Co-funded by the
Erasmus+ Programme
of the European Union

Project number: 2021-1-IE01-KA220-SCH-000027825

Climate Action and Light Pollution Threat

NUCLIO

Portugal, 08/29/2022

A guide to assess students' competences

Project Information

PROJECT: CliC-PoliT

PROJECT TITLE: Engaging students and the society in environmental and climate change activities to raise awareness and strengthen responsible citizenship.

ACRONYM: Climate Action and Light Pollution Threat

PROJECT WEBSITE: https://www.clicpolit.eu/

PROJECT NO.: 2021-1-IE01-KA220-SCH-000027825

PROJECT COORDINATOR: CIT Blackrock Castle Observatory, Cork, Ireland

Project Partners

BLACKROCK CASTLE OBSERVATORY
The Space For Science

NUCLIO
Núcleo Interativo de Astronomia e Inovação em Educação

EUROPLANET TELESCOPE NETWORK

ΑΙΕΝ ΑΡΙΣΤΕΥΕΙΝ
ELLINOGERMANIKI AGOGI

WROHellas
ΟΡΓΑΝΙΣΜΟΣ ΕΚΠΑΙΔΕΥΤΙΚΗΣ ΡΟΜΠΟΤΙΚΗΣ & ΕΠΙΣΤΗΜΗΣ

In collaboration with the ASSESS Project

ASSESS

Contents

Project Information 2
Introduction 4
Why should we assess students? 5
How to assess students 6
Assessing students in a positive way 6
Focusing on each student's individual progress 6
Rubrics 6
Green Competences 8
Formative and summative assessment 10
Collecting evidence 11
Design Thinking in student assessment 12
Conclusion 14

Introduction

CliC-PoLiT is an innovative project that brings to schools several activities and challenges, where students learn content while developing multiple competences. Focusing on student centered approaches, the project invites teachers to adapt their practice to the needs of students, promoting the development of fundamental life competences such as: Critical Thinking, Creativity, Collaboration, Communication and Green skills.

Light pollution is an interdisciplinary topic that can help students develop key skills. By examining the various impacts of light pollution on ecosystems, human health, economy, and astronomical observations, for example, students must use critical thinking skills. This process encourages them to question assumptions, evaluate evidence, and consider alternative perspectives. Students brainstorm innovative solutions to mitigate light pollution's adverse effects. They explore methods ranging from sustainable lighting technologies to community outreach initiatives. Students articulate their findings, concerns, and proposed solutions to diverse audiences, fostering dialogue and awareness. This process improves their effective communication and social skills, while promoting the development of competences related to sustainability. Finally, students can embrace green skills by advocating for responsible lighting practices and environmental stewardship, cultivating an ecological view of the world.

When shifting the teaching practice to more student-centered approaches, it is common that teachers feel lost about how to assess their students. While assessing content retention seems quite simple with standardized assessment methods like tests and exams, evaluating competences is more complex. Furthermore, in student centered approaches, it is common that the knowledge acquired by students differs enough to make it impossible to assess through standardized tests.

Another important reflection is the one about why we assess students and what are the learning objectives that we set for them. In a fast-changing world where so many challenges are appearing (conspiracy theories, wars, poverty, hunger, inequalities, etc.) is the role of school to only focus on teaching curricula content (which is available online) or is it to ensure that all students find the necessary opportunities to develop as Human Beings that can solve societal problems, be empathic and solidary with others and be creative enough to envision a sustainable future?

Considering all this, the present document aims to guide teachers participating in CliC-PoLiT to assess their students, focusing on the development of competences, and a diversified way of collecting evidence to ensure equitative approaches.

Why should we assess students?

Student assessment is a practice that is common among schools around the world. It has been used for a long time and it is commonly seen as a standard practice in education. However, have you ever thought about why you assess your students? What is the ultimate purpose of student assessment? Do you assess your students just to give them a grade? Do you do it to know what they have learned? Or do you use student assessment to support learning and promote self-awareness, regulation of learning, self-esteem, and many other very important competences?

Student assessment, if used with the right perspective, can be a very powerful tool for learning and development. It allows students to plan their learning, to become active agents in their learning process, it teaches them how to evaluate their progress positively and effectively.

