Assessment strategies for digitally-supported learning

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"Don't make me change assessment, because if I change that, I have to change everything."
Philippe Perrenoud (1993)

"The emergence of new technology has forced us to educate children differently."
Howard Gardner (2003)

Introduction

Recent years have seen a proliferation of different kinds of assessment process in the education field, whether it comes to assessing teachers, education programs and systems, or student learning. Meanwhile, fast-moving developments in technology have meant that new digital tools and resources are continually being applied to educational processes. The result has been an intense debate about how, and to what extent, digital technologies are transforming and improving real-world teaching and learning practices.

The experience of recent years and the latest research in the field tell us that the mere presence of ICT, in and of itself, is no guarantee of substantive improvements in teaching and learning processes in formal education. In fact, the use that teachers and students make of these technologies may not represent much of a departure from old, pre-digital practices. In other words, schools often fail to harness the transformative potential of ICTs, and any gains from these new tools are often outweighed by the financial, human and economic efforts that must be expended in order to incorporate them into educational activities (Lafuente, 2003).

Studies of the implementation of ICT-based pedagogical innovations have tended to underline the importance of certain variables in determining the success or failure of such programs. As Lafuente (2003) has observed, rather than describing and identifying the technological advances themselves, many researchers in the field (Pedró, 2017; Cuban, 2001; Harris, 2009) have delved into these underlying factors, the aspects that can contribute to the success of innovative programs in different contexts. This body of research examines how new technology is adopted in real educational contexts, and it looks at how users view these digital resources and adapt to them. Studies have also looked at how these technological changes affect the innovative practices undertaken in other parts of the educational sphere, influencing everything from assessment and school administration to communication and curricular development.

According to Pérez-Pueyo, Hortigüela and Gutiérrez-García (2019), technology seems to have sparked an awakening of education innovation processes, and there are countless new ideas that are ripe for analysis and study, even though most of the new programs are based on modernized versions of well-established notions from thinkers like Montessori, Decroly, Kilpatric, Dewey, Freinet and Freire. Interestingly, many teachers have found over the past few decades that the methodological changes that have come with these sweeping innovations have led to a need to rethink the concept and practices of assessment as well. Central to this new framing of the issue is the idea that students should be involved in their own assessment from the very start. This kind of student collaboration in assessment has become a key tenet of some active educational methodologies (López-Pastor & Pérez-Pueyo, 2017).

A move toward formative and co-assessment involves reconceptualizing some of our foundational ideas about evaluating students. As Monereo (2019) has written, it is useful to take a fresh look at some of the effects of assessment in the context of education:

1) It allows us to establish a starting point via an initial assessment and to see what our students have achieved through a final assessment. Thus, we can measure and evaluate a students' progress over a given educational period.

2) It allows us to gather information on how students learn and how teachers teach, and to establish relations of covariation between these processes.

3) It plays a decisive role in learning and teaching processes. For example, research shows that students are less likely to learn materials that are not subject to assessment. Therefore, assessment practices can help draw a distinction between the most important learning contents and other material that is more secondary. At the same time, assessment practices influence how a student learns, as studying is often done with an eye toward passing a certain type of assessment tool. For example, students might tend toward rote memorization if they know they will have to take a multiple choice test that prioritizes memory. Additionally, decisions about assessment shape how teachers teach. In class, materials must be covered in a way and with a degree of depth that gives students the tools they need to pass the planned tests or exams.

4) Closely linked to the point above is the fact that assessment can provide key information to students and teachers to allow them to evaluate and regulate their own performance and behavior.

5) In curricular terms, assessment can help ensure coherence between learning and teaching. It can also inspire interdisciplinary learning, when contents from various fields of knowledge are included in the same assessment activity, leading to a transfer of learning between disciplines.

6) Finally, assessment has implications on an administrative level for education departments and a range of government entities that may, for example, oversee a large number of schools and educational institutions, often spread out over large geographical areas. Assessment can be used to achieve a degree of standardization in student profiles. In other words, government bodies and others can guarantee that a student finishing her studies at one institution will learn similar contents at a similar level to those learned by another student completing a comparable program at another school.

It is clear, then, that the consequences of assessment are felt both inside and outside the classroom. There is less consensus, however, as to the kinds of basic changes in assessment that are needed to foster meaningful, competency-based learning.

