

Schools/K12 Stage 1: Can Assessment be Democratic and Sustainable through Technology?

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This report was created by Learnovate at Trinity College Dublin for the Schools/K12 Research Working Group.

1. Executive Summary

In 2015, a group of L&D researchers and educators started an initiative to sign and share Manifest 15¹. The manifest summarises initially what those researchers and educators had learned until that date, emphasising the need *“to support learners to become innovators, capable of leveraging their own imagination and creativity to realise new outcomes for society”, “to embrace flat, horizontalized, and distributed approaches to learning, including peer learning and peer teaching, and empower students to realise the authentic practice of these modes”* and *“to put an end to compulsory testing and reinvest these resources into educational initiatives that create authentic value and opportunities for growth”*. In addition, the use of technology in classrooms was criticised as being just a digital replica of the old-school model and becoming a barrier for some teachers to to teach in line with their knowledge and expertise. These 2015 findings truly resonate with the content in this report and align with our literature and State-of-the-Market review on the research topic of authentic assessment.

When asking *“Can Assessment be Democratic and Sustainable through Technology?”*, this report identifies two conceptual learning models that may provide the answer to the following research questions: *How do we assess student learning in a way that provides an authentic and engaging learning experience, measures the correct elements, and promotes positivity, the joy of learning, and student & teacher wellbeing? and How can immersive technology, gamification and effective feedback support this?*

The literature review revealed that researchers and educators have been looking at authentic ways to effectively assess student learning. So far, the Authentic Assessment frameworks tested in the classroom have demonstrated good results in terms of student engagement and motivation. Yet, there is room for improvement and multiple research papers have highlighted the importance of making students as owners of their learning (democratic learning), not only when solving those activities that make part of the assessment process but also through collaborating with teachers and peers to form the growth map that draws their skills development and progress (sustainable learning).

¹ <https://manifesto15.org/en/#>

Many research works show that when guiding their learning through a democratic and sustainable experience, students become motivated agents of their learning process, thereby empowering the student-teacher binary to co-create new authentic ways of learning.

Technology can be a great ally in finding and developing a new authentic learning framework that incorporates the student's voice in the assessment process and their learning progress mapping. But first, we need to explore how teachers are implementing authentic learning and assessment currently by using existing models such as the Authentic Assessment for Sustainable Learning (AASL) or the Authentic Self and Peer Assessment for Learning (ASPAL). For teachers who already adopt digital tools, we need to find out how technologies such as Extended Reality, Gamification and Effective Feedback through Natural Language Processing can realise the democratic and sustainable learning model that we envisage. A model that will ensure authenticity for an engaging student learning experience. This is the main objective that distils from reviewing the academic literature and also reading learning proposals such as Manifest 15.

2. Introduction

The Learnovate team envisaged and explored a potential new line of research to be conducted in the Schools and K-12 space, especially with the aim to address some of the common challenges that the Learnovate members working in the sector may encounter. To initiate this exploration, a questionnaire was shared with all Learnovate members operating in the Schools/K12 space in the summer of 2022. One of the questions asked participants to state “Which of the following research areas is of most value to you?” From this question, the following responses were gathered (Figure 1). As we can see, four responses were clearly the most popular.

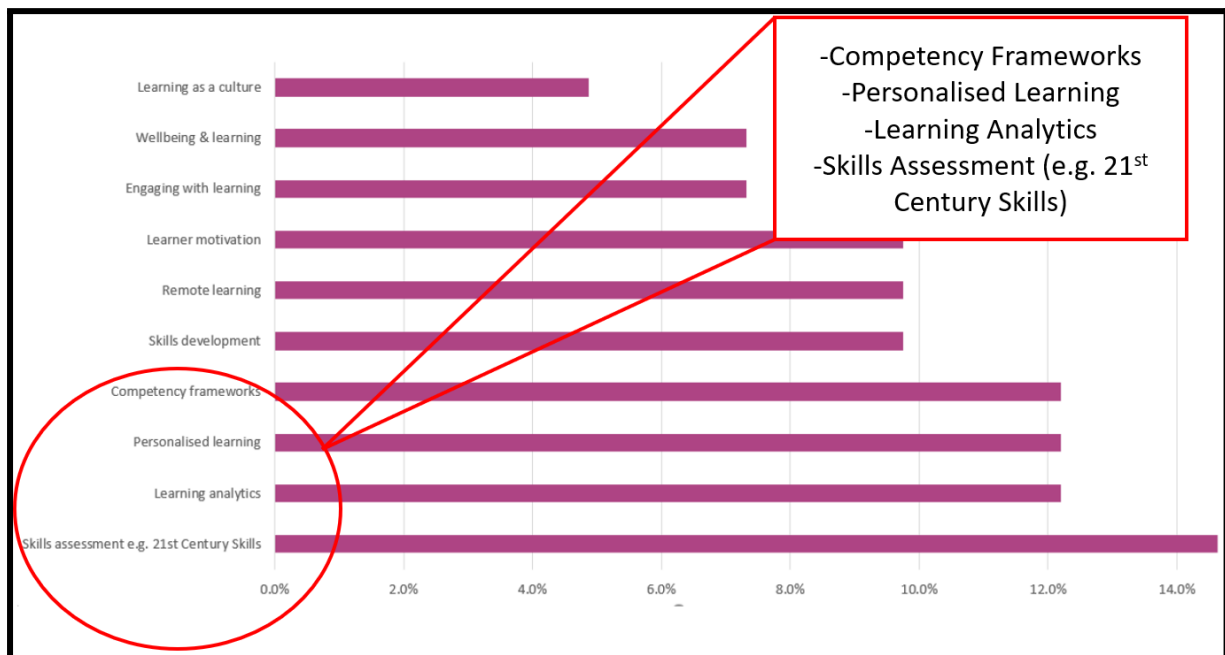


Figure 1: Potential areas of focus from schools/K12 member questionnaire

With these insights as a reference, a Research Question workshop was held in September 2022. The main goal of this activity was to identify the areas of most interest and value to the members of our schools Research Working Group (RWG). Both Learnovate researchers and the schools cluster representatives engaged in the workshop to explore potential topics collaboratively.

The outcome of this workshop can be seen in the interactive whiteboard image in Figure 2.

