

# Forum on Education

American Physical Society

## Fall 2019 Newsletter

Jennifer Dockett, Editor

### In This Issue

<b>From the Chair, Laurie McNeil</b> .....	2
<b>Director’s Corner: APS Innovation Fund, Theodore Hodapp</b> .....	3
<b>From the Editor, Jennifer Dockett</b> .....	3
<b>FFPER 2019: Reports from Collaborative Groups,</b> <i>Rachel E. Scherr, Michael C. Wittmann, Paula R.L. Heron</i> .....	3
<b>Using Social Psychological Interventions to Make Physics Classes Equitable and Inclusive</b> <i>Chandralekha Singh</i> .....	4
<b>A Journal Club for Physics Education Research, Paula Heron</b> .....	6
<b>PER in “Developing” or “Non-Western” Countries: Connections and Ideas, Linda Strubbe</b> .....	7
<b>The PER Review Network: Respectful, Constructive Peer Review, Jayson Nissen</b> .....	8
<b>The Graduate Student/Postdoc Research Symposium at FFPER, Benedikt Harrer</b> .....	9
<b>PERToY - A YouTube Channel for PER, Martin Stein</b> .....	10
<b>Section on Teacher Preparation, Alma Robinson</b> .....	11
<b>Sustaining Your PhysTEC Effort After the Initial Funding: A Case Study, John Simonetti</b> .....	12
<b>My Unexpected Journey in Becoming a Physics Teacher, Ethan Kantz</b> .....	13
<b>Browsing the Journals, Carl Mungan</b> .....	15
<b>Web Watch, Carl Mungan</b> .....	16
<b>Executive Committee of the FED</b> .....	17

Disclaimer: The articles and opinion pieces found in this issue of the APS Forum on Education Newsletter are not peer refereed and represent solely the views of the authors and not necessarily the views of APS.

## From the Chair

*Laurie McNeil, University of North Carolina at Chapel Hill*

Fall is award season for the American Physical Society (APS), and this is true for its Forum on Education (FEEd) as well. The Forum appoints the selection committees for two education awards given out by the APS: The first is the 2020 *Excellence in Physics Education Award*, which goes to the **Open Source Physics Team** “for sustained commitment to computational physics education through creating and disseminating programming environments, books, software, simulations, and other tools to support computational thinking, and for research establishing the value of these tools and best practices for their use.” You can access the instructional materials for which they are honored on the compADRE digital library site of the American Association of Physics Teachers at [compadre.org/osp/](http://compadre.org/osp/). If you know of another team that has exhibited a similar “sustained commitment to excellence in physics education,” I urge you to nominate them for the 2021 award. The deadline is 3 June 2020, and information can be found on the FEEd website.

The second award the FEEd is responsible for is the *Jonathan F. Reichert and Barbara Wolff-Reichert Award for Excellence in Advanced Laboratory Instruction*. The 2020 winner has not been announced yet (though we expect the announcement soon), but you can already be thinking about potential nominees for the 2021 award. The award honors individuals for their outstanding achievement in teaching, sustaining, and enhancing an advanced undergraduate physics laboratory course. This important work often goes unrecognized (especially beyond the walls of a physics department), so please think about worthy physicists you may know and consider nominating them. Information is available on the FEEd website, and the deadline for nominations is the same as that for the Excellence award.

A third award for education is administered by the APS Committee on Education. This is the *Award for Improving Undergraduate Physics Education*, which recognizes excellence and best practices in undergraduate physics education. If you are a member of a physics department or program that you think exhibits these qualities, please consider submitting an application for this award. The 2020 “Departments (or Programs) of Distinction” will be announced soon, and the deadline for applications for the 2021 awards is 15 June 2020. Details can be found on the APS Education programs website.

It gives me great pleasure to recognize the newly-elected APS Fellows nominated by the FEEd Fellowship Committee (led by Past Chair Larry Cain) for their significant contributions to physics education. They are:

**Wendy Adams (Colorado School of Mines):** “For impactful physics education research and the subsequent development of assessments in the areas of problem solving, student beliefs, and teacher preparation, leading to a range of improvements such as increased student learning and reductions in physics teacher shortages.”

**Idalia Ramos (University of Puerto Rico at Humacao):** “For tireless work on behalf of physics students, especially Hispanic women, and for enthusiasm for research that has inspired generations of many Puerto Rican students to enter physics graduate programs.”

Please join me in congratulating all of these outstanding physics colleagues (including those yet to be announced!) for their contributions to our shared educational enterprise.

Fall is also election season, and not just in politics. Members of the FEEd should have received (and, I hope, acted on) an e-mail ballot message directing you to the voting website. The balloting closed on 26 October, and the new Vice-Chair, Secretary-Treasurer, and Members-at-Large will begin their terms on 1 January 2020. The Secretary-Treasurer and the Members-at-Large serve for three years, while the Vice-Chair moves up the line to Chair-Elect, Chair, and Past Chair in subsequent years. I appreciate the excellent work of the Nominating Committee (led by FEEd Vice-Chair Catherine Crouch) in presenting the membership with an outstanding slate of candidates. I look forward to working with the ones who are elected.

One of the most prominent activities of the Forum is to organize invited sessions on education topics to be presented at the APS March and April meetings. Program Chair (and Chair-Elect) Jerry Feldman and his committee have been hard at work all summer putting together some excellent groups of speakers, and I hope to see some of you at those sessions in Denver in March or in Washington in April.

Finally, I remind you that the Forum’s ability to support and enhance physics education is dependent upon having a robust membership. Please encourage your colleagues to join the Forum—it’s free! APS members can join as many Forums as they like without paying additional dues. The more who do so, the greater the voice education will have within the Society.

## Director's Corner: APS Innovation Fund

*Theodore Hodapp*

Ever have one of those ideas that you think: You know, if this works, it could make a huge difference... Well, if your idea happens to be aligned with the [APS Strategic Plan](#), then maybe we could give it a try. In 2019 the APS Board of Directors authorized the first ever [Innovation Fund](#) awards. The intent is to bring together good ideas and people interested in making a difference in the physics community. In 2019 APS made the first four awards, and the plan is to do this again in 2020.

Proposals were judged on how innovative they were, and whether

the activity looked like it was likely to succeed. You also can not ask for money for things you are already doing – it has to be new! There were no awards made in physics education this past year (although several of them involve people learning about physics), so perhaps 2020 would be a good time to try out a new idea.

A new call for proposals should be out after the first of the year and will likely follow a similar format to last year. So, think about how you can build on current advances in education and consider submitting an idea to the APS Innovation Fund.

## From the Editor

*Jennifer Docktor, University of Wisconsin – La Crosse*

This newsletter features reports from working groups at the summer 2019 conference of Foundations and Frontiers in Physics Education Research (FFPER) held in Bar Harbor, Maine. I'd like to thank Rachel Scherr for her leadership role in organizing the contributed articles.

The next newsletter deadline is coming up on January 15, 2020. If you have ideas for future newsletter themes or an article you would like to contribute, please e-mail me at [jdocktor@uwla.edu](mailto:jdocktor@uwla.edu).