Assessment in the context of competency-based learning

As we discussed above, it is possible to change school activities in a whole range of ways (by doing project-based work or cooperative tasks or by using ICTs) without really changing anything fundamental about how education works. In fact, if no changes are made to assessment methods, then it is hard to make any effective changes at all, as teachers will continue to teach according to what and how they plan to assess, and students will learn within the same old parameters. To avoid this stagnation, schools have often taken their cue from the 2015 curricular changes in the Finnish education system, a model for how to meet the challenge of "moving from assessment *of* learning to assessment *for* learning and, even more importantly, to a view of assessment *as* learning." In other words, assessment and learning are inextricably linked, and the former can no longer be seen merely as a procedure to be conducted at the end of the knowledge construction process. Instead, there is a growing realization that assessment is a part of the learning process from the very beginning. Educators use assessment to determine students' baseline knowledge, to analyze students' progress and understanding throughout their learning activities, to identify what difficulties they need to overcome, to inform decisions about how to move forward, and to gather evidence about what students have learned (or not yet learned) at the end of the process. As Jorba, Casellas Quinquer and Prat (2000) have written, we should view the assessment of learning as a continuous process, but one that cannot be synonymous with constant "grading".

Another key aspect of the changes sweeping the field of education has to do with "ceding the power of assessment to the learners" themselves. Traditionally, assessment has been a tool for the exercise of teachers' power. It is us as teaching professionals who have historically decided what kind of assessment data to collect and when to do so, and we use this information to inform our decisions, whether we are offering students opinions and feedback or issuing grades. However, this newer view of assessment *as* learning implies that the learner herself plays the central role in the entire process. Contemporary educators place a great deal of emphasis on promoting student autonomy, but they often forget that an ability for self-assessment is an integral part of autonomous learning.

Nunziati (1990) identified three necessary conditions for students to be able to regulate their own learning. These prerequisites are connected to what we know from research into formative assessment, and they correspond to the broad areas of feedback that should be offered:

- Learning objectives should be made explicit, and the underlying aims of the various educational tasks should be specified.
- Students must be able to recognize the steps and actions necessary to carry out the specific tasks related to the learning objectives and be able to plan how they will accomplish them.
- There must be explicit assessment criteria that make it possible to evaluate the quality with which these steps and actions have been implemented and to offer feedback on how students could improve their performance.

Other researchers (Wiliam, 2011) have advocated creating similar conditions and have observed the need for a classroom (or an online educational setting) to put in place a communication process wherein students themselves can verbalize and share learning objectives and assessment criteria, accepting them as their own. ICT tools can be an ideal way to achieve this shared assent, as long as the tools are truly used to facilitate exchange and the joint construction of goals and criteria, not merely employed as a way to share pre-established information (whether as a rubric or in other formats).

A third aspect to bear in mind as we rethink assessment is the function of feedback (Hattie, 2017). In fact, some in the field now prefer to speak of *feedforward* (Baker & Zubela, 2013), a term meant to highlight how we can use assessment data to inform our decisions as to what direction to take in the future. Traditionally, teachers have limited themselves to offering feedback in the guise of "correcting" or "marking," ways of telling students what they have done wrong on an assignment and giving a grade. *Feedforward*, meanwhile, seeks to encourage learners themselves to make decisions, with the help of their classmates and teachers if necessary. In other words, self-assessment and co-assessment play a key role here. The aim is to help students understand and take ownership of their own thought processes (Panadero, & Alonso-Tapia, 2013), a goal that is not as effectively attained through grading.

Without a doubt, assessment still has a role to play in certifying results and issuing qualifications. This allows students to have a grasp on their own performance and to shape their approach to future educational stages accordingly. It also makes it possible for educators to assess their own teaching practices to seek out ways to improve them, and it provides a basis for education systems that need to make admissions and other choices about higher levels of education.

In short, assessment involves gathering and analyzing data, making judgements about the possible factors underlying the data, and using this information to make decisions, some of them consisting of steps to encourage improvements and others of issuing grades. Throughout all of these phases of the assessment process, a range of strategies and instruments are used (Sanmartí, 2019). For example, an exam might be a useful way of collecting data, while other methods of accomplishing this could include asking students to create videos or draw mind maps. Meanwhile, a rubric is a useful instrument for analyzing data, as it is a document that specifies assessment criteria (which should be designed so as to be useful in these analytical tasks). When it comes to making decisions, it is necessary to use feedback techniques and apply strategies to promote self-assessment and co-assessment. ICTs can be useful in each of these phases, and they open the door to a more diverse set of instruments. For example, the fact that a mind map can be drawn by hand or designed with the help of a computer means that students can choose to express their ideas in the

