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Assessment of Learning about Sustainability in Students with Down Syndrome

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Abstract. Assessment is an essential resource for guaranteeing quality education. In order for it to be effective, it must be continuous, formative and adapted to the characteristics of the individual student, so that it shows their abilities. Students with Down Syndrome benefit from these aspects, as they can demonstrate their achievements and difficulties in different ways. This article analyses these approaches and brings together the suggestions of 14 experts, in the field of education for students with Down Syndrome, from three different countries, 5 members of Belgium and Spain, and 4 members of Ireland. Through the instrumental case study and focus discussions of the experts, using the Delphi method, a series of basic aspects are established on the most appropriate methods and evaluation tools for the target group. In the analysis the experts agreed on three key aspects (with scores of three out of three): maintaining high expectations of students' potential, encouraging self-evaluation, and enabling students controlling their own learning process. The group of experts proposes the use of a learning register or portfolio as a method of assessment for students with Down Syndrome.

Keywords: assessment; down syndrome; sustainability; virtual learning environment

1. Introduction

Achieve inclusive education requires providing equal opportunities for all students to develop their full potential through a response tailored to their individuality (Gamonales Puerto et al., 2018). Attending to their learning style will facilitate and promote the teaching-learning process (Kabashi & Kaczmarek, 2019; Kurth et al., 2020; Lindner & Schwab, 2020). To achieve this, the whole educational process, objectives, methodology, resources, assessment, etc., must be interrelated.

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Assessment is a vital part of pedagogical practice, a fundamental part of achieving quality education. An instrument that provides us significant information and data for educational improvement (Ibáñez, 2020; Jurado-de-los-Santos et al., 2021). Assessment takes on great importance not only as an element of validation of the knowledge acquired at a specific moment but also as a tool for control and reflection on the educational quality. The interpretation of the results obtained allow the student's learning to be ascertained and at the same time direct and adapt the teaching-learning process in an appropriate way in order to achieve the proposed objectives and (Filderman & Toste, 2018; Kurth et al., 2020; Nonato & Almeida, 2019; Yanez, 2016), an interrelated system, not limited to student assessment, but to the assessment of all those involved in the teaching-learning process, whose conceptions and actions have a direct impact on the system (Deneen & Brown, 2016; Santos Guerra, 2017), as well as on the process itself. Although, it is necessary to recognise assessment as a complex term, in this article we will focus only on student assessment.

Assessment goes beyond checking a result or the acquisition of knowledge; it should be aimed at understanding the development of skills, abilities, procedures, attitudes, and values in students. Thus, for assessment to be effective, it is necessary to consider both the context and the resources designed to carry it out, considering the characteristics of the students and their approach to learning (Ibáñez, 2020; Yanez, 2016) to favour the correct demonstration of knowledge (Lormendez Trujillo & Cano Ruiz, 2020). To this end, care must be taken in the choice of assessment methods. Teachers, as the agents involved, must know, and be prepared to design and develop assessment. Using methodologies that are appropriate to the students so that they can show the skills developed (Deneen & Brown, 2016), because different approaches to learning call for different ways of presenting assessment (Anijovich & Cappelletti, 2017). A varied evaluation will provide a more holistic and realistic view of both the knowledge acquired and the learning process itself. Evaluation doesn't necessarily result in a score, certainly not in the light of assessing students with learning disabilities., since the whole learning process must be subject to monitoring, to facilitate the necessary adaptation and to achieve the established objectives. For this, it must be continuous and practical, collecting diverse evidence, in different contexts and moments; furthermore, the learner must be an active participant, reflecting on their process (Araújo Chagas & Mauch Palmeira, 2019) and it must evaluate small goals, offering adequate support to stimulate achievement.

On the other side, we can't forget that school has a first responsibility, and that is to offer quality education, developing each person's potential to the maximum. To do so, it must adapt to this changing society and, in turn, to the needs of each individual, enabling their full personal development (Pazos González et al., 2015). In this changing world, the Information and Communication Technologies (ICTs) have brought about a revolution, integrating and promoting transformations in all areas of our society. These techniques are being used in all fields, including education, where they complement traditional teaching methods (Ortiz Ruiz & Manzano Villagra, 2013; Sosa Díaz & Valverde Berrocoso, 2020).

