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Overview of learning materials aimed to educate students of languages and linguistics for the 21st century job market

UPSKILLS Intellectual output 3.1

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Executive Summary

The core of the UPSKILLS project is constituted by the creation of learning content dedicated to topics deemed to be of particular importance for twenty-first century students of languages and linguistics. This learning content should help students acquire the knowledge and skills needed for the contemporary job market, which offers numerous new opportunities both within and beyond traditional language-oriented professions, but which also requires skills not typically included, or at least insufficiently present in university curricula. However, UPSKILLS is not alone in wishing to bring the knowledge and skills of language and linguistics students more up-to-date with the job market, and some resources relevant for the topics it aims to address have already been created in other projects, within university curricula or in other related contexts. In order to avoid duplicating materials that have already been made available by others, the first step in the creation of UPSKILLS learning content is an overview of already existing materials.

By exploring the outputs of related projects, catalogues put together by European research consortia, public platforms hosting open educational resources and results of web searches, we compiled a list of 276 resources that are already available and could possibly be integrated in UPSKILLS. The focus was on three broad topics (research skills, data acquisition skills and data handling skills) and two cross-cutting components (linguistic theory and research and data management), as defined in the project proposal.

We found that most materials are available for programming (part of data acquisition skills), followed by statistics (data handling skills), research methods (research skills) and machine learning (data handling skills), while the least represented topics include collecting data from human subjects (data acquisition skills), project management (research skills), linguistic theory and research and data management (cross-cutting components). Text/speech processing (data acquisition skills), analytical thinking (research skills) and data standards and repositories (data handling skills) occupy an intermediate position.

Adding to the picture the results of a questionnaire distributed to project partners (who also provided opinions on whether the coverage of UPSKILLS topics in the existing materials was general or specific to the area of languages and linguistics) and the results of the needs analysis conducted within the project, we suggest that for programming, statistics, research methods and linguistic theory, the focus in UPSKILLS should be on integrating the existing materials rather than creating new ones, while all other subtopics require new content to be created, sometimes for specific narrower topics and sometimes at a larger scale. Particular attention should be dedicated to collecting data from human subjects, data repositories and standards and research and data management, as these topics are rather poorly represented either in the existing materials or in the university curricula (or both), while being listed among job requirements.

List of abbreviations

Abbreviation	Definition
ECTS	European credit transfer and accumulation system
ERIC	European research infrastructure consortium
MOOC	Massive open online course
OER	Open educational resource

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1. Rationale

The main objective of the UPSKILLS project is to identify and tackle the skills gaps between the formal, university education of language and linguistic students and the needs of the contemporary job market. A central component of the project is the development of new learning content to be embedded in existing university programmes. In order to better plan the development of new materials, and to avoid unnecessary repetitions (keeping in mind that a number of projects and other actors have already created content relevant for UPSKILLS' goals), the first step was to prepare an extensive overview of already existing materials. This was defined as *Task 3.1: Overview of existing materials* in the project proposal (p. 139). The present report describes the process of data collection and its results.

2. Method

The first step in the overview of existing materials involved defining the methodology. The starting point for this was the project proposal, which listed as targets for the overview the materials previously produced by the project partners, those created in external projects, and those listed in registries of existing courses. These initial criteria were extended and refined through more specific guidelines (outlined in section 2.1 below). We also describe in detail the process of data collection (section 2.2) and the criteria adopted for the analysis of the collected data (section 2.3). Finally, we add a section (2.4) dedicated to a short questionnaire distributed to project partners in order to collect their first impressions of the list of existing materials developed in this task.

2.1 Search criteria

Based on the overarching project goals and the project proposal, the following guidelines were adopted for the collection of existing materials:

(1) WHAT TO LOOK FOR

Existing didactic materials that can be incorporated into UPSKILLS:

- Online courses
- Educational games
- Videos
- Other types of material (tutorials, interactive presentations, lecture slides, etc.)

Conditions for inclusion in the overview:

- The material needs to be free and open to reuse (free registration is acceptable)

- The material needs to be permanently available
- The material should have as its topic some of the following:
 - Research skills (research methods, analytical thinking, project management)
 - Data acquisition skills (programming, text/speech processing, collecting data from human subjects)
 - Data handling skills (machine learning, statistics, data repositories and standards)
 - Other topics can be considered if at least partially relevant (e.g., linguistic theory and research management – included in the project proposal as “cross-cutting components”, or transferrable skills).