A positive student assessment can be the key factor in students' development of a fixed mindset or Growth mindset.

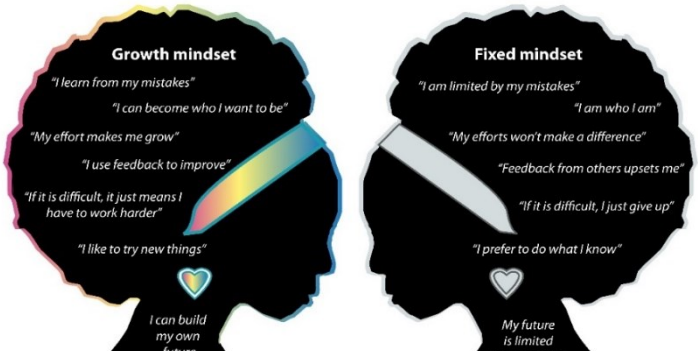

Figure 1. Growth mindset vs Fixed mindset. ©ASSESS project

Student assessment tends to also be a determinant factor in the establishment of a learning environment that promotes diversity and equity, fostering collaboration and empathy.

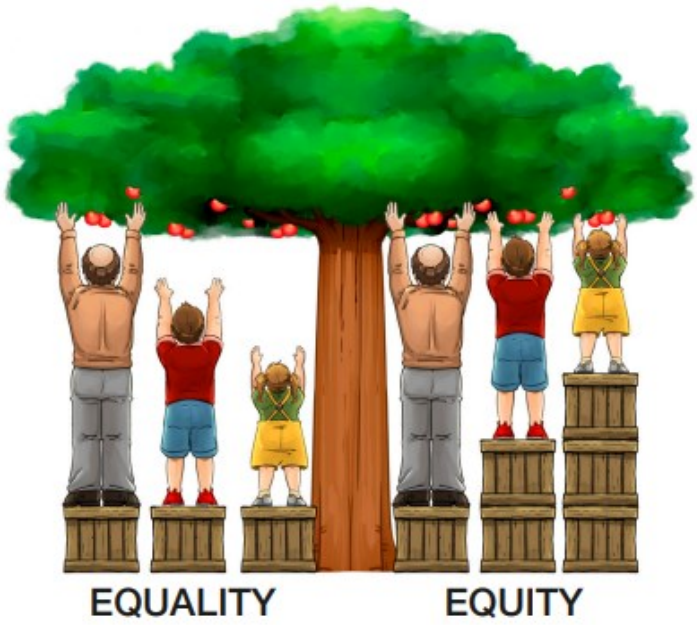

Figure 2. Equality vs Equity ©NUCLIO

How to assess students

Assessing students in a positive way

Student assessment is often the cause of anxiety and stress, acting more as a barrier to learning than as a tool to support it. However, assessment doesn't have to be this way. Assessment can be a tool that promotes the development of several fundamental competences and skills if it adapts to a practice that:

1 – Doesn't compare students among each other but focuses on individual progress.

2 – Integrates diversity in the ways of collecting evidence from students.

3 – Allows students to express themselves in multiple ways.

4 – Fosters communication.

5 – Encourages students to take an active and leading role in their learning.

Focusing on each student's individual progress

There are many ways to assess students in an effective and empowering way. In this document we propose one way that is adapted and in line with the methodologies applied in CliC-PoLiT and which allows an effective assessment of students' competences and progress.

Rubrics

One of the most well-known and effective tools to support students' formative assessment is the rubric. The rubric is a tool that defines the assessment criteria in a very detailed and concrete way, describing performance levels, enabling an easy assessment of students' proficiency level. Using rubrics brings many advantages:

1 – Clear and well-established assessment criteria that can (and should) be shared with students from the beginning of the learning journey.

2 – Allows the following of each students' progress through the different proficiency levels.

3 – Promotes transparency, as instead of just a number, the assessment is based on a clear descriptor of achievement (or proficiency).

4 – Allows for a consistent assessment integrating teacher, self and peer assessments in a coherent way.

