

The assessment of students' creative and critical thinking skills in higher education across OECD countries: A review of policies and related practices

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Abstract

Developed as one of the resources within the context of the OECD Centre for Educational Research and Innovation (CERI) project entitled “Fostering and assessing creativity and critical thinking skills in higher education”, this paper reviews existing policies and practices relating to the assessment of students’ creativity and critical thinking skills in higher education across OECD countries. Creativity and critical thinking are largely emphasised in policy orientations and qualification standards governing higher education in many countries. In contrast, these skills are sparsely integrated into the dimensions of centralised assessments administered at the level of systems. At the local level, because of the large degrees of institutional autonomy and academic freedom, there is little indication that policy orientations translate into actual transformation of assessment practices developed and implemented by faculty members. Based on this analysis, the paper provides recommendations for policy and decision makers in systems and institutions to further support the development and implementation of assessment strategies to measure and foster students’ creativity and critical thinking in higher education.

Résumé

Développé dans le cadre du projet du Centre de l’OCDE pour la Recherche et l’Innovation dans l’Enseignement (CERI) intitulé « Favoriser et évaluer la créativité et l’esprit critique dans l’enseignement supérieur », cet article passe en revue les politiques et pratiques existantes relatives à l’évaluation de la créativité et de l’esprit critique des étudiants dans l’enseignement supérieur des pays de l’OCDE. La créativité et l’esprit critique sont largement mises en avant dans les orientations politiques et les normes de qualification régulant l’enseignement supérieur dans de nombreux pays. En revanche, ces compétences ne sont que peu prises en compte dans les dimensions des évaluations centralisées administrées au niveau des systèmes. À l’échelle locale, étant donné les niveaux généralement élevés d’autonomie des établissements et de liberté académique, il y a peu d’indications que les orientations politiques se traduisent par une transformation réelle des pratiques d’évaluation développées et mises en œuvre par les membres du corps professoral. Sur la base de cette analyse, le document fournit des recommandations aux décideurs politiques et institutionnels pour soutenir davantage le développement et la mise en œuvre de stratégies d’évaluation visant à mesurer et favoriser la créativité et l’esprit critique des étudiants dans l’enseignement supérieur.

1. Introduction

Student assessment is an essential component of instruction in higher education. It constitutes a mean to a broader end, or more precisely three broader ends (Wu and Jessop, 2018^[1]). First, assessment can be summative and used to certify student achievement and acquisition of knowledge and skills. Second, assessment provides measures of performance that can be used to monitor institutions, departments or programmes, and improve their action. Third, assessment has a formative function given its capacity to trigger and orient learning. The purposes and traditions of assessment vary across education systems. For instance, the use of student assessment for monitoring and organisational improvement is more present in the United States than in Europe (Kuh and Ewell, 2010^[2]).

All the above-mentioned assessment types have an impact on students' learning outcomes in higher education. Summative assessment is a powerful instrument to drive teaching and learning as it guides teachers and students' efforts. Administrative assessment can help to gather substantial evidence and improve the performance of educational systems, institutions or programmes. Lastly, formative assessment allows students to benefit from feedback on their performance and gain perspectives to steer their learning process. In this respect, assessment plays a key role in the development of knowledge and skills, including higher-order thinking skills such as creativity and critical thinking.

Creativity and critical thinking stand among the most important skills that young adults should acquire in 21st century societies. Both the research literature and the policy discourse have identified creativity and critical thinking as key competencies for personal and professional fulfilment, active citizenship, innovation, economic development and social inclusion. Higher education institutions and systems play a key role in fostering students' acquisition of these skills by incorporating them into courses, curricula and assessment.

Looking at the research literature on the assessment of students' learning outcomes in higher education, creativity and critical thinking have not been given the same level of consideration. While creativity has been sparsely considered over the last decades, many studies have focused on the assessment of critical thinking. Studies often report low to moderate gains of higher education for critical thinking despite the importance given to this skill in the general discourse (Bok, 2006^[3]; Arum and Roksa, 2011^[4]; Sadler, 2016^[5]; Huber and Kuncel, 2016^[6]). As Bok wrote "*Many [students] cannot reason clearly or perform competently in analysing complex, nontechnical problems, even though faculties rank critical thinking as the primary goal of a college education*" (p. 8). In that regard, there is room for the development of innovative approaches to foster students' learning outcomes and assessment could play a key role in this process (Blömeke et al., 2013^[7]; Coates and (ed), 2014^[8]; Dill and Beerkens, 2013^[9]; Douglass, Thomson and Zhao, 2012^[10]; Shavelson, 2010^[11]).

This working paper reviews policies and practices that were implemented across the OECD, and sometimes beyond, with regard to the assessment of creativity and critical thinking in higher education. The first part focuses on the policy orientations and instruments that were developed for that purpose at the international and national level. The second part examines how this trend translates into assessment practices at the system-level and within institutions. The third part discusses the coherence between general discourse and ongoing practices to identify ways through which policies could further support the fostering and assessment of creativity and critical thinking skills in higher education.

2. Policies related to the assessment of creativity and critical thinking in higher education

To what extent are creativity and critical thinking considered as important expected outcomes of higher education in OECD countries? Do policies across countries promote these skills? If so, does it have an impact on assessment?

Consideration for the assessment of creativity and critical thinking grew over the last decades with the emergence of the perspective of a student-centred education aimed at improving learning outcomes (Nusche, 2008^[12]). This recent trend corresponds to a paradigm shift through which the purpose of higher education moved from instruction – the delivery of lectures and knowledge – toward the accompaniment of students’ learning process to support the development of their skills and competencies (Barr and Tagg, 1995^[13]). This resulted in a greater emphasis placed on the development of students’ “21st century skills” or “higher-order thinking skills” in addition to the acquisition of content knowledge and basic skills. Higher-order thinking skills typically encompass critical thinking, problem solving, creativity, learning to learn, collaboration and communication (OECD, 2013^[14]).

This section reviews policies implemented across OECD countries, and sometimes beyond, to support the nurturing and assessment of students’ creative and critical thinking skills in higher education. The first part discusses the different types of instruments policy makers can use to orient assessment in higher education. The second part provides an overview of policy orientations developed at the international level to promote the cultivation of learning outcomes in education. The last part reviews policies implemented within OECD countries on student assessment in higher education and examines how much these take creativity and critical thinking into consideration.

2.1. Different types of policy instruments

In the great majority of OECD countries, teaching and assessment in higher education have traditionally benefited from a relative independence from external stakeholders in general, and policy makers in particular (Enders, de Boer and Weyer, 2013^[15]). Universities are often granted with high degrees of institutional autonomy while faculty members benefit from academic freedom. Most decisions on teaching and assessment are therefore taken within institutions by individual instructors, sometimes departments, and less often by the central administration. The inherent limitations of policy texts to orient teaching and assessment in education highlighted by Ball are particularly true in the higher education sector: policies are mostly indicative of practice and are mediated by institutions, faculty members and other education stakeholders (Ball, 1997^[16]; Wyse and Ferrari, 2015^[17]).

While keeping this initial remark in mind, policy makers can still use three types of instruments to support and promote the assessment of creativity and critical thinking in higher education: regulation, financial support and information.

2.1.1. Regulation

In OECD countries, regulation policies of teaching and assessment in higher education generally consist of general and non-coercive orientations. Some more binding policies can however have a direct impact on assessment (e.g., licensing examinations).

Over the last decades, regulations governing higher education have focused on the development of measures to address accountability and quality issues (Grendel and Rosenbusch, 2010^[18]). This global trend gave rise to the emergence of quality assurance and accreditation schemes in all parts of the world. These schemes represent the most

widespread form of system-level regulations of higher education that can have an impact on assessment practices.

Quality assurance frameworks set goals and standards, as well as processes, to drive the performance of higher education institutions in several areas (teaching, research, graduate employability, etc.). With regard to teaching and learning, educational authorities rely on quality assurance to establish reference levels of knowledge and skills that all students should acquire during their studies.

Due to their wide scope, quality assurance frameworks seldom provide detailed prescriptions on how to conduct student assessment in different degree programmes. Besides, external quality assurance processes do not rely on direct measurement of learning outcomes acquisition by students but rather on institution self-reports, site visits and peer-reviews (Billing, 2004^[19]). Consequently, as Ewell noted, quality assurance allowed to render the process of monitoring institutional performances “*more intentional, more focused on undergraduate teaching and learning, and far more transparent. But the goal of providing adequate evidence of student learning remains elusive*” (Ewell, 2010^[20]).

Accreditation processes are one form of external quality assurance. Governments rely on accreditation to ensure the compliance of higher education programmes or institutions with regulations or with a minimum level of quality. They rely on evaluations based on pre-determined goals and standards that lead to a formal approval through which a higher education institution, or a programme, is granted the “right to exist” (Schwarz and Westerheijden, 2004^[21]). In Germany for instance, every programme must be accredited since 1998 (Grendel and Rosenbusch, 2010^[18]). Since 2016, institutions can have their internal quality assurance systems accredited, which in turns allows institutions to self-accredit their own programmes. Similar regulation was implemented in Norway where universities have the authority to self-accredit their programmes provided that their internal quality assurance systems are positively evaluated upon audits that are conducted at least once every 8 years (EQAR, 2023^[22]). Accreditation processes rely on institutions self-reporting on several pre-determined criteria or indicators, and possible site visits (Eaton, 2015^[23]; ENQA et al., 2015^[24]).

Quality assurance regimes often rely on a mix of qualitative criteria and input-based indicators (such as the number of teachers and students, the number of teaching and study hours, etc.). They hardly ever explicitly rely on the assessment of students’ higher-order thinking skills. In all European OECD countries, external quality assurance agencies complying with the European Standards and Guidelines for Quality Assurance (ESG) have at least one criterion related to assessment to review programmes or institutions. The ESG framework stipulates that assessment methods and criteria should be published in advance, allow students to demonstrate that they acquired the intended learning outcomes and provide them with feedback. However, the ESG do not specify the skills that need to be assessed as this choice is left to higher education institutions (Manatos and Huisman, 2020^[25]).

A third type of regulation that can have a big impact on the assessment of student learning outcomes consists of large-scale, government-led and often high stakes examinations. Across the OECD, large-scale examinations are much more present at the primary and secondary levels than in higher education. The OECD Review on Evaluation and Assessment Frameworks For Improving School Outcomes identified 28 education systems that conduct a centralised standardised assessment of students at the levels 1, 2 and 3 of the International Standard Classification of Education (ISCED) (Nusche, 2016^[26]). University entrance (or school exit) examinations are one of the most prevalent types of large-scale examinations. They measure the knowledge or the skills acquired by students before attending higher education.

Only a few countries have implemented examinations to assess students' learning outcomes in higher education within or across different disciplines (for instance Brazil, Mexico and some states of the United States). One exception to this relative scarcity are licensing examinations that are conducted at the completion of higher education degree programmes. These are common across OECD countries in few disciplines (e.g., law or medical sciences). They are usually professional rather than higher education assessments.

