

# IOP Institute of Physics

## HIGHER EDUCATION GROUP

NEWSLETTER June 2021

### UPCOMING EVENTS

**Discipline-Based Stem  
Education Research Webinars**

Jan-June 2021

Save the date & follow news for:

**VICE PHEC**

16-20 August, Glasgow

#vicephec2021

Including the

**HEG AGM & Community  
Meeting**

18 August, Glasgow

### FROM THE CHAIR

Welcome to this new edition of our beloved Group Newsletter!

This academic year is unlike any seen before in living memory. I do hope that you, your colleagues, and your students have managed to find ways of working together. It is interesting to hear from the grapevine, and indeed from more structured discussions, how each institution, department, staff and students actually dealt with the restrictions to on-campus teaching brought by the COVID-19 pandemic. The Physics-LTHE network meetings are a perfect example of how the physics higher education community can benefit from working together. Sharing knowledge, ideas, experience, and learning from each other, makes our work more enjoyable and rewarding. Another excellent example of meeting that serves as a forum to exchange ideas was organised this April jointly between HEG and the Computational Physics groups to enhance the teaching of numerical techniques to physics students. Of course, we can always learn from others beyond our own discipline, and the range of webinars hosted by Cardiff University allows all of us to hear from international experts on a range of STEM education research topics.

---

### Looking Forward to Seeing You!

---

In this newsletter we reflect on not only personal experience since the start of the pandemic, but also on what we learned from past meetings organised during the last few months, including a meeting jointly organised between HEG and the History of Physics groups on the developments of teaching and learning in physics higher education in the past 100 years, and discussions held during VICEPHEC2020. On that note, this issue relays the recent announcement on Twitter of the dates of the next VICEPHEC meeting. On behalf of the (virtual) local organisers, I hope to see many of you to this online conference next August.

In January we in HEG got confirmation of our funding allocation, and we were successful in getting support for a number of projects and meetings that the Committee is busy working on! I'm not going to give any spoiler here but let me just encourage you to read our communications via emails and via Twitter. There will be many new developments coming in the next few months!

I am grateful to the whole HEG Committee who is continuously working very hard under the same difficult conditions that everyone knows to not only offer a programme of exciting events, but also develop and deliver other opportunities for the HEG membership to work together and share resources (including via this Newsletter). But in this issue we highlight in particular Bethan Cornell who was the recipient of the Jocelyn Bell Burnell Medal and Prize for 2020 for her cross-disciplinary work in atomistic and molecular modelling, her contribution to improving gender balance and supporting minority groups in physics, and for promoting the interests of early career researchers. Congratulations Bethan!

I hope that you will enjoy reading this newsletter. If you wish to contact me or other members of the HEG committee, you will find contact details at the bottom of this issue. *Nicolas Labrosse*

*The ongoing events related to Covid-19 are forcing us to review some of the plans outlined. Please check event webpages for up-to-date information.*

## **VICEPHEC 2021**

Variety in Chemistry Education / Physics Higher Education Conference (ViCEPHEC) is a national conference that brings together educators in chemistry and physics to discuss and share developments, ideas and good practice in learning and teaching at tertiary level.

This year's conference will again be held entirely online. The organising team at the University of Glasgow is busy preparing an attractive programme between 16<sup>th</sup> and 20<sup>th</sup> August. Mark the dates!

The conference is open to academics, researchers, teachers and postgraduate students as well as those with an interest in chemistry and/or physics higher education (such as A-level teachers interested in supporting students' transition into university).

The site [vicephed.org](http://vicephed.org) will be continually updated with information regarding our programme including our keynote speakers, how to register for the conference (it's free), and information about submitting abstracts for the different sessions during the conference. You can also find more information about us, ViCEPHEC, and how to get involved, but if you have any questions or want more details, please do not hesitate to email us at [vicephed2021@glasgow.ac.uk](mailto:vicephed2021@glasgow.ac.uk), or follow us on twitter @vicephed for updates.

