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Approaches to introductory coding in undergraduate physics degrees

Coding has become a highly sought-after skill in STEM careers over recent decades [1]. Consequently, the Institute of Physics recommends that undergraduate physics students enhance IT skills, such as coding and becoming familiar with a programming package [2]. While some undergraduate students will have encountered coding during their secondary school education, for many students, their first experience with coding often occurs in their first years at university [3]. The research study explored the opinions of pre-honours level physics students regarding the coding tasks they undertake as part of their laboratory sessions at the University of Glasgow. By accumulating data through the use of surveys and a focus group, information relating to the difficulties that students face whilst learning to code, as well as suggestions for future teaching methods were able to be identified and analysed. The main difficulties that students encountered were understanding the coding language, writing syntactically correct code and correcting errors. Students without prior coding experience were subjected to these difficulties more than their peers with experience. Furthermore, second year students expressed that their experience of coding in Year 1 had not prepared them well for Year 2. It was therefore found that a more comprehensive introduction to the basic concepts of coding should be provided in first year, with no prior coding knowledge assumed. Additionally, students found that there was a lack of formal teaching which could be mitigated by introducing coding lectures to the physics courses. Likewise, students expressed a need for more guidance by means of coding demonstrations and tutorials.

References:

- [1] Aho K et al 2014 Introducing programming into the physics curriculum at Haverhill High School using the R Language *Proc. Am. Soc. Eng. Educ.* (Bridgeport, April 2014)
- [2] Institute of Physics, 2011. The Physics Degree: Graduate Skills Base and the Core of Physics. [online] Iop.org. Available at: <https://www.iop.org/sites/default/files/2019-10/the-physics-degree.pdf>
- [3] Martin R F 2016 Undergraduate computational physics education: uneven history and promising future *J. Phys. : Conf. Ser.* **759** 012005

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