During the search process, the above criteria were somewhat modified, largely due to missing information. Specifically, in many materials the licence is not explicitly stated, and/or it is not entirely clear if they are permanently available. We decided to list such materials in the overview so that the project partners can have a more complete picture and can decide for their own areas of expertise whether these materials can or cannot be used. We also included some materials explicitly marked as copyrighted, as they can be linked in UPSKILLS materials and were deemed too useful to be completely omitted. As for the temporal availability, this criterion turned out rather difficult to verify – already during the work on the overview we detected some changes in website addresses and material availability. For this reason, we added comments where prolonged availability seemed to be an issue, while in the other cases it has been left to the project partners to decide whether the materials can be useful for UPSKILLS.

(2) WHERE TO LOOK

Multiple possible sources of existing materials were identified:

- The materials that we (project partners) created ourselves
- The materials created by others that we already knew about
- Public catalogues:
 - EU project catalogues (Tempus, Erasmus+, Horizon, FP7, ERC)¹
 - Other project catalogues (Swiss National Science Foundations, UK funding bodies)
 - Catalogues of large pan-European consortia (CLARIN, DARIAH, CESSDA)
 - Existing course registries (Digital Humanities, SSH Training Discovery Toolkit)
- Massive open online course (MOOC) platforms:
 - Large public platforms (FutureLearn, Coursera, edX, Udemy)
 - Open university platforms (OpenEdX installations and other)

¹ Website addresses are listed in the References section.

- Meta websites listing open educational resources (OER)
- K-12 materials, SAT/GDR preparation materials (e.g. Khan Academy)
- Other (e.g., Google searches)
- Final consultation with project partners on any additional materials they might know about.

(3) INFORMATION TO SAVE ABOUT INDIVIDUAL ITEMS

To have as complete as possible information about the existing materials, we decided to save the following details:

- Strategy how they were found (own material, external project, European infrastructure, public platform, other)
- Link
- Title
- Type (online course, educational game, video lecture(s), slides, other)
- Format (video+audio, video+text, video+audio+text, audio+text, audio only, text only)
- Country
- Creator - project(s), institution(s), person(s)
- Primary topic (research skills, data acquisition skills, data handling skills, other)
- Additional topics
- Specific topic(s)
- Target students
- Part of degree (yes/no)
- Degree name
- Purpose if not part of degree
- Number of ECTS
- Number of hours
- Does it require registration (yes/no)
- Language
- Does it require adaptation (yes/no)
- Adaptation type needed
- Accessibility for impaired sight/hearing or learning difficulties (yes/no)
- Licence.

Not all information was available for all materials (e.g., the number of ECTS and/or the number of hours needed for completion were often missing). An attempt was made by the report authors to extract as much information as possible and estimate some of the details that were possible to estimate (the target student population, for example, was not always explicitly mentioned), so the additional information beyond the basic details and topic should be used as guidelines only.

It should also be noted that some titles and links were saved primarily for future reference (e.g., ongoing projects that will produce relevant learning materials in the coming year or two); for such titles there is only a limited amount of information currently available.

(4) HOW TO SEARCH

The following search strategies were defined (to apply to all sources apart from own material and already known projects):

- If possible, first select categories such as “Language”, “Linguistics” or “Humanities” and then scan manually or search for the terms listed below; if no categories are available, try “language” and “linguistic(s)” together with the terms listed below
- If these categories are available, consider also checking “Data analysis”, “Statistics”, “Computer science” and similar to see if there are materials that are also applicable for language/linguistics students
- Specific search terms to be used (corresponding to topics UPSKILLS aims to cover):
 - Linguistics
 - Data analysis, statistics
 - Research method(s)
 - Corpus/corpora, experiments, fieldwork
 - Text processing, speech processing
 - Machine learning, programming, Python
 - Big data, text mining, Natural Language Processing/NLP
 - Data standards, data repositories
 - Problem solving, critical thinking, analytical thinking/skills, transferable skills
 - Project management

2.2 Collecting and saving information

Based on the above decisions, the information about materials was entered in a dedicated table, whose simplified version is included in this report as Annex 1. The search was performed following the list of sources given in point (2) above. The initial step included entering data about resources created by the project partners themselves, or already known by the project partners who worked on the materials overview. These resources were for the most part already listed in the project proposal, but were described in more detail in IO3-T1.

