Fall , 2023

Issue 54

Long Island Physics Teachers Association Newsletter

Important Dates	
Fall Conference	Sat, Oct 28
Physics Olympics	Thurs, Mar 14
Spring Conference	Sat, Apr 13
AP Physics C Exams	Tues, May 14
AP Physics 1 & 2 Exams	Fri, May 17
AP/IB Analysis	Sat, June 1
Regents Physics Exam	Tues Jun 25
End of year BBQ	Thurs Jun 27

Check the LIPTA website ***www.lipta.org*** for any updated information.

President's Message

A new school year brings new changes. Some of us are teaching new subjects or are in new schools; many of us are in the same school but with new administrators; some of us are new to teaching (veterans, do you remember your first class?); and all of us have new students. If you're teaching a Regents science class then your curriculum is changing to meet the NGSS/NYSSLS curriculum; and if you teach AP Physics, then you have changes in your curricula coming soon. Within memory of our veteran teachers, the field of education has experienced several shifts in pedagogy, and, especially with the recent COVID pandemic, education has experienced major changes in technology.

Changes in pedagogy are ongoing. The changes are intended to improve the quality of learning (with the focus on *learning* as opposed to *teaching)*, to promote personalized growth of each student and to cultivate skills relevant for the 21st century—although I'm still not entirely sure what that means. Learning has become much more student-centered than before, as all newly minted teachers are happy to tell hiring committees. There is an emphasis on cooperative learning; a strong emphasis on experiential learning, linking theory to practice and to critical thinking. The reliance on phenomena in NGSS/NYSSLS is an example of the recent emphasis on experiential learning. Inquiry based learning follows naturally from these pedagogical approaches. Assessments are changing too, and have progressed a long way from straight memorization. This is good news for physics teachers because we have always wanted our students to be able to think critically.

Technology in the classroom has changed too, adapting to the needs of students and the environment. Remote and hybrid teaching pushed the development. Introduction and adoption of devices has enabled us teachers to create more engaging and interactive lessons, tailor instruction to individual needs, and provide students with access to resources beyond traditional textbooks. With accessible technology, many teachers have adopted a flipped classroom approach, either completely or as part of their instructional arsenal. Whether we have adopted or adapted a flipped approach, we are trying to find ways to encourage our students to take an active role in their learning.

Change is normal in teaching. Most of us continue to grow and to hone our teaching skills through reflection, reading, discussions with peers, and

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professional development. At our LIPTA Fall Conference on October 28 we will hear about changes coming to the AP Physics curriculum, with changes being implemented for the May 2025 testing. We will also hear about peer instruction and an NGSS investigation, both of which are relevant for the current changes to our teaching practices. I hope you can join us.

Save the Dates

If you joined us for the LIPTA spring 2023 conference or the 2023 QuarkNet workshop on neutrinos, you may be interested in bringing students to learn about particle physics. The Particle Physics MasterClass is a perfect opportunity. You will need to arrange for busing for students, but the program is free. We spend two afternoons learning about and then analyzing particle physics data from the LHC (Large Hadron Collider). This is followed up with a day at Brookhaven National Lab, which includes a videoconference with students from other countries, as well as a talk and a tour.

2024 Dates
3pm - 6pm Feb 26 at Smithtown HS East
3pm - 6pm March 4 at Plainview Old Bethpage
9am - 1pm March 6 at Brookhaven National Lab

If you have any questions or are interested in joining us, please contact either
Susan Wetzler at SWetzler@pobschools.org or
Gillian Winters at gwinters@smithtown.k12.ny.us

NEED CTLE CREDITS?

- Fall and Spring Conferences (3 credit hours for each conference)
- AP/IB Physics Exam Analysis (3 credit hours)

CTLE Certificates are available.

Why You Should Join AAPT

by Rich Slesinski

Physics teachers should strongly consider joining the American Association of Physics Teachers (AAPT) for several compelling reasons. AAPT offers a myriad of benefits that can significantly enhance a physics teacher's professional growth, teaching effectiveness, and overall experience in the field.

First and foremost, AAPT provides an invaluable platform for networking and collaboration. By becoming a member, physics teachers gain access to a vast community of like-minded educators, researchers, and experts in the field. This network enables them to exchange ideas, share best practices, and engage in discussions on innovative teaching methodologies and curriculum development. Through conferences, workshops, and online forums, AAPT facilitates connections that can lead to meaningful collaborations and partnerships, enriching the educational journey for both teachers and students.

