Competence Assessment of Transferable Skills

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I. Competence assessment of transferable skills

The core curriculum developed in IO1 is a generic frame for training transferable skills to doctoral candidates in SET disciplines. In addition, the project aims at tailoring it to the specific demands, experience, strengths and weaknesses of individual doctoral candidates. In order to realise the adaptation of a generic curriculum to a training scheme tailored to the needs of individuals, a competence assessment tool has been developed and implemented. It strictly applies to the frame conditions of SET doctoral candidates. The tool fulfils several functions:

a) It assesses existing competences, skills gaps and needs of doctoral candidates prior the training. Based on the results, an individual training scheme can be developed. It focuses on potentials for development as well as on the demands expressed by the respective doctoral candidates.

b) It assesses competences of doctoral candidates after the training, ideally at the end of the PhD, thereby reflecting the progress during the training.

c) Competence assessment strengthens doctoral candidates by making them fully aware of their own strengths and competences. In many cases, doctoral candidates are unsure about what skills they have to offer especially to a non-academic labor market. Having a clear picture about transferable skills facilitates their access to the labor market.

The tool is targeted at both, university administration and doctoral candidates. It is composed of a 2-part online questionnaire (prior and after the training). Its implementation can work in four different variations, depending on the university facilities: as self-assessment, as peer-review-procedure amongst doctoral candidates, to be facilitated by PhD supervisors, and to be facilitated by coaches for transferable skills (see also IO5). Special considerations will be given to the demands of female and international doctoral candidates. The tool will be made available on the project platform.

Along with the core curriculum (IO1), the competence assessment tool will be the base for developing individual training schemes. It will be provided to members of the partner universities as well as to other interested university staff across Europe. The medium-term objective is to establish the tool as a standard element to the PhD registration procedure. It can be used by all European universities and beyond providing SET disciplines without or with little adaptation to frame conditions.

All in all, IO4 the competence assessment of transferable skills

a) facilitates the actual implementation of training transferable skills with doctoral candidates in practice

b) allows the development of well-grounded individual training schemes,

c) effectively supports the employability of doctoral candidates in SET disciplines,

d) applies potentially to the needs of all EU universities in SET disciplines,

e) is designed particularly to the conditions and demands in SET disciplines.

The tool is published on an online platform, and it is fully available to any interested individuals and organizations. It can be used by all European universities and beyond providing SET disciplines without or with little adaptation to frame conditions.

II. Methodologies / guidelines

Preparation of the tool

The tool was designed after an initial phase in which thorough research was performed on already existing tools. Our proposal is certainly not the first nor the only tool designed to perform these kind of self-assessment. However, the present tool is particularly focused on transferable skills for doctoral candidates, especially those in the SET disciplines. Moreover, it offers a full and natural integration with the core curriculum developed in the present project.

The following list includes some of the most efficient already available self-assessment tools for transferable skills.