With regard to creativity and critical thinking, the main limitation of government-led examinations is that they rarely assess students' learning outcomes in terms of higher-order thinking skills. As Nusche notes: “*The OECD Reviews of Evaluation and Assessment in 15 school systems found that national frameworks for student assessment were typically lagging behind such competency-based curricula. The curriculum might be competency-based, but the assessment system may not adequately capture many of the key objectives of the curriculum*” (Nusche, 2016, p. 11_[26]).

2.1.2. Financial support

Financial support represents a second type of policy instrument that can be used to orient teaching and assessment in higher education. Funding programmes can support the implementation of new educational and assessment practices. They can also benefit research projects on innovative practices that require further exploration.

With regard to the assessment of creativity and critical thinking, educational authorities have supported several projects across the OECD.

The European Commission has supported several projects around the fostering and assessment of learning outcomes in higher education through the Erasmus+ programme. Examples include the CRITHINKEDU project (Critical Thinking Across the European Higher Education Curricula), the CALOHEE project (Measuring and Comparing Achievements of Learning Outcomes in Higher Education in Europe) and the CREATES project (Creating Responsive, Engaging, and Tailored Education with Students). These projects all aim at advancing the teaching, and sometimes assessment, of innovation skills in higher education in different and innovative ways. The CRITHINKEDU project explored ways to better support the development of critical thinking in higher education. The CALOHEE project seeks to develop qualifications and assessment frameworks for the development and measurement of students' learning outcomes. The CREATES project studied the potential of co-creation and engaging education to foster students' innovation skills in higher education, including creativity and critical thinking.

Another example is given by the government of Ireland which, through the Higher Education Authority, launched the EUR 23 million “Higher Education Innovation and Transformation Fund” to support innovation and quality in higher education between 2018 and 2021. This programme sought to support innovative projects within higher education institutions with several objectives including, in particular, achieving better teaching quality and students' learning outcomes.

In the United States, the federal government made significant investments to improve educational assessments for both summative and formative purposes. One specific programme – the Race to the top funding – led to the investment of USD 350 million for the development of innovative computer-based assessment to evaluate student achievements, including for entrance into higher education (Bean, 2015_[27]).

2.1.3. Information

The third type of policy instrument that can be used to promote the teaching and assessment of higher-order thinking skills in higher education consists of measures to disseminate

information about innovative goals and related practices. These can take various forms such as the publication of guidelines, codes of practice or information campaigns.

A number of information policies were implemented across the OECD to promote the teaching and assessment of creativity and critical thinking, among other skills, in higher education. The QAA's Advice and Guidance on the UK Quality Code for Higher Education (QAA, 2018_[28]) is an example of policy based on information. It provides institutions with advice and guidance to implement internal quality assurance processes to improve the quality of higher education, including through student-centred teaching and the consistent assessment of learning outcomes.

Establishing education quality standards can be a way for authorities to orient teaching and assessment in higher education. Quality standards set at the system-level can be mandatory or elective. In the European Higher Education Area (EHEA), the European Standards and Guidelines (ESG) are enshrined in countries' legislation as it is necessary to comply with these standards to have their qualifications recognised in other countries of the area (Manatos and Huisman, 2020_[25]). Even when mandatory, quality standards are often articulated with a high level of generality and openness because of their system-wide scope and in order to leave room for accommodation to different institutional or disciplinary contexts. Therefore, standards are largely mediated by institutions and individuals and it is difficult to ensure that they actually drive specific types of practices. In that sense, quality standards generally stand between information and regulation types of policies.

The often non-coercive nature of higher education policies does not preclude their capacity to influence teaching and assessment practices within institutions. A study in the United States highlighted a significant relationship between strong political implication and institutional action (Ewell, Jankowski and Provezis, 2010_[29]). The authors showed that active political orientation likely induced higher education institutions to adapt their practices. Regarding assessment, state policies had an impact on institutional behaviour not only in public institutions but also in private ones. For the latter, it seems that policies had an indirect, although significant, influence through communication campaigns targeting the entire higher education sector. They concluded by noting that "*state policy—acting directly or indirectly—can indeed influence what institutions do in the realm of assessing student learning outcomes*".

The three types of policy instruments – regulation, economic means and information – are used differently across OECD countries to promote the teaching and assessment of creativity and critical thinking in higher education. The rest of this section will discuss how these competences are reflected in some recent higher education policies, both internationally and within countries.

2.2. Policy orientations at the international level

Policy orientations set at the international level to orient teaching and assessment in higher education often generally rely on three types of policy levers: general declarations, qualification frameworks and initiatives to disseminate information and stimulate exchange of ideas on good practices.

2.2.1. General declarations

Several declarations and policy agendas have been elaborated at the international level to promote the development of students' creativity and critical thinking in higher education. Two main arguments are often put forward to justify the importance of these skills. On the one hand, policies regularly highlight their key role for innovation and economic

development. On the other hand, these skills are also deemed essential for lifelong learning, active citizenship and the construction of inclusive societies.

A number of international policy agendas promoting the development of students' creativity and critical thinking skills also acknowledge the role of assessment in that process. Yet, these statements remain very generic and rarely clarify what such assessment could look like.

Several policy agendas were developed at the European level. In 2018, the Council of the European Union updated its Recommendations on Key Competences for Lifelong Learning taking into account recent trends such as digitalisation and the impact of automation on labour markets (Council of the European Union, 2018_[30]). The new framework affirms the role of creative and critical thinking skills as building blocks of key competences for lifelong learning. It also highlights the importance of validating the acquisition of competences as well as the need to update assessment methods and tools.

In 2017, the European Commission published the *Renewed EU Agenda for Higher Education* in which the role of higher education to equip students with the capacity to think critically and creatively is highly emphasised (European Commission, 2017_[31]). These skills are considered critical to promote employment, entrepreneurship and innovation on the one hand, and community engagement and social inclusion on the other hand.

The need to nurture and assess students' higher-order thinking skills has also been increasingly emphasised during the last decade with the Bologna Process and the construction of the European Higher Education Area (EHEA), covering 48 countries. Every two or three years, Ministers responsible for higher education in the EHEA meet to take stock of progress made with the Bologna Process and set priorities for the future. In 2009, they emphasised the importance of student-centred learning approaches for the development of learning outcomes (Leuven/Louvain-la-Neuve Communiqué, 2009_[32]). In 2012, Ministers encouraged higher education institutions to educate creative, responsible and critically thinking graduates for the purpose of economic growth and the sustainable development of democracies (Bucharest Communiqué, 2012_[33]). In 2015, Ministers met in Yerevan (Armenia) and reemphasised the need to foster students' creativity for entrepreneurship and innovation, and critical thinking for global citizenship and inclusive societies. They also stressed that learning should be supported by transparent learning outcomes as well as appropriate teaching and assessment methods (Yerevan Communiqué, 2015_[34]). Most recently, Ministerial Conferences of the EHEA took place in Paris in 2018 and Rome in 2020. On these two occasions, Ministers underlined the importance of nurturing students' creativity and critical thinking and building close links with research to better align teaching, learning and assessment methods (Paris Communiqué, 2018_[35]; Rome Communiqué, 2020_[36]).

Beyond Europe and the EHEA, UNESCO also promotes the nurturing of students' creativity and critical thinking. The UNESCO Education Strategy for 2014-2021 sets as one of its three broad objectives “empowering learners to be creative and responsible global citizens” and highlights critical thinking as a core skill of “Global citizenship education”.

In 2015, the Incheon Declaration was adopted by UNESCO along with education Ministers and stakeholders from more than 120 countries and other international organisations such as the World Bank, UNICEF and UNDP (UNESCO et al., 2016_[37]). Covering every education level, the declaration outlines several actions to meet the 4th Sustainable Development goal (SDG4) to ensure inclusive quality education and lifelong learning for all. Creativity and critical thinking are identified as key outcomes of quality education along with a number of other values, skills, attitudes and knowledge. The declaration puts particular emphasis on the role of tertiary education for the development of creativity and

critical thinking because of its relationship with the research function of institutions. It also highlights the necessity to provide clear definitions of learning outcomes and to undertake continuous assessment of students' progression throughout the teaching and learning process.

2.2.2. *Qualification frameworks*

Besides general agendas and declarations, quality assurance and qualification frameworks are another important dimension of international policies promoting the integration of creativity and critical thinking in higher education teaching and assessment. Such frameworks include descriptors and quality standards for different learning outcomes that students should have acquired at the time of graduation for each cycle of study (ISCED 5, 6, 7 and 8). They provide a reference to undertake quality assurance evaluations at the system or institutional level.

The European Qualification Frameworks for Lifelong Learning (EQF-LLL) and the Qualifications Frameworks in the European Higher Education Area (QF-EHEA) are amongst the most visible qualification frameworks developed internationally. International qualification frameworks were also implemented in other regions of the world, such as the ASEAN Qualifications Reference Framework (AQRF), the CARICOM Qualifications Framework (CQF) in the Caribbean, the Pacific Qualifications Framework (PQF), and the Southern African Development Community regional qualifications framework (SADC RQF).

Most international qualifications frameworks include creativity and critical thinking as important learning outcomes of students' higher education experience, even though critical thinking tends to be much more emphasised than creativity. For example, the EQF-LLL includes among its learning outcomes at ISCED level 5 “*an awareness of the boundaries*” of acquired knowledge as well as the ability to “*develop creative solutions to abstract problems*”. ISCED level 6 include learning outcomes such as a “*critical understanding of theories and principles*” and “*demonstrating mastery and innovation*”. At ISCED level 7, graduates should have developed an “*original thinking [and] critical awareness of knowledge issues in a field*” as well as “*specialised problem-solving skills required in research and/or innovation*” (European Parliament and Council, 2008_[38]).

2.2.3. *Information-based policies*

Finally, a third type of international policies rely on the dissemination of information to promote good practices with regard to the integration of creative and critical thinking skills in higher education. These gave rise to a number of initiatives such as the publication of guidelines, the organisation of international events, communication campaigns, communities of practice, etc.

One particular example of such initiative is the HEInnovate project developed through a partnership between the European Commission and the OECD. HEInnovate aims at providing higher education institutions with the opportunity to self-assess their innovative potential. By self-reporting data on different indicators of institutional performance directly on the project's website, institutions can analyse their evolution over time and identify, prioritise and plan their actions in different areas (governance, teaching and learning, internationalisation, etc.). One of these areas, “Entrepreneurial Teaching and Learning”, focuses on exploring educational innovations and nurturing student entrepreneurship. To give institutions the possibility to self-assess themselves, this objective is narrowed down into more practical learning goals including the development of students' creative thinking and tolerance for failure.

The HEInnovate framework is somewhat unique as it represents one of the rare international evaluation frameworks that is directly available to institutions and that takes creativity into account. However, the assessment component of HEInnovate is administered at the level of the institution and does not rely on student-level assessment. Its purpose is primarily administrative, not pedagogical.

