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Authentic Assessment: A Foundation Year Case Study

ADAM J WOOTTON
Keele University

The last few years have seen many universities increasingly move towards authentic assessment as a means of developing a fair, inclusive and relevant curriculum. Taking its cue from Mueller (2005), who defined authentic assessment as 'a form of assessment in which students are asked to perform real-world tasks that demonstrate meaningful application of knowledge and skills', this paper presents two separate contributions. Firstly, a framework for developing authentic assessment that begins with developing the assessment itself, then module-level intended learning outcomes (ILOs), then activities to build towards the assessment and finally creating the taught content. Secondly, a case study is presented which shows this development framework in action. Client-Led Collaborative Design is a Foundation Year Computer Science module that places students in the position of software developers, getting them to engage with clients, create intuitive user interfaces and professionally present their finished products. The steps in creating this module and developing the materials are outlined and advice given for creating authentic assessment in any discipline.

Authentic Assessment

The most straightforward definition of authentic assessment is perhaps the one provided by Mueller (2005, p. 2):

> Authentic assessment is a form of assessment in which students are asked to perform real-world tasks that demonstrate meaningful application of knowledge and skills.

Similar definitions are given by Wiggins (1999, p. 229):

> Engaging and worthy problems or questions of importance, in which students must use knowledge to fashion performances effectively and creatively. The tasks are either replicas of or analogous to the kinds of problem faced by adult citizens and consumers or professionals in the field.

and by Gulikers *et al*. (2004, p. 69):

> An assessment requiring students to use the same competencies, or combinations of knowledge, skills and attitudes that they need to apply in the criterion situation in professional life.

The common thread that unites these definitions and the factor that makes these assessments 'authentic' is that they concern problems faced by graduates outside of academia, in the *real-world*. Rather than measuring the acquisition of knowledge in an abstract sense, traditionally by a time-limited exam, authentic assessment focuses on testing the skills that students would require when employed in the field by placing them in a simulated employment scenario. This is sometimes referred to as developing the so-called 'soft skills' that are not necessarily specific to the subject but which enhance employability.

Natural authenticity and validity

This is not to say that all time-limited exams, essays and other 'traditional' assessments are intrinsically inauthentic, nor that any 'inauthentic' assessments are by their nature invalid or inferior to those that are deemed authentic.

The time-limited exam is a good example of this. There is a lot of literature critical of exams as a mode of assessment in higher education, whether online (Gernsbacher *et al*., 2020) or in-situ (Kim, 2020), and while reservations about their inclusivity and fairness are important, exams are not necessarily inauthentic. An exam principally requires a student to retain a large amount of information, to critically assess and select from that information in response to a question and then accurately to relay this in the shortest possible amount of time. This is a challenge faced every day by employees in the real-world. At any parliamentary select committee, for example, you can see civil servants tasked with having an array of complex data and information at their fingertips, ready to deploy at a moment's notice. The skills required for this are not unlike those required in an exam and so, in the right context, exams have a degree of authenticity.

On the topic of validity, Mueller (2018) cites one of the most authentic assessments currently available: the practical driving test. A prospective driver can pass the authentic practical test but still be denied a driving licence if they fail the 'inauthentic' theory test. This is not an injustice, but rather a consequence of the fact that the practical test requires the driver to demonstrate their skills, while the theory test requires them to show their knowledge and understanding of road use. Mueller's point is that authentic and 'inauthentic' assessments are not opposed to one another, but are instead complementary, testing knowledge and skills in tandem.

Starting Points

Although it is not true in every case, a general rule of thumb is that authentic assessment works best when the whole module is constructed around it, such that all of the learning activities can point towards it and the students spend their time immersed in the 'simulation'. It is still possible to include authentic assessment without doing this, however. For example, on the Keele University Foundation Year, students on a large, multidisciplinary introductory Mathematics module for scientists take an authentic assessment based on analysing the English indices of deprivation

dataset. In this assessment, they are expected to carry out the kind of statistical analysis of data that might be expected of a scientist in the workplace on a real-world government dataset.

There are several suggested approaches to constructing an authentic assessment in the literature. Mueller (2018) suggests beginning by developing standards (what a student needs to know/do), then authentic tasks (how the standards are measured), criteria (to discriminate between levels of performance) and then a formal rubric. Villarroel *et al*. (2018) developed a four stage system that started with identifying the workplace context, looking at the typical graduate profile and employment. This is followed by assessment design, where the assessment should be based on the challenges of employment, with tasks that closely simulate professional performance. Finally, judgement and feedback are used to assess performance and continue the cycle of module development.