- SkillScan, see https://www.skillscan.com/, is a platform containing tools which provide a fast, interactive and intuitive-based process for identifying transferable skills
- Myers Briggs Type Indicator, see https://www.mbtionline.com/, is designed to inform and influence people's perspective as "people-first" thinker. It'll make an impact in your life, every day.
- The National Postdoctoral Association is a US-based association aimed at improving the postdoctoral experience at the individual, organizational, and national levels. Their study about Core Competencies (see https://www.nationalpostdoc.org/page/CoreCompetencies) provides an in-depth analysis on the essential transferable competencies for postdoctoral researchers. The six main categories identified in the study are: Discipline-specific conceptual knowledge; Research skill development; Communication skills; Professionalism; Leadership and management skills; Responsible conduct of research.
- The University of Nebraska developed a canvas site aimed at supporting the Graduate Student Professional Development (see https://canvas.unl.edu/courses/73802). It contains in particular a Career Services Transferable Skills Assessment (see https://canvas.unl.edu/courses/73802/files/6303375?module_item_id=1891811) which identifies the following core competences: Verbal and Written Communication; Problem Solving / Critical Thinking; Planning and Organization; Interpersonal Relations; Leadership; Creativity and Innovation; Team Working and Collaboration.
- The University of Southern California promoted an Individual Development Plan for Postdoctoral Scholars (see https://postdocs.usc.edu/scholars/career-development/idp/). In it, the basic competences are identified separately for scholars in Humanities & Social Sciences on one side, and scholars in Sciences on the other. For the scientific careers the following competencies are evidenced as most crucial: discipline-specific conceptual knowledge; research skills development; communication; professionalism; leadership & management; responsible conduct of research.
- The Association Bernard Gregory is a France-based meeting point between doctoral students and companies interested in possibly hiring them. They developed a very complete self-assessment test (see https://www.abg.asso.fr/js/kcfinder/upload/files/Guide%20Auto-%C3%A9valuation%20-%20Septembre%202017.pdf) assessing the state and evolution of the main competencies during the doctoral career. Their guide provided very useful cues for the Career Self-Assessment Tool we developed in the second part of the present IO4.
- As interesting different point of view is taken by the Student-Supervisor Skills Audit and Assessment Tool developed for Higher Degree Research Students at the Australia-based QUT – Queensland University of Technology (see https://cms.qut.edu.au/__data/assets/pdf_file/0008/636155/skills-audit-research-application.pdf). It is original in that focuses attention on the Student-Supervisor relationship.

Several research papers were particularly influential in our research. Among them we acknowledge inspiration from the following two sources.

Michael F Verderame, Victoria H Freedman, Lisa M Kozlowski, and Wayne T McCormack: *Competency-based assessment for the training of PhD students and early-career scientists*. eLife (2018), **7**:e34801, see https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6002247. It underlines how the doctoral apprenticeship may not always provide the complex knowledge and skills necessary to conduct a successful scientific career. It therefore proposes a competency-based assessment to be used all along the doctoral career.

Anthony P. Bromley, James R. Boran, William A. Myddelton: *Investigating the baseline skills of research students using a competency-based self-assessment method*. Active Learning in Higher Education (2007), **8**:117-137, see https://hal.archives-ouvertes.fr/hal-00571961/document. The paper presents a methodology which combines a competence model and the training needs analysis theory necessary to create an effective self-assessment tool: the DNA, (*Development Needs Analysis*). The tool is specifically aimed at providing to the institutions to provide a quick and clear snapshot of the skills needed by a specific doctoral cohort.

III. Soft skills competences self-assessment tool

The present tool is implemented in an open module that can be filled in and submitted by any doctoral candidate. Upon submission of the replies candidates obtain, on one side, a synthetic view of their own skills and weaknesses. A comparative analysis is also available, and candidates have the opportunity of comparing their own replies with the replies provided by the entire community who used the tool. This can more specifically evidence weaknesses and strengths *relative to the reference community.*

The structure of the tool closely follows the Core Curriculum developed in the present project. This supports the candidates in spotting at a glance the course or the courses which more effectively could complete their own skills portfolio.

The module is available at the following link: https://forms.gle/KLK2RcvQtMT6Ece39. We report here the questions and replies in the module.

All entries are preceded by the question "How do you assess your present skills and competences regarding the following items?" The replies are graded on a scale from 1 to 5, with a '0' category associated with the possibility "not assessed / not relevant". The categories which correspond to the numerical values are: 1 = very untrue of me; 2 = untrue of me; 3 = neutral; 4 = true of me; 5 = very true of me.

Research Ethics and Good Scientific Practice	0	1	2	3	4	5
Knowledge and application of Research Integrity principles						
Knowledge and application of Research Ethics						
Knowledge and application of Code of Conduct to research						
Knowledge and application of safety policy and procedures						
Accountability, collaborative attitude, discretion, honesty and respect in conducting research activities						
Acquiring Third-party Funds and Projects	0	1	2	3	4	5
Writing a project or research proposal for external funding						
Prepare a report, case studies, manuals for academics and other researchers						
Present your research / ideas to external non-technical evaluation panels						
Write text for general public about your work/project						
Carrying out a consultancy or partnership project						
Project Management	0	1	2	3	4	5
Human Resources management: Define/scope project and manage tasks effectively						
Time management						
Give guidance to colleague/students in connection with their own research objectives						
Work effectively in a group to achieve objectives/goals						
Data and resources management						
Cooperation, Communication and Presentation	0	1	2	3	4	5
Encourage, empower, advocate for people						
Present ideas/works/projects to your peers						
Debate ideas in small groups / large groups						
Public speaking / Conference presentation						
Designing a poster or a presentation, write a scientific paper						
Leadership and Management	0	1	2	3	4	5