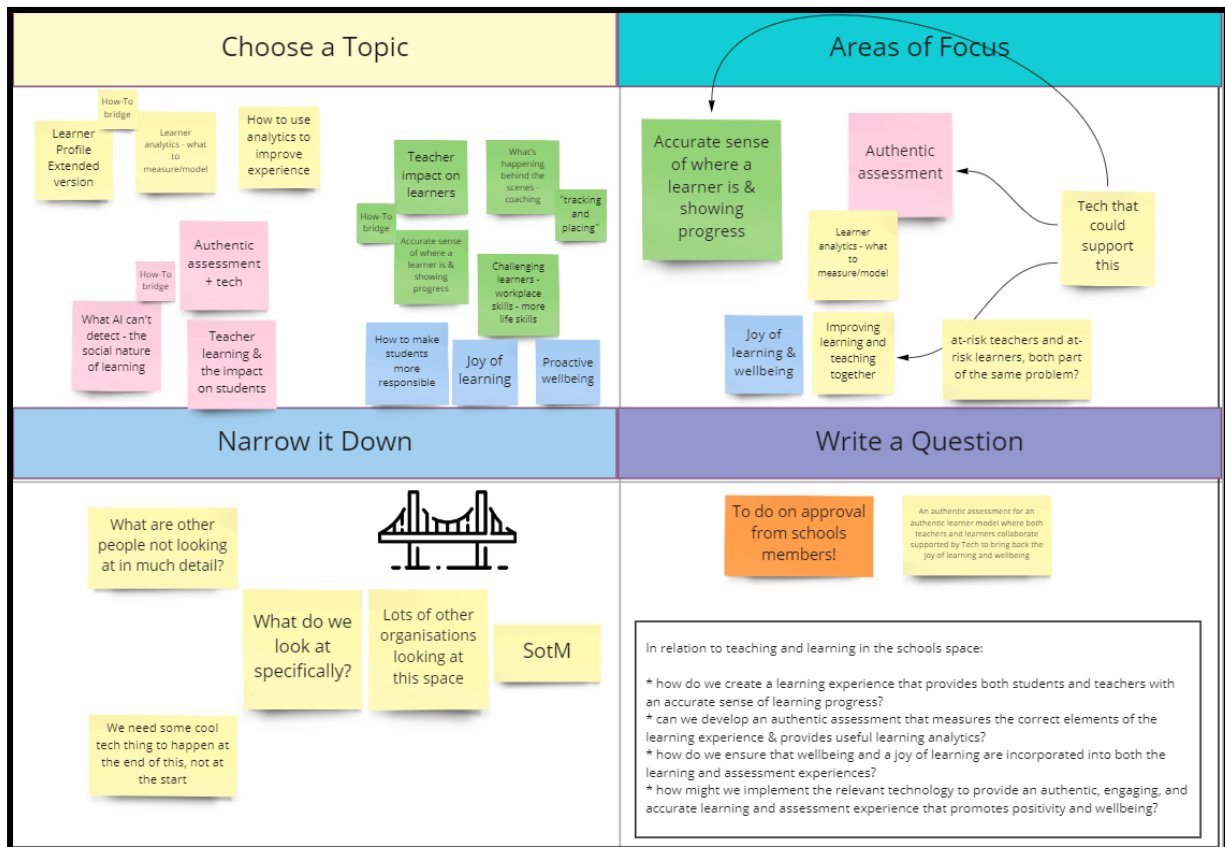


Figure 2: Research Question Workshop digital whiteboard

From the workshop, the RWG and Learnovate engaged in an iterative process of research question(s) refinement. The outcome of this process was the following research questions:

1. How do we assess student learning in a way that:
 - a. *provides an authentic and engaging learning experience*
 - b. *measures the correct elements*
 - c. *promotes positivity, the joy of learning, and student & teacher wellbeing?*
2. How can immersive technology, gamification and effective feedback support this?

This report identifies the main academic findings that will help the RWG to frame and address these questions, by exploring the current state of the art in Authentic Learning and Assessment frameworks. It also explores how teachers ensure the evaluation of learning criteria without removing the authenticity of the experience, and use the voice of the students both in the learning approach and the assessment method, where possible. Finally, the report also looks at the technologies that currently enable and support learners teachers and

students when implementing authentic learning and assessment and where potential barriers exist. A graphical representation of the rationale followed to build this report informed by the literature review can be seen in the Appendix. We recommend checking the diagram while reading this report for better understanding.

3. Authentic Assessment

Authentic Learning (AL), and how learning effectiveness is assessed have concerned academics since the late 1980s. Initially, this model evolved from the apprenticeship models that seek to “bridge the gap between the theoretical learning in the formal instruction of the classroom and the real-life application of the knowledge in the work environment” (Resnick, 1987; Herrington, 2007). Later, the term “cognitive apprenticeship” was used for this model. Cognitive apprenticeship was referred to as a “method designed to enculturate students into authentic practices through activity and social interaction” (Brown, 1989). This model began to include characteristics that tie well with empowering students with so-called ‘21st-century skills, such as problem-solving, creative thinking, metacognition, growth mindset, critical thinking, communication and collaboration. A review by Herrington and Kervin (2007) provided an analysis of this evolving theoretical concept of AL. They presented a list of the 9 characteristics of AL:

1. Provide authentic context
2. Provide authentic activities
3. Provide access to expert performances and process models
4. Provide a variety of roles and perspectives
5. Foster collaboration when building knowledge
6. Provoke reflection so abstractions are formed
7. Generate opportunities for tacit knowledge to be made explicit
8. Give teachers the role of a coach who guides students at critical times, scaffolding the support
9. Embed integrated assessment within the tasks

An additional element to enhance an authentic learning model would be what is called **authentic assessment (AA)**, which refers to the form of assessment that is implement along the authentic learning continuum. In a similar vein to other recent research works that have explored the same topic and found that “assessment drives learning” (Schultz, 2022), we focus our research on AA and how students engage with the learning process. Through a structured literature review, we see that the AA approach is effective in the classroom when

assessment is integrated into learning and guides it formatively. This approach is also called Assessment for Learning (Sambell, 2013).

How do we make assessment authentic?

In the context of AA, it is important to recognise an authentic task. Burton (2011) lists 4 questions that may help some educators to identify the authenticity of a task:

- Does the activity depict real context or not?
- How is the final output produced?
- Does critical reflection or metacognition take place or not?
- Do the activities demand cooperation and discernment?

When exploring authentic assessment conceptualisations, we find similarities with widely-used theories and frameworks such as Bloom's Taxonomy (Bloom, 1956) and Vygotsky's theories of social development (Vygotsky, 1978). But it is in Wiggins's (1998) definition² of what makes an assessment authentic that helps us to develop a clearer picture of what we mean by “authentic” when applied to the assessment process:

“an activity or task that is perceived as realistic, invites judgement and innovation, asks the student to act on the subject, replicates scenarios where adults perform in real work, civic or personal situations, observes and marks how students leverage a suite of knowledge and skills when negotiating a solution for a complex problem and not less important, opens opportunities for rehearse, practice, check resources and solicit feedback when refining performance and product implementation”.

Gulikers et al. (2004) were able to define and challenge a 5-dimensional framework of authentic assessment, based on the previously mentioned works and also on other discussions and interpretations of the meaning of authenticity when applied to assessment (Biggs, 1996). Focused on the importance of the “perception” of authenticity in the way that the authentic instruction links to the assessment as part of the authentic learning process, Gulikers et al. promoted the schema illustrated in Figure 3. This figure shows the five dimensions of the authentic assessment as per Gulikers et al. definition, a set of five aspects

² <https://ctl.wiley.com/authentic-assessment-in-the-online-classroom/>

that inform the authenticity of the assessment: the task, the physical or virtual context, the social context, the results and the criteria.

