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When Niels Bohr said to his colleagues "No, no you are not thinking, you are just being logical" the Nobel Prize-winning physicist was expressing frustration at smart people using their knowledge in fairly ordinary ways. The problem at hand needed new ideas, a dash of creativity and twist of critical thinking. It was going to be messy! Bohr was thinking about the new field of quantum mechanics, and at the time the scientists were struggling with conflicting evidence pulling them in different directions. Nothing seemed to make sense but what they did know was that they did not really know what they were doing. No one had trained them for this. The unknowns seemed overwhelming, the complexity impenetrable and uncertainty caused great discomfort. Developing students' ability to deal with situations such as these will likely be the purpose of a university education in 2030. Of course, not everyone will study physics (or win a Nobel Prize) but every undergraduate will be entitled to learn to think like Bohr and not be limited like his colleagues.

For many years, the industrial model of education placed knowledge and know-how at the centre of university teaching and learning. This made sense in a world where knowledge was difficult to come by. If they were lucky, students would develop new ways of thinking along the way. They might have graduated knowing a lot, but it was fragile knowledge not up to the challenges of the real world. In the future, the development of thinking will be at the centre of university education and the value of knowledge will be in how it helps students to deal with complexity and decide on how to tackle the next problem.

By 2030 there will be fewer universities. Some will have committed organisational suicide by putting all of their courses online. By doing so they will have discarded the social dimensions of thinking and learning and in the long run this will drive students away. If they do still exist, these universities will have been reduced to institutional text-books, churning out familiar information only distinctive because of the colour of the packaging. »

Face-to-face interactions are needed in learning, especially when there is hard thinking to be done, a complex problem to be overcome or a difficult conversation to be had. When students and educators share a feeling of belonging together in a learning endeavour, we have a common purpose that keeps us going when things get tough. We will be able to do hard thinking together and use students' developing knowledge to enable them to ask themselves high-quality questions and think in new ways, rather than focusing exclusively on what they already know.

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At Flinders University in 2030, students will be even more articulate about how their discipline knowledge can be used to change the world. They will be able to tell you how they can use it to complement the expertise of others, to think new thoughts together and to identify new unknowns. They will be comfortable with uncertainty and complexity and, like Niels Bohr, uncomfortable with passivity and easy-thinking. They will be learned, and they will know how to learn. They will laugh at their own productive failures because they will find their new insights rewarding.

Recent developments at Flinders are providing opportunities for all of us to think about teaching and learning in new ways. We are already well on the road to 2030 with our many innovations such as challenge-based laboratory-practicals, work-integrated-learning, and alternative admissions processes that capture an individual's capacity for critical thinking, creative thinking, and thinking with wisdom. I think Niels Bohr would be pleased.

Professor Westall is one of the Chief Investigators on the national ARC Science of Learning Research Centre. He and his team collaborate with teachers across the state, nationally and internationally to help turn research into classroom innovations that develop students as effective thinkers. Martin is the Scientist in Residence at Patch Theatre Company, and a member of the SACE Board. »