These are good approaches that give an idea of the basic process of developing authentic assessment. However, they are not entirely consistent with the author's experiences of module development and understandably take a more general view of application, rather than considering how the process might work at foundation year (FY) level. In light of this, a new model for developing an authentically assessed module has been made and can be seen in Figure 1. This model is more focused on the practical aspects of FY module development. The following subsections explain this model in greater depth.

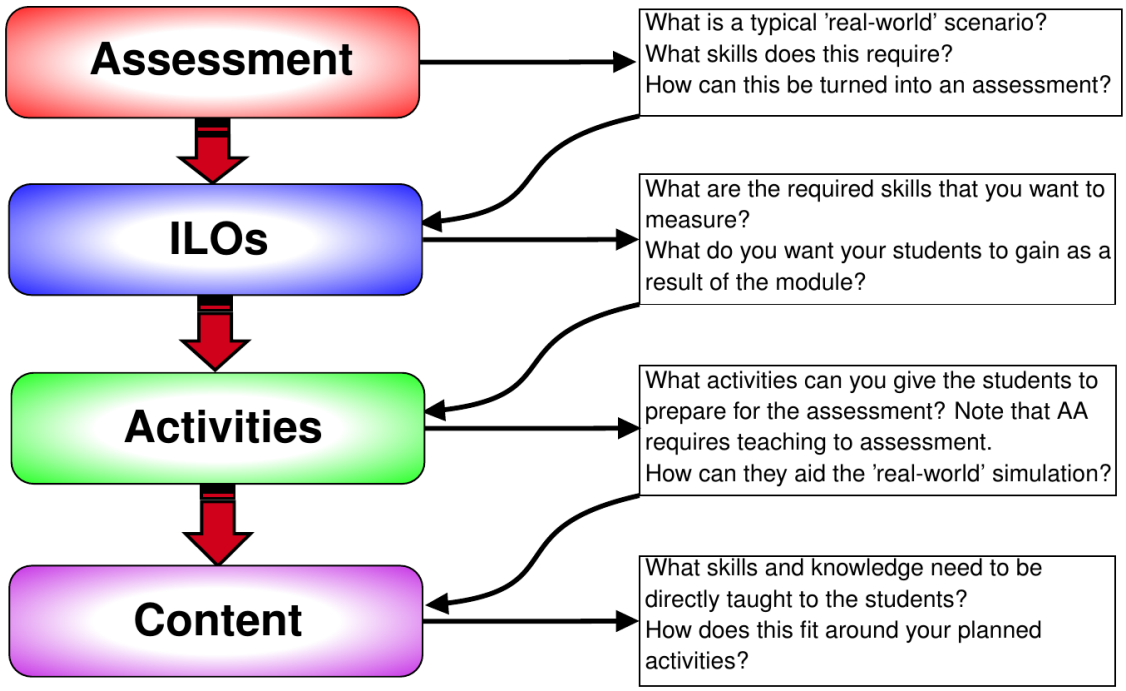

Figure 1: A proposed model for developing authentic assessment (AA), showing the prompts that can be used at each stage as part of the development process.

Assessment

While not impossible, it is difficult to build an authentic module without first knowing what the authentic 'element' is, which is usually reflected by the assessment. Once the assessment has been determined, the other elements around how the module will be taught can start to be put in place. The process of designing the assessment begins with key questions not unlike those posed by Villarroel *et al*. These are designed to drive at something that can be adapted into a task with an output whose quality can be measured. This means looking not just at the proce-

dures that take place in the workplace, but what the tangible outputs are. The suggested prompt questions are:

1. What is a typical career within the field for a graduate in your subject area? What would they typically work towards?
2. How can this be adapted into the form of an assessment?
3. What skills and knowledge are required to be able to do this? How many of them are appropriate for your level of study?
4. What do you want the students to do as their main summative assessment for your module?

Typically, a module built around authentic assessment will actually have more than one assessment, looking at different aspects of the chosen scenario. Having a portfolio of assessments that is completed over time can help to encourage the ideas of simulation and role play (Qandil *et al*., 2021).

Intended Learning Outcomes

In his work on constructive alignment, Biggs (1996) outlined a process for developing a module that began with defining the learning outcomes, choosing activities that lead to these learning outcomes and then assessing the learning outcomes. This has been criticised as a mechanistic view of the complex and dynamic process of learning, where each student has their own unique experience and perspectives (Haggis 2011; Biesta 2010). However, as Loughlin *et al*. (2021) note, this is often born out of frustration with the misappropriation of constructive alignment as a part of administrative processes, rather than in guiding educational design towards student-centred learning. Here, the learning outcomes are used to focus the process of module design on the desirable skills that students should develop through engagement by articulating the requirements of the scenario.