ICTs are presented as a driver of educational change and innovation. These transformations are allowing for new possibilities that favour comprehensible and flexible environments in order to develop the capabilities of all students to their fullest potential (Tangarife Chalarca et al., 2016; Morilla Mazuecos, 2012). They constitute a source of resources that facilitate the teaching-learning process, from the access and acquisition of knowledge to the development of skills and abilities or the promotion of attitudes and values, as well as their evolution and assessment. These new resources and their alternatives are the ones that provide people with intellectual disabilities with different ways to face their learning, allowing them to adapt better to their characteristics and educational needs (Hernández Sánchez et al., 2020). This and the lack of specific studies and materials on sustainability for students with Down Syndrome gave rise to the idea of developing a virtual learning platform (VLE) for them.

The platform aims to help this group to understand the need to care for our environment, making them participants in the concept of sustainability, both in the domestic and industrial spheres. It also seeks to facilitate awareness and the acquisition of sustainable habits in the field of recycling.

This VLE has been developed in the project "SUSKIDS - Empowering professionals and families to transfer knowledge and skills on sustainability to people with Down Syndrome" co-funded by the European Erasmus+ instrument (SUSKIDS, n.d.). This new technological tool contributes to addressing environmental sustainability through an active and participatory methodology focused on students.

This article collects the guidelines of three groups of experts in the field of education of students with functional diversity and education of students with Down Syndrome, from Ireland, Belgium, and Spain. Their aim was to discuss various aspects of assessment, ranging from standards and methods of assessment to appropriate forms of assessment in the VLE with regard to its adaptation to students with Down Syndrome.

The learning portfolio is a learning and assessment system, which allows to collect a set of evidences of the learning process and of what has been learnt as a result of different activities carried out by the student, showing the skills and knowledge that he/she has. It can take a variety of formats, such as photographs, videos, designs, written texts, audios, etc.
These guidelines have been defined in the context of the development of the VLE of the SUSKIDS project, and aim to answer the following research questions:

- What are the compiled aspects to be considered regarding the assessment of students with Down Syndrome?
- What are the general guidelines on assessment that the experts from the three countries agree on? How do they rate each of them?
- What are expert views on the different aspects of assessment of students with Down Syndrome in the field of education?

- What assessment method do they propose to use for sustainability materials and content designed for students with Down Syndrome?
- What opinion do the experts have about the learning portfolio as an assessment method?

2. Methodology

In order to establish appropriate assessment methods, the following actions have been followed. The first methodological action, through instrumental case studies and initial input from experts, assessment methods have been explored from multiple perspectives to establish key principles. Assessment in education involves collecting, interpreting, and using information about learning processes and sources. Given its complexity, a broad perspective has been adopted that considers assessment methods for students with Down Syndrome, assessment methods on the topic of sustainability and inclusive assessment methods. In order to carry out this instrumental case review, around twenty-five inputs were consulted, such as scientific articles, books scientific articles, books and official websites, among others. The research by Lormendez and Cano (2020) collects opinions from specialized teachers who suggest a qualitative assessment based on evidence such as photographs or videos and rubrics, where the teacher establishes the objectives to be achieved by their students. The selection of techniques and instruments must be chosen according to the characteristics of said students. In the case of students with Down Syndrome, they recommend the use of the portfolio and observation.

In the study by Bizama and Martínez (2021), the assessment practices, for students with intellectual disabilities, used by specialists follow traditional procedures to which they apply access adaptations and adjustments to the objectives to be achieved. The incorporation of the Universal Learning Design (UDL) promotes curricular flexibility, which facilitates adaptation to the characteristics of the students. Some of the adaptations they make are increasing the font of the texts, presenting examples, incorporating images to improve understanding, dividing an activity into steps, oral tasks, etc.

Other authors value the use of ICT as support for the teaching-learning process and as an assessment tool for students with Down Syndrome. Da Cruz et al., (2020) analyse how the data recorded in a virtual learning platform (sequence of actions, reaction time, decision making) provide information that allows evaluating the learning progress of students and adopting timely measures. to improve their performance. Toffalini et al., (2018) create virtual environments to promote the learning and assessment of visuospatial skills; They use automatic records of the time spent, the number and type of breaks and the errors made to know the student's progress and evolution.