## FFPER 2019: Reports from Collaborative Groups

*Rachel E. Scherr, University of Washington, Michael C. Wittmann, University of Maine  
Paula R.L. Heron, University of Washington*

In June of 2019, 60 members of the Physics Education Research (PER) community gathered at the College of the Atlantic in Bar Harbor, Maine, for the 8th biennial “Foundations and Frontiers in Physics Education Research” (FFPER) conference. First held in 2005, and modeled after the Gordon Conferences, this meeting is a venue for specialists who are active researchers in the field of physics education. Talks at the conference are all in a plenary format, typically addressing the speaker's take on the major accomplishments of the field of PER (Foundations) or describing possibly promising research directions (Frontiers). This year's plenary speakers were: Mervi Asikainen (University of Eastern Finland), Eugenia Etkina (Rutgers University), Jenaro Guisasaola (University of the Basque Country), Natasha Holmes (Cornell University), Paul van Kampen (Dublin City University), Sam McKagan (Alder Science Education Association), Gina Passante (California State University Fullerton), Amy Robertson (Seattle Pacific University), and Chandralekha Singh (University of Pittsburgh). The plenary sessions are followed by coffee breaks and discussion sessions in which attendees engage deeply with the speakers and with each other.

Afternoons at the conference are spent in smaller sessions. Con-

ference attendees self-organize into collaborative groups that examine particular research interests or explore current issues in PER. This year, the collaborative groups included one about PER in “developing” or “non-Western” countries, one about a possible YouTube channel for PER, one about using social-psychological interventions to make physics classes equitable and inclusive, one about the formation of a PER review network to foster community and improve research, and one in which PER graduate students worked with faculty mentors to review and improve each other's short papers. Each of these groups has provided a short write-up of their discussion for this newsletter.

The FFPER conference continues to exist and flourish in part because of the financial support of the Forum on Education and the Topical Group on Physics Education Research. Members of the PER community value FFPER as a space in which to immerse ourselves in current research and to form connections and collaborations with other members of the community.

*Rachel E. Scherr, Michael C. Wittmann, and Paula R. L. Heron co-founded FFPER and have co-organized it since its inception.*

## Using Social Psychological Interventions to Make Physics Classes Equitable and Inclusive

*Chandralekha Singh, University of Pittsburgh*

When students struggle to solve challenging physics problems, they can respond in two distinct ways. One type of (negative) reaction is to question whether they have what is needed to excel in physics. A different (positive) reaction is to enjoy the struggle because it means the student is tackling new physics and learning. The negative reaction is a manifestation of fixed mindset (i.e., believing that intelligence is immutable and struggling is a reflection of a lack of intelligence), whereas the positive reaction emanates from a growth mindset (the fact that your brain's capabilities can grow with deliberate effort and you can become an expert in a field by working hard and smart) [1]. Unfortunately, due to societal stereotypes [2], women and ethnic and racial minority (ERM) students who are severely underrepresented in physics [3-13] are more likely than the majority students to fall prey to the fixed mindset trap and view struggle with challenging physics problems in a negative light. This is not surprising because compared to any other STEM field, the societal stereotypes are the strongest in physics, a field which has historically been associated with brilliant men. These stereotypes contribute to a lower sense of belonging for women and ERM students in physics learning environments [3-13].

To help players excel in any game, e.g., chess, coaches must ensure that the players have both good defense and offense. Helping students learn physics well, like helping players do well in a game, requires instructors to ensure that they equip all students with both good defense and offense. In particular, instructors should consider strengthening students' defenses by creating learning environments where all students have a high sense of belonging, promoting and emphasizing growth mindset, and ensuring that all students have high self-efficacy to excel in physics. Only if students have strong defenses pertaining to physics learning can they effectively engage with the offense, e.g., by tackling challenging problems and developing physics problem solving, reasoning and meta-cognitive skills.

Students with weak defenses are unlikely to undertake the risk of struggling with challenging physics problems. Without strong defenses, tackling challenging physics problems can collapse a "student's wavefunction" into a state in which the outcome is negative and the student contemplates: "I am struggling because I do not have what it takes to do well in physics. What is the point of even trying?" These kinds of negative thoughts can lead to a lack of engagement with effective approaches to learning physics and can increase students' anxiety during test taking so that some of the limited precious cognitive resources during problem solving are occupied by the anxiety pertaining to solving challenging problems. Unless instructors help all students develop adequate defenses, students with lower defenses can go in a detrimental feedback loop in which negative thoughts about struggling lead to

increased anxiety, procrastination, and disengagement from effective learning approaches including taking advantage of the available resources for learning. The result is deteriorated performance which can then lead to further negative thoughts and anxiety. Due to societal stereotypes and biases that people are bombarded with from a young age [2], women and ERM students are less likely than majority students to have strong defenses when they enter physics classes. Therefore, if the instructor does not make a concerted effort to bolster student defenses and inoculate students against stereotype threats (i.e., fear of confirming a negative stereotype about one's group), the situation is more likely to hurt women and ERM students [2].

Fortunately, instructors and advisors have the power to empower students and impact their defenses positively by creating an inclusive and equitable learning environment in which all students have a high sense of belonging, where students are not afraid to struggle and fail, and where students use their failures as a stepping stone to learning [14-16]. Although physics instructors have traditionally not considered it to be their responsibility to serve as coaches for their students and help boost them along both the defense and offense dimensions pertaining to learning physics, these issues are central for equity and inclusion in physics. Moreover, short classroom activities that take less than a class period at the beginning of the course can go a long way in improving students' sense of belonging and intelligence mindset, particularly for those who need it the most and in creating an equitable and inclusive physics learning environment [14-16].

We implemented a short intervention that shows great promise [14] that only requires half of a recitation class period at the beginning of the semester. Our intervention was conducted in a required introductory calculus-based physics course, which is taken by physical science and engineering majors typically in their first year first semester in college. Two female physics graduate students were trained to facilitate the half-hour activity at the beginning of the semester in half of the recitations that were randomly selected. The facilitators introduced it as an activity that would help the physics department understand student concerns and how to foster better learning environments. Students in the recitation classes in which the activity took place were handed a piece of paper and asked to write about their concerns about being in the physics course. Then they were shown some quotations from both male and female students from previous years who did very well in physics who also had similar concerns. The quotes emphasized the importance of working hard and working smart, learning from one's mistakes and taking advantage of all of the learning resources because that is the way to perform well in physics. Then students were asked to get together in small groups to discuss what they wrote; generally they learned that other students in their

classes had similar worries. Finally, there was a general class discussion summarizing what the different groups discussed, with explicit emphasis of the fact that adversity is common in college physics courses but it is temporary. The facilitators re-emphasized that students should embrace challenging physics problems, use their failures as stepping stones to learning and work hard and work smart to succeed. Using the principle of “saying is believing” [15], in the next recitation class, students were asked to write a short letter telling a future student about strategies for excelling in their physics class.