The initial “known” step was expanded through a more detailed search of resources offered or linked by pan-European infrastructures. These were primarily the large European research infrastructure consortia – ERICs; the main focus was on CLARIN (Common Language Resources and Technology Infrastructure), which is also one of the partners in the

project, and DARIAH (Digital Research Infrastructure for the Arts and Humanities), but CESSDA (Consortium of European Social Science Data Archives) was included as well. These consortia mostly develop and distribute training resources within dedicated Horizon and Erasmus+ projects or sub-projects: PARTHENOS (PARTHENOS Training, CLARIN and DARIAH), #dariaTeach (DARIAH), DARIAH Campus (DESIR project, DARIAH) and SSHOC - Social Sciences & Humanities Open Cloud (CLARIN, DARIAH and CESSDA). One of the issues encountered with the platforms created within these projects is their partial overlap (in particular for #dariaTeach and DARIAH Campus). Additionally, the activities of all three ERICs have a much wider scope than UPSKILLS, so it was necessary to manually select resources that are relevant or at least partly relevant (e.g. belong to the domain of digital humanities if not specifically languages and linguistics). Some of the platforms, in particular the SSHOC's SSH Training Discovery Toolkit, were very useful for discovering additional meta-resources as well. The SSH Training Discovery Toolkit is an inventory of training materials relevant for the Social Sciences and Humanities that links to other platforms rather than to individual resources, so additional manual searches were required in this case as well.

Among European projects (EU, Switzerland, United Kingdom), no relevant new materials were found through searches in Tempus and SNSF (the Swiss National Science Foundation) catalogues - the only projects included were known to the partners from before, either because they participated in them themselves, or because their institution did. On the other hand, multiple Erasmus+ projects were deemed relevant. However, it is important to emphasise that rather than being identified in catalogues, some of the Erasmus+ or Horizon 2020 projects included in the list were already known to the UPSKILLS partners, or were found through other resources. Catalogue searches of project titles and results with different cross-combinations of keywords gave a long list whose top 1,000 projects dealing with research or skills were checked manually. For Horizon, FP7 and ERC several resources were found, mostly slides from training sessions held during the projects, tutorials for tools developed under the projects, as well as several games. The search option was used with different cross-combinations of keywords. There were several hundreds of projects that were checked manually, but a majority was focused on research, and the outputs were scientific publications. There were also many projects that listed training as part of the results, but there was either nothing on the websites or in some cases there were no websites at all. Project platforms of UK funding bodies, such as the Gateway to Research website of UK Research and Innovation, mostly provide lists without links to project websites. Projects whose titles were deemed relevant for UPSKILLS were searched for additionally using Google.

The next strategy focused on public MOOC platforms, including those maintained by individual institutions (OpenEdX instances and similar platforms, found starting from the list available at <https://openedx.atlassian.net/wiki/spaces/COMM/pages/162245773/>, last accessed on 25 April 2021, but also using Google searches), as well as the general platforms (Coursera, FutureLearn, edX, Udemy). These platforms were searched using subject categories and key terms. Typical problems encountered with MOOC platforms were payment requirements and

limited time availability for many courses. Finally, UPSKILLS partners not involved in IO3-T1 were asked to contribute to the list by adding resources they knew about that were not already listed.

As mentioned above, general problems encountered in the collection of resources included missing information for one or more criteria we were interested in, most important of which was missing or difficult-to-find information about licences. The researchers made efforts to sign up for the resources where registration was needed, but in some cases it was not possible to reach the content in order to describe the format in detail. There were also difficulties in classifying some of the resources in terms of format and/or topic. A special kind of problem was posed by inactive links.

2.3 Analysing the list of existing materials

The materials list has been made available to all project partners, who can use it as input for planning the creation of new learning content in their area of expertise in Task 3.2 – the list can tell them what is already available and can potentially be integrated, and what is missing entirely (see also the suggestions in section 5 of this report). Towards the end of the IO3, the materials list will also be published on UPSKILLS website as a project deliverable.

In addition, we provide below (in section 3.1) an analysis of the collected materials according to several criteria deemed central for integrating existing resources in UPSKILLS and deciding on new learning content. Specifically, the materials table is analysed according to strategy, type, topic, specific topics, licence type and language.

