



Reinventing Learning Assessment in the Digital Age: Embracing Authentic, Immersive and Adaptative Approaches for Higher Education

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Abstract. The accelerating transition to distance learning at university highlights the need to review learning assessment methods in this new context. This adaptation presents significant challenges, particularly in terms of relevance, student engagement and teacher pedagogical investment. Our contribution consists in questioning distance assessment practices in higher education, by synthesizing the associated strategies and perceptions. We also explore the benefits of distance learning assessment, focusing on authenticity as a central element of effective assessment, reflecting real-life professional situations. This approach promotes autonomy, motivation and knowledge transfer. We address strategies for overcoming technological and institutional barriers, proposing a framework for implementing authentic online assessments, engaging students in meaningful and realistic tasks. Our work contributes to the debate on improving assessment practices in distance higher education, offering perspectives for more equitable, effective assessments that prepare for the challenges of the 21st century.

Keywords: Online assessment, Higher education, Authentic approach, Pedagogical innovation, Educational technologies.

1 Introduction

In the current context of higher education, the assessment of practical skills represents a major challenge, particularly with the increasing adoption of distance learning modalities. These skills, which are essential to a student's complete training, require assessment methods that go beyond traditional approaches, which are often ill-suited to accurately measure skills in real-life situations. With this in mind, our article explores an innovative approach: distance assessment in authentic situations. This method aims to replicate real-life conditions of professional practice

in a virtual environment, offering a unique opportunity to assess students' practical skills in a precise, contextualized way.

Interest in this approach is rooted in the realization that traditional assessment methods, such as written examinations or standardized tests, although widely used, reveal their limitations when it comes to measuring practical and applicative skills. What's more, the global health crisis linked to COVID-19 has accelerated the transition to distance learning, exacerbating the challenges of assessing these essential skills. In this context, it becomes imperative to rethink assessment modalities to adapt them to the demands of modern higher education, while guaranteeing the quality and relevance of learning.

Our contribution in this article is twofold. On the one hand, we wish to highlight the specific challenges associated with the assessment of practical skills in a distance learning environment. On the other, we aim to present a detailed analysis of an innovative approach to assessment in authentic situations, examining its applicability, advantages and limitations. Through this exploration, we hope to provide valuable insights for pedagogical practitioners and researchers, and pave the way for assessment practices better adapted to the realities of contemporary higher education.

2 Mapping the Challenges: Critical Analysis of the Current State

Transitioning to distance or hybrid learning environments in higher education presents significant challenges, such as unequal access to technology, difficulties in maintaining student engagement and motivation, and concerns about academic integrity. These issues necessitate innovative solutions to ensure reliable assessments. To address these challenges and explore practical solutions, the following summary table highlights the importance of creating authentic assessment scenarios for technical skills. This approach prioritizes preparing students for real-world professional challenges by promoting practical and transferable learning experiences. In light of these challenges, the academic community is encouraged to rethink assessment strategies to ensure they accurately reflect the technical skills required in today's job market [1][2].

Table 1.Innovative Responses to the Challenges of Remote Assessment

Challenge	Innovative Response
Reproduction of Practical Contexts	Difficulty simulating real-life professional situations online, requiring significant investment in simulations and virtual laboratories.[3]
Objective and Fair Valuation	Complexity due to technological and environmental variability, impacting the uniformity of remote assessment[4]. Transparent evaluation criteria, use of analytics for balanced evaluation[5].
Real-Time Interaction and Feedback	Lack of real-time interaction can negatively impact learning, underlining the importance of immediate feedback[6].
Maintaining academic integrity	Remote monitoring systems, review questions based on critical reasoning, peer review[7].
Assessment of cross-cutting skills	The need for creative methods to assess essential cross-cutting skills at a distance[8].
Personalized Learning and Assessment	Exploring the opportunities and challenges of pedagogical adaptation to individual learners in a distance learning context[9].
Maintaining commitment and motivation	Interactive teaching techniques, gamification, instant feedback[10].
Unequal access to technology	Setting up funds to support student and teacher equipment, use of open-source software[11][12].