What is heartening is that this short intervention closed the gender gap in performance compared to the comparison group involving the recitation sections in which this short intervention did not take place [14]. A student’s sense of belonging, self-efficacy and intelligence mindset are strongly intertwined with cognitive engagement and learning [1,2]. Just after winning the US Open in 2019, Naomi Osaka proclaimed, “Fall on my face 18 million times and I’m gonna get up 18 million times. Just wanted to say I’m probably gonna fall down a couple dozen times in the future but hey, the kid is resilient.” Without improving students’ defenses, it is impossible for them to use their cognitive resources appropriately and excel in physics. Physics instructors should consider activities similar to the one we implemented [14] that strive to create classrooms that are inclusive and equitable and give all students an opportunity to develop a solid grasp of physics. Last but not least, it is important to remember that the authenticity and credibility of the facilitator of the activity (e.g., instructor or teaching assistant) is extremely important for students to trust the message underlying the activity and benefit from it.

*Chandralekha Singh is a professor in the Department of Physics and Astronomy at the University of Pittsburgh. She is the past chair of the APS Forum on Education and is currently the President-Elect of the American Association of Physics Teachers.*

## References

- [1] C. Dweck, *Mindset: The New Psychology of Success* (Random House Inc., New York, 2006).
- [2] C. Steele and J. Aronson, Stereotype threat and the intellectual test performance of African Americans, *Attitudes and Social Cognition* **69**, 797 (1995).
- [3] M. Lorenzo, C. Crouch, and E. Mazur, Reducing the gender gap in the physics classroom, *Am. J. Phys.* **74**, 118 (2006).
- [4] Z. Hazari, R. Tai and P. Sadler, Gender differences in introductory university physics performance: The influence of high school physics preparation and affective factors, *Sci. Educ.* **91**, 847 (2007).
- [5] V. Sawtelle, E. Brewe and L. Kramer, Exploring the relationship between self-efficacy and retention in introductory physics, *J. Res. Sci. Teach.* **49**, 1096 (2012).
- [6] A. Traxler, X. Cid, J. Blue, and R. Barthelemy, Enriching gender in physics education research: A binary past and a complex future, *Phys. Rev. PER* **12**, 020114 (2016).
- [7] J. Nissen and J. Shemwell, Gender, experience, and self-efficacy in introductory physics, *Phys. Rev. PER* **12**, 020105 (2016).
- [8] E. Marshman, Z. Y. Kalender, C. Schunn, T. Nokes-Malach and C. Singh, A longitudinal analysis of students’ motivational characteristics in introductory physics courses: Gender differences, *Can. J. Phys.* **96**, 391 (2017).
- [9] E. Marshman, Z. Y. Kalender, T. Nokes-Malach, C. Schunn and C. Singh, Female students with A’s have similar self-efficacy as male students with C’s in introductory courses: A cause for alarm?, *Phys. Rev. PER* **14**, 020123 (2018).
- [10] N. Karim, A. Maries and C. Singh, Do evidence-based active-engagement courses reduce the gender gap in introductory physics?, *Eur. J. Phys.* **39**, 025701 (2018).
- [11] A. Maries, N. Karim and C. Singh, Is agreeing with a gender stereotype correlated with the performance of female students in introductory physics?, *Phys. Rev. PER* **14**, 020119 (2018).
- [12] M. Good, A. Maries, and C. Singh, Impact of traditional or evidence-based active-engagement instruction on introductory female and male students’ attitudes and approaches to physics problem solving, *Phys. Rev. PER* **15**, 020119 (2019).
- [13] Z. Y. Kalender, E. Marshman, C. Schunn, T. Nokes-Malach and C. Singh, Gendered patterns in the construction of physics identity from motivational factors, *Phys. Rev. PER* **15**, 020119 (2019).
- [14] K. Binning et al., Changing social norms to foster the benefits of collaboration in diverse workgroups, unpublished manuscript, [d-scholarship.pitt.edu/36006/](http://d-scholarship.pitt.edu/36006/).
- [15] D. Yeager and G. Walton, Social-psychological interventions in education: They’re not magic, *Rev. Educ. Res.* **81**, 267 (2011).
- [16] L. Aguilar, G. Walton, and C. Wieman, Psychological insights for improved physics teaching, *Phys. Today* **67**, 43 (2014).

## A Journal Club for Physics Education Research

*Paula Heron, University of Washington*

In the past few decades, physics education research has grown and diversified significantly. In the mid 1990s, the field was sufficiently limited in scope and membership that many researchers were able to keep up with essentially all of the literature in the field. Around that time, Physics Education Research Conferences (PERC) became an annual event, following immediately after the Summer Meeting of the American Association of Physics Teachers (AAPT). By the late 1990s, the PERC featured peer-reviewed proceedings. A few years later, *Physical Review PER* (then called *Physical Review Special Topics PER*) began publishing. Both venues have since grown significantly in size and scope. The most recent PERC Proceedings (for the 2018 conference) includes 113 articles. In 2018, 60 articles were published in PR PER, many from authors outside the USA. At the same time, the publication of PER in established journals such as the *International Journal of Science Education* and the *European Journal of Physics* has also increased. In addition to an increase in the volume of PER being produced, physics education researchers are increasingly interacting with other fields of discipline-based education research, cognitive science, linguistics, neuroscience, etc. As a result, many researchers find it challenging even to stay current with the literature in their own area let alone keeping up with developments in closely related fields.

The challenge of staying abreast of a diverse literature was the motivation for convening a working group at the 2019 FFER. The goal of the group was to identify and take the first steps towards creating a mechanism to help physics education researchers stay broadly informed. As potential users of such a mechanism, we recognized the need for high quality as well as ease of accessibility. Initial discussions focused on clarifying the community's needs, the intended scope, etc., as well as identifying an initial organizing team (see below). We decided to explore the *Journal Club for Condensed Matter Physics* as a potential model ([condmatclub.org/](http://condmatclub.org/)).

The *Journal Club for Condensed Matter Physics* is a curated collection of articles, each of which is accompanied by a short commentary by the expert who selected it. Roughly three articles are sent to subscribers and posted on the web each month. In operation since the early 2000's, the *Journal Club* is an outgrowth of an earlier Journal Club run at Bell Labs. The current version was motivated by the shift from primarily paper-based publishing to online dissemination of research results. The *Journal Club* relies on the efforts of a rotating set of experts, who agree to "identify outstanding developments that they come across in the publications over the internet or in the various regular scientific Journals..." and to "...provide between half page to a page commentary on the paper selected and why he/she finds it particularly interesting." This model seemed to us to have many of the features we sought: in particular, expert guidance on what to read, and why it matters.

We also appreciated the following passage in the instructions for contributors: "We would like to establish ... a positive tone towards the developments in condensed matter physics and to go to some lengths to avoid any ill-will. The *Journal club* of course ought not to be used as a column for 'I told you so' remarks. It is also important that the correspondents not write about their own work or of their immediate colleagues."