The different types of policy orientations set at the international level – general declarations, qualification frameworks or information-based initiatives – often highlight the importance of developing student’s creativity and critical thinking in higher education. While these are important signals of common priorities across countries, they remain quite general and need to be transcribed into national policies and initiatives that can provide institutions and educators in higher education with more specific guidance on how to work towards this agenda.

2.3. Policy orientations at the national level

A study of the Centre for Universal Education at Brookings spanned education policy documents across 152 countries worldwide at all levels of education (Care, Anderson and Kim, 2016^[39]; Roth, Kim and Care, 2017^[40]). It shows that, beyond literacy and numeracy, creativity and critical thinking are among the most widely mentioned skills with respectively 61 and 47 countries referring to these in their national education policy documents. Yet only 17 countries mention the progressive nature of students’ acquisition of 21st century skills, i.e., considering how specific skills develop at different levels of education.

These results suggest that the need to foster creativity and critical thinking in education is a widespread concern across education systems. Yet, the absence of reference to progression levels might indicate a lack of understanding of the implications of this goal for classroom practices at different levels of education, including higher education.

Looking more particularly at the higher education sector, the large majority of systems across the OECD have adopted one or several policies underlining the importance of nurturing, and sometimes assessing, students’ creativity and critical thinking. Most system-level policies (either national or sub-national) consists of general agendas and vision statements, as well as frameworks for quality assurance. In a few cases, policies have a more direct impact on assessment as they either prescribe specific forms of assessment, regulate the organisation of system-wide examinations, or support innovative assessment models. These different types of policies are discussed in the following sections.

2.3.1. General higher education policy orientations

General policy orientations can emanate from various policy documents such as declarations, medium or long-term agendas or national strategies. These are broad in their scope and their practical implications need to be further detailed by more specific policies. Yet, they set the general framework and goals to be pursued in education systems and can have an influence on assessment practices. Numerous examples of general orientations can be found across OECD countries. For example:

- In Australia, the *Melbourne Declaration on Educational Goals for Young Australians* issued in 2008 requires that students from all levels of education become “successful learners”, “confident and creative individuals” and “active and informed citizens”. In higher education more particularly, the International Strategy for International Education 2025 sets as one of its main objectives to encourage students to be “self-directed, critical thinkers”.

- In France, the white paper on the *National Strategy for Higher Education* (2017) highlights the importance of fostering creativity and critical thinking to improve quality in higher education. These skills are considered to be key for employment, entrepreneurship, and innovation, as well as to address global challenges.
- In New Zealand, the *Tertiary Education Strategy (2014-2019)* aims at ensuring that higher education supports the development of several transferable skills, including the ability to think logically and critically. More broadly, the Strategy recognises the role of creative and critical thinking skills to meet the labour market needs and stimulate international competitiveness and economic development.
- In Poland, the *Strategy for the Development of Human Capital 2020* develops the vision of the country to improve quality in higher education and adjust higher education programmes to meet the needs of the labour market. Creativity and critical thinking are explicitly emphasised as important skills to develop in that regard.
- In the United States, primary directions for colleges and universities are given by individual states as well as regional and specialised accreditors (Banta, Ewell and Cogswell, 2016^[41]). Several policies were developed at the state-level to promote creativity and critical thinking skills in the higher education sector such as the *Texas Higher Education Strategic Plan: 2015-2030*. This strategy aims at equipping graduates from all public higher education institutions with “marketable skills”. It defines marketable skills as skills that are valued by employers and that can be used in a variety of work settings, such as critical thinking, creativity and teamwork.

In some countries, beyond recognising the importance higher-order thinking skills, policy orientations explicitly mention the role of assessment to develop students’ learning outcomes – including creativity and critical thinking – in higher education:

- In Ireland, the *National Strategy for Higher Education to 2030* repeatedly promotes the development of students’ creative and critical thinking skills, among others, to address societal needs, support lifelong learning, and foster employment. The Strategy calls for innovative approaches to student assessment, along with research-led teaching and quality assurance, to support change in higher education (Department of Education and Skills, 2011^[42]).
- In Japan, the *Third Basic Plan for the Promotion of Education* (2018) covers all levels of education with a specific focus on higher education. Enhancing students’ creativity is an overarching objective of the Plan for higher education, along with independent thinking. These are considered essential for innovation and lifelong learning in the “ultra-smart society”. For that purpose, the plan promotes the assessment of students’ learning outcomes, the improvement of assessment practices, as well as the adoption of a wider set of assessment measures.
- In Latvia, the *Regulations on the State Academic Education Standards*, adopted in 2014, underline the importance of developing creativity and specify the role of the master’s degree thesis in demonstrating students’ capacity to undertake research-based and creative work.
- In Norway, the *White Paper on Quality Culture in Higher Education* issued in 2017 promotes the nurturing of higher-order thinking skills, including creativity and critical thinking, through active learning approaches such as project work, seminars and field experience. The white paper also stipulates that assessment should foster student engagement, be grounded in research and focus on pre-established learning outcomes. That way, educational authorities expect that assessment methods

support “in-depth learning” and enable students to “achieve the set learning outcomes”.

2.3.2. Higher education qualification frameworks

Besides general policy orientations, the majority of education systems across the OECD have developed and adopted qualification frameworks in order to define the levels at which learning outcomes and competences should be fostered and assessed at different levels of higher education (ISCED 5, 6, 7 and 8).

Across the European Higher Education Area, countries have adopted national qualification frameworks in line with the European standards set in QF-EHEA. While only three European countries had developed a national qualification framework before 2005 (Ireland, France and the United Kingdom), in 2018, 44 out of the 49 countries collaborating in the EHEA had adopted such framework in their national policy (CEDEFOP, 2018^[43]; European Education and Culture Executive Agency, Eurydice, 2020^[44]). Creativity and critical thinking are repeatedly and explicitly emphasised in the majority of frameworks, at different levels of higher education (ISCED 5 to 8) as shown by the examples of Iceland (*National Qualification Framework for Higher Education*, 2007), Latvia (*Latvian Qualification Framework*, 2011), the Netherlands (*Dutch Qualification Framework*, NLQF, 2011), Poland (*Polish Qualification Framework*, 2016), Portugal (*National Qualification Framework*, 2010), Spain (*Spanish Qualifications Framework for Higher Education*, 2011), Sweden (*The Higher Education Ordinance – Qualifications Ordinance*, 2014), and the United Kingdom (with the *Regulated Qualification Framework*, 2015, and the *Framework for Higher Education Qualifications*, 2014).

Beyond Europe, a number of countries have also established the importance of creativity and critical thinking in their qualification frameworks for higher education. These skills are explicitly referred to in the *Australian Qualification Framework* (2011) as descriptors of expected learning outcomes at all levels of higher education. The *Canadian Degree Qualifications Framework* (2007) stresses the need to develop students’ critical thinking and capacity for independent and creative work in all bachelor’s programmes. In New Zealand, the national qualification framework (NZQF, 2010) requires all bachelor graduates to be able to demonstrate critical thinking. Master students, for their part, should be able to evaluate critically scientific documents and produce creative scholarly work.

The rise of qualification frameworks over the last two decades illustrates the growing attention of policy makers for the fostering of innovation skills in higher education, in particular creativity and critical thinking. Establishing qualification standards and descriptors allows to promote learning outcomes and enhance quality in higher education. Yet, they articulate very general learning outcomes and broad principles that need to be further specified and operationalised to guide the improvement of teaching and assessment practices (Coates, 2016^[45]).

In that regard, policy makers and educational stakeholders in several countries developed more specific frameworks, often by focusing on specific disciplines and domains. For example, governments in Flanders (Belgium) and Austria recently introduced reforms in the field of teacher pre-service education that takes place at the higher education level. In Flanders, a large reform of teacher education programmes was initiated in 2016 to increase quality in teacher education and improve future teachers’ competencies. The reform establishes descriptors of learning outcomes for teacher graduates at different levels (ISCED 6 and 7), which highlight both creativity and critical thinking as key skills for future teachers (Vlaamse Regering, 2016^[46]). In Austria, the New Teacher Education Scheme (PädagogInnenbildung NEU!) was introduced in 2015 with similar objectives. The

initial report that sets the main orientations for the reform highlighted the necessity to adopt higher standards of graduate outcomes, including creativity and critical thinking.

While discipline specific qualifications frameworks often allow for more precision in the definition of key competencies to be developed in specific higher education programmes, they seldom clarify the implications for pedagogical practice and assessment. In that respect, more specific policies can have a more direct impact on assessment.

2.3.3. Policies prescribing specific forms of assessment

Policies prescribing specific approaches to student assessment are generally related to quality assurance and institutional accountability. Several examples of such policies originate from the United States.

In 2006, the federal Department of Education published the Spellings Report, a strategy to improve the capacity of colleges and universities to prepare students for work in the 21st century (Commission on the Future of Higher Education, 2006^[47]). The report highlighted the need to increase the quality of learning outcomes in higher education. To that end, it called for an increased transparency and accountability in the measurement of learning outcomes and encouraged institutions to test students' critical thinking, problem solving and communication skills through standardised assessments, in particular the Collegiate Learning Assessment (CLA) and the Measure of Academic Proficiency and Progress (MAPP).

Policies prescribing specific forms of assessment in higher education were also developed at the level of individual states. In Pennsylvania, the Strategic Plan 2020 for the State System of Higher Education requires every public university to ensure that programmes equip graduates with the skills and competences they need to succeed in their life and careers, including critical thinking, communication and teamwork. The plan calls for institutions to examine innovative instruction approaches and develop strategies to redesign their courses and programmes. It also requires institutions to establish clear descriptors of expected student achievements and conduct assessments of learning outcomes, including through alumni and employer surveys.

The state of Virginia also established prescriptions for the assessment of learning outcomes in higher education through its Policy on Student Learning Assessment and Quality in Undergraduate Education in 2017. Critical thinking is highlighted as one of the four core competences that all students should acquire along with written communication, quantitative reasoning and civic engagement. To that end, the policy requires every institution to assess students' achievement in these areas. It provides further guidance for assessment including developing rigorous assessment strategies and giving preference to direct measures of student work and performance. Besides, the policy recognises the value of assessment for both formative and summative purposes as it calls for assessment strategies that generate relevant information to substantiate judgements about grades and degrees, as well as to enhance teaching and learning.

2.3.4. Policies organising assessment

A few education systems developed policies to organise and implement large-scale student assessment. These policies have the highest influence on assessment practices as they are directly conducted or controlled by the government. Nevertheless, national assessments remain very rare in higher education and, even in the few systems that adopted such policies, they represent only a small part of assessment practices conducted in the higher education sector.