2.4 Collecting partners' opinions

An add-on to the main analysis based on the materials table is a questionnaire distributed to project partners (see Annex 2), in which they were asked to briefly explore the materials table and provide feedback on the amount of existing materials available for their areas of expertise, stating also their initial ideas on how they might use the existing materials. The partners were asked to select their institution and their topic (with the possibility of filling in the questionnaire more than once, separately for each topic they will be working on), and to answer a series of questions regarding topic coverage in the existing materials and possibilities for their use as part of UPSKILLS learning content.

The first core question contained a statement “I think this topic is well covered in the existing materials”, to be judged on a scale ranging from 1 (disagree) to 5 (agree); a follow-up question for answers “3” and above was related to whether the topic was well-covered generally, in relation to languages and linguistics or both. The second core question asked for an estimate of how much of the intended UPSKILLS learning content for the given topic could be covered using the already existing materials (the options being 0-25%, 26-50%, 51-75% and 76-100%). The third core question was aimed at collecting information about how the project

partners were planning to use the existing materials (by suggesting them within their own materials as additional/optional, by linking specific parts in their own materials instead of something that they would otherwise need to create themselves, by modifying and adapting them to their own needs [where allowed by the licence], or in a different way – to be specified). Several open-ended questions were included for comments on different aspects of the existing materials.

3. Analysis

A total of 276 resources were identified following the procedure outlined in section 2. A shortened version of the list is available as Annex 1 to this report, while the full table is currently used internally by UPSKILLS project partners and will be formatted and published in open access towards the end of IO3. In addition, a total of 16 answers were obtained for the partner survey. The former are analysed in section 3.1, and the latter in section 3.2.

3.1 Breaking down the existing materials

In the following sections we present the materials overview from those points of view that appear most useful for integrating the existing and creating new learning resources within the UPSKILLS project. We first focus on the strategy used for finding a resource, followed by resource type, topic, licence and other considerations.

3.1.1 Existing materials by strategy

Table 1 shows the distribution of materials according to the strategy that was used for finding them. It is easily seen that the largest number of materials was found on public platforms. The second-ranking strategy is external projects, found either in project catalogues or because they were already known by the researchers involved in the materials overview. European infrastructures, own materials and other strategies are all rather infrequent, amounting to around 13% jointly.

Strategy	Absolute frequency	Relative frequency
Public platform	173	62.68%
External project	67	24.28%
Other	17	6.16%
European infrastructure	14	5.07%
Own materials	5	1.81%

Table 1. Distribution of existing materials by strategy

It should be highlighted that public platforms constitute a somewhat heterogeneous strategy, comprising institution-independent MOOC services such as Coursera and Future Learn, but also various installations of OpenEdX and similar platforms by individual research institutions (typically universities, e.g., OpenCourseWare at TU Delft). These two kinds of platforms were difficult to separate into two strategies due to many universities having courses on both platform types; in addition, no clear differences were found between the two types of platform in terms of licences and accessibility over time, which was interpreted as another reason to keep them in a single category.

3.1.2 Existing materials by type

A second view of existing materials captures their distribution by type, shown in Table 2. The most typical type of materials is given by online courses, which represent around one half. The second most frequent category is “other”, comprising manuals and guides, textual tutorials or tools for the creation of games or other educational materials. Existing relevant educational games, video lectures and slides are all less frequent.

Type	Absolute frequency	Relative frequency
Online course	150	54.35%
Other	87	31.52%
Video lecture(s)	19	6.88%
Educational game	10	3.62%
Slides	10	3.62%

Table 2. Distribution of existing materials by type

3.1.3 Existing materials by topic

A particularly important distribution for planning further UPSKILLS activities is that by topic. In Table 3 we show how the existing materials are distributed by general topic, while Table 4 lists the distributions according to specific topics.

Type	Absolute frequency	Relative frequency
Data acquisition skills	81	29.35%
Data handling skills	78	28.26%
Other	60	21.74%
Research skills	57	20.65%

Table 3. Distribution of existing materials by general topic

The general topics looked at are those defined as core areas UPSKILLS aims to address. Their distribution is not entirely even, but all topics take up at least 20%. Most materials fall under the topics of data acquisition and data handling skills, while research skills are somewhat less represented. The category “other” comprises topics such as linguistic theory or digital

literacy, but was also assigned to meta websites that contain too many individual resources for all of them to be described individually.

