sample excerpts above relied on qualitative coding of classroom transcripts, highlighting the development process of the CDOP coding scheme. However, our major objective in developing the CDOP was to make the coding process more quantitative in nature while still providing a descriptive account of the TDMs. To do this we created the CDOP matrix, modelled after the matrix used for the COPUS classroom observation protocol [10], which allows an observer to document all TDMs occurring within each 2-minute period over the length of a class session (**Fig 2**). The codes are grouped into *teacher-centered*, *student-centered*, and *other* and are arranged to facilitate the live coding of a class session. We used the CDOP matrix to code one audio recording from a class session for each of the two instructors (A and B) described above in the sample excerpts. Next, we used this coding to quantify the TDMs used by each instructor during the 10-minute period surrounding their sample excerpt. The CDOP matrix of the class session with more teacher-centered TDMs indicated that Instructor A used *two teacher-centered* TDMs (*sharing* and *evaluating*) and *two student-centered* TDMs (*generative* and *checking-in*) over the 10-minute period (**Fig 3A**). However, *teacher-centered* TDMs were used twice as often (6x) as the *student-centered* TDM (3x). In contrast, the CDOP matrix of the class session with more *student-centered* TDMs showed that Instructor B used the same two *teacher-centered* TDMs (*sharing* and *evaluating*), but used more *student-centered* TDMs (*generative*, *checking-in*, *clarifying*, *representing*, *requesting*, and *challenging*) (**Fig 3B**). Additionally, *teacher-centered* TDMs were used ¼ as often (5x) as *student-centered* TDMs (15x). Thus, this preliminary analysis demonstrates that the CDOP matrix provides a structured mechanism for identifying what discourse in happening in a class and documenting the frequency of usage of particular TDMs. These two examples illustrate how the CDOP matrix can be utilized to determine the TDMs used by an instructor without spending time subjectively evaluating what type of a discourse that is happening in an undergraduate STEM classroom.

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Citation: Kranzfelder P, Bankers-Fulbright JL, García-Ojeda ME, Melloy M, Mohammed S, Warfa A-RM (2019) The Classroom Discourse Observation Protocol (CDOP): A quantitative method for characterizing teacher discourse moves in undergraduate STEM learning environments. PLoS ONE 14(7): e0219019. https://doi.org/10.1371/journal.pone.0219019.

Lookback: My First Time at the NACAT Conference

What was Harbor Freight Tools for Schools winner Baxter Weed's opinion of his first NACAT Conference in 2008? Was he merely satisfied or did the experience leave him with a desire for more which could only be quenched at following NACAT conferences? What was it about the conference which made him feel how he felt?

Let us look at an opinion piece Weed wrote following the 2008 Conference at Pennsylvania College of Technology. It was originally printed in the Fall 2008 issue of NACAT News.

> *As a first-time attendee of the yearly NACAT conference, I wasn't sure what to expect. After being a NACAT member for a number of years and hearing about the conference from peers, I decided it was time to check it out. Williamsport, PA was within a reasonable drive and a weeklong conference with a group of other automotive teachers from North America sounded like fun. Fun was only one part of it...*
>
> *From the opening ceremonies to the closing ceremonies, the conference was very well run, organized, informative, and a great way to meet new people. The facilities provided by the Pennsylvania College of Technology were second to none, and everyone went out of their way to make sure the event went well for everyone. I was impressed by the dedication and amount of work the organizers put in, and I can see why it takes years of planning to host a NACAT conference. Once you host one, it seems like you are almost sure to host another down the road. That says a lot about how much people enjoy being part of NACAT and helping out.*
>
> *The seminars were all so good I had a hard time picking out which ones to attend each day! I wanted to go to each and every one, but there are only so many hours in the day. Good thing because my car was pretty full by the end of the week. The trade show was excellent, had great vendors, and was a very good place to make contacts.*
>
> *Besides the seminars and the college, there was something else I noticed while there. It was the fact that people had traveled very long distances with their families to attend, using the conference as their summer vacation. Proud parents were helping their kids get ready for the valve cover races, spouses were having fun. I noticed friendships that had begun at previous events and stayed strong throughout the years. A sense of camaraderie and being part of a great organization is what struck me the strongest. The board of directors and NACAT staff are all volunteers who put their time into make NACAT what it is, and I could see why. During the banquet when service awards were being handed out, I found myself wondering how many NACAT events I could make it to in the coming years. People had been part of the organization for 35 years! Overall, it was a welcoming environment with a family feel that provided excellent training and many opportunities to network with fellow teachers. Hard to beat that. I was trying to figure how to get to the 2009 NACAT conference by the end of the first day! Hmmm, let's see, how far of a drive is Charlotte* [**Covington, Kentucky for 2020**]*…… Hope to see all you NACAT members there next summer, and if you have never been, I highly recommend it!*

Things to Do in Northern Kentucky / Cincinnati, Ohio!

The Northern Kentucky region has many interesting and exciting things for you and your family to see and do. Here is a small list. Much more can be discovered at the Northen Kentucky Convention and Visitors Bureau website at https://www.meetnky.com.

- Ark Encounter
- Cathedral Basilica of the Assumption
- BB Riverboats
- Braxton Brewing Company
- Cincinnati Zoo and Botanical Gardens
- Great American Ball Park
- Hofbrauhaus Newport
- Licking Riverside Historic District
- Mainstrasse Village
- National Underground Railroad Freedom Center
- New Riff Distilling
- Newport Aquarium
- Newport on the Levee
- Over-the-Rhine
- Southbank Trolley
- The Banks and Smale Park

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A

time (min)	1. Teacher-centered					2. Student-centered										3. Other	
	Share	RealW	Eval	Link	Frcst	Gener	Check	Clari	Conn	Cntex	Repre	Const	Reqst	Expl	Chall	Other	NCD
0 - 2	1		1			1											
2 - 4							1										
4 - 6	1																
6 - 8	1																
8 - 10	1		1			1											

B

time (min)	1. Teacher-centered					2. Student-centered										3. Other	
	Share	RealW	Eval	Link	Frcst	Gener	Check	Clari	Conn	Cntex	Repre	Const	Reqst	Expl	Chall	Other	NCD
0 - 2							1				1				1		
2 - 4							1	1					1				
4 - 6	1		1				1	1					1		1		
6 - 8	1		1			1		1									
8 - 10	1					1		1					1				

Fig 3. Examples of CDOP matrices with mostly teacher-centered TDM codes (A) and mostly student-centered TDM codes (B).
https://doi.org/10.1371/journal.pone.0219019.g003

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Summer Elections - 2020

North American Council of Automotive Teachers (NACAT) is currently accepting nominations from individuals to fill a number of board positions and vital officer position.

NACAT is a family-centered organization comprised of member educators who provide mentoring, educational support, and voice for automotive educators in secondary and post-secondary schools throughout North America. The organization is investing in the repair industry of tomorrow, and is recognized for the exemplary cutting-edge conference it provides to educators each year in different regions of the United States or Canada.

Are you an individual who currently works in the field of automotive education? Do you want to contribute to the industry that has become your profession? Are you an individual that has the desire and intent to use your unique qualities and talents to make the automotive repair industry a better place for the technician and industry of tomorrow? Do you work well with others in efforts to create a common good? If you answered "yes" to those questions and you are currently a NACAT member of record, and have been for a minimum of 24 months, you are certainly an individual who should consider our open positions.

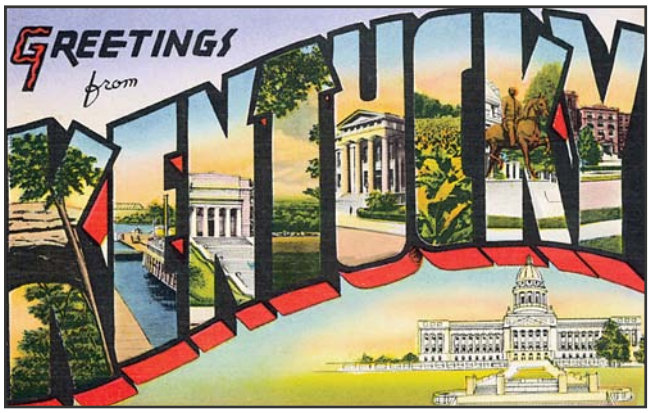
Positions for 2020:

- Board Member *(Three seats open, each with a 3 year term)*
- Secretary / Treasurer *(2 year term)*