From the mapping of higher education assessment policies, Brazil is the only country that developed a mandatory national assessment of learning outcomes for all higher education students. Every year since 2004, the Brazilian government has assessed the learning outcomes of undergraduate students (ISCED 6) at the start and the end of their studies through the National Assessment of Student Achievement (ENADE), as part of its system for quality assurance in higher education (SINAES). Several learning outcomes are assessed in the ENADE but creativity and critical thinking are not an explicit focus of the test (Pedrosa, Amaral and Knobel, 2013^[48]). Similar assessment programmes are under consideration in other countries, for instance in Japan and Hungary. Currently, there is no evidence that these examinations aim to assess students' acquisition of creative and critical thinking skills.

Licensing examinations are another type of large-scale assessments conducted in higher education. These are common in several countries but generally only in specific disciplines or levels, as for example the German *Staatexamen* in law, medical sciences or teacher education, or the French centralised exams for the *Brevet de Technicien Supérieur* (ISCED 5). These examinations are administered to every student graduating from specific fields of study to ensure they have the skills and knowledge required to work in a future profession. They usually focus on student proficiency in a specific domain and do not always aim at measuring students' acquisition of creative and critical thinking skills.

Postgraduate examinations organised by policy can also be administered at the entrance of a profession. These are common in many countries for applicants to positions in the public sector or to enter specific occupations (e.g. bar examinations). While these examinations can integrate elements of creativity and critical thinking, these skills are not necessarily their central focus. Besides, pre-employment or recruitment examinations are not designed to assess the learning outcomes students acquire from their higher education (rather their fit for a prospective job), nor are they systematically administered to all graduates (only applicants).

A third type of policy-driven assessment consists of university entrance (or school exit) examinations such as the Matura examinations in various eastern European countries, the French *Baccalauréat*, the *Abitur* in Germany, Lithuania and Estonia, or the College Scholastic Ability Test (CSAT) in Korea. These are the most widespread central examinations carried out across the OECD and beyond (OECD, 2013^[14]). University entrance examinations are generally mandatory and can be associated with high stakes (for example in France, Japan and Hungary) or with low stakes for students (as in Flanders, Belgium). National examinations for entrance into higher education aim at assessing students' knowledge in several disciplines, typically mathematics, science, national language, foreign language and history. Not all entrance examinations explicitly consider creativity and critical thinking although some may leave room for the expression of higher-order thinking skills, such as in Switzerland, Austria, Estonia and Lithuania, where students are required to work on, and present, a research paper or a graduation project. Furthermore, they do not measure the progression of student skills during higher education but touch upon the learning outcomes acquired in primary and secondary education (up to ISCED 4).

Student surveys represent a fourth type of policy-driven input to the assessment of learning outcomes in higher education. These are generally conducted among students and alumni to evaluate learning outcomes that are difficult to assess through testing (e.g. career prospects, complex skills, or overall satisfaction). Student surveys have been implemented in several countries across the OECD:

- In the United States, a number of states rely on the National Survey of Student Engagement (NSSE) to generate data that institutions can use to improve quality of higher education programmes (Kuh and Ewell, 2010^[2]). The NSSE aims at

measuring student engagement and learning with respect to 10 “engagement indicators”, one of which being higher-order learning.

- In Australia, the Course Experience Questionnaire (CEQ) is a national survey administered by institutions to higher education graduates a few months after graduation. The survey is built around different “scales”, including a “generic skills scale” and an “appropriate assessment scale”. The latter evaluates the extent to which assessment practices focused on higher-order learning rather than the recollection of factual knowledge.
- In Ireland, the Survey of Student Engagement was introduced by the Higher Education Authority in 2014 to better understand the experience of students during their studies, beyond the question of satisfaction. The survey considers student engagement as a driver of their ability to develop several key capabilities, including critical thinking (O’Regan and Harmon, 2016^[49]).
- In Norway, the Agency for Quality Assurance in Higher Education (NOKUT) conducts an annual student satisfaction survey (Studiebarometeret) across all higher education institutions. The survey comprises questions on students’ acquired learning outcomes, including critical thinking and innovative thinking.

While the use of student surveys can be relevant to grasp the multidimensionality of higher education outcomes, they rely on student self-report and do not involve direct testing to measure performance and achievements (Nusche, 2008^[12]). Besides, they are generally implemented for quality improvement purposes and administered at the end of study programmes, or several months after completion. Thus, student surveys have very little impact on respondents’ own learning and are seldom used for formative purposes. Their main contribution is to provide systems or institutions with indications on where they stand.

2.3.5. Policies supporting innovative assessment

Prescribing specific types of assessment, or organising central examinations, are not the only levers that policy makers can use to orient student assessment in higher education. Besides, with the goal of making more space to the assessment of creativity and critical thinking, developing and implementing such policies can be complex. Assessing higher-order thinking skills often requires designing innovative forms of assessments and ensuring their validity and reliability. Against this backdrop, a number of initiatives have been launched in several countries to support the development and testing of innovative forms of assessment.

Policies supporting the development and implementation of innovative assessment practices in higher education can take various forms. Typically, they consist of providing financial support to projects or programmes that aim at advancing the assessment of learning outcomes in higher education. The KoKoHs research programme in Germany, the experimentation of the TECO (Test sulle Competenze) instrument in Italy, the Learning Gains pilot projects in the United Kingdom, and the InTASC (Interstate New Teacher Assessment and Support Consortium) in the United States provide good illustrations of such policies.

In Germany, the “Modelling and Measuring Competencies in Higher Education – KoKoHs” research programme has been funded by the Federal Ministry of Education and Research between 2011 and 2020. This umbrella programme co-ordinated various research projects taking place within German universities to develop assessment frameworks and instruments to measure students’ progression on key competencies in higher education in a systematic, valid, and objective manner. The first phase of the project took place between

2011 and 2015 with the development of models and instruments to measure progression in different learning outcomes. It encompassed 70 projects undertaken by 220 researchers in more than 50 higher education institutions that led to 41 competency frameworks and 116 corresponding assessment instruments (KoKoHs, 2015^[50]). Although the scope of learning outcomes covered in the KoKoHs programme extends far beyond creativity and critical thinking, these skills are reflected in some of its projects (Zlatkin-Troitschanskaia et al., 2017^[51]).

The second phase of the KoKoHs programme took place between 2015 and 2020. It aimed at validating some of the previously developed instruments, developing methodological innovations in competency assessment (e.g. computer-based testing, psychometric-statistical methods, longitudinal studies), and disseminating the findings of the project. It gave rise to multiple conceptual models and corresponding measurement instruments in different domains. These were validated across 350 institutions and with more than 75 000 students. Most assessment instruments focus on both discipline specific and generic skills that are deemed relevant for students to thrive in the 21st century. The research findings and the portfolio of assessments developed as part of the programme were published in 2020 (Zlatkin-Troitschanskaia et al., 2020^[52]; Zlatkin-Troitschanskaia et al., 2020^[53]).

The Italian National Agency for the Evaluation of the University and Research System (ANVUR) has piloted assessments of students' learning outcomes in higher education. In 2012, ANVUR collaborated with the Council for Aid to Education (CAE) in an experimental study to assess Italian higher education students through an adaptation of the Collegiate Learning Assessment test (CLA+): the resulting test was named TECO. The goal of this assessment was to measure undergraduate students' levels of critical thinking and written communication to see if such assessment was feasible in Italy and comparable to the results obtained by students in other countries. The TECO assessment was administered in 2015 to more than 6 000 students across 23 higher education institutions.

The Learning Gain programme conducted by the Higher Education Funding Council for England (HEFCE) between 2014 and 2018 provides a third example of policies to support the assessment of creativity and critical thinking in higher education. The programme funded 13 projects involving more than 70 colleges and universities with the aim of developing and experimenting different ways to measure learning gains in higher education. Learning gains are understood as the improvement of students' knowledge, skills, work-readiness and personal development over the course of their higher education studies (Kandiko Howson, 2018^[54]). Assessment methods developed as part of this programme focused on higher education outcomes in several areas: soft skills, cognitive gains, employability, etc. Critical thinking was a central component of learning gains in several projects supported by the programme. More specifically, two projects adopted a similar approach to the one developed for TECO in Italy by adapting the CLA+ instrument to the English Higher Education context. Besides advancements in the understanding and measurement of learning gains, the HEFCE reported that the programme had an impact on institutional practices as some institutions endeavoured to explore further their overall approach to teaching and assessment after participating in the projects (HEFCE, 2018^[55]).

A last example of policy initiative supporting innovative assessment in higher education is given by the Interstate New Teacher Assessment and Support Consortium (InTASC) in the United States. Unlike previous examples, this initiative is domain-specific as it focuses on teacher education only. The consortium is made up of 36 state education agencies as well as national educational organisations that seek to develop common standards and shared policies to improve teacher education. Created in 1987, InTASC first focused on developing a set of "core standards" for teacher education programmes that was released in 1992 and last updated in 2011 (CCSSO, 2013^[56]). Creativity and critical thinking are

largely reflected in these core standards, both as competences teachers need to acquire (to create meaningful learning experiences and use multiple teaching strategies) and as skills they should be able to nurture through their teaching. Building on these standards, 15 member states of InTASC partnered with Education Testing Service (ETS) to develop the Test of Teaching Knowledge, an assessment of teachers' ability to meet the core standards. The test is made up of several constructed response items focusing on topics such as instructional strategies, education theories, learning needs, or teaching concepts (Darling-Hammond, Newton and Wei, 2010^[57]). The final version of the test could become a common licensing examination for beginning teachers. In addition to this test, InTASC member states recommend that teacher licensing builds on two other types of examination: a test of content knowledge and an assessment of actual practice through portfolios (CCSSO, 2016^[58]).

2.4. Conclusion of the mapping of assessment policies in higher education

Advanced-thinking skills, such as creativity and critical thinking, are key competences for tomorrow. There is a large consensus across the OECD to recognise their importance for (1) innovation, (2) lifelong learning and long-term employment of graduates and (3) active and global citizenship and openness to cultural diversity. Hence, most countries have embedded the necessity for higher education to foster students' acquisition of these skills in their political agenda. Assessment, as both a certification tool and a powerful driver of students' learning outcomes, has a key role to play in this process and needs to be considered carefully when designing and implementing policies around higher education.

Figure 1 summarises different types of policy measures to signal the importance and advance the assessment of creativity and critical thinking in higher education. As of today, most policies adopted across the OECD in pursuit of this goal consist of general orientations and qualification frameworks outlining generic standards of expected learning outcomes in higher education. Although these policies can have direct implications for assessment, they rarely explicitly refer to this aspect.

An important trend across the OECD has been the emergence of international alliances under which different countries adopt similar objectives. These have been implemented in various part of the world, as exemplified by the construction of the European Higher Education Area (EHEA) and the adoption of international qualification frameworks. Such alliances are built for different aims, including ensuring comparability of qualifications and facilitating students and professional mobility between countries. With regard to assessment, they are a way for policy and decision makers to take part in international networks of like-minded countries or institutions, share experience and learn from best practice. Because of their international scope, these initiatives are usually general in nature. They thus often need to be translated, further specified and contextualised into national policy to fully leverage their benefits for students.