Having adopted a model, we made several decisions about the audience, scope, format, etc., for the *Journal Club for Physics Education Research* or JCPER. We decided that while physics faculty, high school teachers, etc., would be welcome to subscribe, JCPER would be targeted towards the needs, interests, and expertise of the international community of active researchers. We further decided that the scope would be inclusive. Specifically, we would not limit the topics of articles or the journals they could be drawn from. We did agree on one restriction: articles had to be current as a retrospective effort could expand indefinitely.

We further agreed that JCPER would have to be relevant and accessible to researchers globally, inexpensive or free (to enable access for researchers without institutional access to expensive journals), that the project should not promote or perpetuate any inequities in the field by favoring articles from established or powerful authors, and that the commentaries should be constructive and respectful.

The working group produced a list of 75 potential contributors which was narrowed down to a broadly representative group of 15 who would be invited to form the first cohort. We also devised a list of keywords that would allow for tagging of articles, and for ensuring that the papers selected would represent a broad scope of topics.

The final working group session results in a set of next steps, which include finding an entity or organization to host the JCPER website, seeking modest financial support, and recruiting a few additional members for the organizing team to increase international representation beyond Europe and the US. Current plans are to launch JCPER sometime in 2020, with publicity through listservs, newsletters, etc. We plan on roughly five papers a month for the first couple of months to allow the community to get used to, and provide feedback on, the model. After that we envision a somewhat slower rate.

It is our hope that the JCPER will add to the vibrancy of PER, foster further interactions and increase impact.

### Working Group members (\* indicates part of the initial organizing team)

Paula Heron\* (University of Washington)  
 Lauren Barth-Cohen\* (University of Utah)  
 Natasha Holmes\* (Cornell University)  
 Manher Jariwala (Boston University)  
 Gina Passante (California State University Fullerton)  
 Mary Bridget Kustus (DePaul University)  
 David Meltzer (Arizona State University)  
 John Thompson (University of Maine)  
 Jayson Nissen (California State University Chico)  
 Paul van Kampen\* (Dublin City University)

Lana Ivanjek\* (University of Vienna)  
 Jenaro Guisasola (University of the Basque Country)  
 Mervi Asikainen (University of Eastern Finland)  
 Cedric Linder (Uppsala University)  
 Kristina Zuza (University of the Basque Country)  
 Bor Gregorcic (Uppsala University)

### References

- [1] [compadre.org/per/perc/conference.cfm?Y=2018#PeerReviewed](http://compadre.org/per/perc/conference.cfm?Y=2018#PeerReviewed)  
 [2] [condmatjclub.org/](http://condmatjclub.org/)

## PER in “Developing” or “Non-Western” Countries: Connections and Ideas

*Linda Strubbe, Kansas State University*

I organized a collaborative session on ‘PER in “Developing” or “Non-Western” countries: Connections and Ideas.’ The rationale behind the session is that the majority of work visible within the US-based PER community takes place in ‘Western countries.’ However, the educational systems, cultural contexts and histories in other parts of the world can be very different from those in Western countries—and stronger connections between researchers and research across the world can strengthen our understanding of physics education everywhere. The intention of the session was to discuss questions like, *What researcher connections across cultures already exist, what could be strengthened, and what could be created? How do goals of physics education and PER, the role of physics in society, equity and inclusion issues, etc., vary between different parts of the world? What are new things people are interested in trying in their teaching across the world? Would they like support, and what kind?*

*And—how do we connect and learn from each other without imposing our own cultural ways of thinking about science and education on other cultures?*

We had a brief discussion about the term “developing countries.” Several of us had concerns about the implication that there is a hierarchy and trajectory of societies from “developing” towards “developed,” or “non-Western” towards “Westernized,” which we did not want to endorse. However, the term “Western” isn’t geographically accurate or full well-defined either. I’ll keep using the term “developing” here for simplicity but with this caveat.

About a dozen people attended the session. Almost all participants were either from outside the US or had experience doing education work in a developing country (or both). My own background in this area is that I am the co-founder and Co-Director of a bi-annual program called the West African International Summer School for Young Astronomers, which I lead with my astronomy

colleagues Bonaventure Okere (from Nigeria) and Jielai Zhang (from Australia). I also have been an educational consultant and led workshops and curriculum development for the University of Central Asia in Tajikistan and Kyrgyzstan. Learning from and building partnerships driven by local educators is especially important to me. Other session participants also had a variety of international experiences, including leading physics teaching workshops, teaching students from disadvantaged backgrounds, and attending university and engaging in research in Latin America, Africa and Asia.

The format of the session was a whole-group discussion, where everyone sat in a circle and shared interests, ideas and perspectives. Participants expressed interest in learning new perspectives, and discussing decolonization, including how to (if one can) share ideas from US-based PER in culturally sensitive and appropriate ways. Mostly people shared anecdotal stories, and it was a chance to build interest and community for potential future collaboration, rather than a working session.

One of the main topics was power. Some participants shared stories about how being an outsider, particularly being a white outsider, led to their being viewed as an expert even when they didn’t want to be or didn’t feel that was appropriate. There was a sense among several participants that (US-based) PER has valuable ideas to share with teachers in other countries, but that sharing needs to happen with humility, creativity, and an understanding that ideas from one context often do not translate well to another context. As a conversation, we went further, discussing the importance of valuing teachers’ agency and building partnerships—potentially offering ideas and collaboration while trying to learn from each other rather than imposing ideas on others. The group also mentioned challenges around lack of physical resources, and a desire to view this in an asset-based (rather than deficit) framing. We also discussed that while there may be a desire to push

against structures that may be colonial or oppressive, there is also a sense that it's important to support students and teachers within the structures that do exist.

After the session, several participants expressed interest in continuing the conversation into the future, perhaps via regular Zoom meetings. I held a Dine & Discuss at PERC in Provo a month later on this same topic, building from my experience holding this session and ideas that we discussed at FFER. There is interest in building some kind of document or product to share ideas with the wider community about this topic, that could potentially be

hosted by PhysPort. Attending the World Conference on Physics Education in Hanoi, Vietnam, in 2020, was another important suggestion for continuing to build connections with the international PER community.

*Dr. Linda Strubbe is a Postdoctoral Research Associate at Kansas State University, researching faculty teaching and professional development in conjunction with the website PhysPort. She is Co-Director of the West African International Summer School for Young Astronomers and has been a consultant for the University of Central Asia.*

## The PER Review Network: Respectful, Constructive Peer Review

*Jayson Nissen, California State University Chico*

*"I am personally offended that the authors believed that this study had a reasonable chance of being accepted to a serious scientific journal."*

*"So overall we do not recommend a resubmission, but can let you try if you insist."*

*"This paper makes no contribution."*

As scientists, we must conduct constructive and respectful peer reviews to support the advancement of our fields. Unfortunately, many graduate programs provide little training or opportunities for learning how to conduct good peer reviews. To help address this issue, the organizers of the Foundations and Frontiers in Physics Education Research (FFPER) conference incorporated a mentor-facilitated, peer-review program into the conference based on one they observed in Finland. Unfortunately, only a small portion of graduate students in PER get to attend the conference and participate in the program. The deadline for the PERC Proceedings submissions is also moving and will occur before the FFER conference. The PER Review Network takes the framework built by the FFER organizers and moves it online so that any student or postdoc can participate.