In sum, using rubrics, teachers can establish the assessment criteria, preferably in cocreation with the students, from the beginning, making it very clear to all students what is expected of them. Students can then self-evaluate to understand where they are, what they want to reach during their journey and keep track of their progress. Furthermore, rubrics allow more effective communication and argumentation between teachers and students, related to each assessment.

CRITICAL THINKING					
INDICATORS	DESCRIPTORS				
	1	2	3	4	5
Showing critical spirit	Does not seem to question information, situations, or conditions of own life.	Visibly questions certain information and situations in own life.	Shows a critical attitude towards information received and the conditions of own life.	Explores and inquires the world around. Shows to be reflective about acquired information and own life.	Demonstrates to formulate personal judgements and evaluations based on systematic reflection.
Distinguishing facts from opinions, interpretations, evaluations, etc. in others' argumentation	Presents personal judgements or decisions based on opinions and personal interpretation as though they were objective facts.	Accepts without question judgments or decisions based on others' opinions and personal interpretation as though they were objective facts.	Questions judgments or decisions based on opinions and personal interpretation.	Proves to be able to distinguish objective facts from opinions and personal interpretations.	Demonstrates to recognize, question, and analyse judgements or decisions based on opinions and personal interpretation.
Actively participating in discussion	Remains passive during discussions.	Struggles to participate in discussions.	Actively participates in discussions.	Participates constructively in discussions, contributing to rich shared reflections.	Participates constructively in discussions serving as a reference to others.
Foreseeing the practical implications of decisions and approaches	Does not appear to be aware of the effects of decisions and proposals.	Appears to ignore the practical implications of decisions and proposals.	Proves to foresee the practical implications of decisions and proposals.	Analyses the pros and cons of the effects of decisions and proposals.	Adequately evaluates the pros and cons of decisions and proposals.
Reflecting on the consequences and effects of one's decisions on others	Does not seem to care or think about the consequences of personal actions on others.	Listens to others' observations and criticism but does not seem to reflect on them.	Seems to listen and reflect about the consequences and effects of personal actions on others.	Critically listens to others' opinions and recognises and accepts personal mistakes.	Asks for, weights, and considers others' feedback on personal conduct in a critical and constructive way.

Figure 3. Example of rubric of competence development. ©ASSESS project

There are several already-made rubrics online, which teachers can easily find, focusing on competences, curricula content, values, attitudes, etc. Teachers can also create their own.

In the ASSESS project, several rubrics were created, considering the following competences:

- **Critical Thinking:** "The habit of questioning things and analysing information before making a judgment. It concerns itself with the foundations on which ideas, actions and judgements are based."
- **Creativity:** "Searching to find and form new and valuable ideas/solutions that make sense in different areas of life."
- **Interpersonal Communication:** "Interacting positively with others through empathetic listening and through respectful, clear and assertive expression of what one thinks and/or feels, by verbal and non-verbal means."
- **Collaboration – Teamwork:** "Actively joining and participating in the attainment of shared goals with other people, departments and/or organisations."
- **Problem Solving:** "Identifying, analysing, and defining the significant elements constituting a problem in order to solve it effectively and with good criteria."
- **Diversity and Interculturality:** "Understanding and accepting age, cognitive, sex/gender, social and cultural/religious (and all forms of) diversity as something that is personally and collectively enriching, coexisting with other people without incurring in discrimination."

- **Oral communication:** "Expressing clearly and opportunely one's ideas, knowledge and feelings in speech, adapting to the audience and situation to ensure good comprehension and attention."
- **Writing skills**: "Relating effectively to others through clear written expression of what one thinks and/or feels, using graphic support as necessary."
- **Learning Orientation:** "Being committed to personal growth and learning. Actively seeking to learn and engaging in learning activities and proposals, assuming learning goals as own."
- **Ethical Sense**: "Being positively inclined toward the moral good of oneself and of others (that is, toward everything that is good or tends toward the wholesomeness or realisation of the individual) and perseverance in that moral goodness."
- **Project Management:** Effectively planning, directing, evaluating, and monitoring a complex project, developing an idea until it is materialised in a service or product.