	0	1	2	3	4	5
Identifying and assigning goals by taking into account the qualities or interests of others						
Serving as a role model – Motivating, inspiring and gain commitment of others						
Research staff management						
Taking responsibility to lead / taking decisions						
Conducting negotations / networking						
Publication and Promotion	0	1	2	3	4	5
Write professional e-mails and reports						
Write text for general public about your work/project						
Develop or present a pitch						
Present ideas/works/projects to peers | Deliver seminars						
Interviewing people						
Innovation and Entrepreneurial Thinking	0	1	2	3	4	5
Create innovative solutions to problems | Develop strategies						
Develop new ideas or innovative products to proof-of-concept stage						
Make use of group synergies						
Start and run a business or social enterprise						
Knowledge and application of intellectual property rights						
Teaching Methods	0	1	2	3	4	5
Establish and communicate learning goals to students						
Design coherent learning modules based on students' background						
Assessing and grading						
Knowledge and correct use of pedagogical approaches, teaching practices, teaching modes and technologies						
Demonstrate ability to supervise individual students and groups of students in thesis and in research internships						

Career self-assessment tool

The second self-assessment (and monitoring) tool we developed is intended to allow the doctoral student to understand whether their careers are proceeding at the expected pace, and whether they are acquiring the transferable skills and competences that should be achieved by the doctoral defence.

The tool is open and freely accessible at the link https://forms.gle/UTfvheruTv82DNkE6. We report here the questions raised in the module.

The replies are graded on the following scale

Not assessed / Not relevant
Poor experience
Moderate experience
Acceptable experience = expected level based on career phase
Good level experience = expected level at the end of career
Excellent experience

1. Research skills and knowledge		Year 1	Year 2	Year 3	Year 4
Researchers are able to formulate clear research questions and hypotheses, design solid research protocols. Researchers demonstrate in-depth knowledge of their field, the challenges that lie ahead and a broad scientific interest outside their specific research area.					
Discipline-specific knowledge	Demonstrates detailed knowledge of specific research area, is critical in evaluation of literature and can define scientific questions and hypotheses.				
Cross-discipline knowledge	Demonstrates broad awareness of latest developments in related scientific disciplines.				
Research-skills	Demonstrates ability to design solid research experiments using appropriate data collection and analysis methods. Interpretation, critical analysis of results and reporting are crucial.				
2. Responsible conduct of science		Year 1	Year 2	Year 3	Year 4
Researchers demonstrate the ability to make sound ethical and legal choices based on knowledge of accepted professional research practices, relevant policies and guidelines. Researchers should be aware of the resources available, should ethical or integrity concerns arise.					
Research discipline	Conducts research conform the accepted (safety) policy and procedures of the organisation e.g. Good Clinical Practice; Good Laboratory Practice; Health & (laboratory) safety; Good Animal Research practice.				
Research integrity	Conducts research according to accepted professional values e.g. scientific integrity and code of conduct; ethics and legal requirements; data ownership, sharing, and management. Shows accountability, collaborative attitude, discretion, honesty and respect.				
3. Personal effectiveness		Year 1	Year 2	Year 3	Year 4
Researchers are able to adapt their personal qualities and behaviours to achieve improved results.					
Resilience	Performs effectively under time pressure, in adversity, disappointment or opposition. Can cope with stress. Maintains work-life balance.				