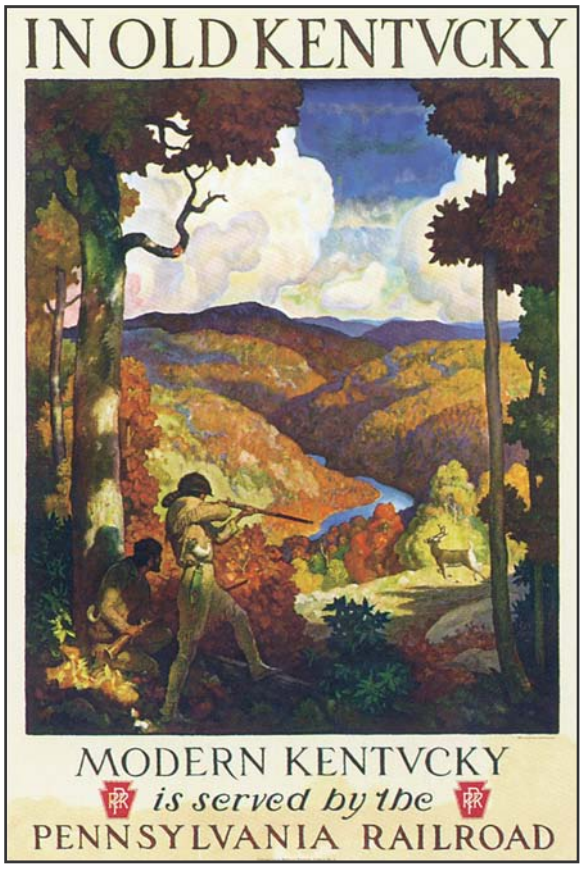
If you feel that you have something to offer NACAT, automotive education, and the automotive industry, please consider running for one of the open positions. ***You can help us continue to make a difference.***

For more information on the open positions, or to learn how to submit a nomination form for one of the open positions, please go to http://www.nacat.org.

21 Interesting Facts About Kentucky!



1. The town of Murray is home to the Boy Scouts of America Scouting Museum located on the campus of Murray State University.
2. The Kentucky Derby is the oldest continuously held horse race in the country. It is held at Churchill Downs in Louisville on the first Saturday in May.
3. Chevrolet Corvettes are manufactured in Bowling Green.
4. Mammoth Cave is the world's longest cave and was first promoted in 1816, making it the second oldest tourist attraction in the United States. Niagara Falls, New York is first.
5. Post-It Notes are manufactured exclusively in Cynthiana.
6. Kentucky is the state where both Abraham Lincoln, President of the Union, and Jefferson Davis, President of the Confederacy, were born. They were born less than one hundred miles and one year apart.
7. Cumberland is the only waterfall in the world to regularly display a Moonbow. It is located just southwest of Corbin.
8. Fleming County is recognized as the Covered Bridge Capital of Kentucky.
9. The first Kentucky Fried Chicken restaurant owned and operated by Colonel Sanders is located in Corbin.
10. In 1888, "Honest Dick" Tate, the state treasurer, embezzled $247,000 and fled the state.
11. The song "Happy Birthday to You" was the creation of two Louisville sisters in 1893.
12. Pikeville annually leads the nation in per capita consumption of Pepsi-Cola.
13. The first commercial winery in the U.S. opened in 1799 near Lexington. The founder, a Swiss businessman named John James Dufour, settled on the location because of a shipping port on the Kentucky River that gave him access to New Orleans and other points south. Today, a descendant of one of Dufour's first shareholders maintains the winery. It is, appropriately, called First Vineyard.
14. Kentucky was the 15th state to join the Union and the first on the western frontier.
15. Bluegrass is not really blue. It is green. In the spring, bluegrass produces bluish purple buds that when seen in large fields give a blue cast to the grass. Today Kentucky is known as the Bluegrass State.
16. Daniel Boone and his wife Rebecca are buried in the Frankfort Cemetery. Their son Isaac is buried at Blue Licks Battlefield near Carlisle, where he was killed in the last battle of the Revolutionary War fought in Kentucky.
17. The only monument south of the Ohio River dedicated to Union Soldiers who died in the Civil War is located in Vanceburg.
18. The public saw an electric light for the first time in Louisville. Thomas Edison introduced his incandescent light bulb to crowds at the Southern Exposition in 1883.
19. More than half of all Americans killed in action in the War of 1812 were Kentuckians.
20. More than $6 billion worth of gold is held in the underground vaults of Fort Knox. This is the largest amount of gold stored anywhere in the world.
21. The Cathedral Basilica of the Assumption in Covington has 82 stained-glass windows including the world's largest hand-blown one. The window measures 24 feet wide by 67 feet high and depicts the Council of Ephesus with 134 life-sized figures.



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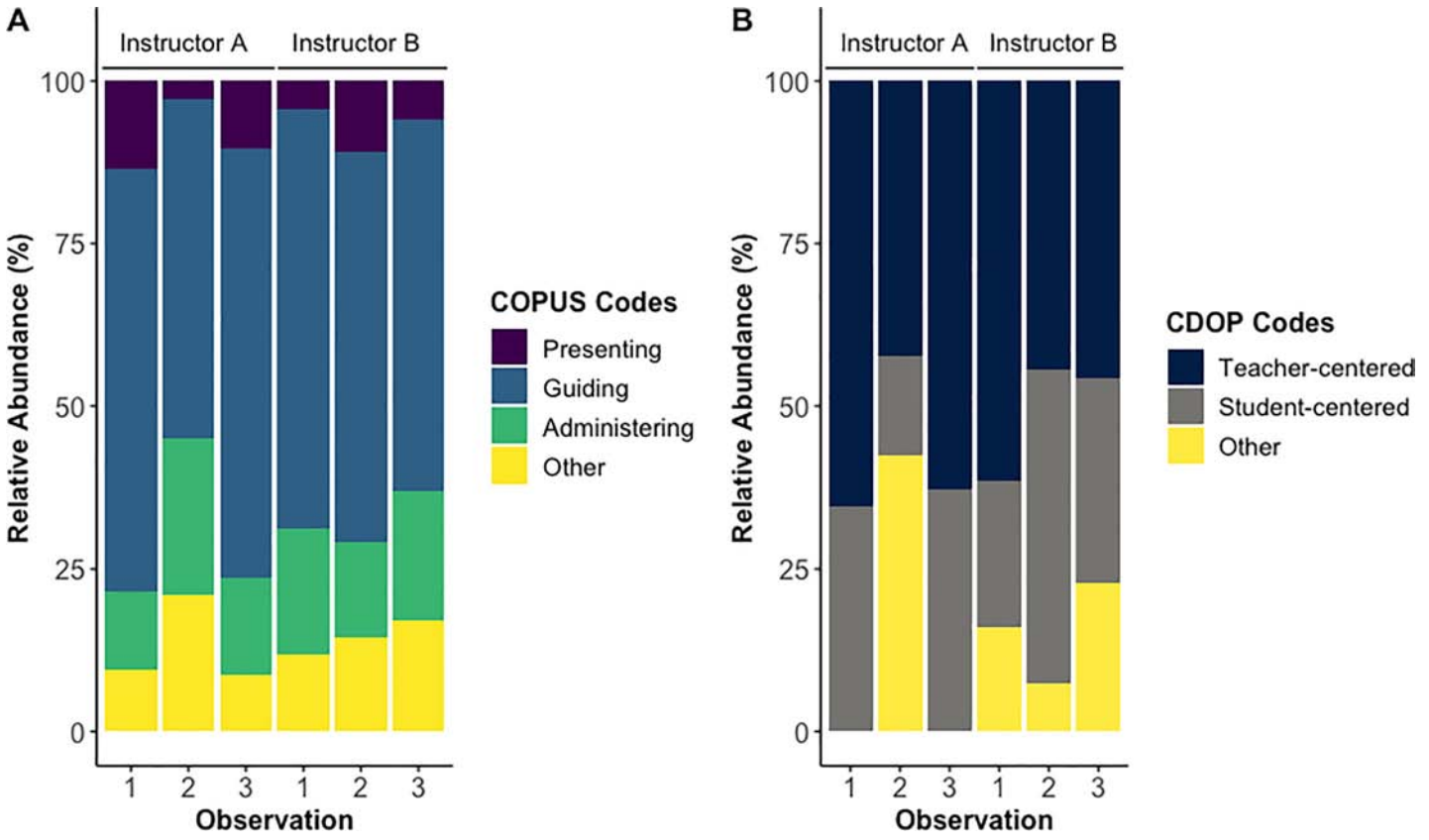

Fig 4. Comparison of COPUS and CDOP results between two instructors teaching in Active Learning Environments.
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Comparison of COPUS and CDOP results

On average, both Instructors A and B spent about 60% of their class time guiding students in active learning tasks as measured by COPUS (Fig 4A), but they spent more time using *teacher-centered* discourse moves than *student-centered* and no content discourse ones as measured by CDOP (**Fig 4B**). When looking at the full class session surrounding the sample excerpts described above (i.e., Instructor A: observation 3, Instructor B: observation 2), Instructor A spent more time guiding students in active learning tasks (Fig 4A), but Instructor B used more *student-centered* and less *teacher-centered* discourse than instructor A (**Fig 4B**). These preliminary analyses indicate that the CDOP can distinguish differences in TDMs used by instructors, even in equivalently highly engaged classrooms as measured by COPUS.