The ASSESS rubrics can be found here: https://assess.nuclio.org/assessment-toolkit

Green Competences

In CliC-PoLiT, students will be exposed to projects and activities that foster the development of several green competences, which are in line with the Green Competence Framework created by the Joint Research Centre of the European Commission. For this reason, a set of rubrics was created to support assessment of these competences.

GreenComp consists of 12 competences (in bold) organised into the four areas (in italics) below. The descriptions are fully retrieved from the document. (Bianchi, G., Pisiotis, U., & Cabrera Giraldez, M. (2022). *GreenComp The European sustainability competence framework* (No. JRC128040). Joint Research Centre (Seville site).)

Embodying sustainability values

- **Valuing sustainability:** To reflect on personal values; identify and explain how values vary among people and over time, while critically evaluating how they align with sustainability values.
- **Supporting fairness:** To support equity and justice for current and future generations and learn from previous generations for sustainability.
- **Promoting nature:** To acknowledge that humans are part of nature; and to respect the needs and rights of other species and of nature itself in order to restore and regenerate healthy and resilient ecosystems.

Embracing complexity in sustainability:

- **Systems thinking:** To approach a sustainability problem from all sides; to consider time, space and context in order to understand how elements interact within and between systems.
- **Critical thinking:** To assess information and arguments, identify assumptions, challenge the status quo, and reflect on how personal, social, and cultural backgrounds influence thinking and conclusions.
- **Problem framing:** To formulate current or potential challenges as a sustainability problem in terms of difficulty, people involved, time and geographical scope, in order to identify suitable approaches to anticipating and preventing problems, and to mitigating and adapting to already existing problems.

Envisioning sustainable futures:

- **Futures literacy:** To envision alternative sustainable futures by imagining and developing alternative scenarios and identifying the steps needed to achieve a preferred sustainable.
- **Adaptability:** To manage transitions and challenges in complex sustainability situations and make decisions related to the future in the face of uncertainty, ambiguity, and risk.
- **Exploratory thinking:** To adopt a relational way of thinking by exploring and linking different disciplines, using creativity and experimentation with novel ideas or methods.

Acting for sustainability:

- **Political agency:** To navigate the political system, identify political responsibility and accountability for unsustainable behaviour, and demand effective policies for sustainability.
- **Collective action:** To act for change in collaboration with others.
- **Individual initiative:** To identify own potential for sustainability and to actively contribute to improving prospects for the community and the planet.

Figure 4. Visual representation of the Green Comp – By Joint Research Centre of the European Commission

The Rubrics used in CliC-PoLiT are an adaptation of the green comp, made by the partners and do not reflect the views of the authors of the GreenComp. The GreenComp rubrics can be accessed here: https://clicpolit.eu/assessment-tools

Adding to the rubrics created in CliC-PoLiT, teachers will have access to the rubrics created in ASSESS: https://assess.nuclio.org/assessment-toolkit

Teachers are also highly encouraged to create their own rubrics so that their students' assessment is adjusted to their specific needs and context: example, curricula content, attitudes, values, other competences, etc.

Formative and summative assessment

A lot of debate exists around the value of summative vs formative assessment. While formative assessment focuses on the process and offers valuable feedback for improvement, summative assessment focuses on the result.

Formative assessment has been gaining a lot of attention as it promotes communication between teachers and students and the sharing of important feedback, supports learning and development and fosters a growth mindset. While summative assessment is still used in schools, as teachers must grade their students, its reputation has been controversial.

While this debate is very relevant and the purpose of each of these types of assessment should always be thought about, in CliC-PoLiT we suggest the integration of both in a smooth and meaningful way.

Grading students based on one single moment or in just a few strategic moments, being the result just a number, might be far from relevant for students. In a world where businesses are looking for skilful, problem-solving, autonomous, and creative self-learners a number is not of great value. However, considering summative assessment as a complete report of the students' progress, gathering qualitative and quantitative data, as a result, is much more meaningful. This way, in CliC-PoLiT we follow the approach developed in the ASSESS project [Empowering Teachers to Design Innovative Assessment Tools in a Digital Era 2020-1-PT01-KA201-078733].

The ASSESS approach considers formative assessment as the key to foster a positive assessment, encouraging teachers to perform as many assessments as possible, collecting a variety of evidence and using rubrics to evaluate the level of proficiency of students in a regular basis. This is the heart of the assessment. Following this method, the summative assessment consists of an automatic calculation of the average classification given in selected formative assessments.