The IoP Higher Education Group will be holding a Satellite meeting, during the main ViCEPHEC conference from 2-4pm on the 18th August. In it we will discuss 'What is meaningful assessment in Physics?'. This meeting will reflect on assessment practice in Physics Higher Education. Universities have had to adapt assessment practices, and this has brought many challenges. How can we maintain academic integrity? How do we best use technology to our advantage? How can we be inclusive? How do we ensure workloads are manageable for staff and students? How are high-stake assessments managed? Are exams with unseen problems the gold standard? There will be a keynote presentation and discussions followed by bitesize contributions on approaches to tackling these issues and time for a question-and-answer session. Please send abstracts for bitesize contributions on any aspect of assessment by 14 July to [nicolas.labrosse@glasgow.ac.uk](mailto:nicolas.labrosse@glasgow.ac.uk).

The AGM of the IoP Higher Education group will also be held on Wednesday August 18th. The AGM will last no more than 45 minutes and all Group members are encouraged to attend. If group members have items they would like to raise please contact the IoP HE group secretary ([helen.heath@bristol.ac.uk](mailto:helen.heath@bristol.ac.uk)).



## JOIN US! BECOME A IOP HIGHER EDUCATION GROUP COMMITTEE MEMBER!

The call for self-nominations for IOP Special Interest Groups, Nation and Branch Committee vacancies is now open. This includes the Higher Education Group (HEG).

**IOP Special Interest Groups** are communities of IOP members with a shared interest in a particular discipline, application or thematic area. Groups enable IOP members to build professional networks, share knowledge and collaborate with peers. **[Click here to view Group Committee vacancies](#)**. For the HEG we have 5 ordinary member positions, Chair and Secretary all open. **[Nominations can be made here](#)**.

The description of the role of Chair on the IOP web pages (<https://www.iop.org/sites/default/files/2020-02/Group-committees.pdf>) is as follows:

“The Chair is responsible for the direction of group activities, is the main point of contact and may speak on behalf of the group. They also chair committee meetings and ensure that the group constitution and committee membership rules are adhered to. The Chair might also be approached by IOP staff to provide opinion on relevant topics. It should be noted that the chair is not expected to undertake or lead every activity the group undertakes, rather to ensure that all tasks are being handled by someone on the committee.”

For a very brief personal and historical background piece, I joined the HEG Committee in 2017 directly as Chair, having never sat on a Group committee before. Even though I wasn't sure what to expect, there were a few things that gave me the confidence to go ahead in this role: my passion for Higher Education and Physics; fairly clear ideas (which I had outlined in my election statement) about what I wanted to do for the Group and the Community; knowledge that there would be experienced colleagues already sitting on the Committee that I could work with; reassurance that the IOP would provide me with support and guidance if needed. I can testify that all these things contributed to make my experience as Chair of HEG an enjoyable one. It doesn't mean I was successful in everything but I have been in a good position to do a few things which I thought were positive. I have met wonderful people on the Committee itself who have all contributed a lot of energy and splendid ideas towards what the Higher Education Group is today. I've also met many others outside the Committee with whom I was able to discuss ideas while representing the interests of the Physics higher education community. Overall, I found that the associated workload and time commitment are manageable. The description of the role taken above from the IOP web pages is accurate. I would encourage anyone who has a passion and a vision for the Physics Higher Education Group to put themselves forward and self-nominate for the position of Higher Education Group Chair. I am very happy to be contacted by email to answer any question you may have. *Nicolas Labrosse*

## SUCCESS OF THE PHYSICS-LTHE NETWORK

COVID struck in early 2020. Lockdown started in mid-March and physicists everywhere were frantically wondering how to teach remotely. How to deliver new content? How to engage students? How to create robust assessments when students have access to notes and internet? And what on earth should we do about laboratory work? Many local conversations were taking place, but nothing was providing the opportunity to share across the community.

This prompted a few of us to approach the IOP with an idea to set up a community network specifically to share good practice for remote teaching and learning. And thus, the PHYSICS-LTHE NETWORK was born. Organisation and chairing of sessions was undertaken by Helen Vaughan, and the first meeting took place on May 29<sup>th</sup> (5 weeks in to lockdown). Our first speakers were Helen Heath (Bristol) and Alex Crombie (Sheffield Hallam) sharing with us their experiences of online lectures and creating collegiality. Subsequent meetings (roughly fortnightly throughout the summer) covered topics such as labs, supporting diversity, group projects and PG supervision, with speakers such as Nick Braithwaite (OU), Aidan Hindmarch (Durham), Bethan Cornell (KCL) and

## WE NEED YOU!

Do you have an interesting higher education project? Attracted some funding? Have examples of good practice to share? We need you to tell us! We would love to include your stories in the next edition of the newsletter later this year.