Type	Absolute frequency	Relative frequency
Other	53	19.20%
Programming	48	17.39%
Statistics (language data science)	36	13.04%
Research methods	35	12.68%
Machine learning	25	9.06%
Analytical thinking	23	8.33%
Data repositories and standards	22	7.97%
Text/speech processing	18	6.52%
Collecting data from human subjects	8	2.90%
Linguistic theory	5	1.81%
Project management	3	1.09%
Research and data management	0	0.00%

Table 4. Distribution of existing materials by specific topic

To complement the analysis by UPSKILLS-defined topic groups, we also explored the specific topic of each resource, as entered and grouped into UPSKILLS-defined topics by the authors of this report (Table 4).² This part of the overview points to technology- and statistics-related topics as being most present (specifically, programming, machine learning and statistics). This is not surprising, given that we did not limit our searches strictly to the domain of languages and linguistics, and these topics are important for many other domains too. In addition, the finer-grained topic analysis reveals that text/speech-oriented topics prevail over materials dedicated to work with human subjects, which was somewhat unexpected given that we also took into account some of the resources from the field of psychology, but also important to highlight, as this topic is likely to require more new learning content to be created.

Among additional topic-related remarks, a large portion of the materials are not specific to language and linguistics, some belonging to neighbouring and partly overlapping disciplines such as digital humanities, and some either very general or belonging to other disciplines (such as engineering or psychology). This is not a problem for transferable skills such as problem solving, but some of the technology- and statistics-oriented materials might require adaptation towards language study (see also sections 3.1.5 and 3.2).

3.1.4 Existing materials by licence

Another central criterion for planning the integration of existing materials into UPSKILLS concerns the licences under which the materials are made available. As can be seen

² As can be seen in Annex 1, the specific topics were not selected from a list, so there were a total of 71 of them. To make the overview clearer and more informative, we grouped them in mid-level topics following the list from the project proposal (also provided in section 2.1 above).

from Table 5, a bit less than one half of the materials carry a Creative Commons licence; most of these materials allow derivatives to be produced, and the main restriction they pose is non-commercial use. As mentioned above, a smaller number of resources is copyrighted, while almost one half does not explicitly state the licence.

Type	Absolute frequency	Relative frequency
Unknown	134	48.55%
CC licences	125	45.29%
Copyright	17	6.16%

Table 5. Distribution of existing materials by licence

In terms of decisions by UPSKILLS partners on the modality of use of materials whose licence is listed as unknown, the individual researchers can further examine the materials they find useful, and possibly contact their authors in order to clarify conditions of use. We suggest that the materials for which no additional information can be obtained be treated as copyrighted.

3.1.5 Other considerations

Among other properties of existing materials, it is useful to mention their language: almost all materials, 265 out of 276, are in English (with some also (partly) available in French or German); among the remaining 11, there are six online courses in Serbian, one series of video lectures in Croatian, one course in Basque, Greek and Hebrew each, and one website with video lectures in multiple languages.

Given that the language the material is in constitutes the main source of the need for adaptations, and English is the main language planned for the UPSKILLS resources, it can overall be said that very little adaptation will be needed in order to integrate existing materials in UPSKILLS. Given the low number of resources that might need translation and the presence of speakers of almost all of these languages among project partners, the exact way in which the translation process will be approached – if needed – will be handled on a case-by-case basis.

Note that we do not list as “adaptation needed” those cases where the material is not specific to languages and linguistics. The understanding behind this choice is that adaptation is seen as a technical step, while it is up to the individual researchers to decide whether and how to integrate the existing material into learning content developed under UPSKILLS.

3.2 Preliminary researchers’ view of the existing materials

Given that expertise in a topic is needed to estimate whether an existing resource can be meaningfully integrated into project learning content, in addition to analysing the information discussed in section 3.1, we also studied the answers of fellow project partners to facilitate the development of suggestions in this report. A total of 16 responses were collected, with almost

all project partners and almost all topics represented (no feedback was received on the subtopic Introduction to machine learning within data handling skills, nor on the cross-cutting research and data management component).³

The overall average mark assigned to the coverage of UPSKILLS topics in the existing materials was 3.3 (roughly corresponding to medium-level coverage, as the scale used was 1-5; see section 2.4 above); the distribution of individual marks is shown in Figure 1.⁴ The average marks were similar for the three major topics (research skills - 3; data acquisition skills - 3.2; data handling skills - 3.3), while the linguistic theory cross-cutting component was judged as very well-covered (mark 5). More specific topics within the three major areas (see Table 6) received uniform marks only in the case of research skills. For data handling skills, the marks were rather close, while marked differences were found for the subtopics related to data acquisition skills: programming received a 5, collecting data from human subjects 3.3 and text processing only 2.8 (which is the lowest of all scores). Collecting data from human subjects and text processing were at the same time the topics that were judged by most partners, who sometimes assigned very different scores.