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"Education breeds confidence.
Confidence breeds hope.
Hope breeds peace."
- Confucius

Icahn Automotive Goes Back to School at Alfred State College

Icahn Automotive, an Icahn Enterprises L.P. company, which owns and operates leading repair and maintenance providers Pep Boys, AAMCO and Precision Tune Auto Care, recently celebrated the opening of a rebranded technical training facility at Alfred State College of Technology (Alfred State), a State University of New York (SUNY) and traditional residential college of technology, with refreshing and inspiring wall graphics featuring messages such as "Find out how far you can go," "Find your own path," "Find the tools you need" and "Find your path."

"Alfred State graduates are in a unique position because they graduate with the technical skills to perform automotive service, plus the business acumen that's needed to manage a shop," said Brian Kaner, CEO- Service, Icahn Automotive. "As a national service network that can both put students to work part-time and put them on the path of owning their own franchise someday, we're excited about the possibilities for Alfred State students."

As one of the largest service network operators in North America, Icahn Automotive offers a broad range of industry-leading opportunities and career paths. Technicians can start by providing basic maintenance and move on to more complex repairs, or progress to running a company-owned store, owning and operating a franchised business, or serving in a corporate leadership role. Once a technician joins an Icahn Automotive business, they can take advantage of benefits such as an apprenticeship program, company-sponsored certifications and more.

"Our partners enable us to provide opportunities to the students that might otherwise not be possible," said Eric Wilmot, chair of the Automotive Trades Department at Alfred State College. "The updated technical facility has given our students a better environment in which to apply what they're learning, and we're looking forward to working closely with the team at Icahn Automotive to provide the students with jobs when they graduate. The automotive program relies on industry support to meet our technical and equipment needs, and our relationship with Icahn is a perfect example of how education and industry can work together for mutual benefit."

Alfred State's automotive technology program is NATEF Master Certified and draws students from across the Northeast. Graduates take advantage of Alfred State's reputation by accepting technician positions across the country. The investment at Alfred State is a critical part of the Company's larger, national "Race to 2026" technician recruitment initiative, which has invested in and supported promising future automotive technicians through scholarship, partnerships with schools, and continuing education opportunities, in an effort to fill the projected automotive technician gap. Throughout the course of the initiative in 2019, Icahn Automotive has made investments in dozens of technical training schools across the nation and awarded $50,000 in scholarships to students studying at automotive trade schools.

Reprinted with permission from Arianna Stefanoni Sherlock, Director of Communications at Icahn Automotive.

About Pep Boys
Since 1921, Pep Boys has been one of the nation's leading automotive aftermarket chains, providing premium tires; automotive maintenance and repair; premium-brand parts and expert advice for the do-it-yourselfer; commercial auto parts delivery; and fleet maintenance and repair to customers across the U.S. Pep Boys operates more than 9,000 service bays in approximately 1,000 locations in 35 states and Puerto Rico, and the Pep Boy Mobile Crew service trailer, which offers automotive maintenance on location. Customers can find the nearest location by calling 1-800-PEP BOYS (1-800-737-2697), by visiting www.pepboys.com, or following Pep Boys on Twitter, Facebook or Instagram.

About Icahn Automotive
Icahn Automotive Group LLC (Icahn Automotive) was formed by its parent, Icahn Enterprises L.P. (NASDAQ: IEP), to invest in and operate businesses involved in aftermarket parts distribution and service. Our businesses have a singular focus: provide premium automotive parts and services at a great value. Icahn Automotive today consists of Pep Boys® automotive aftermarket retail and service chain, Auto Plus® automotive aftermarket parts distributor, Precision Tune Auto Care® owned and franchised automotive service centers, and AAMCO Total Auto Care franchised service centers. The Company also is the licensor of Cottman Transmission and operates under several local brands. The businesses of Icahn Automotive total over 22,000 employees, over 2,000 company-owned and franchise locations, and 25 distribution centers throughout the US, Canada, and Puerto Rico. For more information, visit IcahnAutomotive.com.

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For one class session, Instructor C spent about 57% of their class session *presenting* information to students as measured by COPUS (Fig 5A). Also, this instructor used a total of 8 discourse moves as measured by the CDOP, with *information sharing* being the most frequent (43%) followed by *generative* (22%), *evaluating* (18%,) *no content discourse* (6%), *checking-in* (4%), and *forecasting* (4%), and *linking* (1%), 1% *real-worlding* (1%), and *clarifying* (1%) (**Fig 5B**). Five out of eight of these CDOP codes are teacher-centric and describe activities that often happen during traditional lectures (i.e., activities that are mainly proxy for content delivery). These results suggest that the CDOP can measure TDMs used by instructors than are mostly lecturing (i.e., spending most of their class presenting information as measured by COPUS) in addition to those that are mostly using active learning strategies (i.e., spending most of their class guiding students learning as measured by COPUS). See Tables A and B in S6 File for COPUS and CDOP data and results.

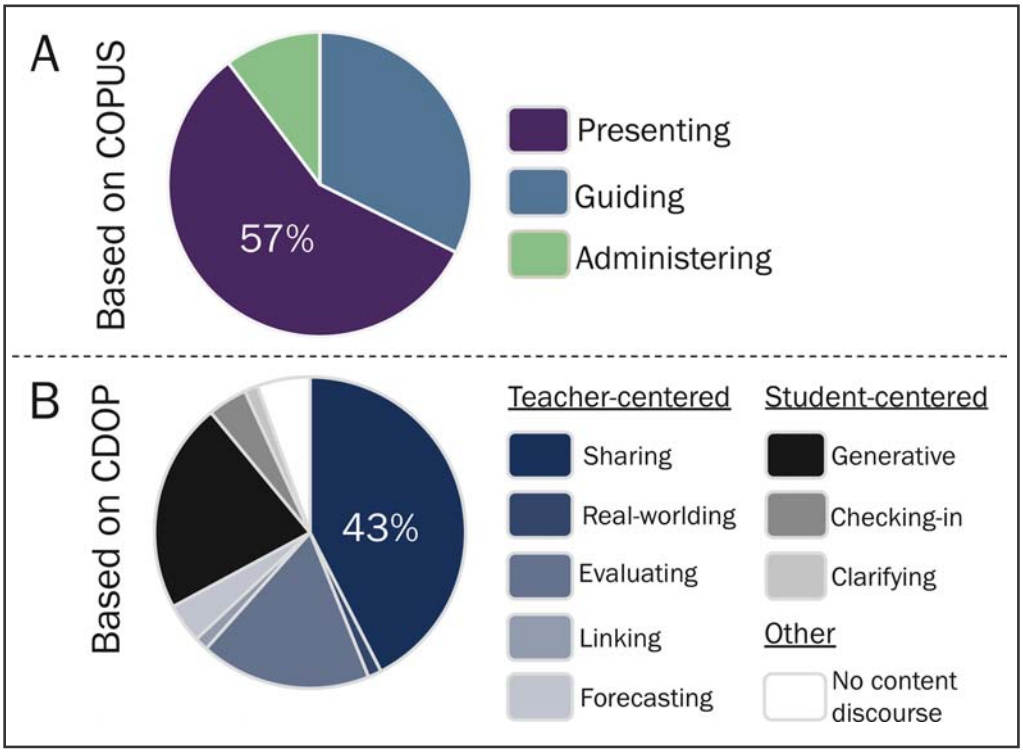

Fig 5. Sample CDOP results of an instructor teaching in a traditional lecture classroom.
https://doi.org/10.1371/journal.pone.0219019.g005

Reliability and validity

We used a two-stage process to establish IRR of the CDOP. First, we qualitatively examined the TDM coding of class transcripts (n = 6). Cohen's kappa scores between coder pairs ranged from 0.51 to 0.78, with an average kappa score of 0.64 among all coders (CI: 0.51–0.71, SE: 0.067; S1 File), suggesting substantial agreement among the coders according to Landis and Koch [47]. Second, we quantitatively coded audio class recordings using the CDOP matrix (n = 13). We first used the CDOP matrix to measure the discourse behavior of the six highest-active engagement instructors in our sample as determined by COPUS analysis. Using this subset of our overall data, the kappa scores between coder pairs ranged from 0.69 to 0.86, with an average kappa score of 0.80 (CI: 0.73–0.87, SE: 0.0364; S1 File). Once we were satisfied with the outcome of this analysis, we extended our CDOP analysis to include the remaining recordings (n = 7). Using CDOP, we reached high average IRR between coder pairs for all 13 instructors ($\kappa = 0.75$; CI: 0.68–0.82, SE: 0.036; S1 File). The mean kappa values we obtained when using CDOP to code class audio recordings indicate substantial to excellent agreement.