Secondly, the established key principles and a presentation of the SUSKIDS project with its objectives, contents, methodology and tools to achieve the defined goals is given to the focus groups from the three countries. The contributions of the groups are submitted to a Delphi study. A systematic forecasting technique for gathering information from subject matter experts and reaching consensus (Cruz Ramírez & Rúa Vásquez, 2018; López-Gómez, 2017; Rowe & Wright, 1999).

The Delphi study was conducted to validate the assessment guidelines. Each country gathered its own expert group on education, with 5 members in the case of Belgium and Spain, and 4 members in Ireland. In the Ireland case the working group consisted of Special School teachers. The Spanish Working Group had more variety in the profiles of those attending the group: higher education teachers, specialist in Therapeutic Pedagogy, Psychologists, Psychopedagogues and Special Education teachers. And in Belgium the group consisted of experts in inclusive (higher) education and diversity and special education teachers. Following the criteria of Rodas & Pacheco (2020), the meetings were held online and lasted approximately 1 hour. A moderator from each group was in charge of leading the discussion on assessment methods and techniques and, in turn, of collecting the main ideas.

The first round of the Delphi study consisted of the focus group discussions to explore expert opinions and generate ideas on assessment methods. The information provided by the experts from the three participating countries was used to create draft assessment guidelines. The second round consisted of two online surveys with the aim to reach consensus on the guidelines proposed in the first round. For this purpose, experts received the draft assessment guidelines. The surveys consisted of Likert-scale and open-ended questions on general guidelines, complemented by focus group input on the proposed assessment guidelines, to provide feedback and reach expert consensus. General comments on the guidelines and the use of a learning log as an assessment method were solicited, eliciting both quantitative and qualitative feedback.

3. Results

The first methodological action established (instrumental case study) provided an overview of current evaluation methods in this field. This enabled us to define the following key principles for assessment:

To assess students with Down syndrome:
Assess the student according to their strengths and needs.
Establish small steps in the learning and assessment process.
Use visual methods.
Combine assessment methods such as questioning, observing and collecting work samples. Promote learning and social skills, both inside and outside the classroom.

To assess sustainability:
Assess attitudes and behaviour as indicators.
Align assessment with learning objectives.
Use diverse assessment methods, especially reflective and performance-based methods.
Empower students in their own learning process, through feedback from teachers, peers and themselves, and actions of care and respect for the environment.

For inclusive assessment:
Assessment policies and procedures should support and enhance the successful participation and inclusion of all students.
Align assessment accommodations with learning accommodations.
Consider the self-esteem and well-being of all students.
Adopt a growth mindset with a focus on positive achievement.
Maintain high expectations for each student and provide appropriate challenge.

Secondly, the guideline document obtained in the first round of the Delphi study was used to form the surveys items for the second round of the study. The two surveys were completed by 8 of the 14 experts, both with closed responses on a 3-point Likert-type scale. The first one consists of 18 items and the second one of 3 items. The results from the different countries have been taken together. Firstly, Figure 1 shows the aspects taken into consideration by the experts with regard to the assessment of students with Down Syndrome and the degree of importance of these proposed guidelines. All experts rated three key principles as the most important with a maximum rating of 3: "Maintain high expectations for every student and provide adequate challenge", "All assessment policies and procedures should support and enhance the participation and inclusion of all learners" and "Enable the student to monitor their own learning process through feedback from teachers, peers and themselves". The experts gave lower scores and pointed out that providing evidence of learning in a variety of ways can be an option, but should not be an obligation for the learner and that the teacher should have autonomy to decide on the best method of assessment, as well as the knowledge, skills and abilities required by each learner based on their individual characteristics. The remaining items receive high scores, ranging from 2.25 to 2.88 out of 3.

