Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development

15-Sep-2016

_____

English - Or. English

DIRECTORATE FOR EDUCATION AND SKILLS
CENTRE FOR EDUCATIONAL RESEARCH AND INNOVATION (CERI) GOVERNING BOARD

FOSTERING AND ASSESSING STUDENTS' CREATIVITY AND CRITICAL THINKING IN HIGHER EDUCATION

Workshop Summary Report

20-21 June 2016
OECD Conference Centre, Room D, Paris, France

On 20-21 June 2016, the OECD Centre for Educational Research and Innovation (CERI) organised an international seminar on "Fostering and assessing students' creativity and critical thinking in higher education".

This document summarises the seminar discussions.

The objective of the seminar was to provide a forum for peer learning on (1) pedagogies used to promote student's innovation skills, including creativity and critical thinking; (2) assessments used to evaluate creativity and critical thinking; (3) progression levels in the acquisition of these skills; and (4) institutional conditions for creativity and critical thinking to be fostered in higher education. Beyond peer learning, the seminar aimed to discuss whether a common, international framework and language could be applied across all levels of formal education, including higher education. The seminar further envisaged a discussion on the feasibility of launching an international controlled pedagogical intervention similar to the one currently coordinated by the OECD in primary and secondary education.

Stéphan Vincent-Lancrin, EDU/IMEP, Senior Analyst and Project Leader: Stephan.Vincent-Lancrin@oecd.org; Almedina Music, EDU/IMEP, Analyst: Almedina.Music@oecd.org

JT03400653

TABLE OF CONTENTS

Highlights of the discussion

In recent years, tertiary education institutions have designed programmes based on new pedagogies with the explicit objective to stimulate students' innovation skills, including creativity and critical thinking. The discussion at the seminar identified some key elements that should inform future action aiming to enhance creativity and critical thinking in higher education.

Creativity and critical thinking: what do we mean?

- While there is consensus on the importance to foster creativity and critical thinking in higher education, stakeholders may not always have the same understanding of their meaning. If at all, practitioners across cultures as well as higher education institutions and domains often define these skills differently. To foster critical thinking and creativity in higher education, it may be necessary to identify the most important practical elements and provide faculty with adequate guidance on teaching practices. Any definition of creativity and critical thinking, however, needs to be sufficiently broad to accommodate potential cultural differences and diversity among institutions.

Pedagogies to promote student's creativity and critical thinking skills and their assessments

- There is a wide range of pedagogical instruments that are designed to foster student's creativity and critical thinking skills depending on the learning objective and whether the higher education institution applies a domain-specific or university-wide approach. Generally, pedagogies to foster creativity, especially in the field of engineering and business studies, can be more easily applied also because the assessment of critical thinking is more complex. Students are assessed with standardised or formative tests, depending on the context. At the higher education level, assessments need to be more flexible, include a tool for self-assessment and leave sufficient room for feedback.

Institutional conditions for creativity and critical thinking to be fostered at higher education level

- The current academic structures do not necessarily provide a suitable ecosystem to promote creativity and critical thinking. As the focus in higher education institutions is on research rather than on teaching, university management need to further encourage these types of activities. Also, faculty often do not have the necessary skills to teach creativity and critical thinking in a domain and therefore any initiative aiming to foster creativity and critical thinking needs to include a major component on teacher training.

Launching an action research project in higher education

- Participants welcomed the opportunity of launching an action research project in higher education co-ordinated by the OECD in line with what is ongoing at the primary and secondary education level. While there is a lack of widely accepted pedagogical instruments, it was suggested to start the process with a more pragmatic, project-based approach in a specific domain focusing on first year university students. The main challenge for this type of project, however, is to identify a sustainable economic model.

- Participants expressed the need for two other types of support: additional seminars and documentation. Seminars on this topic are useful as they provide a platform for exchanges between higher education institutions and policy makers. Participants further asked the OECD Secretariat to document successful models and good practices on fostering and assessing creativity and critical thinking in higher education.

SUMMARY REPORT

International seminar

"Fostering and assessing students' creativity and critical thinking in higher education"

OECD Centre for Educational Research and Innovation (CERI)

20-21 June 2016
Paris, France

The seminar presented and discussed approaches and programmes designed to stimulate students' creativity and critical thinking in higher education. Invited speakers included higher education representatives, government officials and experts with experience in pedagogical approaches and assessments aiming to foster and measure these skills in higher education. The seminar convened about 35 participants from Canada, Estonia, Finland, France, India, Israel, Japan, Korea, Netherlands, PR China, Slovenia, Spain, Thailand, United Kingdom, and the United States.

The objective of the seminar was to provide a forum for peer learning on (1) pedagogies used to promote student's innovation skills, including creativity and critical thinking; (2) assessments used to evaluate creativity and critical thinking; (3) progression levels in the acquisition of these skills; and (4) necessary institutional conditions for creativity and critical thinking to be fostered in higher education. Beyond peer learning, the seminar aimed to discuss whether a common, international framework and language could be used across all levels of formal education, including higher education. The seminar further envisaged a discussion on the feasibility of launching an international controlled pedagogical intervention similar to the one currently coordinated by the OECD in primary and secondary education.