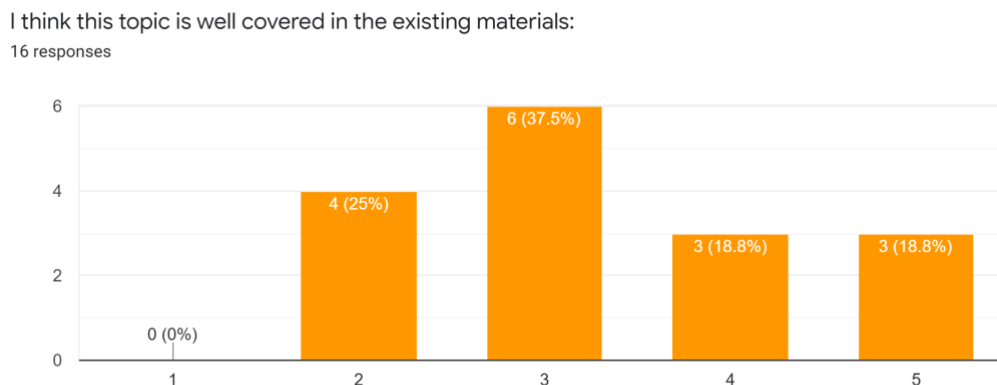


Figure 1. Distribution of scores for coverage in the existing materials (1=disagree, 5=agree)

³ Given that the questionnaire was aimed at assessing the availability of materials, and not the quality of the work on the intellectual output, two authors of this report also provided feedback for their areas of expertise.

⁴ All averages presented in this paragraph are to be interpreted as general indicators only, as some topics were only assessed by one person, and others by up to four, and the scale used was of the ordinal type.

Research skills		Data acquisition skills		Data handling skills	
Analytical thinking and problem solving	3	Collecting data from human subjects	3.3	Language data science	3.5
Introduction to scientific research	3	Text processing; collecting and analysing corpus data	2.8	Language data standards and repositories	3
Project management	3	Introduction to programming	5		

Table 6. Topic coverage scores by subtopic

The topics that received a mark of 3 or higher for coverage were judged as being well-covered both generally and in relation to languages and linguistics exactly half of the time (50% of answers); 41.7% of answers pointed to general coverage only, and 8.3% to languages/linguistics coverage only.

Most researchers believe to be able to cover 26-50% of their UPSKILLS learning content by using the already existing materials (43.8% of responses). Higher percentages are selected primarily for topics that received the highest possible mark for coverage (linguistic theory, programming), or that had a lower mark for coverage coupled with being covered not only generally, but also in relation to languages and linguistics (introduction to scientific research, language data standards and repositories, language data science). Lower percentages are found for topics judged as relatively low-coverage (collecting data from human subjects, text/speech processing), as well as topics with relatively high coverage, but only in the general domain (project management, analytical thinking and problem solving). Note once again that some topics were assessed rather differently by different researchers.

Finally, all three strategies for re-use of existing materials were selected by the project partners, with slight preference for suggesting existing materials as additional or optional within one's own (new) materials (a total of 11 answers, followed by 10 answers for modifying and adapting the materials to one's own needs and 8 answers for linking specific parts of existing materials in one's own materials).

3.3 Combining the analyses

Looking jointly at the analysis of the materials list and the views of the researchers, programming is confirmed to be the most well-covered topic, not only generally, but also in relation to languages and linguistics. It is followed by language data science (i.e., statistics), which is rather well-covered generally, but the materials are likely to require fine-tuning for language- and linguistics-related research. The situation could be similar with machine learning (where researcher feedback was not received, so we cannot be certain) and with data standards and repositories (where medium-range presence is confirmed by both data sources). A good balance seems to be present for research skills, whose component topics (introduction to scientific research, analytical thinking and project management) differ in coverage within the

existing materials, but overall seem to be likely to contribute to new learning content to a similar extent. The two less clearly described topics are text processing and collecting data from human subjects, which received very mixed scores in the questionnaire and are overall marked reversely from their rank in the materials table (collecting data from human subjects was ranked higher by researchers despite being less represented in the materials list).