While the process given here does not follow this precise order, the general principle of aligning outcomes, activities and assessments is critical to developing good authentic assessment. Once assessments that match real-world scenarios have been developed, learning outcomes should be chosen that match the skills required to complete this assessment. Some prompt questions for this stage are:

1. When creating the assessment, the skills required to carry out that assessment were identified. Which of those skills should be measured?
2. What level of expertise should students reach with these skills?
3. What are the top five things that students should gain from the module?

Activities

Once the intended learning outcomes are in place, the learning activities should be designed. Although a small number of sessions can be focused on skill development without really getting involved in the role-play, especially at the start of the module, learning activities should, as far as possible, mimic the sorts of activities that might take place in post-education employment, particularly those that would be part of the typical process of reaching your assessment. This really enhances the role-play and simulation, making the whole module authentic. At this stage, the most important questions to ask are:

1. What is a typical timeline for a project that would culminate in the work that is assessed here?
2. Are there any activities in this timeline that can be adapted and used for skill development?

3. Are there any skills or bits of knowledge that students need to develop, but which do not fit into this timeline? Can they be put at the start of the module?
4. Is every activity linked to a key skill or a key part of the simulation? Does every activity contribute to either the assessment or authenticity?

Content

Counterintuitively, the final step of the authentic assessment module design process is to work out what the students will need to be taught in order to prepare them for their activities and assessment. This is probably the easiest part, since the other details have been worked out and content simply has to be matched to activities and skills. This stage simply determines what knowledge students need to support their skill development and what support students need in order to effectively complete the learning activities.

Client-Led Collaborative Design: A Case Study

A 2018 internal review of the Foundation Year Computer Science route at Keele revealed that there was an imbalance between hard and soft skill development and that there was too much of a focus on technical skills and programming. An effort was made to help FY students to appreciate that there are also parts of Computer Science that call for creativity and an understanding of good design, that necessitate good planning skills and an ability to interact with people - all things that might not ordinarily be considered a part of the stereotypical CS student's toolbox. Client-Led Collaborative Design was a new module designed to address this, with students put in the position of professional software developers, working to produce a webpage or app for a paying (but fictional) client.

Development phase 1: assessment

The brief for this module already answered some of the prompt questions on assessment. However, the exact modes of assessment still needed to be identified. Working through the prompt questions shows how these modes can be elicited from the brief.

1. What is a typical career within the field for a graduate in your subject area? What would they typically work towards?

   The typical career chosen was that of the software developer/engineer who works towards producing software for a paying client.

2. How can this be adapted into the form of an assessment?

   This is a more challenging question that requires a complete break-down of the scenario. At this point, it was envisaged that the end point was probably to have something finished and ready for a client. However, since the focus is on soft skill development, then a better approach would be to focus on dealing with the client directly. This led to the idea that the students could present their finished products to the client and even meet them at the start of the project to get their specification. It would also be more realistic if the students had to work as a group, since software developers typically work as part of a team.

This then led to a more refined picture of the module aim: for students to take part in a semester-long project where they work as a group to fulfil a client's specification for an app or webpage. The students were expected to meet with the client on a regular basis in order to determine their needs. At the end of the project, students present their finished work to the client.

3. What skills and knowledge are required to be able to do this? How many of them are appropriate for your level of study?

   Having developed a clearer picture of what the module should look like, some of the skills that are required also come to the fore. For example, the strong emphasis on soft skills came across very clearly again. The main skills in this case were:
   - Client-facing skills, such as listening to a client, conveying specialist ideas to a non-specialist and interpreting non-specialist language in technical terms.
   - Presentation skills, such as presenting work to a paying client, professional presentation standards and narrative development.
   - Project management skills, including leadership, organization, planning, logging hours, invoicing, communication and file sharing.
   - Technical skills such as user interface design, drafting, wireframe design and coding.

   Of this list, the only skills that were really inappropriate for a FY-level module were the coding skills. The level of expertise required to produce a good app/webpage would require a full module on learning to code at a level not required until the second year of their degree and would consume all of the time on the module. However, prototyping software was available to allow students to produce professional designs without needing code.