The workshop was organised by the OECD Centre for Educational Research and Innovation (CERI) as part of its Innovation Strategy for Education and Training.

Day 1

The first day of the seminar focused on presentations and discussions of different types of pedagogies and assessments that aim to foster students' creativity, critical thinking and other innovation skills in higher education. Presentations and discussions further concentrated on teaching and learning practices, assessments and exams given to students, but also the vocabulary used to define and assess progress in the acquisition of these skills.

Session 1: Welcome and setting the scene

In her opening remarks, Montserrat Gomendio, Deputy Director for Education and Skills, highlighted that fostering creativity and critical thinking skills is a priority for the OECD and provided an overview of OECD initiatives and projects contributing to this agenda. There is a growing consensus that formal education should foster students' creativity and critical thinking skills to help them succeed in modern, globalised economies based on knowledge and innovation. Business surveys reveal that creativity and critical thinking skills are highly demanded by employers reflecting a rapidly changing employment landscape to which education systems need to adapt.

Montserrat Gomendio mentioned that the OECD survey on adult skills (PIAAC) examines the skills use in the workplace and added that an employer questionnaire may be part of the survey in the next survey round. The OECD Education and Skills Directorate regularly consults with employer representatives on related projects and encourages their active participation and involvement.

Initiatives by the OECD Directorate for Education and Skills with regular involvement by employer representation include the work on lifelong learning and national skills strategies. The OECD generally encourages employer representatives to participate in all projects, alongside many other stakeholders.

In his presentation, Stéphan Vincent-Lancrin (OECD CERI) highlighted the link between creativity and critical thinking and highlighted some findings of the CERI project on education and skills for innovation. He also introduced the lead questions for the seminar:

- What do we mean when we talk about creativity and critical thinking in the higher education context?

- Can we categorize pedagogies trying to foster students' creativity and critical thinking? What characterises such pedagogies?

- How are students assessed to show the acquisition of these skills?

- What kind of action research aligned with the OECD project at primary and secondary school level would be helpful and feasible at the higher education level?

Session 2: Example of a university-wide plan to enhance students' creativity and critical thinking

Meredith Davis (North Carolina State University, United States) presented TH!NK, an example of a university-wide initiative that is designed to enhance students' creativity and critical thinking ongoing at the North Carolina University in the United States. Students across disciplines take TH!NK courses to explore disciplinary content through a lens of creativity and critical thinking. The study includes a training component for faculty in the use of general strategies such as analogical thinking, development of scenarios, concept maps, textual analysis, etc. and faculty adapt these teaching strategies to accommodate their disciplinary course content. To measure progress, faculty developed a common rubric for evaluating creativity and critical thinking within their discipline. Critical thinking is also assessed using the Critical Thinking Assessment Test (CAT), a standardised test developed by Tennessee Tech University (scenario-based, faculty scored, using visual, verbal and numerical information). In addition, students use a reflection instrument to capture changes in the awareness of their own thinking processes.

The university uses the results of these assessments to analyse the relationship between student achievement and class size, the relative impact of multiple TH!NK courses on students' abilities, and the effectiveness of the strategies in improving students' creative and critical thinking skills. So far, statistically significant improvement on the CAT could be identified, with the greatest gains observed in what are typically large lecture classes. Also, student reflection proved particularly valuable to the project overall and to faculty in particular.

The study is divided into two phases: the first two years (2014-2016) focused on first-year university students in general education courses. The second phase will integrate this content vertically (first to fourth year courses) in selected university majors. The study is in its third year and so far 76 faculty members have been trained, with 2231 students in the test sample. Additional students have been exposed to the teaching strategies but are not included in the test sample.

Although creativity and critical thinking is a priority for faculty, they are often not prepared to teach these skills and there was a high demand for training. Faculty received a university-funded financial compensation but it did not seem to be the main motivation for their participation in the project and others outside the sample group volunteered to undergo training without compensation. The initiative was presented as a research project and faculty were encouraged to write and publish about the project results.

In fact, especially those faculty members who were up for promotion were interested in participating. However, it was noted that filling the rubric scoresheet can be time-consuming, especially for faculty working part-time.

Session 3: Design thinking

This session discussed different pedagogical approaches to foster students' creativity inspired by "design thinking". Each speaker presented how creativity is fostered in the respective institution, and provided examples of pedagogical activities and assessments.

i.school, University of Tokyo (Japan)

Hideyuki Horii (University of Tokyo, Japan) presented the i.school education programme at the University of Tokyo that teaches students how to become innovative in multiple disciplines. i.school students are trained to be capable of defining creative subjects and independently designing solution processes when they face a complex problem. In other words, students are asked to come up with innovative ideas for products, services, business models and social systems based on 'human-centered innovation', an approach that sets the human and social issues at the core of the activity. To this end, workshops are designed to allow students to address different types of practical, real-life problems and discuss potential solutions in an interdisciplinary team.

To evaluate output ideas, a method based on analogical thinking was developed and students were also asked to self-evaluate their output. As no credit points are given for workshop participation, students that attend are generally very motivated. While creativity is at the core of the i.school educational programme, it does not emphasise critical thinking as much. Currently, a training for faculty members is being developed. The University of Tokyo co-operates on i.school with various higher education institutions worldwide and organises competitive summer programmes for international students.