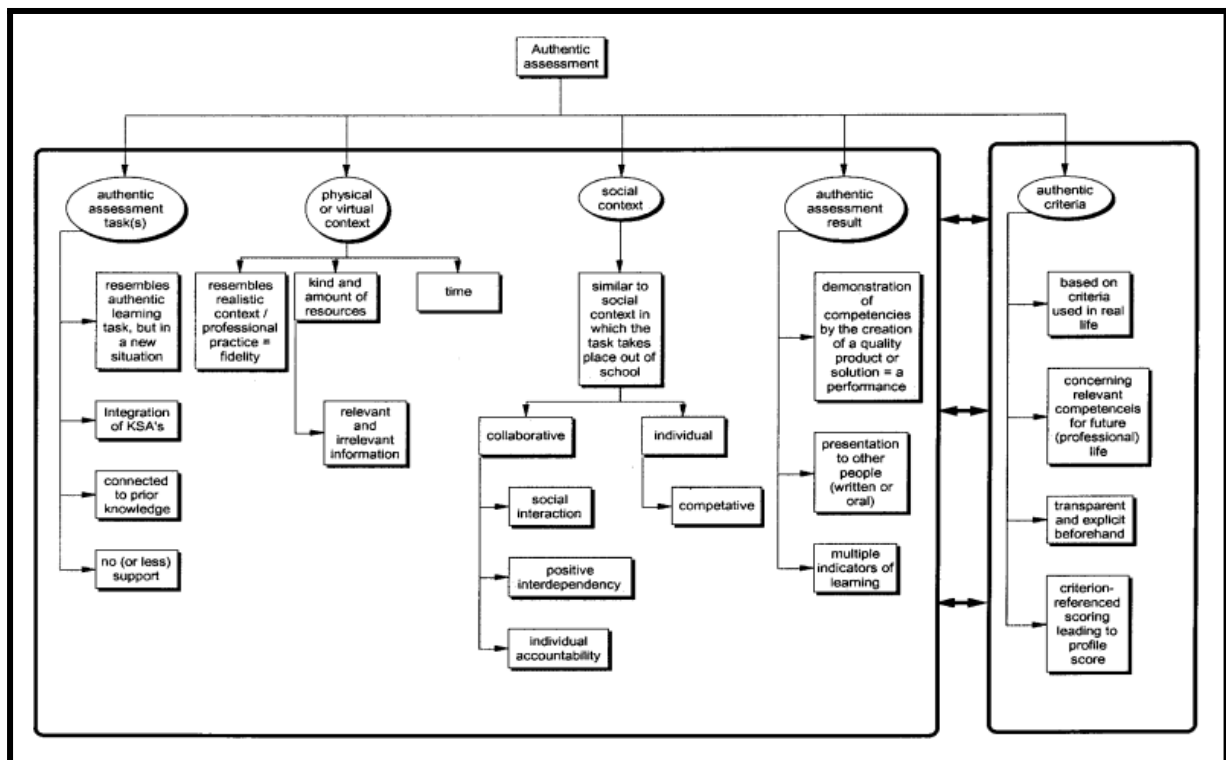


Figure 3: Authentic Assessment Gulikers's schema

When exposed and challenged, the framework resulted in missing a 6th element of “who should use and develop authentic criteria”. The framework also suggested that physical and social context was not as important, indicating that perhaps a “simple” simulation in school, virtual or not, would suffice as it brings enough authenticity when the task, the result and the criteria work effectively (Gulikers et al., 2004).

When following Gulikers et al.'s research, we see that the authentic assessment influence on student learning is still considered by the researchers to be lacking and unsatisfactory. They reinforce the idea that this influence depends strongly on how the student perceives the resemblance between this assessment and the assessments they encounter in professional practice. Note that this framework was developed in the context of higher education, thereby the professional practice reference. Yet, their research revealed a problem that we must consider on our study: when students perceive a mismatch between the simulation of a

real-life task and the type of learning needed for the assessment, they disengage and so the expected learning does not happen.

The answer to this problem may have been found by Sokhanvar et al. (2021), who conducted a systematic literature review of the “Advantages of authentic assessment for improving the learning experience and employability skills of higher education students”. They found that different authentic assessment frameworks, effectively applied in the classroom, can improve the learning experience and learners’ soft essential skills by empowering students to engage in their assessment process.

Why should we try authentic assessment?

While Sokhanvar et al.’s findings make a strong case for AA, we must inspect further why authentic assessment may benefit the learning experience. Recent literature reviews reveal the variety of benefits that authentic learning and assessment can bring to the student experience.

In a review by Schultz et al., (2022), research efforts of various academic representatives such as Ashford-Rowe (2014), Villaroel (2018), Darling-Hammond (2000) and Kearney (2014) were highlighted. This research concluded that higher-order thinking skills (reflection and creativity) and transferable skills would be enhanced and fostered when students participate in AA activities. Also, student motivation and determination increased as they participate in experiences more reflective of their real-life environment. However, there are some drawbacks to consider: lack of time and resources to prepare activities, unfamiliarity that causes anxiety and stress for students, the need for sufficient training for staff and the need for effective collaboration between professionals and educators (Schultz, 2022). Similar challenges are described in the research work of Suurtamm (2004).

In general, positive results have come from the analysis of the effectiveness of AA compared to traditional methods, such as long summative written exams, assigned essays or simple presentations. Vos (2015), highlighted the lack of studies covering the role of the student in AA. Some issues were identified, such as the passivity of the students to perform, plagiarism, and disparity in team members' efforts.

Returning to Sokhanvar's 2021 literature review, eight of their reviewed papers described attempts to enhance students by using methodologies such as the "Authentic Assessment for Sustainable Learning (AASL) and the "Authentic Self and Peer Assessment for Learning" (ASPAL). In particular, Kearney (2013) highlighted that the active engagement of students in the process of assessment not only contributes to autonomy in learning but also kicks off an "educative transformation" when students perceive the effectiveness of the "educative experience".

Schultz et al. (2022) pointed out the need for the students to understand initially what AA is, and how it ties into learning outcomes and lifelong learning. Later in this report, we will investigate how students also need to understand how technology plays a role in AA, which can make the situation more complicated.

The co-creation of authentic assessment

Student's voice appears to be crucial to the success of AL and AA. When exploring the real authenticity of the assessment and its application, Jopp (2020) outlined how researchers stressed the element of **co-creation** when designing the assessment task, an element that would lead to student engagement and the development of skills such as problem-solving and critical thinking. As an example described in Jopp's work, when students participate in the design of an assessment rubric, any anxiety caused by being assessed can be reduced, because the act of designing the rubric ensures that the assessment criteria are well-known to all stakeholders in the learning journey. As Jopp (2020) affirms in his research work, teachers need to clearly detail how this rubric works reliably so students can enjoy a positive learning experience, especially when technology is being incorporated into the process.

In the same research work, Jopp (2020) introduces Mueller's framework Mueller (2017) to discuss the need for a student-structured assessment when enhancing the task authenticity and how both teacher and student will have to agree on the format of the assessment to make it more authentic, engaging and effective. Mueller's model, similar to the one developed by Gulikers et al., defines an AA as a task where students perform actions in real-life situations, by applying knowledge and skills, following a **student-structured** process

with direct evidence. Jopp compared authentic assessment using Mueller's (2017) parameters with a traditional assessment format. This comparison is illustrated in Figure 4.

Traditional	Authentic
Selecting a Response	Performing a Task
Contrived	Real-life
Recall/Recognition	Construction/Application
Teacher-structured	Student-structured
Indirect Evidence	Direct Evidence

Figure 4: Attributes of traditional and authentic assessment (Mueller, 2017)

Investigating further the reasons why authentic learning and assessment tools are potentially beneficial, Newman et al. (2007) described the authentic learning journey as a process for preparing students for their professional and social life, which should enhance their engagement in learning. This professional and career aspect is probably more applicable to post-primary students, and more specifically to senior cycle students. However, we want to aim our research at all students immersed in the K-12 journey. This raises a number of questions. Is student-structured AA with a co-creation angle feasible across all K-12 school years? Is it something that would be a better fit for post-primary students? Is it easier to invite students to define their assessment approach in post-primary? Could senior cycle students (transition year/high school onwards) benefit more from AA and AL given their orientation towards career and professional development?

How do teachers implement authentic assessment?

Herrington and Kervin (2007) discussed the challenge for teachers in introducing technology to the classroom, they stated that “what often happens when teachers begin to expand their use of technology is that the teacher is the only one to use the technology”. Instead, “technologies can be used by students as intellectual partners and tools to analyse and interpret their understanding”. While this discussion took place 15 years ago, it is an important reference as it illustrates how technology introduction has always been a

challenge, even when the array of technology available was not as wide as today. Herrington and Kervin have continued to study the use of technology within AA since then, and have continued to emphasise the importance of the student voice when integrating technology in the classroom.

When attempting to implement authentic assessment in the classroom, different forms of authentic assessment tools can be leveraged by educators, such as presentations, live performances, projects, exhibitions, portfolios, case studies, reflective journals, interviews, and group work (Sokhanvar, 2021). In a recent review of AL and AA, Nieminen et al. (2022) looked for “authentic assessment” OR “authentic feedback” in the various educational grades. They ended up with a dataset of 55 articles that explore the use of different types of assessment, with e-portfolios being the most prominent one. Other means of AA were authentic online tasks, authentic examinations, authentic projects, simulations and authentic case studies.