Furthermore, AAPT equips physics educators with a wealth of resources to enhance their teaching methods and materials. The association publishes a range of journals, newsletters, and educational materials that provide insights into the latest developments in physics education research, classroom strategies, and technological advancements. By staying informed about the most effective teaching practices, teachers can create more engaging and impactful learning environments for their students.

AAPT also offers professional development opportunities that can help physics teachers stay updated with the evolving educational landscape. Workshops, webinars, and conferences organized by the association provide teachers with exposure to emerging trends, technological tools, and pedagogical techniques. Such experiences not only enrich their own teaching methods, but also empower them to guide their students through the ever-changing world of physics.

Additionally, AAPT advocates for the interests of physics educators on a broader scale. The association engages in educational policy discussions, ensuring that the voice of physics teachers is heard and considered when decisions are made at the national and local levels. By being part of AAPT, teachers can actively contribute to shaping the direction of physics education and fostering a more conducive environment for learning and teaching.

As an AAPT member, my physics students are able to participate in the American Association of Physics Teachers *F=ma Exam*, Physics Bowl Contest, and Physics Photo Competition. The *F=ma Exam* is the qualifying exam for the USA Physics Olympiad, and its questions are very thought provoking & fun to grapple with. The Physics Bowl Contest questions are not as challenging as the *F=ma* questions, but this prestigious contest still provides another great opportunity for high school students to receive recognition for their skills and expertise in the field of physics. The Physics Photo Contest gives students an opportunity to explore natural and contrived phenomena by creating visual illustrations and written analysis of various physical concepts. Students participate in an international arena with more than 1,000 of their peers for recognition and prizes.

In conclusion, joining the American Association of Physics Teachers can be immensely beneficial for physics educators and their students. Through networking, resource sharing, professional development, advocacy opportunities, and student competitions, AAPT offers a comprehensive package that supports teachers and students in their pursuit of excellence. By becoming a member, physics teachers not only invest in their own growth and their students' growth, but they also contribute to the advancement of physics as a whole.

Although the Long Island Physics Teachers Association is a section of the American Association of Physics Teachers, there is a separate membership form and fee. Membership is not cheap, but the benefits are well worth it. For more information, go to AAPT.org.

Transforming the Physics Classroom by Harnessing the Power of Artificial Intelligence

by Diana Nigro (with some help from AI)

In the ever-evolving landscape of education, the integration of artificial intelligence (AI) into the physics classroom stands as a revolutionary advancement. This fusion of technology and pedagogy offers a promising array of opportunities, from personalized learning experiences to efficiency gains and cost-effectiveness. However, it also stirs up the controversial debate of whether AI could eventually replace human teachers. In this article, we explore the multifaceted impact of AI on physics education, delving into its potential advantages and considering the challenges it presents.

Efficiency: Enhancing Teaching and Learning

One of the most compelling advantages of integrating AI into the physics classroom is its potential to enhance efficiency. Administrative tasks that once consumed valuable teaching time can be automated, freeing educators to focus on more interactive and engaging teaching methods. This enables teachers to provide individualized attention to students, facilitating a deeper understanding of complex physics concepts. Furthermore, AI-driven simulations and virtual experiments offer students hands-on experiences that were previously difficult to replicate, promoting a deeper grasp of theoretical ideas through practical application.

Personalization: Tailoring Education to Every Student

AI's ability to personalize learning experiences is another aspect that holds great promise. Each student learns at a unique pace and style, and AI can adapt learning materials to match those preferences. Whether a student is a visual learner or requires more practice with certain concepts, AI can tailor content to suit individual needs. This personalization not only fosters a deeper understanding of physics but also enhances students' overall engagement and motivation to learn.

Cost Effectiveness: Balancing Investment with Returns

While integrating AI into the classroom may necessitate initial investments, it offers the potential for long-term cost savings. Optimizing resources, automating administrative tasks, and improving student retention rates can contribute to a more efficient use of educational budgets. As AI technology continues to advance, its integration becomes increasingly cost-effective, especially when considering the enhanced learning outcomes it can deliver.

Controversy: AI vs. Human Teachers

Amidst the numerous benefits, the role of AI in potentially replacing human teachers emerges as a contentious issue. While AI can provide efficient feedback and personalized learning experiences, it lacks the emotional and interpersonal elements that human educators bring to the table. The relationships built between students and teachers foster critical thinking, communication skills, and emotional intelligence – qualities that AI, as of now, cannot replicate. Striking a balance between AI-enhanced instruction and the irreplaceable human touch remains a challenge.