Design Factory, Aalto University (Finland)

Katja Hölttä-Otto (Aalto University, Finland) gave a presentation on fostering design thinking and creativity at the Design Factory at Aalto University in Finland. In the Design Factory, creativity is fostered by:

- teaching creativity methods (lectures, workshops, applied to real problems)

- problem-based learning and open ended design tasks to encourage a more open and broad way of problem solving

- encouraging hands-on activities and experiments (prototyping, testing)

- providing adequate facilities (open 24/7, labs for all types of quick prototyping, flexible spaces for any activity, inspiring interior, etc.).

Katja Hölttä-Otto showed an example based on the "Global Innovation Project", a course in which students explore alternate solutions in a problem area, produce several increasingly more complete prototypes for a product and run through an entire Design Thinking process. A multi-disciplinary team assesses the projects by evaluating the level of creativity of the proposed solution. Regarding creativity, the assessment is about the number, novelty, feasibility and variety of the ideas (a scoresheet has not been developed). For critical thinking, the assessment evaluates the justification for decisions made during the process. Project sponsors are also asked to assess the project. Katja Hölttä-Otto emphasised that creativity

is seen as a process and it is not only the final product that is assessed. It is the creativity of the solution and the level of thinking in the process that is evaluated and failure is considered to be part of the process.

i.Center, Tsinghua University (PR China)

The third presentation of this session showed an example of fostering creativity and critical thinking at the i.Center at Tsinghua University in China. Ben Koo (Tsinghua University, PR China) explained that students at this institution are asked to be active designers of the course content. Students are invited to engage in curriculum design at an early stage and they participate in the planning and delivering of courses. Creativity is fostered by asking participants to refine the delivery mechanism, as well as the content detail of the chosen subject. Critical thinking is fostered by asking students to provide feedback on peers' work. In the process, all students are asked to present and justify their projects approaches.

As part of the assignment, students are required to write a research report. The idea is to allow students to come up with their preferred layout format, their own pictograms, and their own content structures that can best visually or structurally represent their ideas. Students are evaluated based on the feedback and suggestions for improvement they provide on their peers' design proposal.

Session 4: General discussion

The general discussion concentrated on the definition of critical thinking and creativity, assessments/exams to capture creativity and critical thinking and the differences between programme and institutional models.

Most higher education institutions that presented their approaches to foster and assess creativity and critical thinking did not rely on a specific definition while others use a very broad definition only. While faculty and other practitioners have an idea of what they understand by creativity and critical thinking, it may nonetheless be necessary to identify the most important, practical elements and provide teachers with appropriate guidance, possibly based on an agreed definition. Part of the group emphasised the need for flexible tools and definitions and argued that it may be necessary for practitioners to focus on different types of skills depending on the student (for example, some students may need to improve risk taking while others need to focus on mental flexibility). It was noted that the understanding of creativity and critical thinking may especially differ across domains and therefore agreeing on a cross-cutting approach may be difficult. Any definition of creativity and critical thinking needs to be sufficiently broad to accommodate potential cultural differences and diversity among institutions.

Most examples presented above showed domain-specific pedagogies in teaching innovation skills, focusing on the engineering field. They attempted to either mainstream the idea of creativity and critical thinking within their institutions or to create networks. Part of the group challenged the effective use and application of these pedagogies in other domains and expressed concerns about a lacking institution-wide impact.

Participants discussed the challenge of identifying resources to foster creativity and critical thinking. The above-presented projects were all resource-intensive and it is questionable whether they could be scaled up to other contexts. This issue was discussed and challenged. In the i.Center, for example, most tools come from open sources and the issue is more about the skills to use these tools than about lacking resources. In China, other less prestigious schools are already copying the i.Center model. Also, the Aalto Design Factory, started with one institution and by now there are 13 design factories worldwide and they are not necessarily embedded in top universities.

A related question is the challenge of providing equal opportunities to all students, especially in the context of an increasingly diversified student population. Providing additional courses for a selected group

of students or for a small number of institutions may further increase inequality in higher education. In Thailand, for example, higher education suffers from large discrepancies in quality and it is not clear whether all students would benefit from additional programmes. Also, some universities may struggle to develop course content that fosters creativity and critical thinking because of low capacity. In response to this issue, it was suggested that a strategy to mainstream creativity and critical thinking could be developed. The strategy would need to build on the analysis of the various impacts that educational programmes can have on learners, society, the industry, etc.

The participants discussed cultural differences among countries and challenges related to creativity and critical thinking skills. In some contexts fostering these types of skills may not be a desirable outcome. For any project that aims to promote creativity and critical thinking it is particularly important to take into account different cultural contexts and mindsets and emphasise the role of advocacy in promoting new skills in education.