In today’s classrooms, all these assessment approaches can be quite easily delivered through mobile and portable technologies. Teachers can share questionnaires in the shape of online quizzes for the students to fill in on their mobile devices, even from alternative locations to the classroom. Collaborative work is also possible, and both self/peer-assessment can form part of the formative assessment process. Teachers can deliver immediate feedback, assess both real-world related competences and 21st-century skills, and personalise the learning experience for their students by utilising the enhanced functionalities of mobile apps (Nikou, 2017). As an example, Nikou et al. tasked students with using their mobile devices to complete science lab classes outdoors in the Botanic Gardens by collecting information via QR-coding technology and resolving questionnaires in real-time on their phones.

In schools who embrace and have access to technology and who have the appropriate infrastructure, the assessment process can be supported by video technology in the classroom. Teachers use video as a formative assessment tool to capture students’ knowledge and competence. When videos are collected in sequence and follow a certain progressive structure, using digital storytelling methodologies, they can be used to create video e-portfolios. Hence, videos become a process of learning that allows reflection and self-assessment and can help to increase motivation and performance. As has been

identified by Sargent et al.'s research (2021), many researchers and educators have analysed the use of videos for formative assessment in their learning experiences. An authentic assessment example described by Sargent consists of students creating coaching videos and reflecting on their learning process while promoting online discussion via their e-portfolios and a forum. It is the effective combination of video and digital storytelling that makes students' voices crucial to the authentic learning and assessment process's success.

Aligned with the e-portfolio creation strategy, digital tools such as Seesaw³ allow teachers to scaffold an assessment activity that gives students the opportunity for reflection and also allows teachers to easily give feedback to students on their work. Tschida (2020) explored the use of technology to provide students with authentic learning opportunities in the elementary classroom. She recalls Yancey's (2009) work that highlights students' ability to reflect and be aware of how they learn as crucial when grounding lifelong learning. Tschida concluded that AL should not be treated as an "isolated concept nor an additional requisite in a lesson plan" but rather a "continuum" that needs "the right mindset and thoughtful preparation". Also, she adds: "when students are presented with resources that come from their personal experiences they seem more engaged". In another analysis, Wakimoto et al. (2014) explored graduate students' perceptions of e-portfolios when using digital tools for reflection, development and assessment. They used Google Sites as the digital tool to create, share and critique content via an e-portfolio. They concluded that, "e-portfolios can contribute to student self-efficacy, creation of a community of practice and authentic assessment practices".

Authentic assessment has been implemented and analysed in the context of different school subjects. As we have seen, it could be Physical Education (Sargent, 2021), Science (Nikou, 2017), or Language Arts (Tschida, 2020), which may be less challenging to implement. Also, AA could be particularly useful in subjects such as Maths or History where it is traditionally challenging to motivate or engage students. Suurtamm's (2004) research work explores some case studies of developing AA in Secondary School Mathematics. Written submissions and visual demonstrations were enhanced with the use of journals, learning logs and portfolios. These additional tools promoted the development of reflection and self-assessment. A sense of responsibility for one's own learning and self-confidence grew from this assessment

³ <https://web.seesaw.me/>

approach, thereby providing further evidence of the benefits of AA. Suurtamm concludes that AA should reinforce the need for students' sense of responsibility, empowering them to participate in their assessment planning and development.

Project-based learning has been identified as a valid and useful learning approach where authentic assessment occurs (Schultz et al., 2022). As part of their research, Schultz et al. designed and developed an online tool to evaluate the level of authenticity of the assessment approach taken by teachers, in relation to the projects in which students were involved. From their analysis, they found that students lack understanding of the AA concept and process, inviting us again to highlight the need for student involvement not only in the learning process but also in the assessment definition and implementation.

A new authenticity

In a discussion of a case study of the implementation of AA to assess the competence of History teachers, Aman (2019) presented some synonyms for 'authentic' and 'assessment'. Aman states that while assessment aims to measure, test and evaluate, authentic calls for originality, real-world activities, validity and reliability. A variety of assessment tools (journals, quizzes, portfolios, written and oral tests, assignments, observations, etc.) and modes (self/peer assessment) are deemed useful. The research concluded that in order to fulfil a truly authentic assessment, "students must learn actively and take responsibility for their own learning processes" (Aman, 2019).

It appears that when students truly understand and participate in the development of the assessment process, authenticity can effectively happen. In other words, assessment should be a social and **democratic** process. When both teachers and students engage with technology collaboratively, e.g. using digital apps such as SeeSaw, FlipGrid, and Padlet as an assessment support tool, the assessment becomes a "fluid and reciprocal" dialogue and personally relevant, as noted by Sargent & Lynch (2021). Still, there is very little reporting of the student's experience with this type of assessment, so Sargent et al. decided to examine the student experience with AA. In their example, students were asked to reflect on the format of the assessment and it was found that "true feelings and emotions" were captured by using the combination of video and digital storytelling, which made the assessment approach more authentic. As Freire (2007) explains, when using "problem-posing" education

(asking students stimulating questions to provoke true reflection) instead of “banking education”, the learning process becomes reciprocal and teachers begin to practise democratic pedagogy.

Now, what role does the teacher play in this new authentic assessment process? In her study of the Simulation Games in Business and Marketing Education, Lynn Vos (2015) asked how educators assess student learning from simulations. In her dissertation, Vos investigated the use of constructivism and used Schell's (2000) voice when defining the teacher's role: “The teacher provides the roadmap ... while allowing students to construct their understanding of the topic. Learners assume increasingly more control over ... learning and are free to explore the various ... details of the topic. They can build their own mental frameworks in ways natural to them”.

Aldrich (2015) argues that simulations are effective when the teacher provides additional background material, scaffolds the learning experience meaningfully and debriefs with effective feedback and gives a chance for students to reflect. The teacher must then build a safe context for the student to learn autonomously and responsibly. This context, properly scaffolded, includes not only the active demonstration of the student's performance but also opportunities for discussion with others, reflection, analysis, and critical thinking. Authentic assessment criteria must be identified in advance thereby students will become “assessment literate” and will understand and judge the form of the final output (Vos, 2015).

An assessment map can then be agreed upon between the teacher and the student. This map draws the stages of practice with the multiple arrays of tasks, when and how students will get feedback, and how to use that feedback to improve their performance and move to future stages. The map is enhanced with a reflection journal where students explore what they have done and learned, making new connections, forming new understandings and identifying challenges and gaps where the teacher may have to support. As Vos explained, AA will only be truly effective if we consider students' responses and how they impact the overall learning experience. Also, AA will succeed if the teachers know how to prepare students for authentic tasks, how to use higher-level thinking skills, how to learn from feedback, how to engage in reflection meaningfully and how to work more effectively in

groups. Failure to incorporate these elements effectively was recognised by various researchers as a barrier to the implementation of AA.

All the previously described components of the learning experience are what we can call **sustainable** assessment. Sustainability, when applied to the assessment process, has been shown to be effective (Vos, 2015) when measuring how students progress autonomously and learn skills and abilities for the future of work, a future that we presume would need a new authenticity. An authentic assessment is effective when providing evidence of actions, artefacts, and processes, how knowledge was formed over time and how a student is able to apply knowledge in specific situations, now and in the future (Gibson, 2018).

4. Wellbeing & The Joy of Learning

In 1996, Paulo Freire said: “to alienate men from their own decision-making is to change them into objects”. For AI and AA to work effectively, students are asked to become active participants and decision-makers in their learning. When acquiring the higher level skills and competences, solving challenges with new knowledge and also being able to collaborate, critically analyse and reflect on the feedback received, students become able to successfully participate in a democratic way of learning, one that may provide additional benefits such as wellbeing and joy.