Table 1. Types of assessment, functions and aims

Function	Type	Aim
DIAGNOSTIC	INITIAL ASSESSMENT	**To identify the educational needs of each student** This type of assessment is intended to gather information about students' attitudes, personal experience, prior performance, ways of thinking, previous knowledge... It makes it possible to assess the status of each student and group at the starting off point of the teaching and learning process. In this way, teachers and students become aware of this starting off point and can adapt and personalize the process to the specific needs that have been detected. Students can also explicitly accept the objectives of the activities they will be asked to complete.
REGULATORY	FORMATIVE ASSESSMENT	**To gather information on teaching and learning processes** This type of assessment allows teachers to monitor the course of the teaching and learning process. They can determine whether they are meeting students' needs and learning goals, consider the timing of lessons and assignments, detect any learning difficulties and discover their causes, propose activities to help students overcome these difficulties, and offer appropriate feedback.
	"FORMING" ASSESSMENT	**To encourage students to generate proposals to improve the teaching and learning process** This type of assessment allows students to learn to detect their own difficulties, understand the underlying causes and make decisions to strive to overcome them (learning from mistakes). In order to do this, students must adopt learning objectives and assessment criteria as their own, and they must learn to anticipate and plan the necessary steps to complete a task.
GRADING/ CERTIFICATION	RESULT-BASED (OR SUMMATIVE) ASSESSMENT	**To confirm and certify students' progress** This type of assessment allows us to have a systematic, structured overview of students' performance and to evaluate their performance at the end of a teaching and learning process, as well as the differences between the starting off point and the end of the process. This kind of assessment can also be used at certain times during an academic year, or it can inform final certification processes at the end of an educational stage. It allows educators to detect aspects of their teaching plans in need of modification (meta-assessment).

medium best suited to their individual aptitudes (Domínguez, 2019). ICT platforms also offer the opportunity for co-assessment, with the advantage that data are available anywhere and at any time. They can be used as forums to agree upon and share assessment criteria or to suggest possible improvements to classmates' work.

In order to create an assessment system that truly fits into the scheme of competency-based learning, it is important to ensure that the data that are collected and the assessment criteria are coherent with the target competencies, and that all these factors work together to promote autonomous learning. In other words, the assessment methods used must be ideally suited to recognizing whether a student is able to transfer or apply what she has learned to complex new situations

and contexts. If our assessment approach is limited to determining whether a student is able to reproduce learned information or apply memorized rules or formulas, then we fail to meet the challenges of creating meaningful, competency-based learning, regardless of whether students are encouraged to "grade" themselves.

Consequently, it is worth reviewing various kinds of assessment that can be used, depending upon the function and the aim within the learning process. All of these approaches, of course, also share the aim of helping educators refine and improve their lesson designs and teaching practices (see Figure 1).

Contributions of ICTs to assessment

According to Barberà (2006), beyond the broader changes to education brought about by technological advances, there are three major areas in which technology has transformed the context of assessment. At the risk of an oversimplification of the situation, below we classify each of these kinds of contributions. This classification system is compatible with the types of assessment detailed in Figure 1. Our taxonomy of the different contexts and situations in which ICT tools are useful follows:

1. The first contribution is automatic assessment, in which technological tools with interrelated data bases can be used to provide students with immediate answers and corrections. A clear example of this type of contribution would be digital multiple choice tests that include indications of the correct answers.

2. The second kind of contribution is connected to assessment using reference materials. In other words, it is connected to the range of contents that a student has learned from a complex source or a series of sources. An example would be the writing of papers on a specific topic, where students have used the Internet as a comprehensive source of information.

3. The third major kind of contribution is collaborative assessment. Here, technology provides a visual medium for communication in the collaborative processes involved in this kind of assessment. This contribution can take the form of virtual debates, online forums or teamwork using digital platforms.

To this list, we would add a fourth type called self-regulatory assessment. We use this term to refer to the use of new digital tools (such as virtual learning folders, portfolios, rubrics...) in a number of ways. These instruments can help students and teachers monitor the learning process by bringing together assignments and student reflections. They can also be used to inform students of what is expected of them as they complete their learning activities or assignments.

In short, the seismic changes brought by technology have forced the world of education to embrace new models of innovation that are flexible, creative, critical, real and participatory. There is an obligation to under-

take cross-cutting, innovative projects in schools and other educational institutions, endeavors that call for personal commitment at the same time as they foster teamwork and interpersonal understanding. There is a need to generate synergies and forge links between departments, disciplines, faculty groups and schools, and to open up our initiatives to community participation so that everyone has a voice and a vote to influence how we will remake our educational reality. Finally, we must set out on projects that allow us to realize the full potential of connecting with one another in a network, allowing us to get to know each other better and better.

That is why this volume has brought together a series of articles that, from different perspectives, seek to address the concerns and meet the challenges that have emerged in connection with "assessment *for* learning with digital resources and tools." The texts gathered here also offer some reflections on technology's impact on the socio-educational sphere, and they detail some real-world educational projects aimed at improving student learning and enhancing the regulatory function of assessment, at increasing teachers' digital competency and at fostering networked collaboration.