We established face and content validity of CDOP through expert panel evaluation of the instrument. On a 3-point Likert scale of agree to disagree, the panelists strongly agreed that CDOP adequately measures TDMs. The average CVI was 0.90 (S2 File), which is higher than the recommended cutoff of 0.80 for new measures [51], suggesting there was excellent expert agreement on the validity of CDOP as an instrument that can measure TDMs. Some of the panelists provided feedback that improved the operational definitions of the codes as well as helped cluster the codes which increased the functional utility of the instrument. These recommendations were incorporated into the final version of the instrument reported here.

Discussion

Active-engagement instruction transforms the nature of student-teacher interactions, forcing instructors to constantly adjust their teaching practices to facilitate ensuing classroom discourse [9, 33]. Dialogical teaching plays a critical role in promoting an active, collaborative and cognitively-engaging learning experience for all students [21]. Therefore, we developed and validated a new instrument, CDOP, which can reliably quantify TDMs from observational data in undergraduate STEM learning environments.

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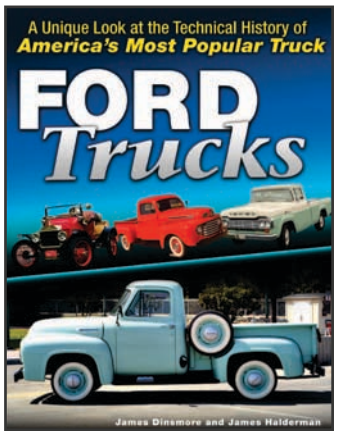
NACAT Member Update

Jim Halderman & Jimmy Dinsmore Are At It Again



NACAT members and authors James Halderman and Jimmy Dinsmore have teamed up again. Following up on the success of their first book together, *Mustang by Design*, they will release a second book titled: *Ford Trucks: A Unique Look at the Technical History of America's Most Popular Truck*. The text will be available for public sale in February of 2020.

The book's Amazon.com page, https://www.amazon.com/dp/1613255128/ref=cm_sw_em_r_mt_dp_U_kzw8Db7SJKT5D, provides the following synopsis.

> Celebrate more than 100 years of Ford truck history in this fantastic all-inclusive volume.
>
> When Henry Ford first started manufacturing Model Ts more than 100 years ago, he didn't really have any sort of pickup or truck configuration in mind. But enterprising people and businesses were modifying those early chassis for commercial use, and it didn't take long for Ford to figure out that there was a demand for this application of the Model T. Soon, Ford was making its own configurations for commercial use, first through third-party body companies and eventually by Ford itself with the Model TT. From these humble beginnings, Ford stumbled onto the basis for one of the most popular vehicles ever built: the Ford F-Series pickup truck.
>
> In *Ford Trucks: A Unique Look at the Technical History of America's Most Popular Truck*, authors Jimmy Dinsmore and James Halderman thoroughly dissect the entire history of Ford pickup trucks as seen from a technical viewpoint. Fully covered are all the options, chassis specifications, running changes, and the evolution of these trucks as they transformed from spartan utilitarian vehicles to the luxury best-selling family cruisers seen today. Not only are Ford trucks the best-selling trucks, they are the best-selling of all vehicles, cars included.
>
> From the TT and the AA models, to the BB 1932-1947 models with the first V-8, to the first F-Series models (1948-1952), the ever-popular second Gen F-Series 1953-1956 models, all the way to what is now the remarkable thirteenth generation of the F-Series, this book will thrill truck aficionados and Ford historians alike.

Article: CDOP

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The CDOP coding scheme is made up of a total of 17 codes: 15 codes that capture TDMs and two more codes that can be used to either identify other or no content discourse moves. These codes identify aspects of classroom discourse and provide descriptive accounts of teacher discourse behaviors. Given the descriptive nature of the CDOP coding scheme, there is no a priori threshold or external criteria for determining an acceptable number of discursive moves. Rather, the aim of the CDOP is to provide a fine-grained detail of what TDMs are occ urring in the observed classroom at the moment of observation. Therefore, the development of tools, such as CDOP, are essential for developing a nuanced understanding of how instructors facilitate student learning when the learning environment results in increased incidences of student-teacher interactions.

Quantifying TDMs from observational data

The CDOP coding scheme identifies TDMs from classroom observational data (Table 2), while the CDOP matrix allows for efficient recording of TDMs in 2-minute time periods over the course of a class session (Fig 1). Additionally, the CDOP matrix permits tabulating the frequencies at which specific TDMs occur and making inferences about the quality of teacher's discourse behaviors. For instance, if an instructor uses only a few CDOP codes, including the teacher-centric CDOP codes sharing and evaluating and the student-centric CDOP code generative, then that would suggest that the instructor is mostly using the IRE discourse pattern. However, if an instructor uses TDMs that exhibit a diversity of CDOP codes, especially student-centric ones like explaining or challenging, then there is evidence that the instructor is engaging in dialogical discourse approaches, such as the IRF discourse pattern, in their classroom.

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Hands-On Vehicle Electrical Troubleshooting Training Program
by Vince Fischelli, Veejer Enterprises Inc., Garland, Texas

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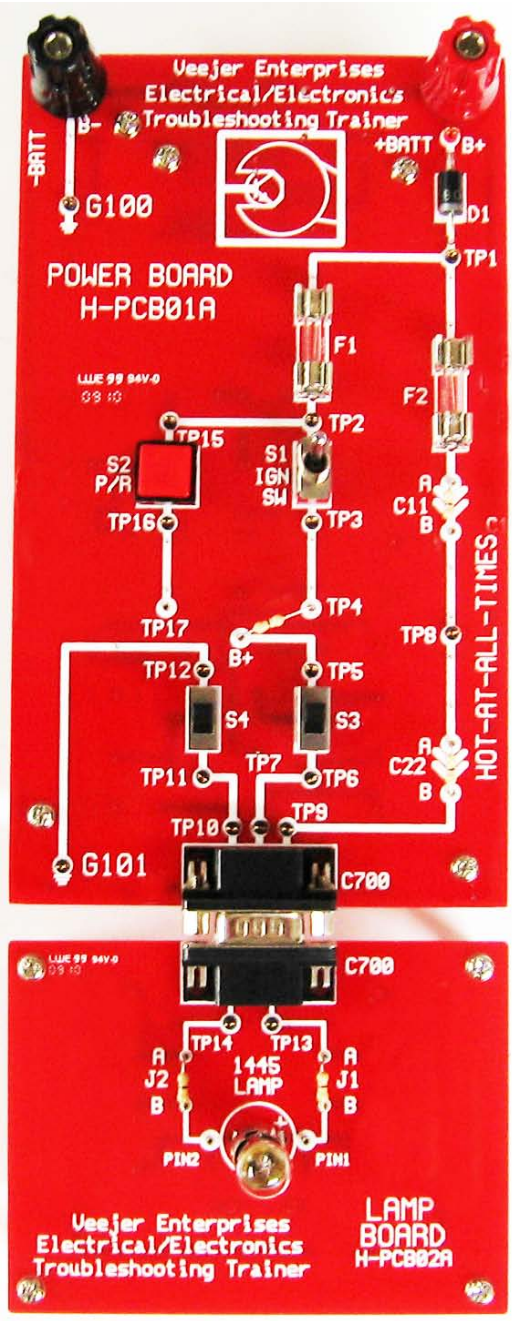

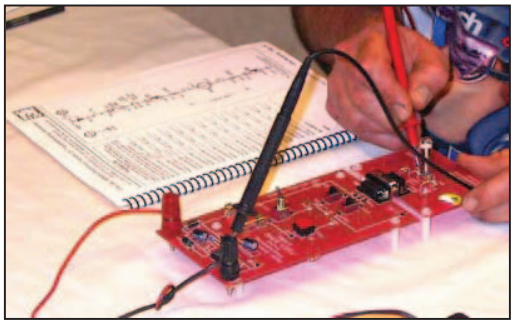

H-111A(S) The Starter Kit

Introducing an effective Hands-On Electrical Troubleshooting Training Program that teaches automotive, truck, diesel and heavy-duty future service technicians how to troubleshoot vehicle electrical-electronic circuits with "hands-on" Electrical Troubleshooting Trainers designed by Vince Fischelli, Veejer Enterprises Inc.

These Troubleshooting Trainers begin with the H-111A(S) shown at the left. They are completely constructed circuit boards that snap together to simulate a live vehicle circuit. Using the Student Workbook, H-WB111A, a student is guided through a series of circuit voltage tests, voltage drop tests and resistance measurements to learn how to test a live vehicle circuit using a DMM. This focuses electrical training time on actual testing of circuits, how they work and how they fail, rather than consuming valuable classroom time building circuits.

Once a technician understands essential circuit measurement skills with a DMM, the Instructor Guide, H-IG111A, explains how to insert electrical problems on the bottom of the circuit boards. Then the student troubleshoots from the top of the circuit boards while documenting his troubleshooting steps in the Student Workbook, H-WB111A, to compare with answers provided in the instructor guide.