As we have stated in the previous section, a dialogical pedagogy empowers students. When students participate in the decisions of their learning plan, they understand the process, they are able to see meaning in the feedback and so progress. A sustainable assessment process where students collaborate, reflect and participate in all the situations of the learning journey.

We can see from the literature that this problem has been identified as early as the 1990s. As an example, all these ideas can be visualised and become evident in Rainer et al. (1999) dissertation. The authors explored the “Democratic practices in teacher education and the elementary classroom”. They found that community building is a critical aspect of dialogical pedagogy and teachers are aware of that. As this article exposed when interviewing a teacher: *“I’ve realized the significance of the children’s voices being heard. If the assessment is just something that is done to them, instead of something that involves them, the students never will have any investment in the process; consequently, they will demonstrate very little growth.”*

The idea of an assessment map presented by (Vos, 2015) in the previous section could be considered a type of growth map. Teachers would normally start by asking students: “What do I want to learn?” and then “If we are learning X, what else would I like to learn?”. From these basic questions, the dialogue initiates and students begin participating in their learning journey, and following their assessment/growth map. Later, questions like “how do I want to

learn this?”, “how do I want to report back?”, “why do I want to learn X?” or “what level of expertise do I want to reach?”, will integrate the student into the assessment process.

Margaret Vaughn (2020) also investigated this idea in her research work “What is student agency and why is it needed now more than ever?”. As she recalls, in Freire’s words (1994), when students influence, transform and expand their learning opportunities, these actions can be powerful experiences as students can become agents of change, change of their community, their society. But only if they know how to do it and why.

Open education calls knowledge a public good and technology should enable this (DeWaard, 2020). The open dialogue between teachers and students can promote experiential, meaningful and personally relevant learning, as Freire covered (1970) and DeWaard & Roberts (2020) recalled in their article “Revisioning the potential of Freire’s principles of assessment: Influences on the art of assessment in open and online learning through blogging”. As the authors state, blogging provides the opportunity for meaningful and authentic reflection as an Open Educational Practice (OEP). According to Paskevicius (2017), OEPs are “teaching and learning practices where openness is enacted within all aspects of instructional practice; including the design of learning outcomes, the selection of teaching resources, and the planning of activities and assessment”. We explored the benefit of this kind of openness and transparency in the previous section.

In a democratic context, one that embraces a diversity of voices, assessment practices should account for **diversity** in perspectives and bring **inclusive** measures of performance. Also, a sense of voluntary participation in the discussion and collaborative activities must exist. When the learning environment allows each student to speak with their true voice in the form they want and freely express their needs, opinions and emotions, wellbeing and joy can much more easily be achieved. The student voice must form an integral part of a dialogue that serves to define the assessment process (Jones, 2021). In an inclusive teacher-student relationship, the teacher-student binary is deconstructed, and students and teachers become co-creators, codesigners and co-learners of the same environment (DeWaard, 2020). As the authors stated, “the goal of learning is to provide the opportunity to expand upon and build sustainable safe learning spaces”. Based on Freire’s theories first and then on Patton’s (2017) interpretation work, the authors highlighted the importance of being dialogic and interactive

and the effectiveness of learning in communities e.g. Communities of Practice (Wenger, 2011).

How does this scenario of collaboration and reflection work effectively in the classroom? Measuring the level of authentic “social embedding” in vocational and professional learning requires a framework. Braunstein et al. (2022) recently completed a systematic review of virtual learning simulations and devised a taxonomy of social embedding, understood as the “degree to which characteristics of real-world social interactions are simulated during task solving” (Gulikers, 2004). Braunstein’s framework consists of five aspects: social placement, social action, social reaction, social interaction and collaborative interaction. After analysing the literature, they found out that most VLS (Virtual Learning Simulations) focus on social action, reaction and interaction but lack **social placement** and **collaborative interaction**. The authors imply the need for additional effort in bringing collaborative learning into the simulations and also drawing a wider social context that better represents the real-life scenario that is truly meaningful for the student.

All these previously described methodologies can easily be aligned with student-centred learning theory (SCL). As a way to put it in practice, Lee & Hannafin (2016) developed a model that encompasses motivational, cognitive, social and affective aspects of learning. When looking at enhancing engagement in SCL, the researchers interpret the self-determination, constructivist and constructionist theories to devise their “Own it, Learn it, Share it” (OLS) framework. The framework description can be seen in figure 5.

Theoretical Framework

Self-Determination Theory

Autonomy
Locus of control
Endorsement
Personal Goals
Choices

Constructivism

Personal meaning making
Scaffolding
Representation of emerging understanding

Constructionism

Sharing
Design and development
Multiple perspectives
Discussion
Reflection

Design Assumptions

Own it

Internalize the rationale
Endorse the value
Personally meaningful choice
Goal setting

Learn it

Individual needs
Prompting, modeling
Progress monitoring
Tools and resources

Share it

Artifact generation
Authentic audiences
Peer review
Web 2.0 publications

Design Guidelines

1. Facilitate endorsement of external goals.
2. Provide opportunities to set specific personal goals.
3. Provide choices that matter.

4. Provide explicit directions on initiating engagement.
5. Support the selection and use of tools and resources.
6. Prompt to support varying needs.
7. Integrate the terminology used in the discipline.
8. Support students as they monitor progress.

9. Promote dialogue among students and audiences.
10. Facilitate helpful peer review.

Figure 5: Enhancing engagement OLS framework

If we look closely, we can identify the various elements that were discussed in previous sections. We can consider these the core elements that are required to build an effective AL/AA roadmap.

- ❖ Students need to understand the learning process, set their own goals and choose their most comfortable way of communicating outcomes,
- ❖ Teachers act as reliable guides, scaffolding the process, monitoring progress and providing tools and resources,
- ❖ Students participate in collaborative processes where they discuss the outcomes, reflect on their performance and analyse teacher and peer feedback.

All these elements are valuable components, as previously mentioned, of any authentic assessment process implemented in the classroom. Even with a successful implementation and well-resourced teachers, there are still challenges that education stakeholders, teachers

and students will encounter: measuring the feasibility of the activity, the impact of replacing traditional assessment, the demand for team collaborative work, and the tension when giving and receiving feedback. All these challenges have an impact on both the student and teacher's wellbeing and have to be considered critically as previously stated (Suurtamm, 2004; Schultz, 2022).

In the next section, we dive into the EdTech market and analyse how technology has been enabling the elements pursued in the design of authentic assessment. As Nieminen's research work discovered (2022), there are gaps in the academic literature when exploring how technology can support student-centred learning and use the student's voice. Particularly around focusing on the assessment design and learning monitoring, how technology supports students to design their possible role in relation to their communities and, if we like, "promote capabilities in a way that takes account of "future authentic", as ways of working that have not yet been developed".

5. The Technology

In his research work “A case study of a technology-enhanced learning initiative that supports authentic assessment”, Jopp (2020) discusses how incorporating technology into the learning environment goes hand in hand with more realistic ways of learning and assessment. However, he finds that technology implementation needs both teacher and student acceptance and the links between technology adoption, learning outcome achievement and student engagement still lack validation. Jopp concludes with the need for a framework for developing a shared understanding of what AA is and what educational value comes when using technology and how this effectively improves outcomes of learning.