4. What do you want the students to do as their main <u>summative</u> assessment for your module?

   This was an easier question to answer, as the scenario naturally provided two main outputs. A software development project normally gives an external output (i.e. finished software given to clients) and an internal output, usually a project reflection report. These two outputs could, therefore, be turned into assessment.

   Since the emphasis of the module was on soft skills and it was already concluded that it would be better to use prototyping software than to get the students to produce real, working products with code, the external output assessed would not be the app/webpage itself, but the presentation to the client. Their work in creating the app/webpage would still be assessed, but this added extra layers to the assessment that really get to the heart of the skills that were to be developed. The students would need to present their finished prototype but also persuade their client that they had fully met the brief. They would need to exhibit professional presentation skills, prepare an invoice and clearly communicate with the client. The client's personal satisfaction with the output of the project could be used to contribute towards the marks. This is a difficult area, as the client would need to have an understanding of an appropriate level of work at FY-level and the limits of the software that the students were using. Asking members of FY teaching staff to take the role of clients in interviews mitigated this.

> Since this presentation would be a group assessment, it made sense that the project report would be an individual assessment, where students would need to explain their personal understanding of the work that was done and how it met the clients' needs. However, it was possible to expand this assessment beyond a simple report. The overall assessment could be a portfolio of weekly tasks, with the final task being the report itself. Each one of these individual tasks could relate to a real part of the design process.

At the end of this first phase of the design process, a clear idea of the scenario had been developed and the skills and modes of assessment had been identified, meaning that it would be possible to create learning outcomes.

Development phase 2: Intended Learning Outcomes (ILOs)

Rather than going through the prompt questions in detail as above, it is more illustrative at this stage to show the learning outcomes that were settled upon. The key part of the prompts used was to come up with a top five desirable outcomes for students and the top five skills that the students should utilise.

1. Demonstrate knowledge and understanding of how to work effectively as a group and interact with clients.
2. Apply knowledge and understanding of prototype design concepts in solving a problem for a client.
3. Discover and interpret a client's requirements from an interview.
4. Plan for and creatively solve a problem given by a client.
5. Demonstrate the ability to participate responsibly and collaboratively as an active citizen in the communities in which you live and work.

Each ILO links with the skills that were previously identified and which were matched with a command word appropriate to the desired level of performance.

Planning tools to aid with development

There are a number of different planning approaches that can aid with development. In this case, a mind map was found to be a particularly effective means of creating a holistic overview of the module and building links between all of the different elements. Figure 2 shows the mind map used here.

The starting point on the mind map was the assessment, given in the top left quadrant. The two modes of assessment each have links connecting them to the learning activities ('practicals', section 2 in the bottom left quadrant) and content ('lectures', section 3 in the bottom right quadrant). This shows one of the most important principles when designing an authentically assessed module, which is that every learning activity should build towards the assessment in a meaningful way and all of the content delivery should support both the learning activities and assessment. Note that the upper right quadrant just listed ideas for different projects.

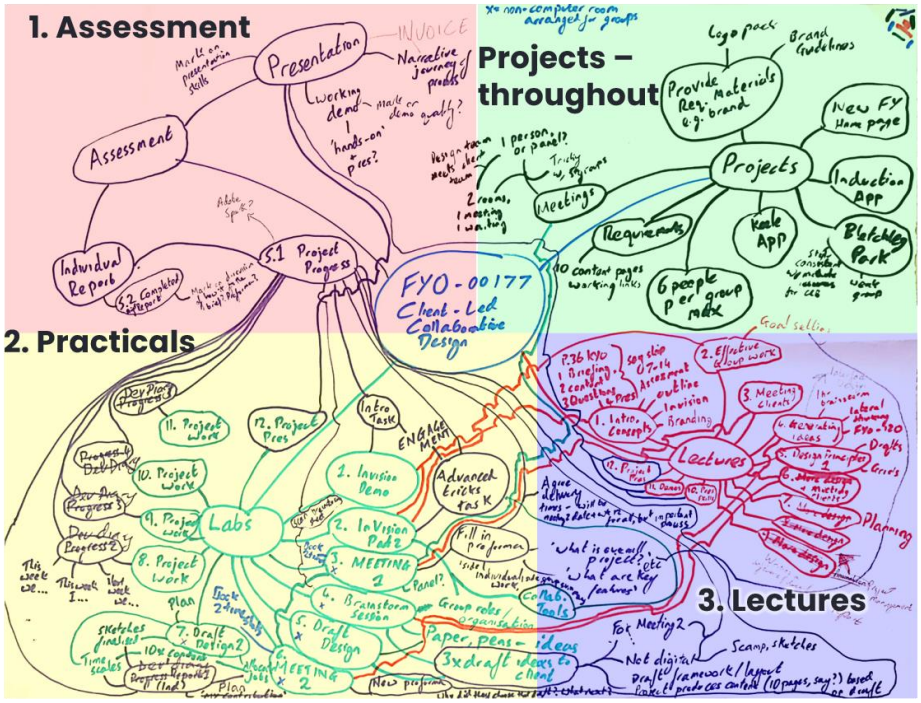

Figure 2: A mind map used to plan Client-Led Collaborative Design.