The synthesis of existing research on practical skills assessment methods in higher education reveals a significant evolution, marked by an awareness of the limitations

of traditional approaches and a growing interest in integrating e-learning technologies. The health crisis has exacerbated the challenges associated with assessing distance learning, prompting higher education structures to rethink their assessment practices. Verchier and Lison highlight the different assessment strategies adopted by pedagogical teams during distance semesters and discuss their limitations, highlighting the importance of taking into account students' feelings towards these assessments to improve future practices[13]. The integration of digital technologies in the assessment of distance learning in higher education is at the heart of Leroux and Nolla's research, which reveals the emergence of innovative assessment practices integrating these technologies to replicate, amplify and transform skills assessment [14]. These practices illustrate a shift towards assessment methods more suited to contemporary learning contexts, highlighting the flexibility and adaptability of teachers and institutions in the face of the challenges posed by distance learning.

The limitations of traditional assessment approaches, which often focus on the restitution of knowledge rather than the evaluation of practical and applicative skills, are increasingly being questioned. Dubois, Desrochers and Nizet discuss a peer evaluation experiment carried out in a distance education graduate course[15]. This reflection highlights the benefits of the approach, such as the enhancement of the student experience and the acquisition of meaningful learning, but also the challenges associated with its implementation, particularly in terms of the credibility and fairness of evaluations.

The need to rethink assessment modalities to better align practices with contemporary learning objectives is a recurring theme in the literature. The adoption of innovative approaches, such as distance assessment in authentic situations, appears to be a promising response to the limitations identified, offering avenues for a fairer, more equitable and more representative assessment of students' practical skills.

3 Foundations of Authentic Assessment: An Immersive Distance Approach

Authentic assessment is defined as an assessment process that seeks to measure students' skills and knowledge in contexts that mimic real-world scenarios. In the field of distance assessment of technical skills, the principles of authentic assessment play a central role, promoting pedagogical approaches that faithfully reflect the challenges and contexts of the real professional world. These principles are based on the creation of learning experiences that engage students in complex and meaningful tasks, often mediated by advanced technologies that simulate authentic professional environments. The use of these technologies, ranging from virtual reality platforms to online laboratories, offers an immersive and interactive

modality, essential for the acquisition of technical skills. The benefits of this approach, as highlighted by Gulikers, Bastiaens, and Kirschner, include increased student engagement and motivation[16]. Indeed, authentic assessment, by offering practical challenges and providing constructive feedback, encourages deeper involvement and significant personal investment on the part of learners. This immersion in realistic situations not only fosters the acquisition of specific skills, but also develops essential cross-disciplinary skills like problem-solving, critical thinking, and collaboration which are essential in the professional world [17]. Thus, authentic distance assessment is emerging as a key vector of meaningful learning, effectively preparing students for the demands of the modern professional world.

4 QQQQCP Strategy: Framework for Authentic Assessment

At the heart of pedagogical innovation, authentic assessment has emerged as an essential approach, designed to immerse students in realistic, meaningful tasks that mimic the complexity of applying knowledge in the real world. This active method, far from being unidirectional, engages teachers, pedagogical advisors and students in a collaborative approach to respond appropriately to the challenges of contemporary learning. The table below, structured using the QQQQCP methodology, provides a detailed overview of the essential components of this holistic approach.

Table 2.Authentic assessment using the QQQQCP method

QQQQCP	Details
Who?	The main players involved are teachers, who observe students' performance and academic behavior; educational advisors, who offer advice on pedagogical approaches; and students, who are at the heart of the process, directly affected by assessment methods.
What?	Authentic assessment is an approach to assessment that focuses on tasks that reflect real, complex situations, requiring the application of knowledge, skills and abilities in practical contexts.
Where?	Authentic assessments take place in traditional (classroom) and virtual learning environments that are conducive to exploration and experimentation, adapted to various educational contexts, including distance learning.
When?	It is implemented throughout the student's learning journey, particularly in response to challenges such as cheating or lack of commitment.