Measure the correct elements

According to the literature review, there are different forms of technology that hold great potential when it comes to enabling the nine authentic characteristics described in (Herrington, 2007):

1. Provide authentic context
2. Provide authentic activities
3. Provide access to expert performances and process models
4. Provide a variety of roles and perspectives
5. Foster collaboration when building knowledge
6. Provoke reflection so abstractions are formed
7. Generate opportunities for tacit knowledge to be made explicit
8. Give teachers the role of a coach who guides students at critical times, scaffolding the support
9. Embed integrated assessment within the tasks

In their literature exploration, discussing the true purpose of designing the digital element of authentic assessment, Nieminen et al. (2022) found out that most of the applications of digital technology in the assessment process seek efficiency and some will look at the student’s digital skills development. Most critically, very few works actually target other types of skills that would probably be needed in a digital society context such as the already mentioned soft skills, making the assessment not fully authentic, or at least, not fully holistic.

Jopp (2020) explains that when integrating technology, this action does not override the core purpose of the assessment. Instead, it must aim to improve learning by encouraging engagement and focusing on the intended learning outcomes. Since the objective is not to assess students' technical capabilities, the teacher must remove the technology barriers and ease the learning curve by explaining clearly the objectives and guiding the process, giving instructions for the students to fulfil the tasks.

A brief State-of-the-Market review serves this research work as a way of collecting answers to the questions raised earlier: *can assessment be democratic and sustainable and how technology can enable this?* Aiming at student engagement and the well-being and joy of learning for both students and teachers, different digital apps have been incorporated into the classroom which seems to address some, if not all of the challenges outlined as part of this research.

Question 1: *How does technology enable Authentic Learning and Assessment? Following Burton's 4 questions (see [Section 3](#)): does the activity depict real context or not? How is the final output produced? Does critical reflection or metacognition take place or not? Do the activities demand cooperation and discernment?*

As we have seen in some of the previously described authentic assessment experiences in the classroom, teachers can promote authentic approaches for students to show back their understanding of concepts and the development of skills. Some teachers use video tools like Flipgrid⁴ when asking students to respond to class assignments and share with peers, collecting their feedback and reflecting on the results. With the appropriate audio, image and video editing tools, students can answer teachers' assignments and eventually create a long-term collection of outcomes in the form of an e-portfolio. The Seesaw⁵ app allows students to create their own "student-driven" digital portfolios by using a variety of multimodal tools, choosing their most preferred channel and availing them to speak with their own voice. The tool allows students to reflect on their progress, and develop their critical thinking and teachers can use different ways of formative assessment, and engage families and communities in the process.

⁴ <https://info.flip.com/>

⁵ <https://web.seesaw.me/lb-portfolios>

Another app that allows teachers and students to work collaboratively on e-portfolios is Fanschool⁶. This app allows students to share their learning with the wider community in a “safe and social learning network”. The app works as an umbrella layer on the school tech stack, allowing teachers and students to safely share their work currently existing in systems such as Canvas, Schoology or Google Classroom with the wider learning community that participates in their network. With a “student ownership” model, Fanschool aims at a “positive culture of sharing strengths and keeping students connected and in control, promoting happy and healthy habits”.

Question 2: *Can current tech solutions support this student-structured process? Can current tech support co-creation? Is the student active in the design of the assessment task? Are self- and peer-assessment feasible? Is discussion fostered? Is it a democratic and dialogic process? How effective is the teacher’s feedback through technology?*

There are various apps in the EdTech market that support formative assessment and teacher instant feedback on students’ assignments. For example, Formative⁷ allows teachers to watch students in real-time resolving tasks and give them instant feedback. Students can answer using multimodal tools (audio, video and text). Also, with the Growth tracker, teachers can see how students perform over time and react to those who struggle. Still, there is a gap in the feedback loop that other tools can help fix.

Nurture⁸ is an app that assists teachers to provide structured feedback to students as well as gather student reflections, thereby closing the feedback loop.

⁶ <https://go.fan.school/vision>

⁷ <https://www.formative.com/>

⁸ <https://gonurture.com/>



Figure 6: The Nurture approach

The Nurture app supports the teachers through guidance in providing students with structured feedback and also allows students to reflect on their feedback and share with the teacher their thoughts and feelings about the feedback through user-friendly methods such as with emojis. It encourages students to engage with the feedback process rather than focusing solely on grades.

The Nurture approach is very much evidence-based and has at its foundation solid learning theory and associated approaches for effective teaching and learning. What may be missing in relation to our research is the co-creation element where students may be encouraged to develop the assessment and feedback process with the teacher.

Question 3: *Can current tech support the "sustainable" assessment framework, matching learning outcomes to assessment activities? Can students act on the learning and judge their progress? Is there any type of growth map embedded in the system?*

Pearson’s MyLab⁹ looks to engage students using immersive content and tools, focused on online homework and assessment products. This product creates personalised learning experiences and uses data to provide adaptive experiences and to identify how students are performing.

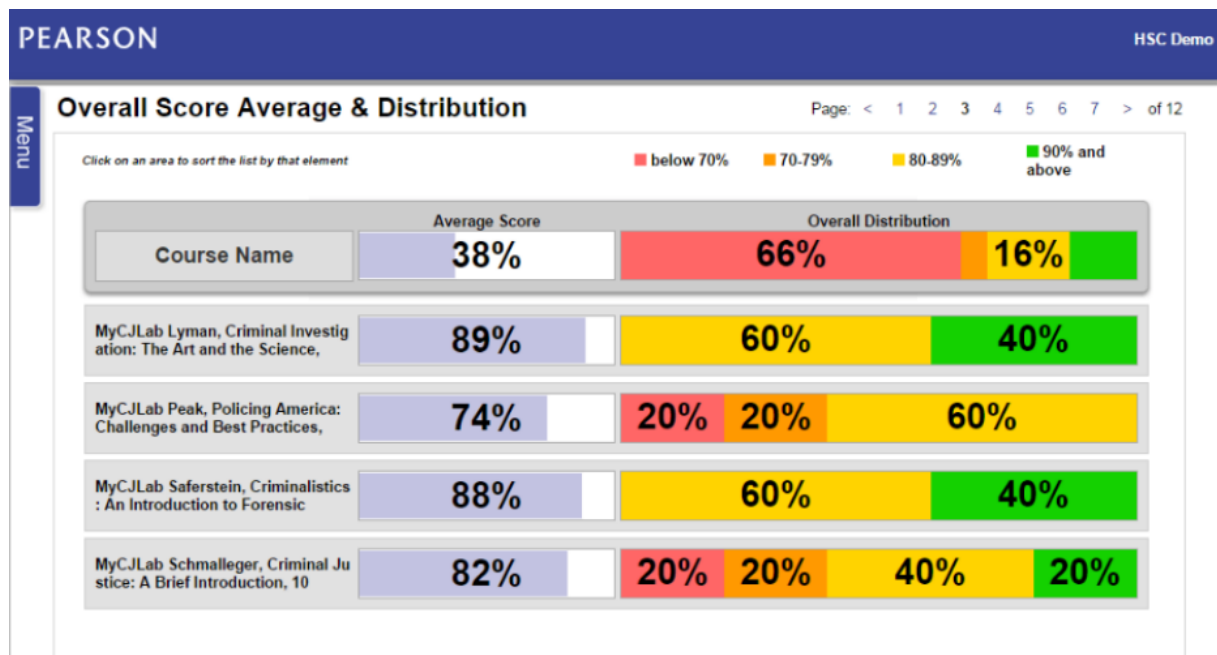


Figure 7: Example of Pearson MyLab dashboard

The MyLab solution can certainly address some of the challenges around progress and performance, and helps students to visualise where they are in their learning journey.

Question 4: *How does technology improve student engagement? Is it with immersive situations? Is it with gamification strategies? Is it with collaborative scenarios? Is it with creativity and reflection?*

⁹ <https://mlm.pearson.com/global/>

Many apps that focus on education are in the space of learner engagement and motivation. In this regard, the approach is often to gamify the experience in order to motivate students to engage with it. Gamification is a process of awarding points and badges (often using competition and leadership boards) to students to encourage them to engage with the learning process (Hawari et al, 2020). Not to be confused with game-based learning which uses games for the purpose of learning (Shute et al., 2016). Both approaches to learning aim to encourage active participation in the learning process while motivating learners to engage with the content, and often with each other.