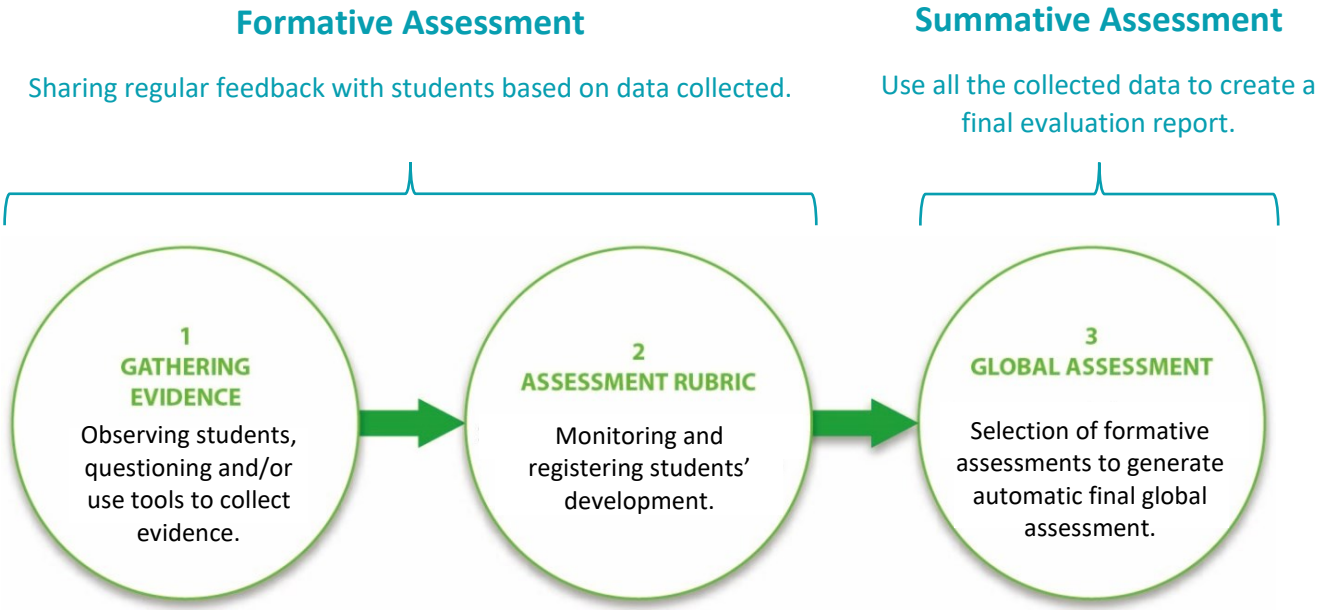

Figure 4. The ASSESS approach to student assessment.

By following this approach, students are assessed in a consistent and fair way, where every moment, every attitude, and every effort counts, instead of basing their entire evaluation on a single

or a few moments in time. Summative assessment is then a result of the formative assessments and a legacy of the students' progress through a comprehensible report of their achievements.