First, the article by Marcelo Careaga-Butter, María Graciela Badilla-Quintana and Carolina Fuentes-Henríquez from the CIEDE - Universidad Católica de la Santísima Concepción (UCSC) in Chile, under the title "**Critical and prospective analysis of online education in pandemic and post-pandemic contexts: Digital tools and resources to support teaching in synchronous and asynchronous learning modalities**" ("*Análisis crítico y prospectivo de la educación en línea en casos de pandemia y contextos posteriores a una pandemia: herramientas y recursos digitales para apoyar la enseñanza en modalidades de aprendizaje sincrónico y asincrónico*"), offers a critical analysis of the disruption caused by the need to move from traditional classrooms to online teaching and outlines some pedagogical, methodological and assessment adaptations that may be needed, as well as some modifications to teaching approaches.

Second, the article by Fernando Manuel Otero-Saborido, Constanza Palomino-Devia, Ainara Bernal-García and Javier Gálvez-González from the Universidad Pablo de Olavide and the Universidad del Tolima, called "**Flipped learning y evaluación formativa: Carga de trabajo del estudiante en la enseñanza universitaria**" ("Flipped Learning and formative assessment: Student workload in Higher Education"), attempts to quantify the workload involved in the use of the "flipped learning" method along with formative assessment in terms of an estimate of weekly hours of dedication by university students.

Third, the article by Meritxell Monguillot and Carles González from the Universidad de Barcelona (IN-EFC), called "**Twitter como herramienta para la autorregulación del aprendizaje: Una experiencia en el Grado de Ciencias de la Actividad Física y el Deporte**" (*"Using Twitter to Support Self-Regulated Learning:*

An Experience in the Physical Activity and Sports Science Degree"), describes a university experience and assesses the use of Twitter as a tool for the self-regulation of learning.

Fourth, the article by Juan-Francisco Álvarez-Herrero from the Universidad de Alicante, called "**El poder de la anticipación en la evaluación: simulacros de examen y rúbricas en la educación superior**" (*"The power of anticipation in assessment: mock exams and rubrics in Higher Education")*, discusses the important role of mock exams and rubrics in helping students to prepare for final assessments, reducing their stress levels, allowing them to learn from mistakes and sparking greater motivation and interest in learning.

Fifth, the article by Aïda Ralda-Baiges and José Luis Lázaro-Cantabrana from the Universidad Rovira i Virgili, titulado "**La evaluación de competencias mediante un sistema de videoanálisis: educación no formal con Ninus**" (*"Competency assessment through a video analysis system: non-formal education with Ninus")*, features an analysis and assessment of a range of different video recorded teaching and learning situations designed to strive for competency-based learning in non-formal educational contexts.

Sixth, the article by Paola Pinilla and María Graciela Badilla-Quintana from the CIEDE -Universidad Católica de la Santísima Concepción (UCSC) in Chile, called "**RubricApp: adaptación y validación de rúbrica para la evaluación de valor pedagógico de aplicaciones educativas móviles**C (*RubricApp: adaptation and validation of Rubric to assess the pedagogical value of Mobile Educational Applications*) details the adaptation and validation of a rubric that assesses the educational value of mobile applications.

Seventh, the article by Glòria Gómez-López from the Facultat de Ciències de la Salut Blanquerna of the Universitat Ramon Llull, called "**Protocol d'estudi: Moodle com a eina didàctica en una experiència d'aprenentatge actiu en lassignatura de Biologia del grau de Nutrició Humana i Dietètica**" (*"Study protocol: Moodle as a didactic tool in an active learning experience in the Biology class of a Human Nutrition and Dietetics degree program"*) assesses (examining motivation, confidence, mastery of materials and perception of usefulness) the results of a Biology course, for students in a Human Nutrition and Dietetics degree program, taught using an active learning strategy based on the Moodle platform.

Eighth, the article by Ingrid Sala-Bars, Maria Macià, Jordi Simón and Elisabet Alomar from the Facultat de Psicologia, Ciències de l'Educació i l'Esport Blanquerna of the Universitat Ramon Llull, called "**Eines digitals per a l'avaluació des d'una perspectiva del DUA**" (*"Digital tools for a UDL-based evaluation"*) briefly explains the theoretical underpinnings of UDL as a universal measure of attention to diversity, reflects on how we can use the principles of UDL to help us rethink our approaches to curriculum and assessment, and presents a series of technological tools to apply UDL to assessment processes.

Our hope is that this monographic issue will provide a clear outlook on how we are currently facing the challenge of incorporating technology and innovation into assessment in the framework of competency-based education, throughout the education field in general and in higher education in particular.

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