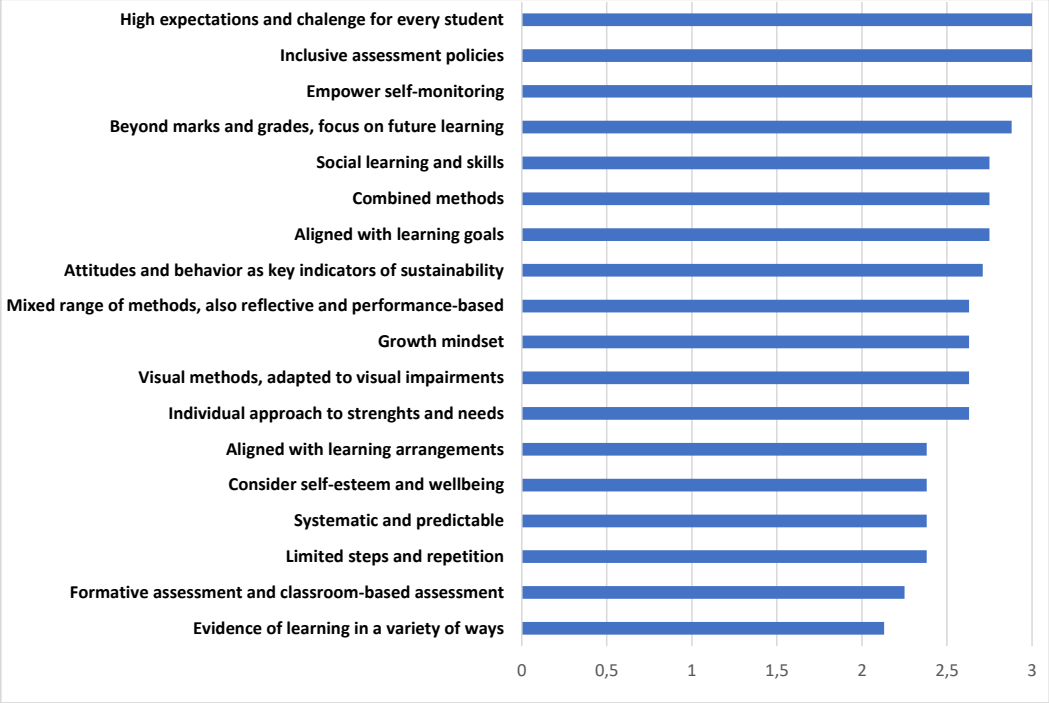

Figure 1: Expert Consensus on Evidence-Based Evaluation Guidelines

The second one, the proposed guidelines are presented based on the experts' input and the degree of importance (Figure 2). The majority of the experts considered the assessment guidelines to be important to very important, with scores above 2.5 out of 3. The greatest consensus obtained among the experts was for a varied and diverse assessment with a score of 2.75 out of 3. One of the experts pointed out that, when working towards equal educational opportunities, the universal design of assessment is very important. In this way, even students with more learning difficulties can participate in class with the same opportunities as others (Lindner & Schwab, 2020). Another expert advised to include a practical assessment, to verify the actual understanding and internalisation of knowledge, as well as to check the development and acquisition of skills and abilities.