Session 5: Different approaches to fostering creativity and critical thinking

McGill University, Canada

Alenoush Saroyan (McGill University, Canada) presented different pedagogical approaches undertaken at McGill University to foster students' critical thinking. She gave examples of initiatives by faculty members and those that were initiated centrally under the aegis of the McGill Teaching and Learning Services (TLS). She also described how physical spaces were being used to foster critical thinking. Examples of individual initiatives included an assignment given by a law professor which requires students to write an op-ed letter to the editor, forcing students to creatively adapt their knowledge to different forms of writing; a biology professor whose assignments force students to critically evaluate the significance of biology in the world around them by examining how accurately biology related science is depicted in news items and movies; and an urban planning professor whose assignment casts students in the role of environmental analysts who have to prepare briefs as advisor to a minister. Examples of TLS initiatives included the teaching-research nexus project, which fosters student engagement in research at the undergraduate level, learning technologies and supportive pedagogies to engage students in active learning, and *Skillsets*, a program that consists of workshops for graduate students to develop professional and soft skills. Finally, she described how newly designed physical spaces support active learning and enable students to apply their knowledge to authentic tasks, allows students to work in teams to problem-solve, and facilitates giving and receiving peer feedback. She concluded by saying that these examples signify that both faculty interest and institutional support and investments are necessary in fostering critical thinking.

HKU University of the Arts Utrecht, Netherlands

Thera Jonker presented an example of how creativity is fostered at the HKU University of the Arts Utrecht in the Netherlands. Creativity is one of the main competencies targeted at this institution and the emphasis is to enable students to put their own signature on their work (the institutions uses 'personal signature' rather than 'originality'). Teachers act more as coaches or facilitators and in many cases external experts are asked to be part of a course. To foster creativity, the institution regularly revises its course content (for students to be more reflective on their own work and also learn to provide feedback), educational design (with project education in cooperation with external parties, a multi-disciplinary approach, including the possibility of failure and risk), learning environment (with a focus on dialogue and feedback) and development of teachers (in their role as coaches). The University runs an Expertise Centre of Education where expertise in new ways of learning and teaching is developed and teachers (from University of the Arts, other universities, primary and secondary schools) are trained in interdisciplinary work, ludodidactics (education based on game principles), the development of creative competence,

assessing creative work, etc. Regarding the assessment, rubrics have not been developed yet and this is considered the most challenging task. At the university, an interdisciplinary Master's on 'Cross over Creativity' has been recently opened and validated.

Creative profiler, France

Todd Lubart presented the concept of the 'creative profiler': a measurement tool for adult creative potential in a job context (measuring both cognitive abilities and personal traits). Different factors affect creative potential (and thus achievement or talent) including cognitive factors, cognitive-affective factors (e.g. motivation and emotion) and the environment. The creative profiler produces a profile for an individual based on ten dimensions such as divergent thinking, intuitive thinking, mental flexibility, motivation to create, etc. To assess each individual, the concept relies on a 'dynamic standardisation', i.e. an individual is either located in relation to the average profile of 1) an expert group that has been constructed beforehand (in this case the expert profile serves as a goal to reach); or 2) his/her reference group in order to identify the relative key strengths and weaknesses of each person. According to this concept, the process of creation can be modelled as a complex sequence of actions, in which the profiles factors come into play. Todd Lubart explained that, for example, good students start projects by documenting and they start motivated whereas weaker students start experimenting and they are quickly stressed and frustrated. Finally, it is noted that in addition to the creative profiler approach, it is possible to assess creative potential with productions tasks which can be designed in accordance with EPoC (Evaluation of Creativity Potential).

Centre of Interdisciplinary Research, France

Francois Taddéi (Centre of Interdisciplinary Research, University of Paris Descartes, France) presented the activities that aim to foster creativity and critical thinking at the Centre of Interdisciplinary Research (CRI). Creativity and critical thinking are at the core of the programmes at CRI. Across all education levels, CRI programmes promote new educational techniques and strategies and invite students to take initiative and come up with their own research projects. The Leadership Program on "Teaching Through Research" has been created to help young researchers in life sciences develop and implement innovative educational projects. About half of students are foreign and the student body comes from various socio-economic backgrounds. In addition to diplomas, CRI relies on interviews when selecting its students and focuses on each applicant's contribution to the team.

Session 6: Entrepreneurship education approaches

This session discussed how entrepreneurship or entrepreneurial education relates to the fostering of creativity and critical thinking and what models it uses to this effect.

Creative entrepreneurial development

Andy Penaluna presented the entrepreneurial approach at the International Institute for Creative Entrepreneurial Development (IICED), University of Wales Trinity Saint David and at the Royal Society for the encouragement of Arts, Manufactures and Commerce (RSA). He emphasized that creative capacities encompass the capabilities and dispositions needed to generate new ideas and turn them into action. RSA believe that a flourishing society relies on creative thinkers, and that emerging research suggests that education has a big role to play. IICED focuses on the development of ideas through 'purposefulness', this includes applied creative thinking, opportunity recognition, problem identification and problem redefining as central concepts. Most of the work informs the enterprise and entrepreneurial learning agenda, with a focus on bringing practice into policy making. As an example, he mentioned that IICED conceptualized and led the development of the UK's Quality Assurance Agency Guidance for

Higher Education in Enterprise and Entrepreneurship, and supported the development of Education for Sustainability Guidance.