Problems are inserted in seconds at various points in the voltage side or the ground side of the circuit to keep technicians busy troubleshooting. By removing a wire jumper on the bottom, an open circuit is created at some point in the circuit. By inserting a fixed resistor, a voltage drop problem is created. Inserting wire jumpers at various points create shorts-to-ground. Students learn to successfully troubleshoot vehicle electrical-electronic circuits by doing it rather than watching someone else do it or just by talking about it. Students successfully troubleshoot electrical problems by themselves, over and over 32 times until they get it right and electrical circuit troubleshooting becomes second nature.

Students practice hands-on troubleshooting a live circuit with real problems to develop self-confidence and convince students they can troubleshoot vehicle electrical circuit problems. The benefits of this electrical troubleshooting training will last for the rest of their careers. It's a great way to master electrical troubleshooting skills as students become confident electrical circuit troubleshooters who won't troubleshoot by changing parts but first troubleshoot by testing a circuit with a DMM to identify the problem. The student below is troubleshooting a problem and recording troubleshooting steps with DMM readings in a student workbook to be reviewed later.

The Starter Kit: Part # H-111A(S) is the first troubleshooting trainer. Comes with 2 circuit boards with step-by-step troubleshooting training. ("S" is the school version) Each Starter Kit contains the two Troubleshooting Trainers shown at the left; Power Board, H-PCB01A and Lamp Board, H-PCB02A. Each H-111A(S) is purchased without books. A bag of fixed resistors for inserting problems is included. Student workbooks, H-WB111A are purchased separately, as well as the Instructor Guide, H-IG111A and the Power Point for H-111A. Other trainers connect to The Starter Kit: H-113(S) DC Motor Circuit Troubleshooting; H-115(S) Troubleshooting Relay Circuits; H-116(S) Wire Harness Troubleshooting and H-200(S) CAN Bus Troubleshooting.. Each circuit board develops a student's understanding of advanced circuit troubleshooting and builds self-confidence.

Live circuit repetitive troubleshooting practice is the only way to learn and develop electrical troubleshooting skills!

Visit www.veejer.com. On the home page click on the "TEACHERS" link. Read through the Teacher's Page with all the details. Special pricing for tech schools with visual aids is available. Ask for a quote! Call (972) 276-9642 or email "vince@veejer.com."

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This type of information can be used to improve how faculty orchestrate classroom discussions, especially during small group interactions. Our preliminary findings suggest that while two instructors might both highly interact with their students, one might use more *teacher-centered* TDMs than the other (Fig 4). While we have not directly tested if the more *student-centered* TDMs are more efficacious in supporting student learning gains, previous studies provide strong evidence that instructional strategies engaging students in constructive and interactive tasks are more effective than simply "being active" (e.g., [1]).

The CDOP was intentionally designed so that an observer can simply document the TDMs occurring without making holistic judgements about the instructional strategies employed by the observer. Specifically, the data collected using the CDOP matrix can be used to inform classroom instructional practices without evaluating or passing judgment on the instructional strategies that are used by the instructor (i.e., small group learning, whole class discussions, interactive lecturing, inquiry-based activities, etc.). Within this instrument, the focus becomes how an instructor orchestrates classroom discourse and documenting its various forms will empower faculty to become more aware of their own teaching practices.

Consistent with the communicative approach proposed by Mortimer and Scott [52], we note that the CDOP codes capture a spectrum of discourse behaviors as follows: 1) *sharing*, *real-worlding*, *linking* and *forecasting* indicate authoritative or instructor-driven, non-interactive discourse behavior. When making these moves, the only voice present in the discourse is that of the instructor. These codes are mostly likely to be observed in classrooms characterized by didactic lecturing; 2) *evaluating*, *generative*, and *checking-in* are similarly instructor-driven, but involve the instructor interacting with their students. These codes capture discourse behaviors in which an instructor engages students in conversation, but does not necessarily provide feedback and are most likely observed in classrooms characterized by what Stains, Harshman [12] call *interactive lectures*; and 3) *constructing*, *connecting*, *contextualizing*, *representing*, *clarifying*, *requesting*, *explaining*, and *challenging* all involve students talking and instructors providing feedback, and therefore, indicate dialogic discourse. These codes refer to situations in which the instructor not only asks students to talk about content, but that there's some indication that the instructor listens and responds to the student talk. As such, these eight codes are most likely observed in classrooms characterized by moderate to high active engagement instruction. In general, to ensure appropriate use of CDOP, we recommend that all new observers obtain appropriate training of instrument before using it.

CDOP observer training guide

We had high agreement (Cohen's $\kappa = 0.80$) across multiple coder pairs, suggesting that with appropriate training new observers can use the CDOP in a similar manner. To this end, we have developed an observer training guide that allows observers to reliability characterize TDMs in undergraduate STEM learning environments. The guide contains the CDOP coding scheme (S3 File), CDOP matrix (S4 File), instruction, timing, and tips for observer training and optional video resources (S5 File).

Limitations and future directions

Although we demonstrated internal validity of the CDOP through face and content validity, a limitation of our study is the lack of external validity, which is the degree to which the CDOP results from our sample classrooms can be generalized to other undergraduate STEM classrooms [53]. We are currently preparing a subsequent paper that will contain the CDOP results of additional instructors across multiple institutions teaching in undergraduate STEM classrooms across the United States for external validation. However, additional research groups should further validate the tool for use in other contexts.

Additionally, CDOP does not measure student discourse moves (SDMs) or the specific conversational strategies used by students to develop their content knowledge. In future studies, it would be interesting to analyze the types of SDMs used in response to TDMs in undergraduate STEM learning environments. Moreover, the Differentiated Overt Learning Activities (DOLA) framework proposed by Chi and Wylie [1] can be used to detect the degree in which the various TDMs invoke different levels of student cognitive engagement. Therefore, we plan to use the DOLA framework to categorize TDMs and determine what levels of cognitive engagement they reveal among the students.

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"Better than a thousand days of diligent study is one day with a great teacher."
– Japanese Proverb

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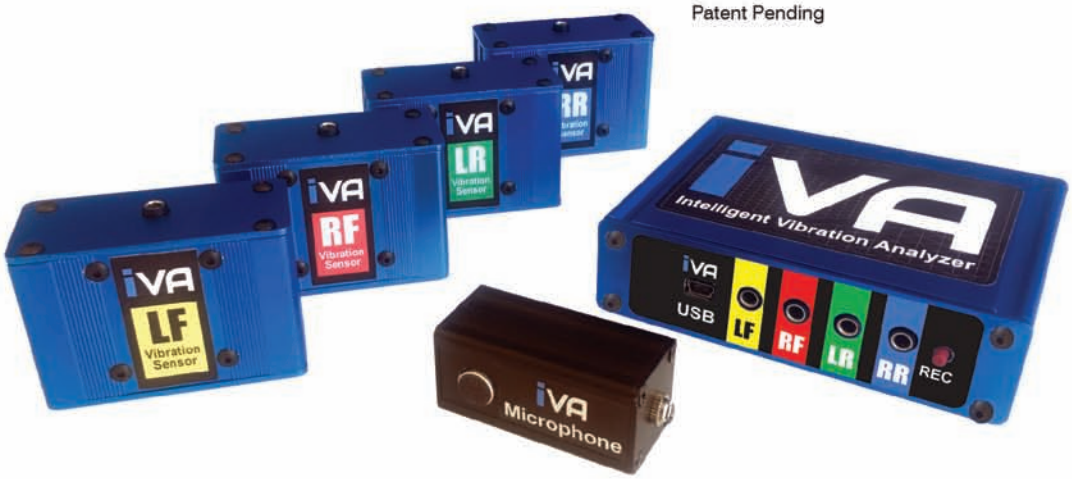

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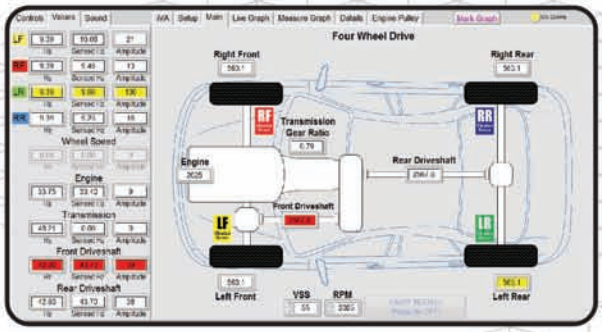

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- Which Brake (LF-RF-LR-RR)
- Which Driveshaft (Front- Rear)
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Roxanne Amiot Named SEMA - NACAT Education Award Winner!