How?	This approach takes shape through group projects, case studies, role-playing and other interactive methods that encourage students to act, think and reflect. It values active participation and encourages a self-directed learning approach, reflecting the dynamic flow of the professional world.
Why?	The ultimate goal is to sculpt a learning experience that resonates with the student, galvanizing personal investment and sharpening professional acuity. It aims to forge a mind ready to innovate, collaborate and excel in the complexity of contemporary professional challenges.

The QQQQCP method, like a backbone to this exploration, supports the architecture of the educational ecosystem, the essence of authentic tasks, the spaces where learning and assessment meet, the ideal moments for assessment to have a significant impact, innovative ways of implementing assessment and the ultimate goal of these approaches.

5 Tools and Methods for Immersive Assessment.

Online assessment in authentic situations uses advanced technologies, such as virtual and augmented reality, to simulate real-life professional scenarios. This methodology builds on work such as that of Jenson and Forsyth [18] who have highlighted the importance of immersive environments for learning practical skills. Scenarios based on real-life problems engage students in tasks that reflect the challenges of their future careers, thus promoting deeper, applicable learning [19]. The success of these approaches, however, depends on the development of clear assessment criteria and the establishment of a constructive feedback system, which are essential for guiding student learning and professional development. **Table 3** illustrates the diversity and specific features of these assessment methods (projects, portfolios, simulations and serious games) by comparing their advantages and disadvantages, highlighting their relevance and adaptability to different areas of technical competence. This table highlights the need for a balanced approach that integrates both the pedagogical advantages of modern educational technologies and the fundamental principles of authentic, meaningful assessment.

Table 3. Comparison of authentic evaluation methods

Methods	Benefits	Disadvantages	Applications
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Projects	Allows skills to be assessed in real-life scenarios.	May require significant resources.	Engineering, architecture.
Portfolios	Encourages reflection on learning and progression.	Requires ongoing self-assessment.	Arts, education.
Simulations	Risk-free hands-on experience.	Can be costly to develop.	Health, aviation.
Serious games	Engaging; simulates complex scenarios.	Balancing entertainment and education.	Professional training.

To understand the depth and effectiveness of authentic assessment methods in higher education, it is crucial to consider the specific assessment criteria that underpin these approaches. These criteria not only serve to measure students' technical skills quantitatively, but also seek to assess the quality and depth of their engagement, their ability to apply theoretical knowledge in practical contexts, and their ability to work collaboratively. Moreover, constructive feedback plays a central role in this process, offering students clear guidance for their personal and professional development. Table 4 below provides an overview of the key assessment criteria used in augmented reality simulations.

Table 4. Evaluation criteria for an augmented reality simulation

Evaluation criteria	Description
Technical precision	Accuracy of actions performed in the simulation.
Decision-making	Ability to choose the best actions according to the context.
Collaboration	Ability to work effectively with other virtual participants.
Critical thinking	Ability to analyze and evaluate results.

The incorporation of virtual environments (VE) and augmented reality (AR) in assessing technical skills is part of an advanced pedagogical methodology, where technology acts as a vector for the creation of highly immersive and interactive learning spaces. These technologies, through integrated Learning Management Systems (LMS) and Graphical User Interfaces (GUI), facilitate the implementation

of assessment scenarios that accurately simulate professional environments, enabling detailed analysis of technical skills in action. EVs, for example, employ game engines such as Unity or Unreal Engine to generate interactive 3D environments where students can manipulate virtual objects, while AR superimposes digital information on the real world, enriching the learning experience with interactive elements accessed via mobile devices or specialized glasses.