Entrepreneurial management

Isabel Sanchez (IE Business School, Spain) presented the Undergraduate Program "Entrepreneurial management" at IE Business School in Spain. Every student takes at least one course on entrepreneurship, writes a business plan either individually or as part of a group, presents the idea and competes at university level for the best project. Each student can self-evaluate her progress in the process. Isabel Sanchez illustrated the approach by explaining the 'Lean LaunchPad' course where groups of students are asked to transform an idea into a company with a viable business model. They analyse the customer delivery process, talk to potential customers, suppliers and competitors and share their knowledge with peers. The evaluation is based on the individual participation and the quality of weekly written lessons learned presentations and the peer-to-peer feedback. Entrepreneurs receive help from students in different faculties (e.g. legal advice is provided for by law students). The University is well-connected with the private sector and is part of a hub/incubator network.

Sharnbasayya Girish (Learning Links Foundation, India) mentioned that India has very specific challenges, particularly related to infrastructure, with their 32 million yearly student intake. He briefly explained an educational programme at the Learning Links Foundation where students have the opportunity to take entrepreneurship courses. Regarding pedagogical issues, India would need to have a tailor-made approach given its size.

Session 7: General discussion

This session invited representatives of universities, faculty and governments to first share some remarks from their perspective. Subsequently a general discussion followed that reflected on the first day.

Andrée Sursock (European University Association) presented the perspective of university leaders: what would rectors need to do to help advance the process? Based on the discussion so far, she highlighted that providing the right ecosystem and facilities to teachers and students seems to be the most important issue. Another crucial topic is to ensure funding and sustainability of projects. In addition, she noted that fostering diversity in universities given increasing internationalisation is key to the discussion. Students would especially benefit from activities of this type (e.g. entrepreneurship courses) if they were included starting at the very first year of university.

Jens Vraa-Jensen (European Trade Union Committee for Education and Education International) mentioned that the Bologna process is supposed to provide an inducing environment for creativity. A key issue is that success in academia depends on research output, rather than on teaching outcomes. In line with the Bologna process, he noted that mobility projects, a reassessment of the academic career and promotion would need to be further enhanced. Evaluation needs to be used as a tool to improve and not to control teaching and learning and thus contribute to further improve teaching. Quality assurance agencies could significantly contribute to this agenda.

Mateja Bercan (Ministry of Education, Science, and Sport in Slovenia) stated that the Ministry generally supports the types of initiatives presented above. Related projects are already being implemented in Slovenia. There is an ongoing project to promote entrepreneurship involving a student, a mentor at a university and a mentor in a company. She stated that in Slovenia the priority in education is on the role of teachers and their professional development.

Kristi Raudmäe (Ministry of Education and Research in Estonia) noted that while creativity and critical thinking are generally considered important topics, they are not covered in the national education

strategy. Also, while structural funds for entrepreneurship education exist, there are no specific programmes to provide funding for creativity and critical thinking projects. Higher education institutions in Estonia are very autonomous and this may be an additional challenge for implementing these types of projects.

The general discussion concerned the idea of expansion and aspects hindering mainstreaming and expansion. While all participants agreed that critical thinking and creativity are important topics in education, the main challenge is how to initiate the change and implementation. Some participants discussed the resilience of the university sector as an aspect that could discourage expansion and mainstreaming. Research is at the core in higher education institutions and therefore the university sector may be reluctant to engage in these types of projects. Even though there are many initiatives for change, long-standing structures may stand in the way. These barriers presented by 'old' academic structures would need to be addressed. The participants further discussed the 'tension' between disciplines, more precisely between arts on one hand and engineering on the other.

It was noted that there may be different needs in different types of institutions. Resources, for example, are generally more of an issue in less prestigious institutions. But an equal challenge is the student body: some (weaker) students may need additional programmes that would enable them to fully benefit from more advanced programmes, as the ones discussed in this meeting. It is important to consider how the discussed pedagogies could be adapted to support those weaker students.

A short discussion emerged on the meaning of 'good' education (21st century skills?; a stronger link with the labour market?) and whether creativity and critical thinking is simply 'good' teaching and learning. For example, many may confuse problem solving and critical thinking and therefore it is particularly important to specify what is meant with the different terms. Some participants also questioned whether there is a difference between critical thinking and thinking in general, and if so, it is not obvious what is added when referring to critical thinking. While at Aalto University, creativity is explicitly part of their programme, the understanding is much broader at McGill University. Participants mentioned that it could be the role of organisations like the OECD to help define what is meant by 'good' education.

To summarise, regarding key requirements for a successful project implementation, the participants mentioned different aspects: adequate concept and pedagogy, supporting environments and facilities in addition to the necessary partnerships and co-operation.

Day 2

The second day of the meeting discussed how students' creativity and critical thinking is or could be assessed by faculty-designed assessments or through standardised tests. The vocabulary to discuss progression levels was reviewed and discussed in light of the ongoing OECD work on fostering and assessing students' creativity and critical thinking in schooling. The meeting concluded by discussing a possible international action research to improve the quality of teaching and learning in higher education institutions in these areas.

Session 8: Assessing creativity and critical thinking

After a brief presentation of an ongoing study on the benefits of engineering education to critical thinking, this session discussed ways to assess critical thinking and creativity from a faculty and from a standardised perspective.

