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## **Title.**

**Artificial Intelligence in the classroom: Flipped learning for MSc Occupational Psychology students**

## **Content.**

### **Abstract**

Artificial Intelligence (AI) may lead us to an evolution of work or a revolution taking over from us (Hurlburt, 2017). AI has been used within occupational psychology for many years especially in writing assessment reports (Bartram, 1995; Wilson, 1999). This success is down to the knowledge in how a psychometric test is interpreted remaining fairly constant (Biggs and Sagheb-Tehrani, 2008). Flipped learning is a student-centred reverse teaching approach (Jong, 2017; Swart, 2017). Given the wide range application of AI at work, this case study explores what students about to embark on a career in occupational psychology have cited in terms of potential AI applications. A reflection on these presentations is given, along with future studies relating to the field of AI. The purpose of this paper is to demonstrate the power of flipped learning in the classroom for students undertaking the MSc in Occupational Psychology.

### **Introduction**

Flipped learning is a student-centred reverse teaching approach, where activities are given to the students (Jong, 2017). Flipped learning yields amazing results in the classroom as students can better engage and retain concepts and information. This process often affects students for the whole of their personal and professional life (Swart, 2017). Flipped learning often uses activities that may be traditionally called homework but puts them back in the classroom, enabling students to explore topics from their own orientation but within a controlled setting (Swart, 2017).

Artificial intelligence (AI) can be defined as encompassing computational techniques for performing tasks that would previously require human intelligence (Hurlburt, 2017). Whether AI will cause an evolution or revolution is difficult to determine; however, it has been growing between the fields of psychology and computer science for sometime (Biggs, Kennair and Stephenson, 2004; Padhy, 2005). AI encompasses areas such as expert systems, fuzzy systems, artificial neural networks, genetic algorithms and swarm intelligence systems (Padhy, 2005). Hurlburt (2017) argued that systems are becoming so intelligent that they may surpass human intelligence in the next 25 years. This “superintelligence” has had lots of media interest with industrialists such as Elon Musk and astrophysicist Steven Hawking warning that unchecked AI could ultimately annihilate humanity (Hurlburt, 2017). Media interest in the rise of AI and in the rise of robots is perhaps then understandable (Ford, 2016). Indeed, even psychologists have discussed this fascinating area from our beloved pets being replaced by robots (Biggs, 2015), the future of therapy being automated (Helgadottir, 2014) and the future of work being led by machine (Biggs, 2017).

Whatever the future may be, it is likely that AI will increasingly affect our lives. According to a recent consultancy report by PWC (2017) the gross domestic product of the UK will be up to 10.3% higher in 2030 as a direct result of AI. This is the equivalent of an additional £232bn if there predictions are correct making AI one of the biggest commercial opportunities in today’s economy (PWC, 2017). It may even affect our pocket directly with PWC (2017) predicting extra spending power per household of approximately £1,800-£2,300 a year by 2030. Given this changing landscape of AI onto our jobs and lives (Ford, 2016), this research thought it would be interesting to examine what students (most of whom are in their early 20s) present about this type of system.

## **Research Design**

The study examined two cohorts for 2015-16 and 2016-17 of presentations submitted by students undertaking their MSc in Occupational Psychology at the University of Gloucestershire. Students were given an introduction into the field of Artificial Intelligence and robotics in terms of its place in philosophy, within film and within the media. Students were then given a flipped learning opportunity to explore this field further by answering the following question: "In pairs, find a case study of AI/Robots at work. Spend thirty minutes reviewing the case study to present back to the class via PowerPoint for at least 10 minutes".

## **Results**

Presentations produced by the students during this flipped learning exercise were engaging and demonstrated their learning and interest in the field of AI. Interestingly none of the students looked at the use of expert systems for psychometric report writing. It seems that this is so commonplace now it is just an additional feature of buying a psychological test that a test reporter will be available to do the work (Bartram, 1995). The presentations produced encompassed the following areas:

- AI and Farming - Robotic Dairy Farming,
- Robots at Work: da Vinci Surgical System,
- To drive or not to drive – When robots meet cars
- Blending Chef Watson and Moley Robot Chef

## **Discussion**

Gopalan and Klann (2017) argued that flipped learning approaches are superior to traditional lecturing in allowing students to review difficult topics, to come to terms with complex material and to capture their thoughts about particular approaches. While retention of knowledge was not a part of this study, it was clear from the results that the students engaged with the topic area in a novel manner. This demonstrates the power of using a flipped learning approach in the classroom in a wide potentially influential area such as AI (Jong, 2017; Swart, 2017).

Robotic Dairy Farming, was an interesting presentation as it was noted for being better for man and beast (Heyden, 2015). The cow walks voluntarily through milking parlour, the udder is brushed and measured, and a laser pinpoints udder before attaching milking pumps. Tags are used to ensure that the cow has not been recently milked and if it has, the gate usher the cow out. Its advantages are that cows can be milked more often and when the cow wants to be milked. This also leads to more milk being produced per cow, less mastitis and stress for the cow and less labour is required (Heyden, 2015). The disadvantages are the high capital cost for the machine (£110,000) and the high maintenance charges. The da Vinci Surgical System, was also expensive. However, the advanced robot allows surgeons to do a number of tasks such as view details at up to ten times the normal magnification and at a high resolution because of its unique 3 dimensional (3D) vision system. However, whether this type of system is better for surgery than just human hands alone was questioned. Certainly more research needs to be done when human and robot can be compared. However, in some cases such as in eye surgery the use of robotics increases positioning accuracy of a laser that has no human comparison (Becker, Valdivieso, Biswas, Lobes, and Riviere, 2009). Driverless cars were also featured, examining how a vehicle is capable of sensing its environment and navigating without human input. This could lead or prevent accidents as other cohorts have shown. Finally yet importantly, robots in the kitchen were

detailed examining the autonomous chefs Watson and Moley. These robots were more advanced than kitchen appliances such as food processors and indeed would cook meals from scratch using personalised ingredients. Obviously, like the other systems costs were an issue. Nevertheless, the social aspects of cooking and making a meal for a loved one would be removed if AI was to dominate the kitchen.

## Conclusion

This study was fascinating as through the use of flipped learning the researchers were able to see what topics in Artificial Intelligence was of interest to our students. While some may argue that we are on the verge of a revolution in AI and Robotics (Ford, 2016; Hurlburt, 2017). The presentations performed by the students were positive towards this technology. Wiedermann (2012) argued that machines will never be able to surpass human levels of intelligence. The students picked up on this, arguing that the disadvantages of the systems are inherent. Interestingly, most of these disadvantages did centre around costs. Other disadvantages, were the social aspects of replacing human activities with machines. Whatever the future may be, it is clear that the 21<sup>st</sup> Century will be influenced by AI, the extent of whether this causes an evolution or revolution is difficult to determine.

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