From left to right: Chris Kersting (SEMA President), Zane Clark (SEMA Senior Director of Education), Roxanne Amiot (SEMA-NACAT Award Winner from Bullard - Havens Technical High School), Paul Katson (SEMA-NACAT Award Finalist from Mira Costa College), Steve Gibson (NACAT Chair), Russ Bacarella (SEMA - NACAT Award Finalist from Cypress College), Laura Lyons (NACAT Scholarship Committee), Juliet Marshall (SEMA Student Programs Manager), and Tim Martin (SEMA Chair).

Roxanne Amiot, auto technology instructor at Bullard - Havens Technical High School in Bridgeport, Connecticut, received the 2019 SEMA-NACAT Education Award during the Education Partners Breakfast at the 2019 SEMA Show in Las Vegas, Nevada.

The award, which encourages education in the automotive aftermarket industry, recognizes instructors who teach automotive-related curricula and demonstrate positive and innovative use of aftermarket technology in their classrooms.

Amiot, who also heads the Automotive Technology Department at Bullard-Havens Technical High School, was selected from a very competitive field that included applicants from the US and Canada.

Amiot, who worked in the automotive industry before teaching in 1988, is an alumni of the award-winning program that she now oversees. The Bullard - Havens Technical High School automotive program has been recognized for its live production repair garage, where aftermarket parts are used in community projects throughout the year. Students are prepared for careers in the automotive industry through job shadowing, community work-based opportunities, as well as interview days that include automotive aftermarket businesses such as NAPA, Federal Mogul, O'Reilly Auto Parts, and Pep Boys.

"Being recognized nationally by SEMA and NACAT brings positive attention and credibility to the work we do in our automotive technology repair program," said Amiot. "With that comes support from the industry and the state to keep our programs open and financially funded so that we can continue to do what we do best, build skilled workers for our automotive industry."

Amiot is an Automotive Service Excellence (ASE) Master Certified Technician with L1 and G1 certifications.

As part of the award, Amiot will also receive a complimentary registration to NACAT and $500 towards travel to attend the 2020 NACAT Conference and Expo in Covington, Kentucky. We can't wait to see her there! Congratulations Roxanne!

Do Your Students Know About Available Scholarships?

Do your students know about the various, non-NACAT, scholarships for which they can apply? While this list is nowhere near extensive, please make certain your students apply for scholarships at the following:

- American Muscle (www.americanmuscle.com/scholarships.html)
- Automotive Hall of Fame Scholarships (www.automotivehalloffame.org/education/scholarships)
- Automotive Women's Alliance Foundation (www.awafoundation.org/pages/Scholarships)
- BUICK Achievers Scholarships (www.buickachievers.com)
- College JumpStart Scholarships (www.jumpstart-scholarship.net)
- The Corvair Society of America (CORSA) Frank Winchell Memorial Corvair Scholarship (E-mail Mike Hall, CSA President (mrhvair@aol.com) or Sarah Bruce, Scholarship Chair (sarahvair@cfl.rr.com) for scholarship applications.)
- Federal-Mogul Automotive Technician Scholarship Program (www.fmmotorparts.com/garage-gurus/scholarships.html)
- SEMA Scholarships (www.sema.org/scholarships)
- The ShearComfort Automotive Scholarship (www.shearcomfort.com/scholarship.asp)
- University of the Aftermarket Foundation Automotive Scholarships (www.automotivescholarships.com)

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One particular limitation of the CDOP is that it only focuses on the performative aspects of teaching–i.e., how instructors interact with students and responds to them "in the moment"–but it does not examine the design elements of teaching–i.e., how instructors create the learning environment, choose content and activities, etc. Given the complexity of classroom teaching and the focus of the CDOP on the specific conversational strategies used by instructors to foster the development of ideas in the classroom, it may be important to pair it with other classroom observational protocols, such as RTOP or COPUS, to get an holistic understanding of what is happening in a classroom. For example, if one's interest is understanding the amount of time they spent on mainly lecture, using interactive lecturing, or utilize cooperative learning approaches, then COPUS would be a better tool to capture those classroom behaviors. The goal of CDOP is to characterize mainly the communicative approaches happening in the classroom and the student-teacher interactions regardless of the nature of the learning environment (traditional or active learning). Additionally, while an instructor may be interacting with a given student or group, other students or groups may be engaged in student-student discourse, necessitating the use of CDOP with other tools to measure student discourse in order to develop a more holistic picture.

Finally, the goal of understanding classroom discourse is to examine how different instructional strategies effect student learning outcomes. Thus, future research should examine the relationship between various TDMs in undergraduate STEM learning environments and student learning outcomes as measured by pre-posttest tools. For example, the research question could be: Is there a differential impact of various TDMs on student learning gains?

Conclusions

The present study reported the development and validity analysis of an instrument, the Classroom Discourse Observation Protocol (CDOP), which reliably quantifies teacher discourse moves (TDMs) in undergraduate STEM learning environments. TDMs are essential features of classroom learning, particularly in active learning environments that increase the incidences of student-teacher interactions. The CDOP coding scheme and the CDOP matrix described in the paper allow observers to capture, on a 2-minute interval basis, the frequency of TDMs occurring over the course of a class period. We found high inter-rater reliability among multiple coders when using the CDOP (Cohen's Kappa values of 0.75 and 0.80). We also found preliminarily that the CDOP is able to detect subtle differences among instructors who are otherwise using similar active learning strategies. Thus, the development of CDOP profiles makes it possible to explore how different faculty orchestrate classroom discourse. This suggests CDOP can be used as a professional development tool to explore instructional practices that are the most effective when teaching in undergraduate STEM learning environments. Continued on page 33

Is Your NACAT Membership Current?

Is your membership in NACAT current? The membership year runs September 1 - August 31. As a reminder, NACAT members enjoy the following benefits:

- NACAT members receive a discounted registration to the NACAT Conference. This annual event provides technical training and professional development classes. The sessions are presented by the industry's leading subject matter experts. The conference tradeshow provides attendees time to meet textbook authors, publishers and manufacturers of training aides. There is plenty of time for networking, fun, and industry awards in a very family friendly atmosphere.
- NACAT members are eligible to receive awards and scholarships.
- NACAT members receive three (3) issues of the NACAT News per year.
- NACAT Members receive nine (9) issues of the NACAT eNews per year.
- NACAT members receive preferred pricing on equipment, subscriptions, tools and training aides from NACAT's industry friends. This information is available in the NACAT News and the NACAT website.
- NACAT members have access to the shared resources repository at the NACAT website.
- NACAT members make life-long friendships through this network of like-minded individuals. Members are part of a family of educators preparing people for careers in the automotive industry or wherever life may lead them.

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Supporting Information

- **S1 File. Inter-rater reliability calculations among coder pairs.** https://doi.org/10.1371/journal.pone.0219019.s001 (PDF)
- **S2 File. Expert rating of CDOP item content validity.** https://doi.org/10.1371/journal.pone.0219019.s002 (PDF)
- **S3 File. CDOP code book.** https://doi.org/10.1371/journal.pone.0219019.s003 (PDF)
- **S4 File. Complete CDOP matrix.** https://doi.org/10.1371/journal.pone.0219019.s004 (PDF)
- **S5 File. CDOP observer training guide.** https://doi.org/10.1371/journal.pone.0219019.s005 (DOCX)
- **S6 File. Manuscript data and results.** https://doi.org/10.1371/journal.pone.0219019.s006 (XLSX)