Prashant Loyalka, (Stanford University, United States) presented preliminary findings of a comparative international study assessing students' skills, including critical thinking and creativity in China, Russia and the United States. The study relies on nationally representative samples of universities

and students from China and Russia (with comparative data from the United States) and focuses on computing and engineering majors. Critical thinking is evaluated with the HEIghten Critical Thinking Assessment, a standardised test developed by Educational Testing Service (ETS). Creativity is assessed by 'Alternate Uses', a concept in which students are asked to generate alternate uses for common objects e.g. a newspaper. Students are evaluated based on the originality, fluency and elaboration as well as the pertinence of their ideas. In both areas, students are taking tests in the first and third year of university (baseline) and again two years after that (follow-up). Preliminary findings indicate differential levels and gains in critical thinking between countries, institutions, and different types of students. In its next steps, the study will also examine which factors in particular (institutional, faculty, instructional, curricular, student behavioural) influence the development of critical thinking and creativity skills. The study will also be extended to other developed and developing countries.

Formative assessments examples

Katja Hölttä-Otto presented a formal assessment of creativity developed in the framework of a cross-sectional and longitudinal examination with the aim of assessing the innovation capabilities of undergraduate engineering students. The study includes a concept generation exercise and the resulting concepts are scored for originality (with five possible evaluations between 'common' to 'exceptional') and their technical feasibility. A focus is put on team work as engineers usually identify solutions in a team. Katja Hölttä-Otto showed some of the student work to illustrate the assessment of the project. Findings show that curriculum seems to impact students' innovation capabilities the most. Also, one of the conclusions of the study is that individual differences in e.g. grade point averages or self-efficacy do not have an impact on outcomes, contrary to what was suggested in previous studies.

Meredith Davis presented the rubric used at North Carolina State University to formatively assess students and insisted on the fact of using rubrics as a basis for discussion and 'negotiation' with the students. Collaborating with students on the rubric is key as it encourages students to make their own judgements and allows them to better understand the ground rules. Also, it is very important to provide clear guidance on the different terms..

Participants discussed whether and what type of exams and assessments for creativity and critical thinking would be most practical and adequate in higher education. Part of the group supported the idea of using tools for self-guidance instead of summative assessments although it depends on the content that students are supposed to be taught. Some participants argued that standardised tests such as the GRE or TOEFL have proved to drive learning. If similar types of tests were used to assess creativity and critical thinking, the learning gains may be greater as compared to when using other types of assessments. Generally, participants agreed that in higher education more flexible types of assessments may be necessary to accommodate the diversity among the different domains. Also, it was mentioned that standardised tests could be less problematic for the regulated professions and developing such tests may be easier in some domains than in others.

Session 9: Discussion on OECD's project on fostering and assessing student's critical thinking and creativity in schooling

Stéphan Vincent-Lancrin presented OECD's ongoing work on fostering and assessing student's creativity and critical thinking at primary and secondary school level. The participants were invited to provide comments on the rubric on creativity and critical thinking in schooling and discuss its validity for the higher education context.

Part of the comments concerned the vocabulary in the rubric. Some found that the language used could be interpreted as having too much of a focus on businesses and product development, which may not

be suitable for primary and secondary education. The rubric could use words such as 'make'; 'context'; 'association', 'possibilities'. It is also not clear what is meant by 'relevant' or 'relevance' and it is difficult to define in the context of creativity and critical thinking.

Other comments addressed the assessment more generally. Some participants criticised the notion of sequence implied by the rubric. While for some tasks there is an element of sequencing in terms of a succeeding order of tasks (for example in product development), creativity can be demonstrated in many ways and the focus should not be about generating a number of ideas only. Especially in the context of higher education multiple solutions should be possible. Part of the group agreed that any form of assessment needs to include an element of self-evaluation.

Session 10: General discussion

The group discussed the particular challenges that persist in higher education when aiming to foster and assess and creativity and critical thinking. The current academic structures often do not allow much room for these types of initiatives. One of the repeatedly mentioned barriers is the priority setting of faculty that focuses on research output rather than on teaching. In addition to focusing on the more obvious challenge related to lacking financial resources, the universities' ecosystem would need to be adapted and modernised to promote creativity and critical thinking skills. At North Carolina University faculty received a financial compensation but more importantly, they were encouraged to conduct research on the topic which proved to be a suitable incentive. It was mentioned that rectors are indeed willing to co-operate on these types of activities and to help advance the agenda. It is important that the university hierarchy supports the activities and encourages faculty to participate.

It was noted that more discussions, and perhaps research, are necessary to identify relevant pedagogical programmes that foster creativity and critical thinking. Especially at higher education level, the learner needs to be included in the process and therefore the traditional way of simply delivering content is outdated. Initiatives that aim to foster and assess creativity and critical thinking could be seen as an opportunity to revise existing pedagogies.

Final session: Designing an action research in higher education

The final session discussed the possible designs of an international comparative action research about fostering and assessing creativity and critical thinking skills in higher education. The discussion was structured around the questions: what would it take for such an international research to be feasible? What fields? What instruments? How many institutions? What economic model?

The group generally welcomed the possibility of designing a project to foster and assess creativity and critical thinking skills in higher education. The participants discussed different options, including implementing a controlled pedagogical intervention or developing a pedagogical toolkit. The group suggested a project-based approach in co-operation with a number of institutions that would offer specific courses to interested students. For this, a domain specific approach would be most realistic as the uptake from different disciplines may vary and therefore the outcomes risk being different. It was also noted that faculties are independent from each other and this may present an additional challenge if an institution-wide approach were employed.

