

# **Authentic Assessment for Lifelong Learning: Futureproofing Healthcare Science, and Engineering Students**

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## **Abstract**

Authentic assessments provide higher education students with opportunities to showcase the practical applications of their knowledge to contextually relevant scenarios. This promotes critical thinking and problem-solving skills through industry-relevance challenges, helping students engage more meaningfully with their studies, while fostering strategies for lifelong learning. This is crucial for fast-evolving professions such as Healthcare and Engineering, both in high demand. Consequently, this paper presents how students within healthcare science and engineering courses at Aston University, UK, are prepared for real-world application of theoretical concepts via authentic assessments. Examples used include co-creation, employability skills, leadership and continued professional development, used to prepare students for future professional environments, and enhancing their ability to innovate. This provides new insights into aligning academic learning with practical demands to better equip graduates to meet the challenges of their chosen professions, and may inform the design of authentic assessments from healthcare to engineering.

## **Keywords**

Authentic assessment, real-world learning, healthcare education, engineering education.

## **Introduction**

Healthcare and engineering consistently feature among the most in-demand professions, with shortages worldwide, due to an aging population and an increasingly technological world. Both are characterised by the practical application of theoretical knowledge, and rapidly evolving disciplines. Consequently, there is a need not only to equip students with the necessary employability skills, but also lifelong learning skills to futureproof their practice.

Authentic assessment, which aims to reflect real-world learning (Archer, et al., 2021), is a proven strategy to contextualise the students' learning in a more practical, industry-focused manner. This has been successfully implemented across healthcare (Anderson, et al., 2023) and engineering, the latter featuring specific frameworks such as Conceive-Design-Implement-Operate (CDIO) (Crawley, et al., 2007).

Moreover, considering Aston University's vision to provide "*positive transformational impact for our people, students, businesses and the communities we serve*", we further argue the importance of co-creation. This has been shown to support diverse cohorts of students (Cook-Sather, 2018), and frameworks have been devised to support student co-creation (Bovill, 2019; Magni, et al., 2020). This work will also suggest industry as a valuable co-creation partner for both employability and lifelong learning skills.

This paper will, therefore, present strategies for authentic assessment and co-creation to support healthcare and engineering students in developing the practical application of their knowledge, to futureproof them for fast-evolving careers. Consequently, employability skills will first be discussed. Then, the futureproofing of professional practice will be tackled. Finally, the main findings will be summarised.

## **Employability Skills**

### ***Healthcare Science***

Students enter university from a wide array of backgrounds and qualifications. The rise of work-based learners and apprenticeships has further diversified the student population and their pathways to higher education. Many students find the transition into university quite overwhelming. To address this, Aston University Healthcare Science students assess the essential skills needed to succeed in their studies. Together with their tutor, they narrow down these skills and are provided with workshop opportunities to enhance them. While proficiency is not expected, students are encouraged to reflect on their skill gaps and consider actions for improvement.

Moreover, a co-created assessment was introduced in a Year 1 module. During the first week, students discussed the qualities and attributes essential for a good healthcare professional, identifying key characteristics as a group. They then explored the skills necessary to support these qualities, such as teamwork for effective patient care. Each cohort discusses and chooses skills which vary year on year. This is where co-creation becomes vital in higher education. To ensure fair assessment practices - recognising that some students may prefer exams while others favour presentations - a collaborative

approach allows all students to contribute to defining assessment requirements. Co-creation involves students and tutors working together to develop teaching activities and assessments. Notably, this is a pass/fail element of the module portfolio. The students work with the tutor to create the pass/fail criteria: by involving students in the creation of the criteria, there is a sense of ownership and engagement.

Ultimately, students provide a reflection on what they've learnt and evidence to support their chosen skills. This includes a written CV, including a LinkedIn profile following a session from the Aston University Careers team. Other evidence may include slides from a group presentation, or pictures of wall planners and diaries as evidence regarding time management skills. Students have the flexibility to showcase their evidence as relevant to them, allowing this to be a personal submission with lifelong learning embedded (Gill and Hussain, 2023).

### ***Engineering***

Engineering and physical sciences have also witnessed a greater diversity of entry qualifications. Coupled with a drive to widen participation, ensuring fundamental skills are provided early on to maximise student success is crucial. Here, these skills are embedded in the personal tutoring scheme. During the regular timetabled personal tutoring sessions, students can raise the specific challenges they are currently facing, and staff can draw on a resource bank to provide the necessary support to their studies or developing career.