The PER Review Network supports students and postdocs in learning how to conduct respectful, constructive peer reviews and in improving their writing and communication skills. Participants in the PER Review Network are organized into pods of three to

four graduate students and postdocs with a volunteer mentor. The participants share their Physics Education Research Conference (PERC) Proceedings papers for everyone to peer review. The mentor then reads and organizes the reviews and facilitates an online discussion between the participants. Integrating the feedback into their papers helps to improve the participants writing skills and increases the likelihood of getting their paper accepted for publication.

The figure below lays out the proposed timeline for participants in the PER Review Network. This timeline may shift until the PERC deadline is set in stone. For mentors and participants alike, the PER Review Network allows getting to know researchers from other groups and with different research goals. Mentors will get to meet new students who may become the next post doc they hire or a post doc who may become colleagues in their department.



Figure 1: Timeline for participating in the PER Review Network.

Anyone interested participating or mentoring can sign up at [forms.gle/CYTWeMqddMoaHBhC9](https://forms.gle/CYTWeMqddMoaHBhC9).



## The Graduate Student/Postdoc Research Symposium at FFER

*Benedikt Harrer, San José State University*

At this year's eighth biennial "Foundations and Frontiers in Physics Education Research" conference (FFPER), the Graduate Student/Postdoc Research Symposium (GSPRS) was held for the fourth time at an FFER. The GSPRS, which first took place at the fifth FFER in 2013 as an offering just for graduate students (see Fall 2013 FEd Newsletter), is a professional development opportunity for graduate student and postdoc conference participants, allowing them to have drafts of their scholarly writing critiqued by peers and faculty mentors. In 2013, I participated in the GSPRS as a graduate student. This year, six years later, I was a mentor for my own "pod" of graduate students.

As a fourth-year graduate student planning to write up a part of my dissertation for publication in *Physical Review (Special Topics) Physics Education Research*, I was eager to participate in the symposium to get feedback on an early draft. My first task as a participant in a "pod" of three graduate students was to submit a PERC-proceedings-style version of my paper to the organizers of the symposium. Shortly thereafter, we received copies of all three papers with the instructions to write reviews for our pod-mates' papers. How we wrote the reviews was up to us, but we were encouraged to provide "constructive criticism aimed at improving the paper and the research it describes, not to judge its readiness for publication."

A little while after I had sent in my reviews, we received an email from our pod mentor, Edward "Joe" Redish. In his email, Joe explained that – mirroring common practice among journal editors – he was not going to provide further commentary as our "editor;" instead, he would let the reviews stand on their own. However, he did give us further guidance on what to do now that we had received our reviews: We were instructed to "look at [our] reviews and decide if they legitimately point to any things in [our] presentation that [we] should fix," then fix those issues, and finally think about how we would respond if we were to write back to the editor of a journal. Joe encouraged us to "be cautious about writing your reviewer off as an idiot," since there was always a possibility that we weren't sufficiently clear in our papers. In addition, he explained that reviewers are typically drawn from our intended audience, and that if they don't get what we're trying to say, that's good information that should inform our revisions.

At the conference, we then each had 30 minutes to share and discuss our work. During the first ten minutes, we used prepared slides to summarize our papers and refresh everybody's memories. The remaining time was used to discuss the paper, the reviews, and the overall review process. At this point, I had already submitted my paper to *Phys Rev*, but the experience of directly interacting with the reviewers of my earlier draft helped me understand where readers might still get confused in the paper. Writing responses to my pod-mates and discussing these responses face-

to-face was also great practice that prepared me well for revising my paper and writing my response to the *Phys Rev* reviewers only two weeks after FFER had ended. A month after the conference, my paper was accepted for publication.

After this great experience many years ago, I was delighted when I received an email from the FFER organizers, asking if I'd be interested in being a mentor for my own GSPRS pod at this year's conference. Of course, I said yes! My pod was to consist of four graduate students and a postdoc. This year's process was more structured than back when I had participated as a graduate student. Instead of asking participants to write reviews however they saw fit, specific guidelines were provided this time around. Participants were asked to read Rachel Scherr's excellent article on "Writing good negative reviews" (first published in the *PERCoGS Newsletter* for April 2014), which lays out a structure for how to approach reviewing a paper, along with the general recommendation to write reviews as if writing a letter to the authors. In addition, the guidelines for this year's GSPRS suggested comments that might help make a review generative, rather than judgmental (e.g., "When you say .... I'm not sure if you mean \_\_\_ or \_\_\_," or "This transition is confusing to me. The last paragraph sets up \_\_\_ and then you suddenly pivot to \_\_\_"). Another change was to have participants submit their papers as Google Docs (in addition to formatted PDFs) where reviewers could leave comments and even comment on other reviewers' comments. During the review process, the manuscripts were only shared with reviewers. Authors were invited to view comments only after the review process was concluded.

As the pod mentor, I was asked to synthesize the peer reviews for each paper and provide my own commentary. Once I had received all reviews, I wrote up "decision letters" as if I was acting as a journal editor, summarizing the main points of the peer reviews (especially where the reviews converged) and adding "editorial guidance" on which of the reviewers' comments to prioritize in revisions to the papers. I also compiled all reviews and marked-up manuscripts in folders for each of the pod members and shared those folders with them for review in preparation for our in-person meeting at FFER.

At the conference, we had a 90-minute session to discuss each pod member's work and reflect on the overall review process. Each author was asked to summarize their paper in one sentence to remind everybody of the topic and then discuss the reviews they received. I encouraged them to ask clarifying questions about the reviews of their manuscripts (a rare opportunity given that the review process is typically anonymous), respond to individual feedback, and synthesize the reviews they had received. An utterly respectful and productive conversation ensued, during which we dove deeply into issues of adequately describing study

setting, theoretical framework, methodology, and data analysis in scientific papers.

Getting to experience the Graduate Student/Postdoc Research Symposium at FFPER first as a graduate student and then as a mentor, I was able to pay forward the mentorship I received years ago, using what I learned from the symposium as a graduate student and from my experience publishing in scientific journals since then. The additional structure and scaffolding have further

improved the experience, I think, both for the participants and for us mentors. I highly recommend the GSPRS to all graduate students and postdocs attending FFPER in future years, and I encourage the more senior attendees interested in sharing their experiences with the publishing world to volunteer as mentors.

*Benedikt Harrer is an Assistant Professor in the Department of Physics and Astronomy at San José State University.*

## PERToY — A YouTube Channel for PER

*Martin Stein, Cornell University*

During the FFPER conference 2019 in Bar Harbor, Maine, we discussed possibilities to make more talks on Physics Education Research available online. I initiated the discussion out of a perceived need to share more ideas between different research groups: As a (now third-year) graduate student I still grapple with the interdisciplinary nature of PER. Reading papers from other research groups, it is often hard to understand the researchers' background or the assumptions and commitments that their research is based on. It is often hard to read between the lines of a peer-reviewed publication and to figure out what a researcher is telling us with their paper. Some of these barriers are reduced in conference talks, allowing researchers to use more informal language, give more background information, and focus on more than one study. This was especially obvious in FFPER's out-of-the-box talks in which several speakers brought forward visionary ideas spanning multiple studies and large research projects. Yet most such talks are only heard once and only by the people with the privilege of being in the room at the time. Recording talks could preserve them for the future and make them available to a much larger audience.