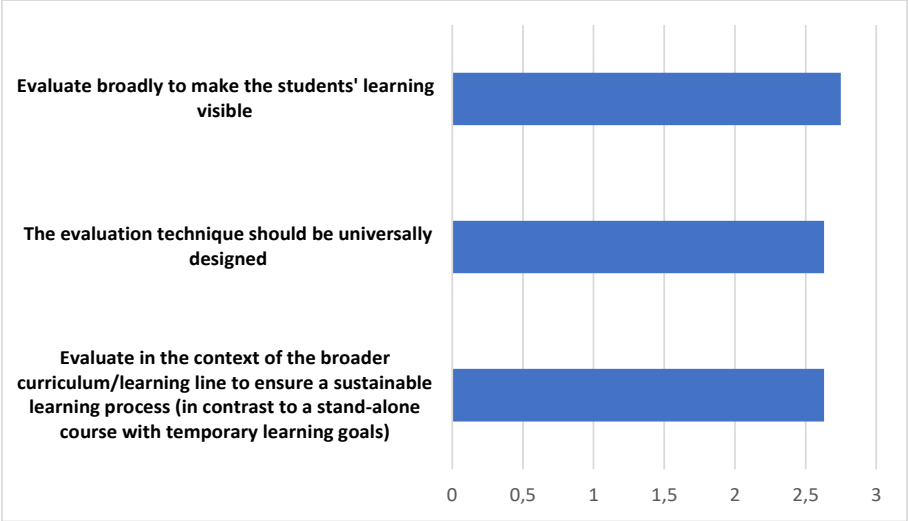

Figure 2: Expert Consensus on Expert-Based Evaluation Guidelines

The experts also gave their general opinion on the assessment guidelines. Several of them considered that the guidelines are clearly defined, timely and useful in this area of functional diversity. However, one of the experts stated that the guidelines could be more goal-oriented, as it is important to know the goals in order to be able to adapt the assessment to them. Another confirmed the clarity of the guidelines and noted that they are inviting to put them into practice. They are evidence-based and recognisable for practitioners who also work with scientific knowledge, and that they have a research approach to classroom practice.

Finally, the experts were asked for their opinion on the learning portfolio as an assessment method. It is considered by most experts as an appropriate and interesting form of assessment, as well as a timely resource to enable students to monitor and reflect on their own learning process. The experts pointed out that when using this type of learning recording method, attention must be paid to the definition of the objective to ensure that it is used according to the interests identified and, as we have already mentioned above in the description of the portfolio, it is necessary to take into account the format of presentation, as it should be adjusted to the needs and possibilities of the recipient, e.g. only in writing or incorporating digital work, the extent to which a template and structure is provided as a model or not. According to them, the portfolio can be indicative

and informative of the student's learning process and can show personal competences in the form of difficulties and strengths that will help the teacher to adjust the support more effectively. One of the experts considers that it is necessary to use a variety of assessment methods to check the acquisition of knowledge and skills. As a final result of the above guidelines, they indicate an evaluation method for the learning materials and contents on sustainability developed in the SUSKIDS project: the portfolio.

4. Discussion

From the contributions and opinions gathered from the expert groups, based on the case reviews conducted and their own extensive experience in the area of assessment, sustainability and inclusive education for students with Down Syndrome, various considerations on appropriate assessment guidelines are established.

On the one hand, people with Down Syndrome show a more or less characteristic learning style, apart from individual peculiarities (Balasong, 2022; Faragher et al., 2020; Van Hooste & Maes, 2008), which provides guidance on how to approach their educational process in order to provide a meaningful and quality education (Faragher & Clarke, 2013; Grieco et al., 2015). Therefore, assessment, as an integral part of the teaching-learning process, must be geared to this learning style of students, in order to capture and enable students to demonstrate the knowledge and skills acquired and developed. They are visual individuals and require explicit learning (Basten et al., 2018; Ruiz Rodríguez, 2012), therefore, assessment can benefit from the use of sufficiently large and clear pictures, drawings or visual cues. They need more time for learning and will need more time for assessment, so learning can be accompanied by continuous assessment and sequenced in small steps or objectives (Ruiz Rodríguez, 2012). In general, teachers approach assessment by combining different methods: questioning, observing and collecting work samples (Faragher et al., 2020). It is advisable to try to apply and transfer learning to their immediate environment in order to consolidate it outside and encourage generalisation (Moreira, 2017). Another point to take into account is their ability to learn by imitation and therefore to value role models in learning, both inside and outside the classroom (Almendra & Elvas, 2020; Angulo Domínguez et al., 2008).

On the other hand, Education for Sustainable Development (ESD) or environmental education aims to raise awareness, knowledge, skills and positive sustainable attitudes. Opportunities should be created for this purpose and models and activities should be provided to increase sustainability competences (Chawla & Cushing, 2007; Díaz-Salazar, 2020; Mínguez Vallejos, 2021; UNESCO, 2017). The United Nations Educational, Scientific and Cultural Organisation (UNESCO) proposes, alongside learning objectives and activities, the assessment of ESD learning outcomes, which can act as a guide and starting point for assessing sustainability. UNESCO recommends aligning the method of assessment with teaching-learning objectives and practices and using a variety of methods (UNESCO, 2017). These methods should go beyond traditional assessment to encompass more reflective and performance-based methods (Klein

et al., 2021), for example, teacher and peer feedback and self-assessment, to enable the learner to monitor their own learning and identify possibilities for improvement (Anijovich & Cappelletti, 2017; Santos Guerra, 2017).