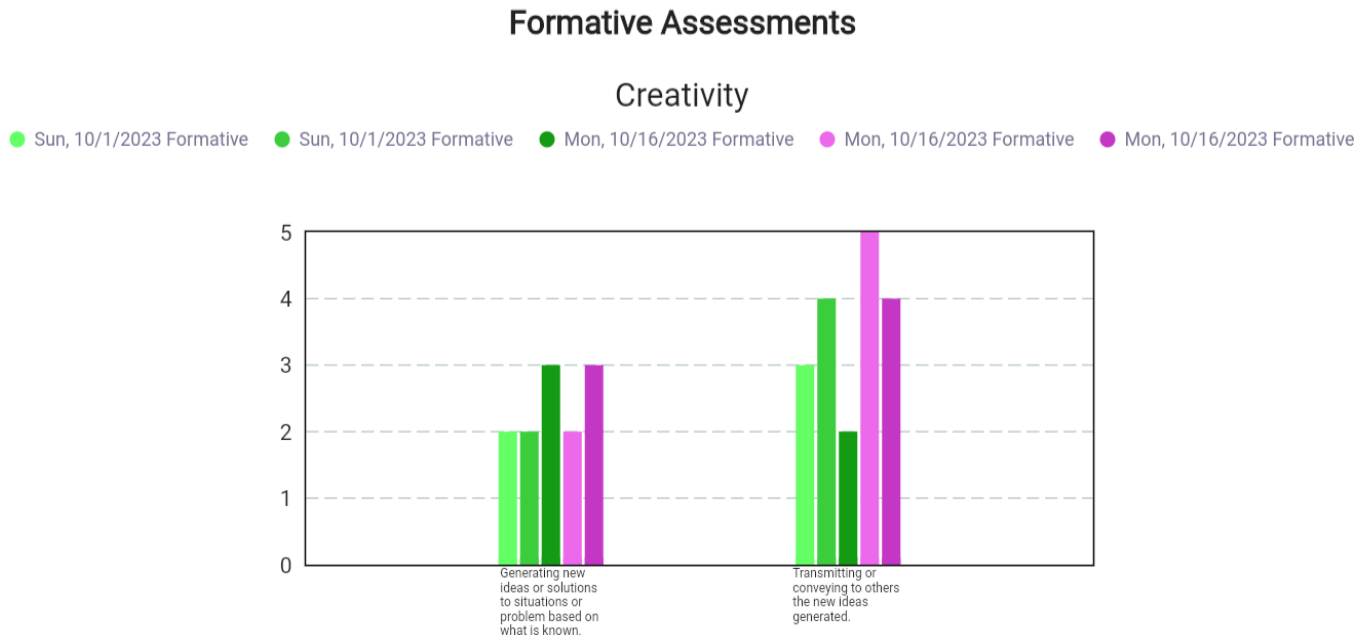

Figure 5. Example of graphic containing information about formative assessments. Using the ASSESS app these graphics are generated automatically.

Collecting evidence

Rubrics are a very effective way to assess students, however, to use them, teachers need to collect evidence, so that they are equipped to select the level of proficiency of their students. One of the most important, key factors in student assessment is the way teachers choose to collect evidence. Students are different in their way of thinking, learning, and expressing themselves. Some students are more comfortable with written expression, others with oral expression, some are more physical, others more artistic, etc. Knowing the specific types of expression of each student can be challenging and not always possible. However, to ensure and equitative and inclusive way of collecting evidence is not dependent on that. **Diversity is the key!**

The more diverse the process of collecting evidence is, the more inclusive and fairer the assessment.

There are dozens, hundreds of even thousands of different tools to collect evidence and an online search will reveal many good ones. Some examples are online games, quizzes, polls, story-telling platforms, etc. In-class observation, strategic questioning and checklists are other examples.

The way teachers collect evidence is totally up to them and since there are so many ways, we leave here only a few examples, but we challenge teachers to find more and diverse ways that best suit their class and goals.

Design Thinking in student assessment

Design Thinking is a creative and empathic approach to solving problems, which has been used in the business sector for many years now. It is an approach that allows companies to design better products, adjusted to their client's needs, and therefore become more successful and with more satisfied clients.

This approach has been integrated in education in many ways, allowing school leaders to make management decisions that accommodate the school community needs, allowing teachers to adjust their classes to the needs of their students and allowing students to develop meaningful projects in the school.

In CliC-PoLiT, following the ASSESS approach, we suggest teachers to follow the design thinking method to better assess their students and promote their learning and development.

To offer students a meaningful and supportive assessment approach, it is fundamental to start with reflecting on several questions:

These questions will guide teachers in the design of an effective student assessment approach, that can foster students' learning, growth, and development.

WHO: Who are your students? Where do they come from? What are their interests, talents, and challenges?

These questions are not always easy to answer as sometimes teachers are presented with numerous classes and too many students. However, given the opportunity, teachers can begin the school-year with some ice-breaking games like "two truths and one lie" where students share a little bit about themselves. Through empathy and observation teachers can also discover some features of their students throughout the year and use these as input to adjust their assessment and teaching methods if necessary.