On the type of intervention, some participants were in favour of a more experimental approach and suggested to start the process with a pedagogical instrument that has worked elsewhere. The group agreed that overall it seems to be more important to work on creativity than on critical thinking. On the timing of intervention, participants generally agreed to work with first year university students in a specific domain and evaluate progress in creativity and critical thinking skills a year after or later.

To ensure a successful implementation of the project, teacher training would need to be a major component. While the examples above have shown that teachers are to some extent willing to co-operate, they are not trained to foster creativity and critical thinking through their teaching.

Participants also discussed the issue of sustainability. As a consensus, the group emphasised the long-term perspective and noted that for this type of project a longer time frame should be envisaged. A major challenge, however, remains in identifying a sustainable economic model for this type of project. The participants mentioned several possibilities (open call to universities, crowdsourcing model, co-operating with the creative industries) but further research is needed to ensure a suitable and sustainable business model.

The participants expressed the need for more meetings of this type, especially because they allow useful exchanges with other institutions. Participants further asked the OECD Secretariat to document successful models and good practices on fostering and assessing creativity and critical thinking in higher education. This could be used as an important basis for future research or advocacy work.

ANNEX: AGENDA AND LIST OF PARTICIPANTS

Agenda

International seminar

"Fostering and Assessing Students' Creativity and Critical Thinking in Higher Education"

OECD Centre for Educational Research and Innovation (CERI)

20-21 June 2016

OECD Conference Centre,
2 rue André Pascal, 75016 Paris, France
Room D

Day 1: Monday 20th June

The first day of the meeting will mainly concentrate on presentations and discussions of different types of pedagogies or assessments that try to foster students' creativity, critical thinking and other innovation skills. They may be implemented at the programme or institution level. Presentations and discussions will focus on teaching and learning practices, assessments and exams given to students, but also on the vocabulary used to define and assess progress in the acquisition of these skills.

9:30-10:00: Session 1: Welcome and setting the scene

This session will welcome participants, put the meeting in the broader perpsectives of the OECD, and show how it relates with the ongoing CERI project on education and skills for innovation.

- Montserrat Gomendio, Deputy Director, OECD Directorate for Education and Skills

- Stéphan Vincent-Lancrin, Senior Analyst and Projet Leader, OECD/CERI

10:00-10:40: Session 2

This session will present a university-wide plan to enhance students' creativity and critical thinking.

- Meredith Davis, North Carolina University (United States)

- Discussion

10:40-11:00: Coffee break

11:00-12:20: Session 3: Design thinking

This session will discuss different pedagogical approaches to foster students' creativity (and perhaps critical thinking) inspired by "design thinking".

- Hideyuki Horii, i.School, University of Tokyo (Japan)

- Katja Hölttä-Otto, Design Factory, Aalto University (Finland)

- Ben Koo, i.Center, Tsinghua University (PR China): fostering creativity and critical thinking at the i.Centre

- Discussion

12:20-12:45: Session 4: General discussion

- Do we agree on what critical thinking and creativity mean?

- What are (would be) characteristics of assessments/exams to capture them?

- What are the differences between the programme and institutional models?

12:45-14:00: Lunch

14:00-15:15: Session 5: Different approaches to fostering creativity and critical thinking

This session will explore diverse pedagogical approaches to foster students' creativity and critical thinking.

- François Taddéi, Centre of Interdisciplinary Research, University of Paris Descartes (France)

- Alenoush Saroyan, McGill University (Canada)

- Thera Jonker, HKU University of the Arts Utrecht (Netherlands)

- Discussion

15:15-16:00: Session 6: Entrepreneurship education approaches

This session will discuss how entrepreneurship (or entrepreneurial) education relates to the fostering of creativity and critical thinking and what models it uses to this effect.

- Andy Penaluna, Royal Society for the Arts and University of Wales Trinity Saint David (UK)

- Isabel Garcia, IE business school (Spain)

16:00-16:20: Coffee break

16:20-17:30: Session 7: General discussion

This session will reflect on the first day. Representatives of universities, faculty and governments will share some remarks from their perspective.

- What do the different approaches have in common?

- Would it be desirable to "mainstream" them? If yes, how?

- What are the institutional conditions necessary for them to work?

- Do systems already do reasonably well in these areas?

17:30: Reception

<u>**Day 2:**</u> **Tuesday 21st June**

The second day of the meeting will discuss how students' creativity and critical thinking is or could be assessed by faculty-designed assessments or through standardised tests. The vocabulary to discuss progression levels will be reviewed and discussed in light of the ongoing OECD work on fostering and assessing students' creativity and critical thinking in schooling. The meeting will conclude by discussing possible international action research to improve the quality of teaching and learning in higher education institutions in this areas.

9:00-10:00: Session 8: Assessing creativity and critical thinking

After a brief presentation of an ongoing study of the benefits of engineering education to critical thinking, this session will discuss ways to assess critical thinking and creativity from a faculty and from a standardised perspective.

