

# What's in a physics degree? High quality education in the age of AI

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It is fair to say that the world is currently in turmoil. Aside from the continuing war in Ukraine, with all the uncertainty this brings for the future of peace in Europe, the recent outbreak of war in the Middle East has sent shock waves around the world and threatened the global economy. At the time of writing, the war is still being fought and we have no idea of the long term consequences. However, there are other forces at work which threaten even greater disruption to the established order. Generative AI is being talked about in the same terms as the first industrial revolution, which saw mass migration from the country to the towns and the development of a very different way of life. The way of life in the age of AI is thought by many to be one of mass unemployment.

It seems unlikely at present that AI will replace the physicist. Despite the name, AI is not really intelligent in as much as it doesn't appear to be able to synthesize new information. What it can do very effectively, and far better than humans, is summarize a wealth of existing information, but even here it suffers a difficulty. There have been some notable incidents in the UK in which AI appears to have been used to summarize legal arguments only for it to turn out that AI has fabricated content. Most notably, the judgement in the Sandie Peggie case was changed twice when it turned out that quotations from previous cases cited in the judgement did not reflect the reality. Whether these are in-built deficiencies in AI that will always exist or whether future versions will be able to overcome them remains to be seen, but even with these limitations AI in its current state already poses a significant challenge for educators.

The impact of AI on education cuts across disciplines and levels, but physics education is our particular interest and it is within that context that we must look at the challenges, solutions and possible benefits. We have arrived at the situation now where AI can solve most of the conventional problems an undergraduate would typically be set. The purpose of setting such problems is not only to assess what students know and can do, but also to provide a vehicle for the development of understanding and skills. It is no longer safe to assume that if students are set work to complete in their own time that the work they submit will reflect any cognitive effort or input by the students. Sands and Henriegel discuss the challenges this poses for educators and the possible impact this will have on the design of degree programmes. Yeadon discusses the impact of AI on assessment at all levels and in particular at university, where educators have more freedom to design assessments that overcome the challenges posed by AI.

The fact that AI can solve most problems faced by undergraduates means that potentially it can be harnessed both to help with assessments and to provide tutorial support. The articles by Babayeva et al and Küchemann et al explore these aspects with examples from their own educational research into supporting students with AI.

As AI develops and educational systems adapt, there will no doubt be other challenges. All we can do at present is meet the challenges we face. They are considerable and I believe we are on the threshold of some of the most significant changes to the structure of education to occur in decades. These four articles give some idea of the possibilities. ■