Finally, assessment should facilitate inclusion; inclusive assessment is an approach to assessment in general settings designed to promote the learning, participation, and inclusion of all students as far as possible. Just as all other elements of the teaching and learning process are adapted, assessment will be open to appropriate adaptations to respond to the functional diversities of students, which is not the same as lowering standards but adapting them to the level of individual attainment (Lormendez Trujillo & Cano Ruiz, 2020). Assessment content should address the self-esteem and general well-being of students in order to achieve an inclusive approach (National Council for Curriculum and Assessment [NCCA], 2017). Assessment should be used to improve learning and progress, so it should show progress and ways in which the learner can improve. Seeking and generating examples of positive achievements builds self-esteem and motivates students to meet the challenges presented (Anijovich & Cappelletti, 2017).

The key message of the expert group was to pay attention to learning objectives and evaluation methods tailored to the pupil in front of us. The most important thing is to adapt and create learning opportunities for a certain pupil. It is therefore important to see and read the results as guidelines or advice that can be used to test the learning objectives or to gain insight into the learning process of the pupil. The simultaneous use of a multitude of different elements (visual, oral, etc.) maintains interest in learning and ensures interactivity during learning and assessment. The experts seem to agree that the assessment guidelines are easy to understand and are conducive to collaboration and reflection.

The method of assessment should always come from the learner's abilities in the first place, and be subject to the freedom of choice and action of the supervising teacher or practitioner (Yepes Villa & Gutiérrez Avendaño, 2022). A learning log or portfolio is proposed as a formative, planned and intentional monitoring assessment tool of the students' learning experience (NCCA, 2017). It contains information about what the learner is learning and how he/she is learning it. The log is a means for the learner to reflect on his or her learning and should allow for a dialogue between the learner and the teacher (NCCA, 2017; Sartor-Harada et al., 2022).

The content of the log depends on the learner completing it, but teachers can provide a structure or template for what the log will look like and what it should contain, specific prompts or guidelines, or reflective questions. In providing this kind of support, it should not be forgotten that too many guidelines may hinder the learner's creativity. An alternative is to provide a limited number of questions from which the learner can choose to answer and/or develop. An initial message such as "*Work I am proud of*" can be included to motivate the learner to collect evidence of their successes. Teachers may choose to define examples of what work the learner should or can include according to the learning objectives, e.g., take a

photo of an object or describe the material used in making a design, describe what he/she recycles, etc.

An assessment method for the portfolio can be to compare the evidence gathered in the learning log with the initial learning objectives. The assessment should be about the process of growth and reflect the extent to which the learning objectives are achieved (Romero et al., 2018).

5. Conclusion

Three key aspects were identified by the experts as priorities for the assessment: maintaining high expectations of students' potential, encouraging self-evaluation, and enabling students controlling their own learning process. But which method of assessment is more appropriate for sustainability materials and content designed for students with Down Syndrome? Most of the experts in the study conclude that a good option could be the learning portfolio that shows what and how they learn (Lormendez Trujillo & Cano Ruiz, 2020). This procedure allows for a variety of formats according to personal preferences and the needs and possibilities of the student, collects both concepts and practical skills and transversal competences and encourage self-assessment, reflection and continuous dialogue with the teacher to adjust, redirect and/or guide educational practice (Espinoza Freire, 2021).

The format of the portfolio depends on the choice of the learner and the teacher, but it must always follow Universal Design Requirements. It is suggested that it should be sustainable, e.g., avoid printing too much paper and thus be in line with the sustainability principles of the project. It is also encouraged to combine multiple formats, photos, videos, written reports, drawings, etc., in order to achieve a broad picture of the learning process and the students' skills from various perspectives and to be able to assess them in other transversal aspects, such as digital competence.

At this point, it would be interesting to discuss extending the scope of assessment to non-school contexts in order to assess the generalisation of learning and autonomous development, managing this learning in a systematic way and validating daily tasks and personal experiences.

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