Perseverance	Continues to focus on achieving the set goals, despite difficulties, setbacks, opposition or distractions.				
Inquisitiveness	Understands and effectively applies new information within his/her field. Has a curiosity-driven mindset.				
Commitment	Adjusts own behavior in line with the policies, needs, priorities and goals of the organization, scientific discipline and profession.				
Initiative	Anticipates and acts on opportunities (active behaviour) instead of waiting for others (passive behaviour). Identifies problems and quickly reacts adequately. Shows independence.				
Self-reflection	Critically analyses own behavior and attitude, and is open to evaluation by others. Is able to learn from these evaluations. Welcomes feedback.				
4. Communication		Year 1	Year 2	Year 3	Year 4
Researchers demonstrate interpersonal, written, verbal, listening and non-verbal communication skills enabling them to effectively and appropriately communicate facts, ideas or opinions to colleagues, members of public and media.					
Presentation skills	Transfers his/her message across clearly and effectively to diverse audiences including interviews, work-groups and conferences. Shows sufficient proficiency in spoken English.				
Writing skills	Writes clearly and effectively in diverse formats including thesis, PR, grants and CV. Spelling, grammar, structure, writing style are important skills. Shows sufficient proficiency in written English.				
Interpersonal skills	Engages effectively in face-to-face communication with one or more people from diverse backgrounds. Shows verbal & non-verbal communication, open-minded listening, personal appearance and presentation.				
Personal skills	Enhances effective communication. Shows anger control, empathy, assertiveness, persuasion, sensitivity.				
5. Professional development		Year 1	Year 2	Year 3	Year 4
Researchers are able to improve their professional skills to further their career prospects.					
Adaptability	Demonstrates adaptability and flexible behaviour in relation to changing research environment, work protocols or responsibilities of him/herself or others.				
Ambition	Endeavors to push the boundaries of own capabilities to become more successful or obtain more responsibilities (in relation to career development).				
Creativity	Develops new ideas or applications or creates innovative solutions to problems to push existing boundaries of science further.				
Entrepreneurship	Seeks opportunities and possibilities for the development of commercial ideas, acts accordingly and is willing to take well-considered risks. Copes with set-backs.				
Networking	Develops and maintains a network of contacts within and outside the organization and uses it to obtain / access knowledge to further common goals.				

Organisation sensitivity	Is aware of the mission, aims and strategy of the organization. Understands the impact and consequences of own decisions and activities on the organization, colleagues and patients.				
6. Leadership & Management		Year 1	Year 2	Year 3	Year 4
Researchers are equipped to manage and develop project ideas as well as facilitate effective team work including problem solving skills. Researchers are able to mentor others (e.g. students).					
Collaboration	Contributes to a joint result, even when the topic is not directly related to his/her own task. As such contributes to a common goal of the organisation. Demonstrates an understanding of the qualities or interests of others. Contributes to a healthy team spirit.				
Coaching	Enables co-workers to grow and succeed through feedback, instruction, and encouragement.				
Leadership and delegation skills	Gives guidance to a colleague/student in connection with his/her own research objectives. Conferring own tasks or responsibilities in an effective manner to an appropriate colleague/student.				
Negotiation	Effectively communicates views and arguments to identify common goals leading to agreement of all involved parties.				
Planning and organisation	Effectively sets and plans realistic goals and priorities taking account of the required time, tasks and resources available to achieve the set goals.				
Vision	Demonstrates ability to place detailed research results in a bigger picture to formulate broad longer term goals.				
7. Teaching		Year 1	Year 2	Year 3	Year 4
Learning and teaching skills	Establishes and communicates learning goals to students. Collects and utilises various sources of information, including student feedback, to improve learning experience.				
Course designing skills	Demonstrates knowledge of subject matter, designing suitable learning modules based on students' background and utilising effective use of materials and technology in teaching practice.				
Supervising skills	Demonstrates ability to supervise individual students and groups of students in bachelor and master thesis and in research internships. Designs and effectively implements a supervision plan.				
Professional educator skills	Reflects on teaching practice, engaging and supporting students, establishing teaching goals and developing as a professional educator.				

Imprint

"Training the mindSET"-Partner organisations

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