Submissions of around 400 words with images are encouraged. Please contact Emily Brunsdon ([emily.brunsdon@york.ac.uk](mailto:emily.brunsdon@york.ac.uk)).

Manus Hayne (Lancaster). Restricted column inches here prevents the naming of all our fabulous speakers, but a full listing and all recordings are available on the Physics-LTHE website <https://www.liverpool.ac.uk/central-teaching-hub/physicslthe/> (kindly hosted by the University of Liverpool at present).

Meetings usually take the form of two or three short talks (15 mins each) followed by breakout groups and sharing back with the main room. And the chat facility on Zoom has been a wonderful means for the whole community to pose and answer questions of the speakers and each other. This format has given everyone the opportunity to share ideas and pose key questions for further thought. Meetings have been attended by up to 200 participants and it has been a lifeline during lockdown to know that physicists everywhere are pondering on the same issues, having the same problems, and willing to share what works, and just as helpfully, what doesn't work so well.

Following a break in meetings while we all taught semester 1, we had an enjoyable reunion at the end of January to share experiences and refuel our minds with new ideas. There are several meetings planned in the near future, and we welcome new speakers, or ideas of themes to cover. So, don't be shy, feel free to email any of the people below with suggestions or offers to speak. *Alison Voice*

### **Founders of PHYSICS-LTHE**

Helen Vaughan (Liverpool) [H.L.Vaughan@liverpool.ac.uk](mailto:H.L.Vaughan@liverpool.ac.uk)

Alison Voice (Leeds) [A.M.Voice@leeds.ac.uk](mailto:A.M.Voice@leeds.ac.uk)

Samantha Pugh (Leeds) [S.L.Pugh@leeds.ac.uk](mailto:S.L.Pugh@leeds.ac.uk)

Nic Labrosse (Glasgow) [Nicolas.Labrosse@glasgow.ac.uk](mailto:Nicolas.Labrosse@glasgow.ac.uk)

Robyn Henriegel (IOP) [Robyn.Henriegel@iop.org](mailto:Robyn.Henriegel@iop.org)

Daniel Heanes (IOP) [Daniel.Heanes@iop.org](mailto:Daniel.Heanes@iop.org)

**Twitter:** @LthePhysics **Website:** <https://www.liverpool.ac.uk/central-teaching-hub/physicslthe/>

To join, email [LISTSERV@NETWORKS.IOP.ORG](mailto:LISTSERV@NETWORKS.IOP.ORG) with the following line in the message body SUB PHYSICS-LTHE [Your Name].



## **LESSONS LEARNED IN LOCKDOWN: TEACHING COMPUTATIONAL PHYSICS IN 2020 AND BEYOND ONLINE EVENT, 4 APRIL 2021**

The Higher Education Group and the Computational Physics group ran a joint meeting on the teaching of computational physics in lockdown. The lively meeting had a maximum 40 simultaneous attendees with nearly 30 still engaging in the discussions when time ran out

### **Opportunities for dynamic delivery**

In this varied session the speakers presented a wide range of technological solutions that had been used successfully to deliver teaching in a range of computing languages and with wide range of platforms. There are clearly many solutions available with different pros and cons. There were common issues with the technology available to students producing

disparities in student experience. It was noted that some universities could be galvanised into action by lockdown to provide e.g. servers.

The first session identified common themes that reappeared during the day for example students had been presented with material in advance but had not always engaged with it, turning online sessions into delivery of teaching.