For example, Padlet¹⁰ is an app that encourages students to collaborate while blogging, writing essays or completing other activities. Students can give a variety of access to others such as read-only and moderator and can be used to develop an e-portfolio, as discussed earlier.

Seesaw¹¹ also focuses on engagement, using drawing, video, and voice recording to encourage and motivate students to engage with their learning. Seesaw encourages students to engage in learning through its app not just at school, but at home with their families also.

Question 5: *How does technology help teachers and students remove the barriers: lack of time and resources to prepare activities, unfamiliarity that causes anxiety and stress for students, the passivity of the students to perform, plagiarism, the disparity in team members' efforts and the need for sufficient training for staff and effective collaboration between professionals and educators?*

Any technology or app to be implemented into the classroom environment needs to help both students and teachers by streamlining activities to give students and teachers more time while being relatively simple to implement. Free resources are also valuable for schools as there are often challenges associated with bringing in new approaches or technology, particularly from a financial standpoint.

¹⁰ <https://padlet.com/>

¹¹ <https://web.seesaw.me/>

Question 6: *What does the future look like? Is there any mention of the student as an agent of change in their community? Is there any innovative functionality in the app that brings new authenticity and helps us devise future ways of learning and working?*

Intellispark¹² is an education technology company focused on helping PreK-12 schools, families and communities implement a new approach to promoting student success. The platform delivers a wide range of data for teachers to act on the student learning progress, not only looking at grades but also at wellbeing indicators and general student profiles, letting students see the “story behind the story”:

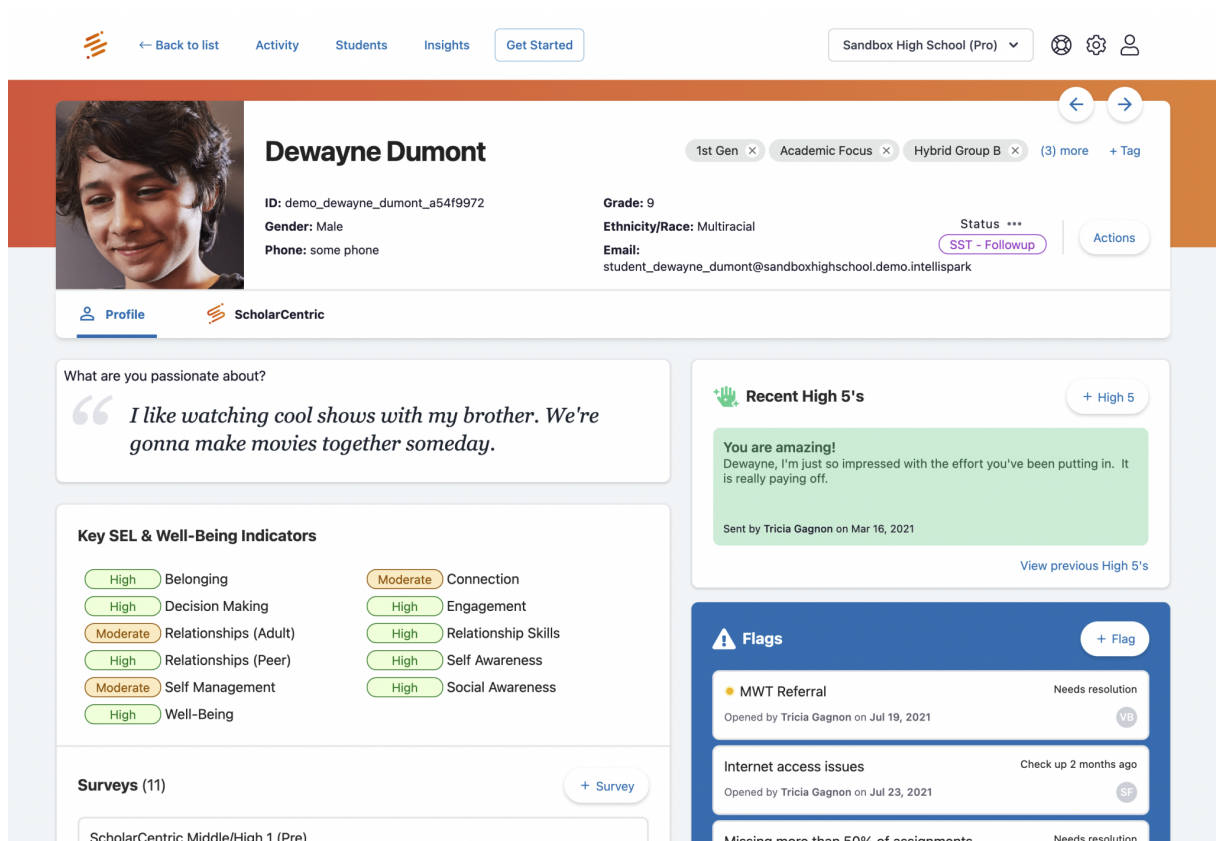


Figure 8: Intellispark Student Profile

The platform works with this “holistic and universal approach” that embraces each individual student’s strengths and needs. The learning process is shared by all educational ecosystem stakeholders in a collaborative manner. Also, there is a culture of “celebrate, don’t just remediate” that brings the feedback loop to the next level. Their feature called “High 5s”

¹² <https://intellispark.com/>

allows teachers to motivate and engage students by celebrating their successes with personalised communication. Students can participate actively in this shared and structured space and connect with their community.

6. Discussion

What is the final objective of the educational experience? Let's start with the idea that students will need to gain all the knowledge and skills necessary to have a comfortable and joyful life. To live that life in society, children must not only acquire knowledge and skills but also learn how to ensure their well-being and enjoy the process of living. Hence, they must enjoy the process of learning from the very beginning of the school period.

In authentic learning, it is intended that knowledge and skills match learning activities with clear reflection on real-life world experiences. How teachers assess students' performance and knowledge acquisition must also be authentic.

From the literature review, we have seen that some researchers have brought back old theories such as Paulo Freire's (DeWaard & Roberts, 2020) and tried to show that those questions that existed in the past are still alive. Especially in the last years of school, when students are closer to joining the life of work, authentic learning and assessment seem to be an effective way to enhance students' performance. When it initially sounded like the correct way to approach the problem of learning results and students' motivation, it seems like different approaches can be explored and authentic learning and assessment can be iteratively revisited and redesigned. Also, the current use of technology and how digital apps can support AA should be challenged.

In this report, we try to look in a different direction. Instead of remaining on performance, we aim at the well-being of students and lifelong learning behaviour, a new authentic assessment where students act more consciously about their learning. Our redefinition of the authentic assessment will include two aspects that evolved from Freire's theories and most recent self-determination, constructivist and constructionist models: a democratic assessment that fosters student active participation in the assessment definition and implementation, and the sustainable assessment of the skills and knowledge for a student-guided map of learning progress.

Yet, some questions need to be answered before developing any new framework or even a technical solution. Can we implement AA with democratic and sustainable characteristics in

primary education? For example, if we base our AA on blogging, discussion and peer assessment, how can teachers prepare students in their early school years to satisfactorily and joyfully contribute to these assessment experiences? In addition, when the authentic learning framework is ready to be implemented, can technology help teachers and students to effectively run this approach? We foresee that the collaborative use of technology by all classroom stakeholders, following a clearly articulated authentic learning and assessment framework, agreed upon by all actors and guided by the teacher, would eventually lead to a more engaging learning environment, one that will ignite the well-being and joy of learning. For this to happen, it is important to remember that teachers will need to be fully supported, since they will never embrace a new framework with lack of training and scaffolding.