From an assessment point of view, these technologies enable the implementation of assessment criteria based on precise data, such as response time, accuracy of tasks performed and ability to follow specific procedures in simulated environments. Integrated assessment platforms collect this data in real time, providing a solid basis for quantitative and qualitative analysis of student performance. Constructive feedback, central to this approach, is often generated using artificial intelligence (AI) algorithms capable of processing performance data to offer personalized, adaptive recommendations. This feedback, articulated through immediate or delayed feedback systems, is designed to reinforce adaptive learning, encourage critical reflection and facilitate self-assessment, based on clear and measurable metrics.

6 Overview: SWOT analysis of authentic remote assessment

Having explored the key components of authentic assessment through the QQQQCP method, it is essential to consider the strengths, weaknesses, opportunities and threats associated with this approach, for a comprehensive understanding of its potential and challenges in higher education. Before tackling the SWOT analysis itself, it's essential to understand what this method represents and what it consists of. The SWOT method, an acronym for Strengths, Weaknesses, Opportunities and Threats, is a strategic tool used to evaluate these four aspects of a project, a company or, in our case, an educational approach. This analysis makes it possible to identify the internal factors (strengths and weaknesses) and external factors (opportunities and threats) that can influence the success or failure of the approach in question[20]. In the context of authentic distance assessment, this analysis provides a framework for critically evaluating the effectiveness of these assessment methods, highlighting the strengths to build on, the challenges to overcome, as well as the future prospects to explore and the risks to anticipate.

Table 5.SWOT analysis of authentic online assessment

<i>Strengths</i>	<i>Weaknesses</i>

Student engagement: Authentic assessment deeply engages students by involving them in meaningful tasks that require the concrete application of knowledge in realistic situations. This not only enhances their motivation but also strengthens their commitment to learning.

Developing cross-disciplinary skills: Authentic assessment challenges students with complex, contextualized scenarios, promoting the growth of essential skills like critical thinking, problem-solving, and effective communication.

Preparation for working life: By simulating real-life challenges in the professional world, authentic assessments effectively prepare students to meet the expectations and demands of their future working environments.

Time and resources: Implementing authentic assessments is demanding in terms of time and resources, posing a significant challenge for teachers in designing and evaluating these tasks.

Teacher training: More training is needed for teachers to effectively design authentic assessments and master the necessary technological tools.

Assessment and grading: The subjectivity inherent in assessing authentic tasks can make grading less transparent and fair.

Access to technology: Disparities in access to technological resources can compromise the equity of authentic online assessments, affecting some students more than others.

<i>Opportunities</i>	<i>Threats</i>
Pedagogical innovation: Authentic online assessment paves the way for innovations in teaching and assessment methods, exploiting advanced digital tools and interactive approaches.	Academic integrity: The risk of plagiarism and cheating could increase without adequate monitoring and authentication measures in online assessments.
Interdisciplinary collaboration: It also encourages collaboration between disciplines, enriching learning through varied and integrated perspectives.	Resistance to change: The reluctance of some teachers and institutions to adopt innovative assessment methods can hinder the adoption of authentic assessment.
Meeting educational needs: By offering a more flexible and accessible approach, authentic assessment meets the requirements of modern education tailored	Inequalities of access: Inequalities in access to technological resources risk exacerbating educational disparities, limiting the effectiveness of authentic

to individual needs.

assessment for certain groups of students.

This SWOT analysis exercise demonstrates not only the importance of authentic distance assessment, but also the need for a thoughtful, strategic approach to its deployment. By focusing on strengths and proactively addressing areas of vulnerability, institutions can better prepare students for the realities of the 21st century, making online learning a rich, engaging and, above all, meaningful experience.

7 Theory and Practice: Case Studies in Authentic Assessment

In higher education, the adaptation of authentic distance assessments to the specificities of fields of study is essential for the adequate training of students [21].

In the health sciences, online medical simulations offer a valuable opportunity for students to practice procedures in a safe environment, thus improving their technical and decision-making skills. [9]. These simulations, designed to faithfully reproduce real-life clinical scenarios, enabled students to practice their skills in a controlled, safe environment. Research by Hardy-Massard, Heckenauer, and Gandon demonstrated that the use of clinical simulations not only improved students' practical skills but also boosted their confidence in their clinical abilities, highlighting the effectiveness of authentic assessment in health sciences education[22].