Beyond general orientations, some countries have implemented large-scale standardised examinations of students' knowledge and skills. These rarely seek to measure students' level of advanced-thinking skills, including creativity and critical thinking, acquired in higher education. Attempts to measure the acquisition of these skills at a large-scale generally rely on student or graduate self-report through surveys. These instruments are not directly assessing knowledge and skills, but they can give valuable information to policy and decision makers in higher education to orient action.

The complexity of advanced-thinking skills and of appropriate methods to assess them may account for the relative low level of consideration given to these skills in large-scale examinations. For this reason, several countries implement policies to support the

exploration of innovative assessment practices in higher education. These often take the form of programmes that fund exploratory work and pilot projects.

This high level of complexity also calls for identifying the right degree of policy regulation in different contexts. When designing and implementing innovative practices, institutions and instructors are often well placed to know what could work in their context and with their students, and what would not. This explains why most policies prescribing specific types of assessment have a high level of generality – for example by encouraging performance-based assessment or the diversification of assessment methods – without being heavily restrictive. The key for policy makers lies in finding the right balance between openness and regulation as requirements or guidelines should drive the assessment of creativity and critical thinking forward while being flexible enough to leave room for institution or teacher-based innovation.

Figure 1 Summary table of policy levers to foster the assessment of creativity and critical thinking in higher education

Adopt/adapt a **general policy agenda** highlighting creativity and critical thinking as key learning outcomes of higher education, as well as the importance of designing and using assessment methods that are aligned with this goal

Main goals:

- Signal priority learning outcomes and the crucial role of assessment to the higher education sector
- Act as a starting point, and an umbrella policy framework, for the design and implementation of more specific policies and initiatives around teaching and assessment in higher education

Examples include: “National Strategy for Higher Education to 2030” (Ireland), “Third Basic Plan for the promotion of education” (Japan), “White Paper on Quality Culture in Higher Education” (Norway)

Adopt/adapt **qualification frameworks** so that they (1) include creativity and critical thinking as key learning objectives of relevant higher education programmes and (2) specify progression levels of these skills at different grades and in different domains

Main goals:

- Define specific learning outcomes to guide the design of relevant assessment methods and strategies
- Provide clear expectations and directions for assessment at different levels across the higher education system through progression levels

Examples include: NZQF (New Zealand), New Teacher Education Scheme (Austria)

Adapt **quality assurance, accreditation and evaluation schemes** to reflect the objective of fostering creativity and critical thinking in higher education. Develop, or revise existing, requirements and/or guidelines around assessment accordingly

Main goals:

- Inform or incentivize the parties in charge of assessment in higher education to reflect on existing practices and further integrate creativity and critical thinking in assessment
- Remove possible regulatory obstacles to the assessment of creativity and critical thinking

Examples include: Policy on Student Learning Assessment and Quality in Undergraduate Education (Virginia, United States), Strategic Plan 2020 for the State System of HE (Pennsylvania, United States)

Adapt **Government-led assessment initiatives** to integrate further advanced-thinking skills such as creativity and critical thinking

Main goals:

- Certify skills acquired by individuals before, during or at the end of higher education
- Signal priorities in term of expected learning outcomes to institutions and educators
- Collect information on the level of skills development to guide policy design and implementation

Examples include: School exit/University entrance examinations in Estonia, Switzerland or France, Annual student surveys in Australia or Norway, National Assessment of Student Achievement (Brazil)

Support the design and implementation of **innovative forms of assessment** to assess creativity and critical thinking, including by funding pilot research project, monitoring impact and tacking stock of progress to feed back into policy

Main goals:

- Advance knowledge on valid and reliable methods to assess creativity and critical thinking
- Disseminate best practices across the system, build capacity among higher education stakeholders, encourage reproducibility and scalability

Examples include: KoKoHs research programme (Germany), ANVUR’s TECO pilot assessment (Italy), Learning Gain programme (United Kingdom), InTASC’s Test of Teaching Knowledge (United States)

3. Practices related to the assessment of creativity and critical thinking in higher education

This second section aims at discussing the extent to which creativity and critical thinking are reflected in assessment practices across higher education institutions and systems, and how policies influence actual practices.

Across all levels of education, only a few examples of centralised examinations are conducted with the intent of assessing students' deep-thinking skills such as creativity and critical thinking (OECD, 2020^[59]; Stobart, 2021^[60]). These central examinations are not the main part of assessment and examination practices as decision making regarding assessment is highly decentralised across higher education systems in OECD countries. As highlighted in the previous section, higher education policies generally provide broad orientations to teaching and assessment without giving specific prescriptions about their implications for courses and programmes. Teaching and assessment practices therefore mainly depend on choices made at the institutional and individual levels.

Student assessment practices in higher education can be divided into two main categories:

- The first category comprises standardised tests and examinations implemented across several institutions within a region, a country or even internationally. These tests can be policy-driven or operated by private organisations. Most of them seek to measure traditional learning outcomes such as levels of disciplinary knowledge and skills. Some tests, which mainly focus on the acquisition of disciplinary learning outcomes, also include questions aimed at assessing students' deeper thinking skills. A few tests focus primarily on measuring students' higher-order thinking skills, including critical thinking. Creativity is hardly ever considered in standardised testing.
- The second category consists of all the instruments and strategies developed at the level of individual institutions, departments or instructors to measure student achievements and progressions in courses or programmes. Institution or instructor-based assessment and examination practices are very heterogeneous. Yet, they often share some commonalities and several forms of assessment (thesis, project reports, presentations, portfolios, etc.) could potentially take students' creativity and critical thinking into account, either explicitly or implicitly.

These two categories of assessment practices are further discussed in the next two parts.

3.1. Creativity and critical thinking in standardised tests

A number of standardised tests and examinations were developed in higher education systems across the OECD. Some include items aimed at assessing students' higher-order thinking skills, and more particularly critical thinking. Yet, their relevance for that purpose is sometimes called into question. An overview of standardised assessments used across the OECD is presented hereafter. A second section will discuss how these instruments can be further adapted to measure higher-order learning outcomes.

3.1.1. Overview of standardised assessments in higher education across the OECD

Standardised assessments are generally developed and offered by private, and to a lower degree public, organisations to be used in higher education institutions to evaluate students' knowledge and skills in different areas. They tend to be far more used in some countries, such as the United States, than others, for example European countries (Coates, 2016^[45]).

Some exceptions might however be pointed out, namely national university entrance – or school exit – examinations, as well as licensing examinations in particular disciplines.

Internationally, a number of initiatives emerged in the last decades to develop standardised assessments with the explicit aim of measuring student’ critical thinking, among other skills. Examples include the OECD’s Assessment of Higher Education Learning Outcomes (AHELO) feasibility study (Tremblay, Lalancette and Roseveare, 2012_[61]) and initiatives to translate and adapt the Collegiate Learning Assessment (CLA and CLA+ developed by the Council for Aid to Education) to different national education systems. Another recent international assessment of critical thinking was piloted among students in STEM education using the HEIghten Critical Thinking Assessment developed by ETS to conduct cross-country comparisons of skills acquisition at different levels of higher education and in different types of institution (Loyalka et al., 2021_[62]).

At the national level, universities can voluntarily take part in nation-wide standardised examinations in Mexico and Australia. In Mexico, the National Centre for Evaluation in Higher Education (CENEVAL) organises examinations for student admission into undergraduate (EGEL) and postgraduate programmes (EXANI-III). In Australia, the Graduate Skills Assessment (GSA) has been developed by the Australian Council for Educational Research (ACER) for institutions willing to assess the generic skills of students, including critical thinking, at the beginning and the end of their studies.

In the United States, a large number of standardised tests developed by non-governmental organisations are being used by hundreds of universities in the country and beyond. Several standardised tests include items that aim to measure students’ deep-thinking skills, including critical thinking, among other skills. Examples of those include the Graduate Management Admission Test (GMAT, from the Graduate Management Admission Council) administered in graduate business studies, the Graduate Record Examination (GRE, offered by ETS) taken by students seeking to enter graduate programmes, or the Scholastic Assessment Test (SAT, developed by the College Board) for prospective undergraduate students.

A number of standardised assessments were developed primarily to measure students’ critical thinking skills. This is the case of the CLA+ that measures higher education students’ critical thinking and written communication skills through a performance task built around real-life issues and a set of selected-response questions. Another test, the ETS Proficiency Profile (ETS-PP, formerly known as the Measure of Academic Proficiency and Progress, MAPP) assesses critical thinking along with skills in reading, writing and mathematics through multiple-choice questions complemented by an optional essay. ETS also offers the HEIghten Critical Thinking Assessment that relies on selected-response questions on short arguments or informational passages. In Mexico, CENEVAL offers an examination of critical thinking skills for students in the course of their undergraduate education (ECCyPEC). In the United Kingdom, the Thinking Skills Assessment (TSA) developed by Cambridge Assessment is used by the universities of Cambridge, Oxford and University College London for admission into some undergraduate courses. TSA measures students’ critical thinking and problem solving skills through 50 multiple-choice questions.

Standardised assessments aiming at measuring critical thinking skills have also been developed within the framework of specific academic disciplines, in particular in the medical sciences and law. In Australia, ACER developed the UMAT (Undergraduate Medicine and Health Sciences Admission Test) and the GAMSAT (Graduate Medical School Admission Test) to assist institutions in the selection of students into undergraduate and graduate medical and health sciences programmes. Both tests aim at assessing students’, or prospective students’, skills in critical thinking and problem solving. In the United States and Canada, the DAT (Dental Admission Test, developed by the American

Dental Association) and the MCAT (Medical College Admission Test administered by the Association of American Medical Colleges) both measure students' critical thinking for admission into higher education programmes. Still in the medical field, the BMAT (BioMedical Admissions Test, developed by Cambridge Assessment) is used by universities in several countries (e.g., the United Kingdom, the Netherlands, Spain) to test prospective students' skills in critical thinking, problem solving, data analysis, communication and application of knowledge. In the United Kingdom, the LNAT (Law National Aptitude Test) operated by the LNAT consortium in partnership with Pearson Education, is used for admission into undergraduate law programmes to measure prospective students' skills in comprehension, interpretation, analysis, synthesis, induction and deduction.

Overall, critical thinking tends to be much more considered than creativity in standardised assessments administered across multiple higher education institutions. From the mapping of assessment practices conducted for the current study, very few standardised assessments explicitly aiming at measuring students' creativity were identified, aside from specific assessments administered as part of research projects on creativity.

Another exception are tests designed to assess critical thinking that explicitly integrate a creativity component. This is the case of the Critical Thinking Assessment Test (CAT) developed by the Center for Assessment & Improvement of Learning at Tennessee Tech University. This institution-based tool was developed with inputs from faculty members in different disciplines to assess four skills areas identified as central to critical thinking, one of these areas being creative thinking. In the United Kingdom, the Critical Thinking Assessments developed by the private company MACAT were recently designed for international implementation, including as university entrance examinations. They are based on a conceptual framework – the PACIER model – that integrates creativity as a key dimension of critical thinking.