Development phase 3: activities

One of the first decisions made when it came to activities was that students would be supported with one practical laboratory per week. This meant that each week there could be one topic which could build towards preparing the students for the assessment.

Although it is best if the activities all add to the simulation, there was no avoiding the fact that the students would need to spend some time learning to use the prototyping software and different filesharing tools. Thus, the first two weeks of the module were given over to practical tasks developing prototypes and bringing the students together in their groups. The tasks that the students completed for this were then to be submitted as part of their portfolio, encouraging engagement.

The remainder of the lab sessions could then be given over to simulating the process of developing software for a client. The schedule that was finally settled on was as follows.

1. Prototype development in InVision Studio
2. Advanced prototype development and group coordination
3. First meeting with client – specification creation
4. User interface design brainstorming
5. Wireframe draft design
6. Second meeting with client – draft presentation
7. Formal project plan development
8. Group meeting and coordination session
9. Group meeting and coordination session
10. Group meeting and coordination session
11. Group meeting and coordination session
12. Final presentation to client

Development phase 4: content

The final part of the process was to determine the content that needed to be delivered. In this module, this was to be done via one weekly lecture. This was initially delivered in-situ but moved to one lecture per week being released asynchronously due to the Covid-19 pandemic.

With all of the activities in place, the content of the lectures was simply determined by considering the knowledge that needed to be provided to enable the students to engage with the learning activities. The lecture topics used here were as follows.

1. Introduction to software engineering
2. Group work and project management
3. Meeting clients
4. Interface design principles
5. Wireframe drafts and grid layout
6. Commercial project management – interview with a professional project manager
7. Project planning
8. Project management
9. Software engineering reports
10. Video presentations
11. Invoices and prototype demos

A note on assessing the effectiveness of this module

While it has been difficult to quantify the effectiveness of the module in light of the rapidly changing educational landscape since its inception, informal reflection has taken place and changes have been made. For example, in the first year of the module, lecture 6 did not take place and the students were given the week to prepare for their client interview. However, informal student feedback suggested that the students would benefit from seeing the 'bigger picture' and legitimising the project management processes that they were taught, leading to the idea to include an interview with a professional project manager.

Generally speaking, if the module is constructively aligned then effective teaching should lead to good student performance on assessment. In this case, student performance has been exceptionally good and the module has one of the highest average marks in the Keele FY. Furthermore, staff 'clients' have consistently remarked on the development and growth that they see in the students between the first client interview and the final presentation.

Concluding Remarks

Higher education has undergone a seismic shift in recent years owing to a number of different external drivers. A renewed focus on employability in a competitive student marketplace and the enforced loss of in-situ exams due to the Covid-19 pandemic have seen authentic assessment come to the fore. This paper presented a process for developing authentic assessment and showed how this could be carried out in practice with a real example.

The authentic assessment process had four stages. Firstly, the assessment itself was determined through an examination of the typical workplace challenges of a graduate in the subject area. From this, ILOs were created by identifying the core skills required for this assessment. Activities to support skill development and build towards the assessment were then developed before the final stage, where the content to be delivered is determined.

When executed well, an authentically assessed module is a pleasure for both staff and students. It is the author's experience that students really engage with the role-playing elements of the module and relish the challenge of testing skills that are not usually developed in more traditional modules. From a staff perspective, the most satisfying part of Client-Led Collaborative Design was seeing the way that students would initially nervously and tentatively engage with their client in the first meeting but then hone their skills over the course of the module to the point where the final presentation would be slick, carefully stage-managed and revolve around a genuinely impressive finished prototype.

'Inauthentic' assessments will always be a key part of the student university journey, but it is the author's view that complementing these with authentically assessed modules is greatly to the benefit of the students.

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About the Author

Adam Wootton is the Director of Education and a lecturer in Mathematics, Computing and Physics for the Keele University Foundation Year. He has a particular interest in innovation through technology in the Foundation Year and can be contacted at a.j.wootton@keele.ac.uk.

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