- Prashant Loyalka, Stanford University (United States)

- Formative assessments examples: Katja Hölttä-Otto and Meredith Davis

10:00-11:00: Session 9: Defining progression in creativity and critical thinking

This session will discuss an ongoing qualification framework to capture progress in skills acquisition in "design thinking" programmes. What are the existing ways of definig different levels of "creativity" and "critical thinking" for higher education students?

11:00-11:30 Coffee break

11:30-13:00: Session 10: General discussion

This session will discuss and compare the specificities of creativity and critical thinking in higher education compared to schooling. It will also re-examine and continue the discussion started in session 7.

- What kinds of pedagogies and assessments have been missing from the discussion so far?

- Are the creativity and critical thinking skills different in higher education compared to schooling?

- How do the creative and critical thinking skills align with the labour market?

- What would be the conditions for more uptake of these approaches in higher education? What are the challenges depending on different types of institutions and in different domains?

- What faculty professional development is required to implement these approaches?

- What are the possible futures scenarios and policy or institutional levels for the systematic development of these skills in higher education?

13:00-14:00: Lunch

14:00:16:00: Designing an action research in higher education

This final session will discuss the possible designs of an action research on how to foster and assess creativity and critical thinking skills in higher education. What would it take for such an international research to be feasible? What fields? What instruments? How many institutions? What economic model?

16:00-16:30: Wrap up and next steps

16:30: Close of the meeting

List of participants

Please note that, in this list, countries only indicate the origin of the participants.
Participants are not necessarily delegates representing their countries.

Canada	Ms. Alenoush SAROYAN Professor and Chair Department of Educational and Counselling Psychology McGill University
Estonia	Ms. Kristi RAUDMÄE Chief Expert Higher Education Department Ministry of Education and Research
Finland	Ms. Katja HÖLTTÄ-OTTO Aalto University
France	Mr. Todd LUBART Professor of Psychology LATI Laboratory Paris Descartes University Mr. Hubert MICHAUDET D.school paris Email: michaudeth@dschool.fr Mr. Francois TADDEI Directeur du CRI Paris Descartes University Centre de Recherches Interdisciplinaires (CRI)
Israel	Ms. Shay BIALIK Advisor Permanent Delegation of Israel to the OECD
Japan	Mr. Hideyuki HORII Professor Department for Civil Engineering, School of Engineering The University of Tokyo
Korea	Ms. Juhui LEE Counsellor Permanent Delegation of the Republic of Korea to the OECD

Ms. Eun Young KIM
Research Fellow
Office of Higher & Lifelong Education Research
Korean Educational Development Institute (KEDI)

Netherlands   Ms. Thera JONKER
Director
Expertise Centre of Education
HKU University of the Arts Utrecht

Slovenia   Ms. Mateja BERCAN
Senior Advisor
Department of Higher Education
Ministry of Education, Science, and Sport

Spain   Ms. Isabel SANCHEZ
IE University

Turkey   Mr. Ender SARITEKIN
Counsellor
Permanent Delegation of Turkey to the OECD

United Kingdom   Mr. Andrew (Andy) PENALUNA
International Institute for Creative Entrepreneurial Development
University of Wales Trinity Saint David

United States   Ms. Kim ARVIDSON
3rd Grade Teacher
Empressa Elementary School

Ms. Meredith DAVIS
Professor / Graphic and Industrial Design
Graphic and Industrial Design
NC State University College of Design

Ms. Anne FENNELL
Project Co-Lead Teacher
High School Music Department Chair
Vista High School

Mr. Craig GASTAUER
Project Co-Lead
High School Science Department Chair
Vista High School

Mr. Prashant LOYALKA
Education and International Studies
Stanford University
Email: prashantstanford9@gmail.com

Mr. Gary VILLA
Science
Lynn University

India   Mr. Sharnbasayya GIRISH
Learning Links Foundation

People's Republic of China   Mr. Benjamin KOO
Associate Professor
Department of Industrial Engineering
Tsinghua University

Mr. Zhiyi PEI
Daxue Road Primary School

Thailand   Mr. Kraiyos PATRAWART
Policy Specialist
Quality Learning Foundation

Mr. Vicheanpant THANYAWICH
Lead researcher
Sripatum University

**European Trade Union
Committee for Education**   Mr. Jens VRAA-JENSEN
Chair of Higher Education and Research Standing Committee
EI/ETUCE

**European University
Association (EUA)**   Ms. Andrée SURSOCK
Senior Advisor
European University Association (EUA)

**UN Educational Scientific
and Cultural Organization
(UNESCO)**   Mr. Peter J. WELLS
Chief, Section for Higher Education
United Nations Educational Scientific and Cultural Organization
(UNESCO)

OECD   Ms. Rhodia DIALLO
Assistant
EDU/IMEP

Ms. Sofia DROMUNDO
Trainee
EDU/IMEP

Ms. Montserrat GOMENDIO
Deputy Director
EDU

Mr. Gwénaël JACOTIN
Research assistant
EDU/IMEP

Mr. Nicolas JONAS
Analyst
EDU/IMEP

Ms. Almedina MUSIC
Analyst
EDU/IMEP

Mr. Stephan VINCENT-LANCRIN
Senior Analyst
EDU/IMEP