A few other standardised tests provide indications that might encourage students to demonstrate creative thinking without explicitly aiming at measuring this skill. One example is the ACT Scaling Test designed by ACER for undergraduate students in Australia who are required to work on an “argumentative essay”, provide original responses and demonstrate creative thinking. Another example is given by the essay section of the LNAT (Law National Aptitude Test, United Kingdom) for which students are advised to develop interesting and thought-provoking arguments by demonstrating creativity. These examples show that creativity has been integrated as part of the learning outcomes measured in a few standardised assessments, although often indirectly or implicitly.

3.1.2. Adapting standardised examinations for the assessment of students' creativity and critical thinking in higher education

Standardised assessments, when associated with high stakes for students, teachers or institutions, have a considerable impact on teaching and learning processes as they signal the types of knowledge and skills that are valued in the system (Pepper, 2011^[63]; Lucas and Claxton, 2009^[64]). Currently, most standardised assessments conducted across OECD countries do not include higher-order learning outcomes as part of the knowledge and skills they aim to assess. In systems and institutions that rely on such assessments, it is thus essential that these tests integrate creativity and critical thinking as part of their assessment frameworks and rely on clear and relevant evaluation criteria. Such adaptation of standardised assessments requires overcoming a number of limitations associated with their format and purpose.

An important limitation of standardised assessments is their restricted format. These assessments generally consist of single tests administered over a few hours during which it is difficult to fully assess complex competencies (OECD, 2013^[14]). Given the concerns for high levels of reliability, impartiality and cost-efficiency, most tests focus on a narrow set of learning outcomes, generally literacy and numeracy, which are measured through selected-response items (also known as multiple-choice questions). Several authors argued that selected-response items lack authenticity as compared to constructed-response or open-ended questions formats as students are required to select rather than generate responses. This situation does not relate accurately to real-life circumstances and the difference between the ability to recognise and the ability to generate has been largely documented (Frederiksen, 1984^[65]; Lane, 2004^[66]; Shepard, 2000^[67]; Liu, Frankel and Crotts Roohr, 2014^[68]).

Measuring advanced-thinking skills such as creativity and critical thinking calls for the use of elaborate open-ended and curriculum-embedded tasks (e.g. research projects, development of products, presentations, etc.) through which students can engage in analysis, apply knowledge and communicate their response more extensively (Darling-Hammond, 2012^[69]). In addition to increased costs in term of development and scoring, a difficulty with these types of elaborated assessments is to ensure their reliability (i.e. the comparability of results between different students) (Shavelson, Baxter and Pine, 1991^[70]; Linn, Baker and Dunbar, 1991^[71]). Ensuring reliability is essential when assessments are used for accreditation or accountability purposes (European Commission, EACEA and Eurydice, 2018^[72]; Liu, 2011^[73]).

Solutions exist to strengthen the reliability of open-ended assessments. One consists of multiplying the number of reviewers – a process known as moderation – by submitting student work to several examiners, potentially from different institutions (Kuh and Ewell, 2010^[2]). Systematic moderation processes have been implemented in various systems such as Denmark, France, the Netherlands, New Zealand and the United Kingdom (Lewis, 2010^[74]; OECD, 2017^[75]; Kuh and Ewell, 2010^[2]). A second solution could be to multiply the number of assessments undertaken by students. Some authors showed that increasing the number of assessments can lead to important gains in assessment reliability, as opposed to multiplying the number of reviewers (Hathcoat and Penn, 2012^[76]).

Beyond reliability, the validity of several standardised assessments of critical thinking is also debated in the literature. The validity of an assessment refers to its ability to measure what it is meant to measure. Some instruments lack a clear definition of critical thinking that constitute the basis of their assessment methodology. Others provide such specifications but adopt a narrow view of critical thinking as logical thinking, quantitative reasoning or the capacity to make inferences and draw conclusions. These definitions fail to consider a series of dimensions underlying critical thinking (Sternberg et al., 2011^[77]; Vincent-Lancrin et al., 2019^[78]). Several authors pointed out additional limitations such as the existence of confounding factors, for example writing skills, and the excessive length of some assessments (NPEC, 2000^[79]; Halpern, 2014^[80]; Heft and Scharff, 2017^[81]; Dominguez, 2018^[82]).

To adequately integrate creativity and critical thinking, assessment approaches need to rely on a clear definition of these skills. This implies looking beyond sole memorisation and further considering inquiry, originality and innovation (Amabile, 1983^[83]; Sternberg, 1988^[84]; Cannatella, 2001^[85]). A number of assessment solutions exist such as essays, dissertations, oral presentations, collaborative projects, student portfolios etc. As compared to selected-response items, they can present an enhanced construct validity and provide more information to assess a wider range of skills (NPEC, 2000^[79]; Nusche, 2016^[26]).

Because of these limitations, several institutions reduced their use of standardised examinations. In the United States for example, after the release of the Spellings Report in 2006, higher education leaders gathered to develop the Voluntary System of Accountability, an instrument to compare the quality of higher education programmes and institutions through the assessment of students' knowledge and skills, including critical thinking, in a standardised manner. Through this system, institutions were invited to test students, during their first year of study and at the time of graduation, through one of three standardised tests of generic skills: the MAPP (Measure of Academic Proficiency and Progress), the CLA (Collegiate Learning Assessment) or the CAAP (Collegiate Assessment of Academic Proficiency, developed by ACT) (Liu, 2009^[86]). After 10 years however, this impetus was not sustained. A survey conducted by the American Association of State Colleges and Universities (AASC&U) showed that instructors in higher education were much more likely to use alternative methods, such as rubrics applied to student work and locally developed exams, to assess student learning (Banta, Ewell and Cogswell, 2016^[41]).

Beyond institutions, some countries have also shifted away from the use of single tests based on selected-response items for certification or admission purposes. In Korea, the university entrance liberalisation policy (2008) aimed at reducing the high influence of the College Scholastic Ability Test (CSAT) for admission in higher education. The policy enabled universities to set their own admission criteria such as school records, practical skills tests or essays. In France, a recent reform of the *Baccalauréat*, the national examination every student must pass to graduate from secondary school and pursue higher education studies, has come into force in 2021. The reform puts a stronger emphasis on student ongoing assessment (internal grading conducted throughout the school year) that should account for 40% of final grades. The final examination also includes a new assessment task: the oral presentation of a project on which students will have worked during the last two years of high school. This type of task is often considered as adequate to assess more advanced-thinking skills as assessment is conducted upon an authentic performance.

3.2. Creativity and critical thinking in institution-based assessment practices

Assessment practices developed and implemented at the institutional, departmental or individual level (e.g., by central administration, faculties and instructors) represent the great majority of student assessments conducted in higher education. These institution-based practices are very heterogeneous and seldom documented. They can be determined or influenced by policy orientations established at the system-level through mechanisms described in the next section. A second section discusses the current state of institution-based assessment of higher-order learning outcomes in higher education.

3.2.1. *How policies on student assessment impact institutional practice*

Decision making processes regarding student assessment in higher education is highly decentralised in the majority of OECD countries. Policies provide general orientations and guidance but national steering is rather soft (Gaebel et al., 2018^[87]). Institutions, given their autonomy, are generally allowed to adopt their own norms for assessment and statements of expected learning outcomes (Rhoades and Sporn, 2002^[88]; UNESCO, 2015^[89]; Wu and Jessop, 2018^[1]). This is also true within institutions where faculty members usually benefit from academic freedom and can decide on the type of assessment and examination to administer in their courses. Therefore, the translation of orientations for student assessment may vary considerably between, but also within, institutions. Besides, there is often a gap between the design of assessments on paper and the actual experience they induce for

students (Knight and Yorke, 2003^[90]; Jessop, McNab and Gubby, 2012^[91]; Jessop, El Hakim and Gibbs, 2014^[92]; Wu and Jessop, 2018^[1]).

Despite their limitations, orientations set at the level of systems can bring about important changes in institution-based assessment practices. Regional and national qualification frameworks have been valuable to translate large and disorganised sets of qualifications into harmonised and structured schemes describing the main outcomes students should expect from a higher education experience (Chakroun, 2010^[93]; Coates and (ed), 2014^[8]). Defining such standards represent a necessary first step for the development of competency assessments even though qualification frameworks still lack an empirical foundation as well as domain-specific translations (Zlatkin-Troitschanskaia, Shavelson and Kuhn, 2015^[94]).

In reaction to this policy impetus, and in order to address the limits of general statements, a number of initiatives emerged to define learning outcomes at the level of disciplines, domains or professions. Among the best-known undertakings of this kind is the Tuning Process that builds on the collaboration between experts and universities to specify the generic and specific competences of higher education graduates in different disciplines and different contexts (González and Wagenaar, 2005^[95]). Originally developed at the level of the EHEA to put the prescriptions of the Bologna Process into action, the Tuning Process was then instigated in various regions and countries worldwide (e.g., Africa, China, Latin America, Russia, United States). Within the EHEA, the Tuning process led, among others, to the identification of 31 generic competences, which include the “capacity to generate new ideas (creativity)” and “the ability to be critical and self-critical” (Drudy, Gunnerson and Gilpin, 2008^[96]).

Initiatives like Tuning are a significant step towards the establishment of clear and measurable standards of complex competences to guide teaching and assessment in different disciplines. Moreover, as they directly involve academic stakeholders in the definition of competences and learning outcomes through collaborative processes, their outcomes are more likely to be accepted and harnessed by institutional leaders and faculty members. Nevertheless, these processes seldom reach the stage of collaborative design of assessment methods and rather focus on advancing best practice guidelines or case studies (Coates, 2016^[45]).

Going one step further, other initiatives illustrate the mechanisms through which policy orientations translate into institution-based assessment practices. These consist of programmes or projects specifically oriented towards the collaborative design of assessment tools. One example of such tools are assessment rubrics that provide scoring guidelines and reference points to assess students’ performance. Rubrics are particularly adapted for the assessment of complex and multi-dimensional competences as they allow to place a greater emphasis on understanding rather than memorisation and can be applied to a wide range of performance tasks (Oakleaf, 2008^[97]). Rubrics for the assessment of various skills were developed in a number of institutions and systems across the OECD. For examples, the VALUE rubrics designed by the AAC&U (Association of American Colleges and Universities) in the United States were developed to assess student progression with regard to 16 different learning outcomes, including critical thinking and creative thinking. At the OECD, the Centre for Educational Research and Innovation (CERI) also worked with institutions from various countries to develop and trial conceptual and assessment rubrics for creativity and critical thinking.