Looking Ahead: A Collaborative Future

The integration of AI into the physics classroom holds immense potential to revolutionize education. However, its successful implementation requires a thoughtful approach that combines technology with the strengths of human educators. Rather than viewing AI as a replacement, it

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should be seen as a powerful tool that educators can leverage to enhance their teaching methods and students' learning experiences. By fostering a collaborative ecosystem between AI and teachers, education can truly evolve to meet the needs of the 21st century learner.

In conclusion, the synergy between artificial intelligence and the physics classroom presents a dynamic paradigm shift in education. The efficiency, personalization, and potential cost-effectiveness it offers are undeniably appealing. Yet, as we navigate this transformative journey, it's vital to address the concerns and potential drawbacks, particularly the delicate balance between AI and human teachers. Ultimately, the future of physics education may well be shaped by our ability to harness AI's capabilities while preserving the invaluable contributions of human educators.

Did You Know …

by Harry Stuckey

Some years stand out for major contributions to physics. For instance, Max Planck's introduction of the quantum hypothesis in 1900. Or Einstein's "miracle year", 1905, when he published papers on special relativity, the photoelectric effect, Brownian motion, and $E=mc^2$. More recently, 2012 marked the first observations of the Higgs boson. But did you know that 1932 was a watershed year in physics? Several Nobel Prizes are traceable to work done that year. On January 1, Harold Urey reported the discovery of deuterium, which led to heavy water and applications in nuclear fission and fusion. He received the Nobel in Chemistry in 1934. In February, James Chadwick announced the discovery of the neutron, which resolved a major problem involving spin and the nitrogen nucleus. Chadwick was awarded the Nobel in Physics in 1935. Enrico Fermi quickly recognized the potential of the neutron as an "atomic bullet" to bombard nuclei to induce changes. His work in this area led to his Physics Nobel in 1938. Also in 1938, Otto Hahn and Fritz Strassman irradiated uranium with neutrons resulting in the discovery of nuclear fission. Hahn was awarded the Chemistry Nobel in 1944. In August 1932, Carl Anderson revealed the existence of the positron, the first antimatter particle detected, from cosmic ray studies using a cloud chamber. The 1936 Physics Nobel went to him. 1932 also witnessed the first use of particle accelerators to study nuclear reactions. John Cockroft and Ernest Walton devised circuitry using capacitors and diodes to rectify AC to DC and boost the voltage. By early 1932 they were achieving outputs of 600 kV, which they used to accelerate protons and bombard lithium resulting in helium. They shared the 1951 Physics Nobel for their pioneering work. Later in 1932, Ernest Lawrence patented the cyclotron, for which he was awarded the Physics Nobel in 1939. Lest we think that only the experimentalists were busy, there was also important theoretical progress. Late in 1932, Wolfgang Pauli proposed a new subatomic particle to explain the energy discrepancies in beta decay. This particle would eventually be called the neutrino and open many avenues of experimental exploration. In retrospect, 1932 certainly qualifies as an "annus mirabilis"!

Do you have any comments, information, or tips to share for future newsletters? Send it via email to: *keogh@lipta.org*

LIPTA Fall Conference
Sat, Oct 28
Manhasset HS
9 am— 12 noon

Summary of Changes coming to Regents and AP courses
Bill Leacock, LIPTA VP

Advancing the Quality of Physics Teaching using Peer Instruction
Dr. Eric Mazur, Harvard University

"To improve learning — and therefore teaching — we need to pay attention to the human, social, cognitive, and aspirational sides of education. A first, key step in the process of improving learning is to shift from teaching by telling to teaching by questioning." In this lecture, Eric will interactively demonstrate an easy-to-implement way of shifting the focus from the teacher to the learner and create a level of engagement that is difficult to accomplish in the more passive, traditional approach to education.

Transforming Energy and Power into an NGSS Investigation
Adriana Wetzel & Sara Whitaker, Farmingdale HS

NGSS focuses on a student-centered approach that has students uncover the relationships involved in a system. In this lesson, the stair lab is transformed as students model energy transformations, and then design, create, and analyze the work and power of their system.

Register at lipta.org
Current Members: $25 (pre-registration), $30 (at the door)
$40 for non-members (includes 1 year membership)
3 CTLE credits are available to attendees