Additionally, co-creation has been employed to understand how students can best be supported in their authentic assessments, particularly in the emerging context of Industry 4.0, featuring a greater integration of cyber physical system. Therefore, a project on Pedagogy 4.0 was undertaken (Boyd, et al., 2023), which constituted a final year student's dissertation. The findings revealed the preferred pedagogical approach by students, which then informed the delivery of new modules to ensure students are equipped for employment.

Finally, extensive work has been undertaken on understanding the comparative perception of graduate skills and attribute for employability. A survey of staff, students and local employers was conducted, specifically targeted at the Engineering courses at Aston University. Among the many insightful findings that have allowed to enhance the course to better align with skills and attributes expected by engineering employer, the top five skills for each respondent group are presented in Table 1. Interestingly, the top two skills for industry professionals, namely "*personal and working attitude*" and "*professional conduct*" are absent from the student and academic responses. This will inform changes to the engineering curricula, detailed in the following section, with authentic assessments better targeted at these key skills and attributes.

**Table 1.** Top employability skills and attributes according to each respondent group, reproduced from Soupeez (2023).

<b>Rank</b>	<b>Students</b>	<b>Academics</b>	<b>Industry Professionals</b>
1	Teamwork	Problem solving	Personal and working attitude
2	Problem solving	Critical thinking	Professional conduct
3	Critical thinking	Teamwork	Communication
4	Identification of problems	Communication	Critical thinking
5	Communication	Identification of problems	Problem solving

## **Futureproofing Professional Practice**

### ***Healthcare Science***

Healthcare students will advance into leadership and service management roles, making it essential for them to have opportunities to practice teamwork and leadership skills. Consequently, as part of the 'Leadership, Innovation, and Quality' module, MSc students have access to materials from external guests, including clinician experiences of undertaking quality improvement, as well as resources on leadership in the NHS. Guest lecturers that work in the NHS as Clinical Leads or Heads of Service have inspired students but also provided realistic contexts for students to showcase the applicability of their roles.

The module has been developed iteratively, incorporating feedback from students, healthcare stakeholders, and experts in the field to enhance its clinical relevance and incorporate authentic assessment. As part of it, students are required to reflect on their leadership style for a recorded presentation, develop a business plan for an innovative service improvement, and deliver a group presentation on a quality process. These assessments are designed to interconnect, providing a structured approach to enhancing critical thinking and appraisal skills. Reflection is a vital aspect of the module, and students must include a reflective commentary in their presentations (Hussain, 2024).

Historically, students have excelled in these authentic assessment tasks. They actively engage and participate in live sessions led by clinical leaders and healthcare experts, such as department heads and accountants. Students have noted that the module pushes them

to acquire new skills, reflect on their current practices, and explore innovative ways to implement change. They also contemplate their future roles and responsibilities, outlining the steps necessary for their personal and professional development.

These topics are crucial for aspiring healthcare leaders. The varied approach, incorporating different specialties, fosters opportunities for interprofessional education, collaborative working, and reflection. The module aims to incorporate co-creation in the future, providing additional authentic assessment opportunities by allowing MSc students to practice leadership and innovation.

### ***Engineering***

At levels 4 and 5, CDIO represent half of Aston Engineering students' credits, highlighting its key role in preparing industry-ready graduates. Contemporary and upcoming society challenges are addressed in these modules, with authentic assessments covering the design, manufacture and test of an electric car, wind turbine, medical device and fuel cell, all with a focus on sustainability. Such practical experiences do not only support transition into employment, but also impart on students lifelong learn skills on tackling novel complex problems.

At level 6, and to address some of the key employability skills identified by employers (see Table 1), while clearly setting a mentality of lifelong learning and engagement with continued professional development after graduations, students undertake a module of 'Professional Engineering Practice'. One of their assessments consists in preparing an Engineering Technician (EngTech) application, which represents the first step towards become a Chartered Engineer (CEng) as their career progresses. This module and particular assessment evidence a clear commitment to futureproof their professional practice, and leading students to realise the importance of lifelong learning.

### **Conclusions**

In this paper, a range of initiatives at Aston University have been used to illustrate how co-creation and authentic assessment encourage students to actively participate in their learning journey, while ensuring that assessments are equitable and relevant for one of the most diverse student populations in the UK. This integration of authentic assessment represents a clear shift in how student learning is evaluated, prioritising real-world applications of knowledge to prepare students for employment and lifelong learning. These practices have been shown to apply for healthcare and engineering, and it is anticipated the examples provided in this work could benefit the wider higher education landscape.

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