Besides scoring rubrics, other collaborative processes were initiated to develop shared assessment instruments. These undertakings have taken place at very different scales (from local to international) and focused on different outcomes (e.g., discipline specific knowledge and skills, generic learning outcomes, etc.). The KoKoHs programme

implemented across multiple institutions in Germany is one example of such initiative taking place at the national level. Another example is given by the collaboration between institutions in the Netherlands and the United States to design and trial common assessment instruments in medical sciences (Schuwirth and van der Vleuten, 2012^[98]; Freeman et al., 2010^[99]).

Another project has been developed at the international level to support competency assessment in higher education institutions: the project on Measuring and Comparing Achievements of Learning Outcomes in European Higher Education in Europe (CALOHEE). CALOHEE aims at enhancing the work started during the Tuning process since 2000, by developing competency frameworks and assessment instruments for learning outcomes in different disciplines (civil engineering, teacher education, history, nursing and physics). In addition to “qualifications reference frameworks”, “assessment reference frameworks” for each of these disciplines were designed by teams of field specialists and stakeholders (alumni and employers) and published by the end of 2018. Going beyond general descriptors of qualifications, these frameworks seek to establish measurable learning outcomes statements as well as examples of good practice of learning, teaching and assessment methods.

Critical thinking and (albeit to a lesser extent) creativity are largely reflected as core competencies in the CALOHEE reference frameworks: critical thinking is embedded in the expected learning outcomes of all disciplines while creativity is explicitly mentioned in the assessment frameworks for teacher education, history and physics. According to the project’s co-ordinating team, the current set of assessment frameworks are valuable to provide guidance for course design and delivery, as well as new principles for quality assurance at the level of programmes. Ultimately, the ambition of the project is “*to develop a transnational multi-dimensional assessment model, which allows for actual measuring and comparing of learning, while taking into account the specific mission and profile of each degree programme within its cultural and academic context. This model should offer sets of consistent test formats and items which make it possible the assessment of deep knowledge and understanding, as well as high level skills.*” (Wagenaar, 2018^[100]).

3.2.2. What we know about institution-based assessment practices

Little is known about institution-based assessment practices because these are very heterogeneous and sparsely documented. Two types of initiatives allow collecting evidence on student assessment within institutions: national and international survey and more specific research project.

National and international surveys

Some surveys have been conducted in the recent years to explore the evolution of teaching and learning practices in higher education. Two surveys administered by the AAC&U and the EUA (European University Association) are particularly interesting in the context of this paper as they provide valuable information about the current trends in assessment of learning outcomes in higher education. Moreover, they were administered at different points in time during the last two decades, therefore allowing for the comparison of results over time. The last AAC&U survey was conducted in 2015 among 1 001 higher education institutions in the United States with responses from 325 academic officers (Hart Research Associates, 2016^[101]). The most recent EUA Trends survey was conducted in 2017 and collected responses from 303 higher education institutions in 43 education systems across the EHEA (Gaebel et al., 2018^[87]).

Both surveys highlight that a growing number of institutions across the United States and Europe have adopted and implemented a set of learning outcomes for their students, and that this practice has become generalised. A large majority of respondents to the AAC&U survey (85%) reported that they have a common set of intended learning goals or outcomes for all undergraduate students. This share was 78% in 2008. Similar results, although slightly less pronounced, emerged from the survey conducted by the EUA: 76% of respondents reported that they had set expected learning outcomes for all courses (as compared to 53% in 2010).

In the AAC&U survey, critical thinking is widely recognised as a key skill to be nurtured in higher education. Within the group of institutions which have a common set of learning outcomes for all students, almost all of them (98%) adopted “Critical thinking and analytic reasoning skills” as a central learning outcome of their programmes. Creativity is not explicitly addressed by institutions although it might be included in other learning outcomes such as “Research skills and projects” which was adopted by 75% of this group of respondents and is sometimes covered as a dimension of critical thinking. The EUA survey does not address the nature of the learning outcomes adopted by institutions.

The surveys also examine the implications of this shift of perspective for teaching and assessment practices. In the EUA survey, the great majority of respondents that reported having adopted a learning outcomes approach also report that this led to the revision of course contents (91% of these institutions) and of assessments and examinations (88%). This can however be challenging. For a number of respondents, translating learning outcomes in curricula had caused problems (41%) or was still causing problems (22%). The revision of assessments towards a better alignment with learning outcomes is also challenging as the majority of institutions either had experienced problems (34%) or were still experiencing problems (32%) with this task.

From the AAC&U survey, 87% of institutions reported that they assess students’ learning outcomes, and 67% do so cumulatively across multiple courses. Furthermore, the survey investigated the methods used to assess students’ acquisition of learning outcomes. Among the institutions assessing cumulative learning outcomes, the large majority (91%) reported using rubrics applied to samples of student work while a fewer proportion (38%) rely on standardised tests of general skills developed by other organisations. These results indicate a change in institution-based practices for the assessment of learning outcomes as, in 2008, a smaller share of institutions reported using rubrics (77%) while a higher proportion was relying on standardised testing of general skills (49%).

Within AAC&U member institutions using rubrics to assess student’s cumulative learning outcomes, 42% used the common rubrics developed by the association (the VALUE rubrics), namely 28% of all institutions. Among AAC&U member institutions that used the VALUE rubrics, the rubric for critical thinking was the most widely used (71%, i.e., 20% of all AAC&U member institutions) while the rubric dedicated to creative thinking was used by nearly one in five institutions using the VALUE rubrics.

Research projects

Besides large-scale surveys as those conducted by AAC&U and EUA, several research projects sought to investigate the nature of institution-based assessment practices. Yet, evidence with regard to the consideration given to the assessment of creativity and critical thinking – and to the approaches used for that purpose – remains very scarce.

In the United States, the American Council on Education, the Association for Institutional Research and the National Institute for Learning Outcomes Assessment partnered to develop an inventory of resources designed to assess institutional effectiveness: the

Measuring Quality Inventory (Borden and Kernel, 2012_[102]). The Measuring Quality Inventory currently include more than 250 items of different categories: assessment instruments, software tools and platforms, benchmarking systems, etc. Student assessments and examinations represent the majority of items. In its latest version, the inventory catalogues around 15 instruments that intend to assess students' critical thinking skills. These consist of surveys, standardised tests (such as the CAAP, the ETS-PP or the CLA+), rubrics (the VALUE rubric and the Holistic Critical Thinking Scoring Rubric) and a series of tools designed specifically to assess critical thinking (e.g., the California Critical Thinking Skills Tests Family, the Watson-Glaser Critical Thinking Appraisal, the Critical Thinking Assessment Test of Tennessee Tech University, etc.). While this inventory is useful to provide an overview of the different types of tools and practices that exist to assess students' critical thinking – even though it is primarily focused on the context of the United States – it does not provide indications on the extent to which such resources are actually used within institutions. Besides, no resource for the assessment of creativity is included in the Measuring Quality Inventory apart from the dedicated VALUE rubrics.

In Europe, the CRITINKEDU project conducted interviews among 53 higher education teachers from 11 different institutions and 9 different countries to better understand how they foster and assess critical thinking with their students (Dominguez, 2018_[82]). Out of the 53 teachers interviewed, 47 did not make reference to a particular tool or criteria for the evaluation of critical thinking skills while the other 6 were relying on specific tests or rubrics. This finding led the project co-ordinators to highlight the lack of data regarding how instructors in higher education measure students' critical thinking.

Overall, the consideration given to higher-order learning in higher education teaching and assessment is difficult to appraise as institution-based practices are poorly documented. Focusing on assessment, some resources to measure critical thinking have been developed and publicised; creativity is hardly ever explored. This does not mean that these skills are sparsely considered in higher education as a number of existing practices (dissertations, projects, thesis, etc.) could include room for their expression and assessment, even implicitly. Currently though, there is too few evidence to claim with sufficient certainty that these skills are appropriately taken into account in institution-based assessment.

3.2.3. *Summary*

Assessment practices in higher education can be divided in two categories: large-scale standardised assessments administered across several institutions (at the system-level or internationally); and institution-based assessments designed and implemented directly within institutions.

Large-scale standardised assessments can assess different types of learning outcomes. There are generally used for admission or licensing processes. Currently, most of them seek to assess traditional domain-specific learning outcomes in the form of disciplinary knowledge and skills. Yet, some standardised assessments also include items to assess deeper thinking skills. A few standardised assessments were designed primarily to assess students' critical thinking (for example the CLA+ and the HEIghten Critical Thinking Assessment). In this last group, some assessments include creativity as a dimension of critical thinking (i.e., the CAT and MACAT's Critical Thinking Assessments).

The capacity of standardised instruments to measure advanced-thinking skills such as creativity and critical thinking is limited by their format that can prevent the use of sophisticated assessment approaches to provide information about students' higher-order thinking skills. Yet, standardised assessments often have a strong influence on teaching and learning because they signal the types of knowledge and skills that are valued. In systems or institutions that rely on standardised assessments for admission or certification purposes,

incorporating creativity and critical thinking as an important focus of these instruments could substantially drive the fostering and acquisition of these skills in higher education.

In contrast to large-scale standardised assessments, institution-based assessment practices are developed and implemented directly by instructors or at the level of a department or an institution. This second category of assessment practices is a very heterogeneous group, comprising course examinations, student project evaluations, thesis, presentations, portfolios of student work, etc. It represents the great majority of assessments conducted in higher education across OECD countries.

Policy makers at the system-level can support the integration of advanced-thinking skills in institution-based assessment practices in different manners. A promising way is by incorporating these skills into qualification frameworks in different disciplines and developing aligned assessment tools. Examples of such initiatives are the KoKoHs programme in Germany, the CALOHEE project in Europe, and the assessment rubrics developed at national or international levels such as the VALUE rubrics in the United States and the OECD rubrics for creativity and critical thinking. These initiatives can hardly rely on policy makers only. Because of the largely decentralised nature of decision making around assessment in higher education, building on collaboration between higher education stakeholders is a key lever of acceptability and engagement of all parties in such processes.

Finally, it is important to note that despite a number of national or international surveys, most institution and instructor-based assessment practices are not systematically monitored and remain scarcely documented across OECD countries. While several commonly used assessment practices in higher education can be conducive to the development and measurement of creativity and critical thinking (e.g. thesis, research project, etc.), it is difficult to know whether and to what extent it is actually the case. Collecting this information could provide policy makers with meaningful information to support institutions and faculty members in higher education to foster and assess students' creativity and critical thinking.

4. Future perspectives for the assessment of creativity and critical thinking in higher education

The analysis of policies and practices related to the assessment of creativity and critical thinking in higher education allowed identifying several policy orientations and assessment initiatives across the OECD. At the present time however, the incorporation of deeper thinking skills into higher education assessment remains limited and insufficiently documented. Several recommendations for policy and decision makers in systems and institutions can be drawn from this analysis to further support the fostering and assessment of creativity and critical thinking in higher education. These are summarised below.