A major theme identified was the difficulty of engaging students with demonstrating online. Trying to replicate the “over the shoulder” type help is very difficult. Ideas included using gather.town which seemed to have worked well both for demonstrating and promoting interaction amongst students. Teams allowed quick switches from chatting to video calls. Polls had been introduced in one course where every hour students were polled on their progress so that demonstrators could help those in most need. In discussion it was reported that discord had been used with success. Autograding had eased the burden of marking for large classes. This allows quick feedback, but it is difficult to make precise and unambiguous questions that are not trivial. Students tend to get perfect grades or do poorly, but it can be very useful for formative feedback.

## Encouraging Engagement

Following on from the issues identified in the morning session the first half of the afternoon focussed on methods to improve engagement with a study of whether providing solutions to problem on demand rather than at a fixed time made a difference to attainment. We heard about the potential for using augmented reality in teaching. We also heard how a computational project prize based on solving a challenging problem had motivated students with a lot of programming experience -even after the prize had been awarded elsewhere! Padlets for asynchronous chats had been successfully used.

We were encouraged to be honest about how coding works. To show that we do google solutions to programming problems.

A final talk in this session was on teaching physics to visual artists to get them to produce accurate representations of physical effects without maths, was illustrated by some Kurzgesagt explanations of physical phenomena – do check out the webinar recording. A 3<sup>rd</sup> year Physics class is being asked to do the same thing. It would be interesting to see the results.

## Prospects for Project work

We hear an illuminating talk on the software carpentry approach to teaching computing with an important feature being I code...You code. This live coding in front of students, with the inevitable mistakes made by the teacher was felt have many good points including giving students permission to make mistakes themselves and was compared to the success of online gamers who attract large audiences. The course described had presented Python to postgraduate students but assumed no knowledge. Students who were experience were encouraged to act as helpers. This approach was also reported as having been successful elsewhere and solution to the variety of experience that students have in computing course.

We heard about the use of dedicated breakout rooms for students to get individual support in a 1<sup>st</sup> year computing lab project and the variety of approaches being used to take experimental work online. And as a final thought that remote teaching is likely to be in place next year at least for some students.

Discussions raised many questions. Is there now “more computational material” because of COVID issue or is this a trend exacerbated by COVID?

## COVID-19 REFLECTIONS

The pandemic hit hard and fast, but in some ways, it felt strangely familiar to me. In 2011 I was a PhD student and graduate teaching assistant when the Christchurch Earthquake struck. After the initial emergency response, we were faced with a semester of undergraduate teaching with no buildings, reduced technology support and a lot of scared staff and students. Somehow though, we managed. We taught in marquees on the carparks in the baking heat. We had plastic moulded chairs, a small TV at the front and 100 or more students with pen and paper in their laps. The result was a strong connection between the staff and students, something I will never forget. Ten years later we have very different challenges we are facing in a global pandemic, and of course very different solutions (with thankfully better technology!) but the connection has again come through. I see the strength my colleagues and students show every day, every week, every month and I take heart in the human connections we make which help us all out.

*-Emily Brunsten*

Do we understand how students interact? Discord as reported as being popular with students and has a mix of video chatting and text. Asynchronous chatting is well used, and this may impact the choice of platform as in some cases chat disappears. We need to remember how important computation skills are using real world examples. Despite difficulties with engagement and technology in most courses many students have performed very well. IoP members can [find the presentations here](#). *Helen Heath*

## **SURVEY: EVALUATING THE EFFECTS OF THE SHIFT TO ONLINE PHYSICS TEACHING**

This survey is being administered collectively through GIREP (Groupe Internationale de Recherche sur l'Enseignement de la Physique), EPS (European Physical Society), and the IOP Higher Education Group. It is designed to explore the challenges and benefits to both staff and students of transitioning to online teaching/learning of physics in response to COVID-19. The aim is to establish a foundation to develop transformative practice in physics education. How have you adapted your teaching of Physics in response to the Covid-19 pandemic? What new methods (if any) would you like to retain going forward and why? Take the [STAFF SURVEY](#) This anonymous survey is open until July, but an early response would be appreciated.

## **REPORT FROM VICEPHEC 2020 'TEACHING, LEARNING AND ASSESSMENT IN A PANDEMIC'**

As a result of the COVID-19 outbreak the VICEPHEC 2020 conference went virtual with pre-recorded talks and posters made available on an online platform during the week starting Monday 17th August. This was followed by live Q&A sessions online on Friday 21st August. The satellite events for the IOP Higher Education Group and the RSC Higher Education Teaching network also took place live online during this week.