The idea of recording talks to make them available online to a larger audience resonated well with other graduate students at FFPER. We discussed the advantages of such recordings and proposals to realize this idea in a working group of several graduate students. We concluded that recording talks online does not only make scientific work more accessible intellectually, but also makes work in PER accessible to researchers or practitioners who cannot attend a conference talk. Most of us can think of several reasons to not attend a conference talk: It might be health, a lack of funding, an interesting parallel session, or environmental concerns of flying to multiple conferences a year, potentially internationally.

We drafted a vision of how our ideas might be implemented. The first stage of our project would simply tap into existing resources with the lowest effort possible: We hope to start by recording,

collecting, and uploading talks that are given on conferences and colloquia nationally. We thought of two ways of achieving this goal: First, if we could collect consent from speakers, we could make a wide range of talks given at AAPT meetings and PERCs accessible to the PER community online by using graduate student volunteers who can use their cell phones or cameras to record talks they attend. To streamline getting access from speakers at these conferences, we pitched our idea to AAPT executives during the AAPT 2019 summer meeting town hall. We hope to be able to include a consent form in the abstract submission process for talks at AAPT/PERC. The idea was conceived well and we are in contact with AAPT executives to discuss options for the next summer meeting.

The feasibility of recording a conference is demonstrated by some conferences that already record the majority of the talks given through "crowdsourcing"--having volunteers record the sessions with their mobile phones. For example the Evolution meeting by the American Society of Naturalists started recording their conference talks a few years ago. The conference's Youtube Channel for the 2017 edition with 1,700 attendees had about 26,000 video views on 367 videos. We believe that if for example an AAPT summer meeting with a similar size of around 1,200 attendees achieves a similar number of recorded talks and views, our mission has been a success already.

A second possibility to record conference talks would be after the conference by sending out solicitations to speakers to record their talk using screen-recording software. Software is freely available and easy to use, for example Zoom and Skype have this functionality. We piloted this option by sending solicitations to some speakers we personally knew at the AAPT summer meeting this year.

Whatever way the videos end up being recorded, the simplest possibility to make them widely available would be to upload them to a YouTube channel we created: PERToY - Physics Education

Research Talks on YouTube. We created a sample video to show how such a recording could look like.

As a second stage of our project, we hope to provide a managed and moderated platform with quality standards and control. Thereby we could ensure the quality of uploaded talks, checking for good audio and video quality, synchronizing slides and a video of the speaker, and providing supplemental information on the talk (abstracts, links to papers, etc.) Ideally, this would also increase international visibility of the platform, hopefully inviting contributions from international conferences, and allowing the PER community to share ideas more easily internationally. To maintain such a platform, we would probably need external funding at this stage of the project.

As a third stage in our project, we envision going beyond recording talks that are given anyway and creating original content. We were inspired by individuals and some journals that create podcasts alongside publications already. In podcasts, we could provide unique insights into personalities and work in the PER

community and come closest to the career-spanning and visionary talks that inspired this project in the first place.

We want to thank the FFER conference organizers for connecting us and providing the space to discuss such ideas. We hope that in return our project will help connect the PER community more and allow researchers to more informally exchange ideas.

Working Group members:

Martin Stein (Cornell University)

Brianna Santangelo (North Dakota State University)

Cole Walsh (Cornell University)

Lisa Goodhew (University of Washington)

Bor Gregorčič (Uppsala University)

William Riihiluoma (University of Maine)

Elias Euler (Uppsala University)

*Martin Stein is a graduate student in the Cornell Discipline-based Education Research group (CDER).*



### *Alma Robinson, Virginia Tech*

The Physics Teacher Education Coalition (PhysTEC) has been instrumental in helping colleges and universities build effective high school physics teacher preparation programs, and many of those institutions have been able to sustain thriving programs after the PhysTEC funding period. This issue of the Teacher Preparation will focus on one such legacy site, my home institution of Virginia Tech.

John Simonetti will describe the programs that were implemented at Virginia Tech in conjunction with becoming a PhysTEC Com-

prehensive site and explain how, six years post funding, they've been successful in keeping their program strong.

Ethan Kantz, a pre-service physics teacher at Virginia Tech, offers a student's perspective of how his student-centered introductory physics course paired with multiple undergraduate teaching opportunities led him from wanting to become an aerospace engineer to having a deep passion for physics teaching.

## Sustaining Your PhysTEC Effort After the Initial Funding: A Case Study

*John Simonetti, Department of Physics, Virginia Tech*

Virginia Tech is a major research university and a land grant institution with a large engineering school. It is also a comprehensive Physics Teacher Education Coalition (PhysTEC) site, having been so since 2011. The first three years were funded by a PhysTEC grant, but the program has been supported entirely by the College of Science and the University since 2014. For a number of years, including years after the initial funding, Virginia Tech's PhysTEC program has been a member of PhysTEC's "5+ Club" for graduating at least five students with physics (or related) degrees prepared to teach physics at the high school level. While most PhysTEC programs have their own somewhat unique situations, and Virginia Tech is no exception, you may learn something useful from our experience for thinking about how to sustain your PhysTEC program after its initial funding period.

Most of the funding from the PhysTEC grant was used to support the Teacher in Residence (TIR). Without a doubt, the success of our program can be traced to the superlative TIRs we have had (Alma Robinson and Mary Norris). Because much of our continuing success depends on the work of the TIR, we found that it was particularly important to find a way to sustain the TIR following the initial grant funding. In this article, we will elaborate on how the current role of our TIR and the implementation of our other teaching initiatives have contributed to the sustainability of our PhysTEC program.

Following the initial three years of grant funding, the TIR position has been supported by the College of Science. The first three of those additional years of support were required by Virginia Tech's initial agreement with PhysTEC, and the department argued, successfully, that it continued to need Robinson's efforts. Her position is as an instructor in the department, which includes teaching both physics and physics teaching and learning courses (courses she has created), as well as serving the department on committees and advising our Society of Physics Students. Instructors are faculty not on the tenure-track route, and Robinson has been acting as the TIR under this instructor position.