4.1. Providing system-wide policy orientations

As highlighted in the first section of this paper, an important way to promote the assessment of creativity and critical thinking in higher education is to adopt general policy orientations that clearly and explicitly set this objective. Many countries across the OECD have already made progress on the declarative dimension as they adopted national strategies, published White Papers or joined international declarations to promote this agenda. Several countries also incorporated the need to equip students with advanced-thinking skills, including

creativity and critical thinking, into qualification frameworks and competency standards for graduates of higher education programmes.

Although declarative policies are general in nature and need to be translated into more operational strategies, they provide overarching guidance to higher education stakeholders as well as umbrella frameworks for the design and implementation of more specific policies and initiatives. Articulating the objective of fostering and assessing students' creativity and critical thinking into general higher education policy at the system-level is thus the first step to be taken in systems that seek to advance this agenda.

4.2. Ensuring alignment at all levels

Education research has shown that it is critical for assessment to be aligned – or constructively aligned – with educational goals and teaching practices (Biggs, 1996_[103]). Elements of a course are aligned when the teacher define a set of clear learning objectives, design instruction methods to achieve these objectives and adopt assessment approaches that measure students' progression with regard to the same learning objectives (Heijltjes, Van Gog and Paas, 2014_[104]; Marin and Halpern, 2011_[105]; Wiggins, 1998_[106]; Heft and Scharff, 2017_[81]).

The importance of alignment is not limited to educational practice but should be considered at all levels of the system, from overarching policy orientations to local instruction and assessment methods. An important misalignment in most higher education systems today lies between qualification standards expressed by governments in term of higher-order thinking skills on the one hand, and student examinations focusing on the sole acquisition of content and procedural knowledge on the other hand (Looney, 2011_[107]; OECD, 2013_[14]). Practitioners and policy makers in higher education should aim at ensuring that assessment practices are aligned with qualifications and competency standards.

Policies impacting assessment in higher education can be diverse. Governments can administer mandatory assessments, regulate how assessments should be conducted in programmes, incentivise specific institutional practices through accreditation and evaluation, or fund projects to innovate assessment practices. System leaders should align all types of policy with the objective of fostering creativity and critical thinking and make sure that assessment practices include these skills as part of their dimensions.

4.3. Adapting assessments administered at a large scale

Centralised assessments provide a powerful incentive to institutions, teachers and students to orient their behaviour and focus on securing good results in these assessments (Lucas and Claxton, 2009_[64]; Pepper, 2011_[63]; OECD, 2013_[14]; Arum and Roksa, 2011_[4]; Wu and Jessop, 2018_[1]). When associated with high stakes, these assessments signal the type of knowledge and skills that are valued in the system and tend to frame the scope of topics covered during instruction, acting as “hidden curricula” (Nusche, 2016_[26]).

Beyond their signalling effect, assessments administered at a large scale also represent examples of strategies that can inspire assessment practices developed and implemented by institutions or teachers. In that way, they set the tone for institution-based assessment practices. Governments, because they administer, control or make these assessments mandatory, thus have the responsibility to lead by example.

For these reasons, government-led assessments should be adapted to integrate critical thinking and creativity in their dimensions. Because of their exemplary nature, the adaptation of assessments should not be limited to those administered in higher education but encompass other assessments such as school exit or entrance examinations for specific

professions. This also applies in systems where large-scale standardised assessments are commonly used by institutions for certification or admission purposes without governmental regulation or oversight. In that case, governments can ensure that enough standardised instruments including creativity and critical thinking as part of their dimensions are available to higher education institutions.

4.4. Providing central support to the development of creativity and critical thinking

As assessment is intrinsically tied to other educational practices such as defining learning objectives and elaborating instruction strategies, policies designed to promote the inclusion of creativity and critical thinking in assessment practices do not necessarily need to focus solely on assessment. Policies providing support to build general educational capacity in institutions and across higher education systems can have an indirect but substantial impact on institution-based assessment practices.

At the level of higher education institutions, several researchers have reviewed teacher-made assessments and noted that these were mainly measuring memorisation and recall of content knowledge rather than higher-order learning (Crooks, 2008^[108]; Black, 1993^[109]; Black and Wiliam, 2007^[110]; Harlen, 2007^[111]; OECD, 2013^[14]). Other authors studying assessment practices in higher education also emphasised that teachers sometimes lacked the pedagogical knowledge to foster and assess critical thinking (Dominguez, 2018^[82]; Abrami et al., 2015^[112]).

Policy can play an important role in addressing this situation by regulating, promoting or supporting teacher professional learning programmes. These programmes can take many forms: from pre-service education to in-service training and teachers' participation in innovative education projects. They are very valuable to equip faculty members with the knowledge and skills necessary to set clear learning objectives and elaborate aligned instruction strategies and assessment approaches. In that way, professional learning programmes can provide teachers with relevant tools to incorporate the development of students' creativity and critical thinking alongside content and procedural knowledge in all the dimensions of course delivery, including assessment – for more information on how to design and implement professional learning programme to foster these skills, see Saroyan (2022^[113]). Some examples of promising instruction and assessment practices identified by researchers for the development of creativity and critical thinking are highlighted in **Error! Reference source not found.**

Box 4.1. Insights from education research on relevant practices to foster and assess creativity and critical thinking with students

There is a large consensus among education researchers that the assessment of creativity and critical thinking should be different from the traditional assessment of content knowledge. The literature highlighted several approaches that could benefit practitioners seeking to assess these skills.

An example of relevant instructional and assessment practice lies in setting explicit and clear statements of learning goals for the development of creative and critical thinking skills (Abrami et al., 2008^[114]; Heft and Scharff, 2017^[81]; Dominguez, 2018^[82]). In a meta-analysis, Behar-Horenstein and Niu reviewed several instructional methods integrating critical thinking either explicitly or implicitly. They noted that implicit instructional methods yielded the lowest probability of finding significant growth in students' critical thinking, as compared to approaches that choose to explicitly designate critical thinking as a learning objective of instruction (Behar-Horenstein and Niu, 2011^[115]).

Several authors also highlighted the importance of using assessment not only to certify skills acquisition but also, and most importantly, for learning purposes (Marton and Säljö, 1976^[116]; Sadler, 1989^[117]; Black and Wiliam, 1998^[118]; Nicol, 2010^[119]; Nicol and MacFarlane-Dick, 2006^[120]; Boud, 2000^[121]; Gibbs and Simpson, 2004^[122]; Hattie, 2009^[123]; Sambell, 2016^[124]; Wu and Jessop, 2018^[11]). Assessment can support the development of students' advanced-thinking skills, including creativity and critical thinking, as they allow teachers to provide students with feedback. Feedback has been identified as an important trigger for improvement of learning when it is precisely stated and clearly understood by students, immediate, supportive and task-focused (Butler, 1988^[125]; Sadler, 1989^[117]; Fink, 2003^[126]).

A third example of promising assessment strategy consist of increasing the number of assessments conducted during a module or programme and diversifying their formats. Research has shown that multiple assessment instruments administered at regular intervals during course delivery are required to fully capture the complex reality of student learning and progression of advanced-thinking skills (Garfolo and L'Huillier, 2015^[127]; Valencia, 1990^[128]; Perry and Southwell, 2011^[129]; McWilliam, 2009^[130]; Ritchhart, 2015^[131]; Freeman et al., 2014^[132]; Bourke, 2018^[133]; Looney, 2009^[134]). Conducting multiple assessments is also a way to provide students with "multiple cycles of practice and feedback" (Heft and Scharff, 2017^[81]) that enable them to self-reflect and improve on the desired skills (Bok, 2006^[3]; Fink, 2003^[126]; Wiggins, 1998^[106]).

4.5. Piloting innovative assessments and disseminating promising practices

Researchers have developed several tests to measure students' creativity and critical thinking. Despite these advances, there is still a need for more empirical findings to support assessment in higher education toward a better integration of creativity and critical thinking skills (Egan et al., 2017^[135]; Dominguez, 2018^[82]; Zlatkin-Troitschanskaia, Shavelson and Kuhn, 2015^[94]). To advance this agenda, policy makers can support innovative projects in higher education to pilot and disseminate new assessment approaches to assess creativity and critical thinking.

Instruments developed by researchers to assess creativity generally consists of psychometric measures that focus on the output of creative processes in term of fluency (number of ideas), flexibility (number of categories of responses), originality and elaboration (Cropley, 1997^[136]; Plucker and Renzulli, 1999^[137]; Plucker and Makel, 2010^[138]; Blamires and Peterson, 2014^[139]). A few experimentations were also conducted with a focus on assessing students' creativity for admission into higher education, such as The Rainbow project (Sternberg, 2006^[140]) and the Kaleidoscope project (Sternberg, 2009^[141]) in the United States.

A number of tests were also developed to measure student's critical thinking (Watson and Glaser, 1980^[142]; Halpern, 2010^[143]; Facione and Facione, 1992^[144]; Facione, Facione and Giancarlo, 1992^[145]; Ennis, Millman and Tomko, 1985^[146]). Most of them are domain-general although some tests focus on specific fields (e.g., medical and nursing). These assessments are designed around a number of subskills students are supposed to master in order to become critical thinkers. Beyond tests, other methods to assess creativity and critical thinking using scoring rubrics and calibration processes for scoring represent relevant alternatives to standardised approaches.

Policy can support research initiatives to build a robust knowledge base around the assessment of creativity and critical thinking in higher education. Beyond piloting innovative instruments, an important policy lever lies in the development of central teaching, learning and assessment resources, and disseminating these to inspire institutions and teachers. To do so, system leaders can partner with education experts to develop resources. Another solution consists of establishing communities of practice bringing teachers together to identify and document promising approaches in different domains and provide physical and virtual spaces for sharing resources, ideas and experiences. With adequate measures to scale and systematise the sharing of knowledge, such initiatives can prove very beneficial to innovate assessment practices throughout the system.

4.6. Setting up a monitoring and evaluation strategy

A final recommendation that can be drawn from the mapping of assessment practices and policies in higher education across OECD countries consist of building a clear picture of where systems stand and a plan of action to further support the integration of creativity and critical thinking into educational practice. For that purpose, it is essential that system leaders define clear methodologies and timelines to monitor progress and close the gap between aspirations and reality.

A first approach to consider consists of collecting and documenting information on the adoption of creativity and critical thinking assessment practices in higher education systems. This can be done by mapping the different types of centrally administered and institution-based assessments, collaborating with quality assurance agencies to gather information on assessment practices implemented within institutions, or surveying representative samples of higher education teachers and institutional leaders on their assessment strategies.

A second approach to monitor and evaluate progress would be to directly assess large cohorts of students focusing on advanced-thinking skills, including creativity and critical thinking. This would require the development of relevant, valid and reliable assessment approaches and evaluations would need to be repeated at regular intervals in order to get a clear view of progression over time. Beyond monitoring purposes, such an initiative could inspire assessment practices implemented within institutions and signal the types of knowledge and skills that are valued in the system, thereby supporting the teaching and learning of creativity and critical thinking skills in higher education in many ways.

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