There were 27 great talks and over 30 posters presented at VICEPHEC 2020, in addition to a keynote from Dr Kathleen M. Quinlan, Professor of Higher Education and Director of the Centre for the Study of Higher Education at the University of Kent on 'What interests students and why?' The presentations were recorded and are available at: <https://vicephec.org/2020/>. Hence it is still possible to view the talks and posters. We encourage everyone to do so, for some inspiration on how to get started on your own physics education research, or simply to adapt some of the great ideas presented for your physics teaching and learning!

The talks were grouped into four themes: Online and Blended Learning; Pedagogy and Assessment; Projects, Labs and Employability; Underrepresented groups, Accessibility and Student Success. They include research from both physics and chemistry higher education contexts. Some of the physics-focused research is mentioned here, but there were many other great presentations from both disciplines, so it is important to emphasize that this is just a taster! Michael Fox, University of Colorado Boulder, spoke about 'Measuring the impact of the transition to emergency remote teaching on instructors and students in lab courses'. He reported on how he and his colleagues used E-CLASS, a survey instrument designed to investigate learning and attitudes to experimental physics. Stan Zochowski, University College London, shared his successful experiences in setting up and running online physics and math courses for third- and first-year physics students. Peter Sneddon and Christine Sneddon gave an overview of a new initiative that was implemented in the School of Physics & Astronomy at the University of Glasgow to provide personalised feedback in a manageable fashion to a large class, based on a scheme developed in Secondary Education. Anna Wood, University of Edinburgh, reported on students' positive experiences of an active learning physics class, designed to give students more opportunity for active participation and transaction in a large class grouping. Samantha Pugh, University of Leeds, described development of a Group Industrial Project module for undergraduate students, intended to increase their business acumen and commercial awareness. Alison Voice, University of Leeds, outlined a collaborative research project between 5 Physics departments from across the UK and

### **UPDATES!**

Make sure your details are up to date in the IOP member database! This helps us understand the HEG and how we can be useful to you. It only takes a minute to review your details at the link below.

<https://applications.iop.org/MembershipLogin.aspx> - gref

Ireland, whereby a longitudinal study was undertaken with 1st year students via 3 surveys at key points in the academic year. This allowed comparison of students' prior expectations of Physics at university with their 'lived experience', and with their perceived and actual academic success. Findings indicated ways in which we can support student belonging and engagement in physics. And finally, Vicky Mason, University of Kent, reported on an investigation of an undergraduate final year physics group project module from a gender perspective. This project looks to students both male and female across two cohorts in the final year of their degree and investigates their physics identity development during group work pedagogy, finding that female students are underrating themselves compared to male students, and suffer from low self-concept. *Grainne Walshe*

## CONGRATULATIONS TO JOCELYN BELL BURNELL MEDAL AND PRIZE FOR 2020 WINNER BETHAN CORNELL IOP HEG committee member

Professor Dame Jocelyn Bell Burnell was one of a group of senior women scientists whose efforts led to the creation of the Athena SWAN awards, recognising a commitment to advancing the careers of women in science. She was also an exceptional Physicist - she discovered the first four pulsars, a finding that led to the award of the Nobel Prize in Physics to Martin Ryle and Antony Hewish in 1974.

The Jocelyn Bell Burnell medal and prize is annually awarded by the IOP for exceptional early-career contributions to physics by a very early career female physicist. To be eligible, the recipient has to have completed their first undergraduate degree in physics less than five years ago and both be contributing to their chosen field in a significant way and also encouraging others in physics.