7. Future Steps

This research explores the fundamentals of authentic learning and focuses on the assessment element and its authenticity. As we have seen, a variety of literature reviews and their findings help us to devise a new form of authentic assessment that will effectively use the student's voices and meaningfully reflect the process of learning that the students have travelled through. This is what we called a democratic and sustainable assessment. The visual in the Appendix can be useful to understand the rationale behind these concepts.

This Appendix shows the questions, answers, the reasoning behind using AA and how different technologies can apply to the different phases of this AA process.

In the search for this new authentic assessment, different tools and frameworks have been developed and tested. One example is the online tool that Schultz's research team (2022) implemented to evaluate the levels of authenticity in the teachers' practice. This is something that we could explore further and perhaps use for the initial framing of the current state of the AA implementation.

A couple of frameworks can be also reviewed in the attempt to design and test a new improved version of the AA process: the "Authentic Assessment for Sustainable Learning" (AASL), identified in Sohkanvar's research work (2021) and the "Own it, Learn it, Share it" (OLS) by Lee & Hannafin (2016).

Teachers are a great ally in this process of defining a new authentic assessment. We need to investigate their current implementation and see if they can help to ideate new ways of making the student more active in the process, fostering an effective dialogue with reflection and feedback, and leveraging the technology with the appropriate use and purpose.

Finally, the democratic and sustainable authentic assessment must embrace a diversity of voices and be inclusive. How the classroom environment enables this fruitful collaborative and socially-relevant setting is crucial for the success of the AA and the wellbeing and joy of both teachers and students. Future research work should consider this aspect, and also how

technology can support class participation and engagement with gamification, creativity and multidirectional communication.

8. References

Aman (2019). History Teachers' Competence in Implementing Authentic Assessment: A Case Study in a State Senior High School in Yogyakarta. *International Journal of Learning, Teaching and Educational Research* Vol. 18, No. 10, pp. 68-88, October 2019 <https://doi.org/10.26803/ijlter.18.10.5>

Biggs, J. (1996). Enhancing teaching through constructive alignment. *Higher Education*, 32, 347-364.

Braunstein, A., Deutscher, V., Seifried, J., Winther, E., Raush, A. (2022). A taxonomy of social embedding - A systematic review of virtual learning simulations in vocational and professional learning. *Studies in Educational Evaluation* 72 (2022) 101098

DeWaard, H., Roberts, V. (2021). Revisioning the potential of Freire's principles of assessment: Influences on the art of assessment in open and online learning through blogging. *Distance Education*, 42:2, 310-326, DOI: 10.1080/01587919.2021.1910494

Eunbae Lee, Michael J. Hannafin (2016). A design framework for enhancing engagement in student-centered learning: own it, learn it, and share it. *Education Tech Research Dev*.

Gibson, D., Ifenthaler, D. (2018). Analysing Performance in Authentic Digital Scenarios. *Authentic Learning Through Advances in Technologies*. Chang, T., Huang, R., Kinshuk. Springer

Gulikers, J., Bastiaens, T., Kirschner, P. (2004). A Five-Dimensional Framework for Authentic Assessment. *ETR&D*, Vol. 52, No. 3, 2004, pp. 67-86 ISSN 1042-1629

Gulikers, J., Kester, L., Kirschner, P., Bastiaens, T. (2008). The effect of practical experience on perceptions of assessment authenticity, study approach, and learning outcomes. *Learning and Instruction* 18 (2008) 172e186

Hawari, N., Zain, N. H. M., & Baharum, A. (2020). The need of gamified assessment for engaging learning experience. *Bulletin of Electrical Engineering and Informatics*, 9(2), 722-728.

Herrington, J., Kervin, L. (2007). Authentic Learning Supported by Technology: Ten suggestions and cases of integration in classrooms. *EDUCATIONAL MEDIA INTERNATIONAL* 44(3), 219-236

Jones, E., Priestley, M., Brewster, L., Wilbraham S., Hughes, G., Spanner, L. (2021). Student wellbeing and assessment in higher education: the balancing act, *Assessment & Evaluation in Higher Education*, 46:3, 438-450, DOI: 10.1080/02602938.2020.1782344

Jopp, R. (2020). A case study of a technology enhanced learning initiative that supports authentic assessment, *Teaching in Higher Education*, 25:8, 942-958, DOI: 10.1080/13562517.2019.1613637

Kearney, S. (2013). Improving engagement: The use of “Authentic self and peer assessment for learning” to enhance the student learning experience. *Assessment & Evaluation in Higher Education*, 38(7), 875–891.

Kearney, S., Perkins, T. (2014). Engaging Students through Assessment: The Success and Limitations of the ASPAL (Authentic Self and Peer Assessment for Learning) Model. *Journal of University Teaching & Learning Practice*, 11(3). <https://doi.org/10.53761/1.11.3.2>

Nieminen, J., Bearman, M., Ajjawi, R. (2022). Designing the digital in authentic assessment: is it fit for purpose?, *Assessment & Evaluation in Higher Education*, DOI: 10.1080/02602938.2022.2089627

Nikou, S., Economides, A. (2017). Mobile-based assessment: Investigating the factors that influence behavioral intention to use. *Computers & Education* 109 (2017) 56e73

Rainer, J., Guyton, E. (1999). Democratic practices in teacher education and the elementary classroom. *Teaching and Teacher Education* 15 (1999) 121–132

Sambell, K. (2013). Engaging students through assessment. In: Dunne, Elisabeth and Owen, Derfel, (eds.) *The student engagement handbook: practice in higher education*. Emerald Group Publishing Limited, Bingley, UK, pp. 379-396.

Sargent, J., Lynch, S. (2021). ‘None of my other teachers know my face/ emotions/thoughts’: digital technology and democratic assessment practices in higher education physical

education. *Technology, Pedagogy and Education*, 30:5, 693-705, DOI: 10.1080/1475939X.2021.1942972

Schida, V. (2020). Using Technology to Provide Students with Authentic Learning Opportunities in the Elementary Classroom. *School of Education Student Capstone Projects*. 454.

Schultz, M., Young, K., Gunning, T., Harvey, M. (2022). Defining and measuring authentic assessment: a case study in the context of tertiary science, *Assessment & Evaluation in Higher Education*, 47:1, 77-94, DOI: 10.1080/02602938.2021.1887811

Shute, V. J., Wang, L., Greiff, S., Zhao, W., & Moore, G. (2016). Measuring problem solving skills via stealth assessment in an engaging video game. *Computers in Human Behavior*, 63, 106-117.

Sokhanvar, Z., Salehi, K., Sokhanvar, F. (2021). Advantages of authentic assessment for improving the learning experience and employability skills of higher education students: A systematic literature review. *Studies in Educational Evaluation* 70 (2021) 101030

Suurtamm, C. (2004). Developing Authentic Assessment: Case Studies of Secondary School Mathematics Teachers' Experiences. *Canadian Journal of Science, Mathematics and Technology Education*

Tschida, Valeria, "Using Technology to Provide Students with Authentic Learning Opportunities in the Elementary Classroom" (2020). School of Education Student Capstone Projects. 454. https://digitalcommons.hamline.edu/hse_cp/454

Vaughn, M. (2020). What is student agency and why is it needed now more than ever? *Theory into Practice*. 2020, VOL. 59, NO. 2, 109–118 <https://doi.org/10.1080/00405841.2019.1702393>

Vos, L. (2015). Simulation games in business and marketing education: How educators assess student learning from simulations. *The International Journal of Management Education* 13 (2015) 57e74

Wakimoto, D., Lewis, R. (2014). Graduate student perceptions of eportfolios: Uses for reflection, development, and assessment. *Internet and Higher Education* 21 (2014) 53–58

Wenger, E. (2011). Communities of practice: A brief introduction.

9. Appendix