In the field of engineering, one engineering school has implemented design projects as an authentic assessment method for its students. These projects, based on the use of computer-aided design (CAD) platforms, promote collaborative learning and simulate the real working environment [23] In addition to real-life challenges submitted by partner companies, they required student teams to develop innovative solutions, applying their theoretical knowledge to practical problems. Miguel's research revealed that this approach not only facilitated the acquisition of technical skills but also promoted the development of transversal skills such as teamwork, communication, and project management, illustrating the added value of authentic assessment[24].

In economics, the application of simulation games to assess students' decision-making skills was explored by Jacquot , showing that such methods can enrich understanding of complex economic concepts. Results showed that simulation games significantly improved students' understanding and application of economic concepts[25]. They encouraged active engagement and enabled students to practice

decision-making skills in realistic scenarios. These examples illustrate the versatility and effectiveness of authentic assessment across a range of academic disciplines, highlighting its potential to actively engage students in their learning and realistically assess their practical skills.

8 Projections for tomorrow's Authentic Assessment in higher education

The continuous adaptation of assessment methods to technological developments represents a major challenge for higher education, especially in the field of technical skills. This dynamic requires a periodic review of teaching tools and strategies to incorporate the latest innovations and meet the changing demands of the job market. The rise of artificial intelligence (AI) and data science opens up fascinating prospects for improving assessments, offering the possibility of creating personalized and adaptive learning environments. For example, AI can facilitate the assessment of technical skills by simulating complex scenarios where students have to apply their knowledge in a variety of situations, while providing instant, personalized feedback that takes into account their progress and specific needs. What's more, analysis of the massive data generated by these assessment processes enables trends to be identified, learning paths to be optimized and areas requiring particular attention to be highlighted. This innovative approach promotes an inclusive pedagogy, recognizing the diversity of students' learning styles and needs, and striving to provide everyone with the tools and opportunities they need to develop their full potential. Ultimately, the integration of these advanced technologies into the assessment of technical skills is essential to prepare students for the challenges of the 21st century, equipping them not only with the requisite technical skills but also with the adaptability and innovation that will enable them to succeed in an ever-changing professional environment.

9 Conclusion

In an ever-changing academic world, where distance learning has become an inescapable component of the student experience, this article highlights the crucial importance of adopting assessment methods that fully embrace technological innovations while remaining true to the authentic requirements of professional environments. Through an in-depth exploration of current practices and future prospects, this article highlights the central role of authentic distance assessment in effectively preparing students for the challenges of the 21st century.

In considering the strengths, weaknesses, opportunities and threats associated with authentic distance assessment, it becomes clear that, despite potential obstacles such as resource constraints and unequal access to technology, the benefits of this approach are undeniable. Not only does it offer a more engaging and relevant learning modality for students, it also promotes the development of essential

transversal skills, preparing students to excel in complex and dynamic professional environments.

Incorporating advanced technologies like virtual reality, augmented reality and artificial intelligence into the assessment of technical skills opens up promising avenues for more personalized, adaptive and inclusive assessment methods. These innovations make it possible to create immersive, interactive learning scenarios, offering students constructive feedback in real time that reinforces their learning and encourages self-reflection.

At the dawn of this new educational era, it is imperative for higher education institutions to continue to explore, innovate and implement assessment practices that not only fairly and equitably assess students' skills, but also prepare them to successfully navigate the ever-changing professional landscape. By accepting the challenge to innovate in assessment, higher education can ensure that graduates are not only competent in their respective fields, but are also equipped to contribute meaningfully to society with agility, creativity and seamless adaptability.

In conclusion, the widespread adoption of authentic distance assessment represents a fundamental step towards achieving higher education that is both relevant and resilient in the face of future change. It embodies a commitment to an education that values authenticity, innovation and inclusivity, ensuring that every student is well prepared for the challenges and opportunities of the future.

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