Acknowledgments

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References

1. Chi MTH, Wylie R. The ICAP framework: Linking cognitive engagement to active learning outcomes. Educational Psychologist. 2014;49(4):219–43.
2. Baepler PM, Walker JD, Brooks DC, Saichaie K, Petersen C. A guide to teaching in the active learning classroom: history, research, and practice. Sterling, Virginia: Stylus Publishing; 2016. 269 p.
3. National Research Council. Discipline-based education research: understanding and improving learning in undergraduate science and engineering. Washington, DC: The National Academies Press, 2012 s.
4. Association of American Universities. Progress toward achieving systemic change: Five-year status report on the AAU Undergraduate STEM Education Initiative. Washington, DC.: 2017.
5. Hora MT, Ferrare JJ. Instructional systems of practice: A multidimensional analysis of math and science undergraduate course planning and classroom teaching. Journal of the Learning Sciences. 2013;22(2):212–57.
6. Freeman S, Eddy SL, McDonough M, Smith MK, Okoroafor N, Jordt H, et al. Active learning increases student performance in science, engineering, and mathematics. Proceedings of the National Academy of Sciences. 2014;111(23):8410–5. pmid:24821756
7. Dolan EL. Biology education research 2.0. CBE—Life Sciences Education. 2015;14(4):ed1. pmid:26628560.
8. Michaels S, Sohmer RE, O'Connor MC. Classroom discourse. Sociolinguistics: An international handbook of the science of language and society. 2004:2351–66.
9. Walshaw M, Anthony G. The teacher's role in classroom discourse: A review of recent research into mathematics classrooms. Review of educational research. 2008;78(3):516–51.
10. Smith MK, Jones FHM, Gilbert SL, Wieman CE. The Classroom Observation Protocol For Undergraduate Stem (COPUS): A new instrument to characterize university STEM classroom practices. CBE-Life Sciences Education. 2013;12(4):618–27. pmid:24297289
11. Smith MK, Vinson EL, Smith JA, Lewin JD, Stetzer MR. A campus-wide study of stem courses: New perspectives on teaching practices and perceptions. CBE-Life Sciences Education. 2014;13(4):624–35. pmid:25452485
12. Stains M, Harshman J, Barker MK, Chasteen SV, Cole R, DeChenne-Peters SE, et al. Anatomy of STEM teaching in North American universities. Science. 2018;359(6383):1468–70. pmid:29599232
13. Michaels S, O'Connor C. Conceptualizing talk moves as tools: Professional development approaches for academically productive discussion. Socializing intelligence through talk and dialogue. 2015:347–62.
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14. Duschl R. Science education in three-part harmony: Balancing conceptual, epistemic, and social learning goals. Review of research in education. 2008;32(1):268–91.
15. Christodoulou A, Osborne J. The science classroom as a site of epistemic talk: A case study of a teacher's attempts to teach science based on argument. Journal of Research in Science Teaching. 2014;51(10):1275–300.
16. Ohlsson S. Learning to do and learning to understand: a lesson and a challenge for cognitive modeling. In: Reiman P, Spade H, editors. Learning in humans and machines towards an interdisciplinary learning science: Pergamon; 1996. p. 37–62.
17. Cazden CB. Classroom discourse: The language of teaching and learning. Portsmouth, NH: Heinemann; 2001.
18. Chapin SH, O'Connor C, Anderson NC. Classroom discussions: Using math talk to help students learn, grades K-6: Math Solutions; 2009.
19. Herbel-Eisenmann BA, Steele MD, Cirillo M. (Developing) teacher discourse moves: A framework for professional development. Mathematics Teacher Educator. 2013;1(2):181–96.
20. Howe C, Abedin M. Classroom dialogue: A systematic review across four decades of research. Cambridge journal of education. 2013;43(3):325–56.
21. Alexander RJ. Towards dialogic teaching: rethinking classroom talk: Dorchester Publishing Company, Incorporated; 2008.
22. Michaels S, O'Connor C. Talk science primer. Cambridge, MA: TERC; 2012.
23. O'Connor C, Michaels S, Chapin S, Harbaugh AG. The silent and the vocal: participation and learning in whole-class discussion. Learning and Instruction. 2017;48:5–13.
24. Sawada D, Piburn MD, Judson E, Turley J, Falconer K, Benford R, et al. Measuring reform practices in science and mathematics classrooms: the reformed teaching observation protocol. School Science and Mathematics. 2002;102(6):245–53.
25. Wieman C, S. G, Dolan EL. The Teaching Practices Inventory: A new tool for characterizing college and university teaching in mathematics and science. CBE—Life Sciences Education. 2014;13(3):552–69. pmid:25185237.
26. Gee JP. How to do discourse analysis: A toolkit. London: Routledge; 2010. 224 p.
27. Rojas-Drummond S, Torreblanca O, Pedraza H, Vélez M, Guzmán K. 'Dialogic scaffolding': Enhancing learning and understanding in collaborative contexts. Learning, Culture and Social Interaction. 2013;2(1):11–21.
28. van de Pol J, Elbers E. Scaffolding student learning: A micro-analysis of teacher–student interaction. Learning, Culture and Social Interaction. 2013;2(1):32–41. https://doi.org/10.1016/j.lcsi.2012.12.001.
29. Prediger S, Pöhler B. The interplay of micro- and macro-scaffolding: an empirical reconstruction for the case of an intervention on percentages. ZDM. 2015;47(7):1179–94.
30. Strauss A, Corbin J. Basics of grounded theory methods. Beverly Hills, CA: Sage; 1990.
31. Pimentel DS, McNeill KL. Conducting talk in secondary science classrooms: Investigating instructional moves and teachers' beliefs. Science Education. 2013;97(3):367–94.
32. Chin C. Teacher questioning in science classrooms: Approaches that stimulate productive thinking. Journal of Research in Science Teaching: The Official Journal of the National Association for Research in Science Teaching. 2007;44(6):815–43.
33. Hardman J. Tutor–student interaction in seminar teaching: Implications for professional development. Active Learning in Higher Education. 2016;17(1):63–76.
34. Warfa A-RM, Roehrig GH, Schneider JL, Nyachwaya J. Role of teacher-initiated discourses in students' development of representational fluency in chemistry: A case study. Journal of Chemical Education. 2014;91(6):784–92.
35. Rasmussen C, Kwon O, Marrongelle K, editors. A framework for interpreting inquiry-oriented teaching. Conference on Research in Undergraduate Mathematics Education, Mission Valley, CA; 2008.
36. Sinclair JM, Coulthard M. Towards an analysis of discourse: The English used by teachers and pupils. London: Oxford University Press; 1975.

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Miami Dade College Inaugurates Electric Vehicle Training Center

On December 4, 2019, Miami Dade College's (MDC) West Campus celebrated the inauguration of its new, one-of-a-kind and state-of-the-art Electric Vehicle Training Center and the graduation of its first cohort of Tesla START students. MDC is the first institution in the Southeastern United States to partner with Tesla to offer a certificate training program for service technicians called Tesla START.

"With the opening of the new training center, students will be able to compete for opportunities in the growing field of electric vehicle service technicians," said MDC's Interim President Dr. Rolando Montoya. "The College continues to provide our students with cutting-edge technology training programs in preparation of today's competitive global workplace."

The Career Technical Certificate in Advanced Automotive Service Technology – Tesla Technician Program, called Tesla START, is an accelerated 12-week program designed to equip students with the skills necessary to become electric vehicle technicians. Tesla has provided the training equipment, vehicles, tools and curriculum for the program. Following the completion of the program, successful students are eligible to work as full-time employees at a Tesla Service Center in North America.

"Our new Electric Vehicle Service (EVS) Center will allow students in the Southeast United States to train as electric vehicle technicians in our state-of-the-art facility," added Dr. Beverly Moore-Garcia, West Campus President. "Miami Dade College is committed to establishing industry partnerships such as the one with Tesla to provide students with industry skills and certifications which lead to in demand careers."

MDC is one of only six colleges nationwide to implement the Tesla START program, which employs and educates students on electric vehicle technology and prepares them for careers at Tesla. During the program, students develop technical expertise and earn certifications through a blended approach of in-class theory, hands-on labs and self-paced learning. Tesla collaborates with graduates to place them at Tesla Service Centers from Coral Gables to Tampa and across North America. More than 200 students have graduated from the Tesla START program nationally to date. The endeavor is part of MDC's "Earn and Learn" initiatives which have already received major awards and recognition, including the prestigious 2019 Lumina Foundation Education Innovation Judges' Choice Prize, a top national distinction.

MDC's School of Engineering, Technology and Design (EnTec) offers a variety of degree and certificate programs, including unique opportunities and access to in-demand and growing industries, such as cybersecurity, data analytics, cloud computing, and AR/VR. With input from top industry partners including Florida Power & Light, IBM and AWS, to name a few, courses deliver the education that the nation's top employers are looking for. For more information about the Tesla START program, visit www.mdc.edu/tesla or contact us at tesla@mdc.edu.

Kentucky Automotive Facts!

1. Ten vehicle models are produced in Kentucky with two more on the way: Toyota Camry, Camry Hybrid, Avalon, Avalon Hybrid; Ford Escape, F-Series Super Duty, Expedition, Lincoln MKC; the Chevy Corvette; and the Lexus ES350.
2. 1,316,137 Kentucky-Made vehicles were produced in 2016.
3. One out of four manufacturing jobs in Kentucky is in the automotive sector.
4. On a per capita basis, Kentucky ranks FIRST nationally in light-vehicle production and THIRD overall.
5. More than $5.4 Billion in Kentucky-Made vehicles and parts were exported in 2016.
6. Kentucky has more than 500 automotive-related manufacturing, service and technology establishments, which include four major auto assembly plants, employ nearly 95,000 people.

Facts provided by the Kentucky Automotive Industry Association (http://www.KyAutoIndustry.com), which was established to advance and promote Kentucky's automotive industry by providing leadership and creating collaborative partnerships. The association was formed hand-in-hand with Kentucky's OEMs and suppliers to ensure its continued focus on addressing the challenges and opportunities of the industry. KAIA is a statewide organization representing all automotive interests including OEMs, suppliers, academic institutions, individuals, and any organization serving the auto industry in any capacity.