I was hugely grateful to win the Jocelyn Bell Burnell medal and prize for 2020 for my cross-disciplinary work in atomistic and molecular modelling, my contribution to improving gender balance and supporting minority groups in physics, and for promoting the interests of early career researchers. *Bethan Cornell*

## DISCIPLINE-BASED STEM EDUCATION RESEARCH WEBINARS Jan-June 2021, Hosted by Cardiff University

These webinars aim to bring together an interdisciplinary community of academics and discipline-based education researchers to share results, approaches, and methods, and further support the development of evidence-based STEM education. The talks are sponsored by the IOP Higher Education Group, the Royal Society of Chemistry, and the collaboration of the Cardiff Centre for Education Support and Innovation (CESI). **Recorded talks are available for viewing. Find out more at <https://blogs.cardiff.ac.uk/CESI/stem-webinar-series/>.**

**Discipline-based STEM Education Research Webinars**  
January - June 2021, via Zoom. Registration at [bit.ly/CardiffUCLstemwebinars](https://bit.ly/CardiffUCLstemwebinars)  
Organiser and host: Andrea Jiménez Dalmaroni

These webinars aim to bring together an interdisciplinary community of academics and discipline-based education researchers to share results, approaches, and methods, and further support the development of evidence-based STEM education.

	<b>Eric Mazur</b> (Harvard University), 27 <sup>th</sup> January, 4pm GMT. <i>"Assessment: the silent killer of learning"</i> .	
	<b>Ginger Schultz</b> (University of Michigan), 10 <sup>th</sup> March, 4pm GMT. <i>"Writing strategies for learning: How writing can change the way students learn science"</i> .	
	<b>Carl Wieman</b> (Stanford University), 21 <sup>st</sup> April. Special time: 5pm BST. <i>"Taking a Scientific Approach to Teaching Science (and most other subjects)"</i> .	
	<b>Simon Bates</b> (University of British Columbia), 26 <sup>th</sup> May, 4pm BST. <i>"Attributes of the 21<sup>st</sup> Century STEM educator, and pathways to institutional support"</i> .	
	<b>Brittlind DeKorver</b> (Grand Valley State University), 2 <sup>nd</sup> June, 4pm BST. <i>"Bias in our STEM classrooms: Efforts toward a more equitable curriculum"</i> .	

## COVID-19 REFLECTIONS

I spent the summer listening, discussing and sharing ideas for how to deliver the best student experience. By early autumn I had distilled it down to the following 6 aspects: **WORKLOAD** – this has to be manageable for staff and students. **LEARNING OUTCOMES** – focus on what is important. **SYNCHRONICITY** – helps engage students and keeps it feeling ‘normal’. **ASYNCHRONOUS DELIVERY** - affords students flexibility and supports diversity. **CONCEPTUAL UNDERSTANDING** – such an important aspect of physics, can be developed through frequent quizzes. **BELONGING** – it’s even more important to ensure all students feel connected and valued as members of the class.

*-Alison Voice*

## THOUGHTS FROM THE ‘REMOTE TEACHING AND ACCREDITATION – CASE STUDIES AND GOOD PRACTICE’ MEETING

### IOP HEG Satellite Meeting, August 19<sup>th</sup> 2020

In August 2020 the IOP Higher Education Group held a virtual version of its traditional satellite meeting as part of the VICEPHEC 2020 programme. The themes of discussion this year were how best to teach remotely and how to meet the IOP Accreditation criteria, with excellent presentations from Dr Helen Vaughan and Dr Ross Galloway. This meeting brought together the Physics Higher Education community in the UK, Ireland, and beyond, to reflect on and share experiences of these two key issues that affect us all.

**Dr Helen Vaughan** of the University of Liverpool gave a great introduction and overview of the Physics Learning and Teaching in Higher Education (Physics-LTHE) community meetings that began life during Spring 2020 when the physics community was suddenly faced with the issue of how best to teach remotely. As she explained, a group of educators wanted to set up a place where they could discuss and share ideas about shared problems. This coincided with the advent of the new IOP accreditation system. So the decision was taken to invite various speakers to share their experiences of how they were managing different aspects of teaching and learning physics online, via a series of Zoom meetings, which began in May 2020. The group of academics who came up the initiative got the backing of the Institute of Physics and the IOP Higher Education Group.