Robinson's responsibilities as TIR are so intertwined with her work as an instructor that there is no distinction, really. She has been doing all the work she did as TIR, but just has a different title. She teaches a section of introductory calculus-based physics for physics majors in a SCALE-UP<sup>1</sup> classroom using interactive pedagogy, which models how we wish our students to teach and learn. Simonetti, the PhysTEC site director, teaches the other section in a different SCALE-UP classroom. In effect we are team teaching the freshman physics majors. We also team teach Seminar for Physics Majors, a First Year Experience (FYE) course that meshes, in some ways, with introductory physics. For the FYE

course, all of the first year students (freshman and transfers) are in the same classroom. Thus, we are the "face of Virginia Tech physics" for the freshman physics majors (in addition to student advisors). In both courses we stress student-centered pedagogy, active learning, and the importance of teaching (e.g., your peers) as a way to learn the physics. And, since the FYE course discusses research opportunities, internship opportunities, and career opportunities, careers in teaching naturally come up frequently. Robinson created and teaches the Physics Teaching and Learning course and the Enriched Physics Outreach course, which are courses that came into existence because of PhysTEC and described in more detail below. Finally, Robinson also serves as a mentor to any students who want to know more about teaching or our teaching programs, or who pursue the Master of Arts in Education degree with a physics emphasis.

So, some of our success is that the TIR position has not changed dramatically after the funding period. This is partly because the department is very supportive of our PhysTEC efforts and very happy with Robinson's contributions to the department. But it is also important to note that the PhysTEC program has always been under the leadership of someone in the administration of the department (Simonetti is Associate Chair), so there is no need to convince the department leadership of the need to sustain the program, as apparently happens at other institutions. Perhaps we have a "happy situation" here.

We have three additional thriving aspects of the PhysTEC program which help its continued success. One is the Learning Assistant (LA) Program, in which undergraduate students get experience as undergraduate "teaching assistants" in a variety of courses (introductory courses, both calculus-based and algebra-based, and more advanced courses, up to junior level courses), and in a variety of ways (running introductory astronomy labs, assisting in peer-instruction during lectures, running review sessions, or providing office hours). We typically have about a dozen LAs each semester. Robinson and Simonetti administer the LA Program: accepting applications, getting requests from faculty for LAs, assigning LAs, and organizing a final presentation day at which the LAs tell us about their experiences. LAs earn Independent Study course credit for their work as an LA, so funding is not required. They must also take the Physics Teaching and Learning course that Robinson designed and teaches each Fall, so the LAs are well prepared for their work. Of course, this early teaching experience is often the catalyst for LAs to consider becoming secondary school teachers. And faculty benefit from the help provided by the trained LAs.

Another successful aspect of our program is the Physics Outreach program, a course where undergraduates go to neighboring schools (elementary, middle, and high schools) and perform

<sup>1</sup> [scaleup.ncsu.edu/](http://scaleup.ncsu.edu/)

demonstrations and engage the students in learning about physics. It is a long running program of ours which has also turned some students on to teaching. Robinson created a second course, Enriched Physics Outreach, for those students who wanted to pursue this effort in a deeper way, working with her and the local teachers to design lesson plans for topics those teachers want or need to provide for their students.

Lastly, for many years the department has been able to offer Graduate Teaching Assistantships to physics students (and engineering students) who want to pursue a Master of Arts in Education (MAEd) at Virginia Tech following their undergraduate degree. With an MAEd degree, our graduates obtain licensure to teach physics in Virginia, are more competitive candidates in their job searches, and earn a higher starting salary. We have this ability to provide teaching assistantships to our MAEd students because of the large number of undergraduate engineering students taking introductory physics; many teaching assistants are required to cover the laboratory and recitation sections of the introductory courses, and we don't have enough physics graduate students for the task! Robinson and Simonetti advertise this opportunity to our majors,

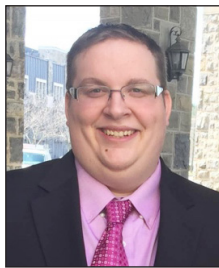
and often employ the MAEd students as the teaching assistants for our freshman physics majors. Each year we both serve on the graduate student committees of many of our MAEd students, showing that the pipeline of students getting degrees in physics and moving into the MAEd program, with funding, underlines a very productive and congenial working relationship between the Department of Physics and the School of Education here at Virginia Tech. Indeed, this relationship pre-dates PhysTEC. Our PhysTEC program is actually a joint effort of both Physics and the School of Education. So, the last piece of our success is the cultivation of such campus-wide relationships. May you have such relationships and experience a sustainable PhysTEC program as well!

*John Simonetti has a Ph.D. in Astronomy and Space Sciences from Cornell University. He is the Associate Chair of the Physics Department at Virginia Tech, and the PhysTEC site director there. He has been a faculty member at Virginia Tech for 32 years. His research interests lie in testing frontier ideas in gravitation and particle physics in the astrophysical realm.*

## My Unexpected Journey in Becoming a Physics Teacher

*Ethan Kantz, Virginia Tech*

I was so disappointed the day that I received my acceptance letter from Virginia Tech – I was accepted into Tech, but for the Physics Department, my second choice to Aerospace Engineering. Even though I was explicitly told not to do this, I reluctantly accepted anyway, planning to transfer into the engineering department later.



*Ethan Kantz*

My attitude toward Physics as a career was bleak. I was not the least bit interested in doing research. Physics just was not an avenue that I wanted to pursue; it seemed to be a dusty, dead-end subject that I found uninteresting.

But during my freshman year, I made many new friends in the physics program. Without realizing that I was settling in, I learned more in one physics class than I had ever learned in any prior class. The discussions that came out of that SCALE-UP<sup>1</sup> classroom were thought provoking and intriguing to me. The table discussions captivated me and led me to participate in the Physics Department's Outreach and Enriched Physics Outreach programs.

It was in Outreach that I became fascinated with teaching. Lead-

ing hands-on physics activities with students in local schools showed me that my enthusiasm was contagious, and that planning was a necessary step in teaching, as it was there that I wrote my first lesson plan. I found that I thoroughly relished leading students in making observations and conclusions, just like I had done in the SCALE-UP classroom.

My enjoyment of the Outreach program steered me to take Teaching and Learning, which then led me to become a Learning Assistant (LA). It was there that I had my first exposure to pedagogy. Unknowingly, I had been consumed by the desire to pursue Physics Education Research (PER). I had forgotten all about transferring to the engineering program. Who was this guy that enjoyed creating physics lessons and actually teaching them? Having been reared by a mother that was a teacher and constantly fighting with a sister who is now a teacher, I never thought I wanted to teach. Could this be changing?

I went on to become an LA for introductory physics in a SCALE-UP classroom, the same course that I first took when I got to Tech; a classroom with round tables where freshman university students collaborate in learning physics. Over the next few semesters, I became a teaching assistant for about 30 students in an astronomy laboratory class and LAed for Intermediate E&M, a junior level physics class in another SCALE-UP classroom. Teaching physics began to consume me.

<sup>1</sup> [scaleup.ncsu.edu/](http://scaleup.ncsu.edu/)

But my most enjoyable time was in Physics Outreach and Enriched Physics Outreach, where I helped plan and execute lessons to local K-12 institutions as well as taught college students how to deliver these demos to said places. This was where I was most comfortable sharing my passion for physics.

Still trying to find my niche as to my most desired level of teaching, I now serve as the Graduate Teaching Assistant for an introductory physics course in the SCALE-UP classroom. Grading college-level homework has helped prepare me for a career in physics teaching. While I love working with students in class and recitation, my office hours are some of the most fruitful times – this is when I am able to get more one on one teaching time with the students, answering their questions, and getting to know them.