US Consumers Lag Far Behind Major Industrialized Countries in Embracing Electric/Hybrid Vehicles, According to Survey

Americans are much less likely than consumers in other major industrialized countries to purchase an electric vehicle or hybrid, largely because of concerns over access to charging stations away from home, according to a comprehensive survey by global consulting firm OC&C Strategy Consultants.

The survey, which included 10,000 respondents across five countries – The US, China, France, Germany and the United Kingdom – looked at consumer attitudes and preferences on a number of issues currently facing the automotive industry: Electric and autonomous vehicles; car-sharing, subscription models, car ownership and more.

Just 53% of US consumers said they would consider purchasing an EV/hybrid. In contrast, 77% of French consumers and 94% of Chinese respondents said they would consider buying that type of vehicle. Only 10% of US consumers said they purchased an EV/hybrid as their most recent vehicle.

Other key findings from the survey:

- Government incentives are a key driver in getting consumers to purchase electric vehicles. For example, in California, which offers strong financial incentives to purchase EVs, consumers purchase nearly 50% of all EV sold in the US.
- Car ownership remains vitally important to Americans; 84% say having their own car is "essential to getting around," highest among the five countries. Additionally, 64% of Americans say they expect to own their own car in the future, ahead of all countries except China.
- Nearly 70% of Americans (and Europeans) would not trust an autonomous vehicle. Conversely, 72% of Chinese consumers would trust an autonomous vehicle.
- Car-sharing, short-term renting and taxis are largely unappealing to consumers in most Western countries because they want a vehicle "when and where they need it" and "it's too much of a hassle to pick up a vehicle."
- US consumers are interested in "bundling" car-related services - such as insurance, service and maintenance and breakdown coverage - into one monthly bill.
- No single company has all the ingredients to lead the way in car selling, servicing, financing, insurance which could lead to partnerships and/or vertical integration across car-rental firms, service companies, etc.

Nicholas Farhi, US-based partner at OC&C Strategy Consultants, who specializes in the automotive industry, said the study shows that "America remains the spiritual home of the individually owned automobile and the open road, with few willing to adapt to innovation. Dwindling incentives and static or loosening emission standards have failed to push more Americans to consider electric vehicles."

"This survey also points to a future where consumers buy 'just add fuel' subscription vehicles. Companies who can take their experience managing fleets, such as car rental agencies, to becoming service providers to this market will be the unheralded winners."

"While the evolution of the way we transport people and goods is a key pillar in the race to decarbonize transportation, the younger generation in the U.S. are constrained by their finances in purchasing greener EV and hybrid vehicles."

ABOUT OC&C STRATEGY CONSULTANTS

Founded in 1987, OC&C is a leading global strategy consulting firm that brings clear thinking to the most complex issues facing today's management teams. OC&C's client roster includes some of the world's most respected companies in the retail, consumer goods, leisure, media, communications and technology sectors, as well as industrial products and services, travel and transport and private equity.

"Tell me and I forget. Teach me and I remember. Involve me and I learn."
– Benjamin Franklin

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37. Mehan H. Learning lessons: Social organization in the classroom. Cambridge, MA: Harvard University Press; 1979. 227 p.
38. Garton S. Speaking out of turn? Taking the initiative in teacher-fronted classroom interaction. Classroom Discourse. 2012;3(1):29–45.
39. Krussel L, Edwards B, Springer G. The teacher's discourse moves: A framework for analyzing discourse in mathematics classrooms. School Science and Mathematics. 2004;104(7):307–12.
40. Lidar M, Lundqvist E, Östman L. Teaching and learning in the science classroom: The interplay between teachers' epistemological moves and students' practical epistemology. Science Education. 2006;90(1):148–63.
41. Criswell BA, Rushton GT. Conceptual change, productive practices, and themata: supporting chemistry classroom talk. Journal of Chemical Education. 2012;89(10):1236–42.
42. MacDonald R, Miller E, Lord S. Doing and Talking Science: Engaging ELs in the Discourse of the Science and Engineering Practices. In: Oliveira AW, Weinburgh MH, editors. Science Teacher Preparation in Content-Based Second Language Acquisition. Cham: Springer International Publishing; 2017. p. 179–97.
43. NGSS Lead States. Next generation science standards: For states, by states. Washington, DC: The National Academies Press; 2013.
44. O'Connor C, Michaels S, Chapin S. Scaling down" to explore the role of talk in learning: From district intervention to controlled classroom study. Socializing intelligence through academic talk and dialogue. 2015:111–26.
45. Seidel SB, Reggi AL, Schinske JN, Burrus LW, Tanner KD, Tomanek D. Beyond the Biology: A Systematic Investigation of Noncontent Instructor Talk in an Introductory Biology Course. CBE—Life Sciences Education. 2015;14(4):ar43. pmid:26582237.
46. R Core Team. R: A language and environment for statistical computing. Vienna, Austria: R Foundation for Statistical Computing; 2018.
47. Landis JR, Koch GG. The measurement of observer agreement for categorical data. Biometrics. 1977;33(1):159–74. pmid:843571
48. Nunnally JC, Bernstein I. Psychometric theory: McGraw-Hill New York; 1994.
49. Hubley AM, Zumbo BD. A dialectic on validity: Where we have been and where we are going. The Journal of General Psychology. 1996;123(3):207–15.
50. Rubio DM, Berg-Weger M, Tebb SS, Lee ES, Rauch S. Objectifying content validity: Conducting a content validity study in social work research. Social work research. 2003;27(2):94–104.
51. Davis LL. Instrument review: Getting the most from a panel of experts. Applied nursing research. 1992;5(4):194–7.
52. Mortimer EF, Scott PH. Meaning Making in Secondary Science Classrooms. Maidenhead: Open University Press; 2003.
53. Cohen L, Manion L, Morrison K. Validity and reliability. Research Methods in Education. New York, NY: Routledge; 2007.

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For example, the authors estimated that each additional centimeter of B-pillar intrusion was associated with a 3 percent increase in death risk. Each additional millimeter of rib deflection, one of the measures recorded by the dummies in the test, was associated with a 10 percent increase in death risk.

"This tells us that the current side crash test measures the right things," says IIHS Senior Statistician Eric Teoh, the lead author of the paper. "We know that we don't need to go in a completely different direction or upgrade to expensive new dummies as we update the test."

Optimizing test conditions

An earlier IIHS study looked at side crashes in good-rated vehicles that resulted in deaths or serious injuries. That study showed that many of those crashes were more severe than the IIHS test and also had a more forward impact location.

The severity of a side crash depends on both the weight of the striking vehicle and its speed. The movable barrier currently used in the IIHS side test weighs 3,300 pounds. At the time the test began, many SUVs on the road were close to that weight, but they have gotten much heavier since then.

To better reflect the higher-severity crashes occurring in the real world, Mueller and other IIHS engineers began a series of research tests at a higher speed — 37 mph instead of the 31 mph speed used in the current side rating test. They also made the movable barrier heavier, increasing its weight to nearly 4,200 pounds, the average weight of a 2019 model SUV.

"These changes might not sound like a big deal, but the 6 mph speed increase alone produces 42 percent more crash energy," Mueller says. "Together with the weight increase, the modified test configuration has 82 percent more energy than our current side rating test."

IIHS engineers also conducted tests with a more forward impact location on the struck vehicle, but that change didn't appear to lead to higher injury risk. In fact, the injury measures from the dummies were lower in the forward configuration than in the standard configuration.

The goal of these research tests was to see how well crashes at the higher speed with the heavier barrier resembled crashes using a real SUV or pickup in place of the barrier.

For the initial round, the team selected four good-rated vehicles — a Toyota Camry, Volkswagen Atlas, Honda Accord and Infiniti QX50 — to subject to a variety of impacts. The test vehicles were struck by a popular pickup, SUV and car, as well as by the 4,200-pound movable barrier. Tests were conducted at the current side test speed of 31 mph and also at 37 mph.

The crashes with the movable barrier weren't identical to the crashes with a second vehicle. Video footage showed that the struck vehicles rolled away from the barrier but toward the striking vehicles.

The structural damage also differed. The frame rails — the stiffest part of a vehicle front — of the striking vehicles punched into the middle of the struck vehicle's doors, wrapping around the B-pillar.

In contrast, the movable barrier has uniform stiffness and strikes the vehicles more evenly. That means the B-pillar can absorb more of the crash energy in the test than it would in a real-world crash.

The engineers are now experimenting with changes to the barrier's honeycomb face to try to better replicate the interaction of vehicles in a real-world crash involving a late-model SUV or pickup as the striking vehicle. They are altering the honeycomb shape and varying the stiffness within it, just as it varies on the front of a real SUV.

"Our goal is to create a barrier that creates the same type of damage as a typical late-model SUV or pickup would in a 37 mph crash," Mueller says. "That way, we can be confident that the changes automakers make in hopes of achieving good ratings in the new side test will result in better protection for vehicle occupants in real-world crashes."

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