These meetings have been attended typically by over 100 participants, and at the time of the satellite meeting seven had taken place. The meeting format is usually two or three presentations, from volunteers in the physics community, followed by breakout discussions in smaller groups. The presentations are recorded and made available online at

<https://www.liverpool.ac.uk/central-teaching-hub/physicslthe/>

The topics of the meetings have included taking activities online, virtual and remote laboratories, assessment, inclusion, groupwork and developing undergraduate learning communities to improve the university experience. These topics touch on the concerns of many colleagues in the community, and there has been very positive feedback to the organisers.

Helen Vaughan pointed out that the changes somewhat foisted upon us by circumstances may permit an opportunity to implement good practices in physics teaching and learning in higher education, moving towards more active learning in lecture delivery and away from recipe-type practical activities. Many of these changes, she said, are in fact implicit within, and align very nicely with, the new IOP accreditation standards.

This was an excellent overview talk on the important work of the Physics Learning and Teaching in Higher Education community, and the body of recorded meetings are a great resource for educators.

**Dr Ross Galloway** of the University of Edinburgh then talked about ‘Guidance for Meeting the IOP Degree Accreditation Requirements under Social Distancing Policies due to COVID-19’, a document issued by the IOP.

The background to his talk is that the current degree accreditation scheme has been reviewed and the revised scheme is expected to be in place for academic year 2021/2022. The Guidance for COVID-19 takes account of the new

accreditation requirements, however, so one leads naturally into the other. Overall, the IOP is taking a sympathetic approach in this difficult period.

Ross Galloway's talk focused on how departments could adjust their delivery of physics programmes in the light of the Guidance document. He pulled out the main points that are covered under the broad headings in the Guidance, that is, teaching, assessment and classification, laboratory and experimental work, projects, and student welfare, equality, diversity and inclusion. A crucial point is that the current accreditation requirements focus on input, as in what departments must do, how they structure their courses and so on. However, the new accreditation requirements will focus on outcomes, that is, what should students be able to do, what skills will they have at the end of their degree. As a result, the new accreditation requirement is generally less prescriptive, such that it permits a focus on non-canonical physics, e.g., Environmental Physics, and other areas that do not easily work with the current requirements.

Hence, in the Guidance document for COVID-19, under the heading of **teaching**: the core areas required are Electromagnetism; quantum and classical mechanics; statistical physics and thermodynamics; wave phenomena and properties of matter. Departments have a lot of leeway within these areas, and the idea is building in more flexibility into the accreditation, with more emphasis on skills and abilities. In the COVID-19 period specifically, the IOP recommends departments seek student feedback more often than under normal circumstances, as to what teaching methods are working, etc. While neither the Guidance nor the new criteria mandate educational research, Ross Galloway pointed out that in this period of change, it is an ideal opportunity to undertake it, to measure impact of changing pedagogy and teaching approaches, as we adapt to the online environment.

The Guidance document has several suggestions regarding **assessment and classification**, and how to best design this for a remote learning context. One very useful approach can be to use more narrative assessment, whereby students have to give an account of what they're thinking while they're doing things, or of how they arrived at a solution to a problem. This helps the teacher have a better understanding of student thinking and can help circumvent and detect collusion. With respect to **laboratories**, the Guidance document promotes flexibility in approach and timing as to when students attain practical skills. The focus is programme level outcomes, so if some postponement is necessary that is fine. Student **projects** are essential part of their degree, and these are mandatory and must be assessed, but with flexibility in their execution. Students can undertake physics education research projects for their FYPs, as well as the traditional physics lab-based projects. Departments must be cognisant of **Diversity and inclusion**, with respect to supporting student cohesion and cohort-building, as well as being alert to individual student difficulties and possible inequities, for example with access, while learning remotely.

Ross Galloway's very interesting and informative presentation was followed by breakout rooms themed on the accreditation core expectations (content delivery, practical skills, project work, problem solving, computing, transferable and professional skills, and assessment).

All in all the Higher Education Group satellite meeting in 2020 was a very helpful session for all in physics teaching in higher education who are trying to adapt to remote and virtual learning, while at the same time providing an essential insight into the new Accreditation landscape to come. *Grainne Walshe*

## **IOP HEG NEWSLETTER CONTRIBUTION CALL (YOU COULD GET A PRIZE!)**

Do you have an interesting higher education project? Perhaps a good story of COVID adaptations to teaching? Attracted some funding? Have examples of good practice to share? We would love to include your stories in the next edition of the IOP Higher Education Group Newsletter. We also have an annual £100 prize for the best newsletter contribution. Submissions of around 400 words with image(s) are encouraged. Deadline for the second 2021 edition will be in October 2021- but early submissions are welcome! Please contact Emily Brunsdon ([emily.brunsdon@york.ac.uk](mailto:emily.brunsdon@york.ac.uk)).