Having had these multiple teaching experiences at many different educational levels, I am now in the Master of Arts in Education program, and I have determined that my ultimate desire is to teach high school physics. I have loved my middle school student teaching experience thus far, but I am really looking forward to my high school placement in the spring.

I cannot believe that I ever wanted to be an engineer. Throughout my years at Tech, it has become clear to me that not only does the teaching profession need intelligent teachers, but moreover, the profession needs excited, motivated and enthusiastic teachers who really enjoy their subject matter. The PhysTEC program at VA Tech has brought out all of this in me. I only wish that more people were aware of the programs and joined me in the pursuit of teaching physics.



*Ethan Kantz during a Physics Outreach visit*

*Ethan Kantz is a graduate student in the Masters of Arts in Education program at Virginia Tech. He plans to complete his degree and teach high-school physics. Ethan is also considering eventually returning to school to get his Ph.D. in Educational Leadership. In his free time, he enjoys helping out his friends and communities, playing video games (who doesn't), and even does a bit of DJ work on the side.*

## Browsing the Journals

*Carl Mungan, United States Naval Academy, [mungan@usna.edu](mailto:mungan@usna.edu)*

- The damped oscillations of the water level inside a partly submerged drinking straw are modeled on page 433 of the June 2019 issue of the *American Journal of Physics* ([aapt.scitation.org/journal/ajp](http://aapt.scitation.org/journal/ajp)). Section II of a paper on thermodynamics on page 752 of the September issue gives a particularly helpful treatment (in four equations and a graph) of how to actually use the Lambert W function to find the roots of the transcendental equation in which an exponential equals a linear polynomial. I also found the experimental investigation of different ways to excite a ringing wine glass on page 829 of the October issue to be intriguing and readable.
- Charles Babbs has an accessible analysis of the physics of skipping stones on page 278 of the May 2019 issue of *The Physics Teacher* ([aapt.scitation.org/journal/pte](http://aapt.scitation.org/journal/pte)). I also appreciated Wayne Garver's discussion of heterodyning on page 312 of the same issue. Many teachers will probably be helped by Dan Styer's article presenting some convincing examples and arguments for why entropy cannot be considered a measure of "disorder" on page 454 of the October issue.
- Article 045402 in the July 2019 issue of the *European Journal of Physics* presents a new method to analyze the finite square well potential that I am going to try on my students when we get to this topic in my modern physics course this semester. An interesting discussion of applying either the flux rule or the Lorentz force law to the unipolar generator appears in article 055202 of the September issue. Finally, I thought Lemos presented some useful new insights into the calculus of variations problem of the "least uncomfortable" journey between two points in article 055802 of the same issue. Article 045001 in the July 2019 issue of *Physics Education* presents arguments and experimental evidence that the color of pure water is blue. In comment 056501 in the September issue, Rizcallah presents a simple argument for why the relative speed of impact between two particles is the same before and after a 2D elastic collision, which partly generalizes that well-known result in 1D. Both journals can be accessed online starting at [iopscience.iop.org/journalList](http://iopscience.iop.org/journalList).
- Donald Truhlar explains some misconceptions associated with molecular dispersion forces on page 1671 of the August 2019 issue of the *Journal of Chemical Education*. You may also wish to peruse an informative review of Count Rumford's cannon boring experiments on page 1955 of the September issue. The journal archives are at [pubs.acs.org/loi/jceda8](http://pubs.acs.org/loi/jceda8).



## Web Watch

*Carl Mungan, United States Naval Academy, <mungan@usna.edu>*

- A pictorial gallery of impactful scientific instruments of the twentieth century is at [instruments.sciencehistory.org/](https://instruments.sciencehistory.org/).
- A collection of science articles written and edited by kids can be enjoyed at [kids.frontiersin.org/](https://kids.frontiersin.org/).
- A network for K–12 STEM education researchers has been started with NSF support at [cadrek12.org/](https://cadrek12.org/).
- A visualization of the most frequently assigned college textbooks (including for physics) can be explored starting at [galaxy.opensyllabus.org/](https://galaxy.opensyllabus.org/).
- The process of evaporation is determined more by changes in pressure than temperature according to [news.mit.edu/2019/physics-how-evaporation-works-0610](https://news.mit.edu/2019/physics-how-evaporation-works-0610).
- Statistics pertaining to women studying STEM in college can be perused at [bestcolleges.com/resources/where-women-study-stem/](https://bestcolleges.com/resources/where-women-study-stem/).
- My attention was recently drawn to the list of the Back of the Envelope Problems that AJP published in the past. It is compiled at [web.mit.edu/rhprice/www/Readers/backEnv.html](https://web.mit.edu/rhprice/www/Readers/backEnv.html).
- A free open-source cross-platform video editor is available at [shotcut.org/](https://shotcut.org/).
- Award-winning science journalism is presented at [showcase.casw.org/](https://showcase.casw.org/).
- Finally, just for fun, an interactive map of the United States showing the most often searched for resident (using Wikipedia) from that city is online at [pudding.cool/2019/05/people-map/](https://pudding.cool/2019/05/people-map/).





## Executive Committee of the FEEd

**Chair:**

Laurie McNeil  
(01/19 – 12/19)  
University of North Carolina, Chapel Hill

**Chair-Elect:**

Gerald Feldman  
(01/19 – 12/19)  
George Washington University

**Vice-Chair:**

Catherine Crouch  
(01/19 – 12/19)  
Swarthmore College

**Past-Chair:**

Laurence Cain  
(01/19 – 12/19)  
Davidson College

**Secretary/Treasurer:**

Charles Henderson  
(02/17 - 12/19)  
Western Michigan Univ

**Councillor:**

Noah Finkelstein  
(01/17 – 12/20)  
University of Colorado, Boulder

**Members-at-Large:**

Chuhe Kwon  
(02/17 – 12/19)  
California State University, Long Beach

Mackenzie Stetzer  
(04/18 – 12/20)  
University of Maine

Adrienne Traxler  
(01/19 – 12/21)  
Wright State University

**APS-AAPT Members-at-Large:**

Benjamin Dreyfus  
(01/19-12/21)  
University of Maryland, College Park

Beth Lindsey  
(02/17 – 12/19)  
Pennsylvania State University

Eleanor Close  
(04/18 – 12/20)  
Texas State University, San Marcos

**Graduate Student Member-at-Large:**

Julian Gifford  
(01/19 – 12/20)  
University of Colorado

---

## Non-voting Members

**Chair, Committee on Education:**

Laura Henriques  
California State University, Long Beach

**APS Liaisons:**

Theodore Hodapp  
APS Director of Project Development

Monica Plisch  
APS Director of Education and Diversity

**AAPT Representative:**

Gordon Ramsey  
Loyola University, Chicago

**Newsletter Editor-in-Chief:**

Jennifer Docktor  
University of Wisconsin – La Crosse

**Upcoming newsletter deadlines:**

Spring 2020: January 15, 2020  
Summer 2020: June 1, 2020