WHY: Why are you assessing your students? What is your motivation? Is it only to give them a grade? Is it to collect information about the effectiveness of your teaching? Is it to support your students' learning? Is it to promote the achievement of learning goals?

This question is mandatory as teachers must know why they are assessing their students and ensure that they are doing it for the right reasons. Not just because they have to but because they will use assessment as a support to reach their goals and to leave a positive impact in their students' lives.

WHAT: What will you be assessing? What are the learning goals and objectives that you want to set for your students? Will you assess content retention, competences, both? Will you also assess your students' behaviour, values, and attitudes?

This question is also key to be able to plan an assessment that is in line with the learning goals and that will support their achievement. Knowing what is expected of students and sharing these goals with them from the beginning is the best way to ensure transparency and co-creation of the learning journey with students. Knowing what they are meant to achieve allows them to take an active role in the process, which in turn will promote the development of several competencies like regulation of learning and responsibility.

HOW: Knowing what the goals and objectives have been set for my students, how can I assess them? What are the available tools to collect evidence of their achievement? How can I make sure that I use diverse and equitative approaches? How can I allow students to express themselves in diverse ways? How much freedom can I give to my students in the way they express their learnings? If I have to grade my students, what tools will I use? Will I integrate self and peer assessments?

Defining how you will assess your students is extremely important, in ensuring that you choose tools and methods adjusted to WHO your students are, and that they are effective to assess WHAT you want to assess and are in line with WHY you assess your students. Examples of tools to collect evidence have already been mentioned in this document. We also recommend using rubrics to assess your students' proficiency and propose the ASSESS approach to formative and summative assessment, which has already been described in this document. The ASSESS app is also valuable resource to the use of rubrics and generation of real-time graphics and automated summative reports: https://assess.nuclio.org/assessment-app

WHEN: With what regularity will I use the selected tools to assess my students? Am I able to assess all students once a week using the tools I have selected? Can I assess them all at the same time or do I have to alternate every week?

The regularity of assessment is subject to the availability of teachers. Teachers that are working with fewer students will be able to carry out more formative assessments to each student than teachers working with more students. Formative assessment can be done every single day through observation, strategic questions, etc. However, quantitative assessments require the use of tools (like rubrics and the assess app) and these require a more organized approach. Deciding from the beginning how these moments will be organized, is important so that students are prepared and can be active in the process.

NOTE 1: We challenge teachers to avoid concentrating on the student assessment in a single moment in time (or just a few). To be more equitative and fair it is important to consider every single progress and achievement of the students in a formative way. The more regular feedback they receive, the more they will progress, and this should be part of their final assessment report.

NOTE 2: Also, it is important to note that not all formative assessments must be considered for the final summative grade and report. Teachers can be flexible and fair when selecting which formative assessment moments best reflect the progress and achievements of the students.

Conclusion

Schools of today are faced with the big challenge of updating their learning environments and teaching strategies to accommodate the fast societal development. Teachers all over the world are being encouraged to enroll in training courses and update their teaching methods.

Student assessment is a key factor in school education, acting as a driver or as a barrier to such innovation. Considering the way assessment is deployed is key to allow schools to innovate. As such, it is important to reflect on why we assess students and what goals we aim to achieve through this process. Student assessment should be aligned with this vision and should never be done without a concrete and strong purpose. If we want to provide students with multiple opportunities to learn and develop and ensure that they leave school with a strong sense of self and a growth mindset, we must rethink the way we assess them, which will strongly influence the way they learn to assess themselves through life. Mistakes are part of growth and should be embraced as such. Assessment should be positive and solution-based, never hindering students' self-esteem or causing anxiety and stress, but always encouraging students to be persistent, believe in themselves and go beyond.

It is also important to have a clear definition of how the assessment methods can support the achievement of the pre-established learning goals. This is, the assessment methods should never be defined prior to the establishment of learning goals. Assessment should be viewed as a means to an end and never as an end itself.

Finaly, it is mandatory to make the assessment approaches more flexible, diverse, and adjusted to the students' needs. All students are different and need different strategies to learn and develop. Schools have in their hands the power to shape the development of all students and should see this with great responsibility. Students must learn how to be humans in this fast-changing world!