## DEVELOPMENTS IN PHYSICS TEACHING AND LEARNING IN HIGHER EDUCATION DURING THE LAST 100 YEARS, 9-10 NOVEMBER 2020

The way that students learn, and the way we teach, has changed a lot during the last 100 years partly due to evolutions in physics itself, partly due to changes in technology and partly due to better understanding of what is effective. Students' learning, and the concept of "active learning", have many dimensions which have changed over time. The purpose of physics education (both for students and teachers) is often neglected as a crucial factor as is the need for an internal focus in the student's mind.

This two-day online meeting was jointly organised by the IOP Higher Education and History of Physics groups last November to provide an opportunity to discuss the developments in Physics teaching in Higher Education over the last 100 years, what we can learn from this perspective, and how learning and teaching physics at university may evolve in the future. In this short report I would like to highlight the thought-provoking talks given by our invited speakers.

Opening the meeting, Gareth Jones (Imperial College London) took on the challenging task of giving an overview of the effects of crisis on Physics Education since 1920. The talk had a particular emphasis on historical aspects of the following themes: (a) the change in physics itself and how this has been incorporated in higher education, (b) the change in purpose and emphasis in our teaching towards a more student centred approach and the growth of "active learning", (c) the growth of European cooperation and student exchange programmes in physics higher education, (d) the effects on physics higher education of various worldwide crises from the 1st World War to the present including some parallels with effects of the present pandemic. Gareth used several examples to illustrate these themes, for instance that of the two World Wars on students and staff, as well as the effects of revolutions in physics on UG physics degrees, or the effects of various European initiatives to promote cooperation in physics education (illustrated by the ERASMUS programme and international networks such as EUPEN, TUNING, the IDEA League and CLUSTER).

Next, Derek Raine (University of Leicester) provided a historical background to the evolution of Problem-Based Learning and its role in Physics education. Problem-Based Learning (PBL) is now a common pedagogy in professional education in many parts of the world, but it has found little adoption in physics. In the 1970s the infusion of PBL into professional education emerged especially into medicine, then in chemical engineering (all at McMaster University), but its subsequent adoption in the pure sciences in HE has been relatively slow. Derek ended the talk by looking at some of the PBL physics programmes and suggested reasons for the relative lack of interest in PBL in university physics education.

Finally, Alan Cayless (Open University) discussed developments in teaching experimental physics at a distance, looking at the developments in remote experimental work, contrasting the home experiment kits of the 20th century with the online remote experiments of the 21st century. In the 1970s, 1980s and 1990s, physics students would be sent home experiment kits containing equipment for practical experiments. In more recent times, experiments have increasingly been carried out online, operating real laboratory equipment remotely in real time through the OpenScience Laboratories. Alan described how these remote experiments also enable students to develop valuable professional skills such as team and group working.

As the meeting [programme](#) shows, the contributed talks and posters provided further insight on these topics and indeed triggered many interesting discussions among participants. Additional resources can be found on our webpages, particularly presentation [slides](#) and [posters](#). *Nicolas Labrosse*

---

## **IOP HIGHER EDUCATION GROUP**

Chair: Nicolas Labrosse (nicolas.labrosse@glasgow.ac.uk)

Secretary: Helen Heath (helen.heath@bristol.ac.uk)

Treasurer: Dr Thomas Stallard (tss8@leicester.ac.uk)

Follow @IOPHEG on Twitter

Website: <https://www.iop.org/physics-community/special-interest-groups/higher-education-group>

The contents of this newsletter do not necessarily represent the views or policies of the Institute of Physics, except where explicitly stated.

For content submissions (news, upcoming events, research stories...) please email Emily Brunsten (emily.brunsten@york.ac.uk).