Among the cross-cutting components, linguistic theory is not represented by numerous materials, but it appears that those that are available are precisely what is needed most and should be able to satisfy most of the learning content needs in this domain. The research and data management component is the one we know least about, as no researcher feedback was obtained and the materials on this topic appear to be absent from our materials list (see Table 4 above). However, it is rather likely that this topic was not always correctly identified, as it is closely related to research skills on the one hand, and to data handling skills on the other; we thus leave further analyses to researchers involved with this topic in Task 3.2.

4. Comparison with the needs analysis

In order to better define the integration of existing materials, it is useful to compare the analyses outlined in section 3 with the results of the needs analysis, conducted as intellectual output 1 in the UPSKILLS project. Given that the work on the needs analysis is still ongoing at the time of writing of the present report, we focus on those results that are already available – a survey of language and linguistics curricula at European universities, a survey of the literature and a corpus-based analysis of job adverts.

The survey of curricula (Gledić et al. 2021) showed that all skills and topics identified in UPSKILLS as important for the new generations of students of language-related subjects are underrepresented in the curricula of European universities (with no major differences in terms of levels of study, institutional ranking or country). Scientific research skills and general data skills (such as data collection and data interpreting) were found to be mentioned in approximately one quarter of the examined curricula. Problem solving skills, analytical skills and project management skills were found to be less present, similarly to text and corpus processing, and to programming, machine learning and linguistic theory (the latter three being included almost exclusively in MA curricula). Collection of data from human subjects appears to be covered mostly under the general heading of data gathering, without receiving a special focus, similar to research and data management, covered only at a more general level, in relation to project management. Finally, data standards and repositories were not mentioned in any of the examined curricula.

The literature review (Bernardini and Miličević Petrović 2021), based on combined insights from industry surveys, institutional position statements and academic reflections, identifies six skills clusters important for present-day students of languages and linguistics,

which largely overlap with the central topics of UPSKILLS. Leaving aside the “core disciplinary knowledge” and “(inter)cultural awareness”, already well-covered by the relevant university degrees and not dealt with in UPSKILLS, the review points to “data skills” and “research skills” as the ones that can open up most opportunities on the contemporary job market, and should thus be central to twenty-first century university education in the area of languages and linguistics. Other skills identified by UPSKILLS are also treated as valuable in the literature, specifically “interpersonal and entrepreneurial skills” (which cover topics such as project management) and “technical skills” (ranging from basic knowledge of how computers work to developments in artificial intelligence); these, however, are seen as being rather evidently needed (especially the technical skills) and as already being tackled. Combining these insights with the results of the materials overview, it becomes clear that skills such as problem solving and research skills are seen as most useful, even though more materials seem to be available for technology-oriented topics. The match is somewhat better for data science, very present both in the needs analysis and in existing materials.

The analysis of a dedicated corpus of job advertisements (Ferraresi et al. 2021) shows that experience and knowledge required for contemporary industry positions include linguistics, natural language processing, machine learning and data analysis (as well as knowledge in more specific areas such as localisation, translation, speech recognition and computer science). Experience with specific tools or techniques is often required, e.g. the Python programming language or regular expressions. Some of the other UPSKILLS topics are present in job adverts under skills rather than knowledge requirements, for example analytical and problem solving skills.

Table 7 sums up the relationship we found between the results of the needs analysis and those of the materials overview for the different UPSKILLS subtopics.⁵ Each subtopic is described in terms of its status in the different aspects of the needs analysis, as well as its status in the existing materials list combined with the responses about the list provided by project partners.

SUBTOPIC	Status in needs analysis			Status in materials coverage	
	<i>Presence in university curricula</i>	<i>Emphasis in the literature review</i>	<i>Presence in job adverts</i>	<i>Overall coverage</i>	<i>General vs. lang/ling</i>
Research methods	Medium	High	High	Medium-high	General
Analytical thinking	Low	High	High	Medium	General

⁵ Note that Table 7 reports overall estimates by the authors of this report. Not all of the estimates are based on exact frequencies (as such frequencies are not available for all aspects of the needs analysis), so they are to be taken as initial indicators for project partners, to be further checked once the work on Task 3.2 (creation of new learning content) is started.

Project management	Low	High	High	Medium	General
Programming	Low-medium	High	High	High	General and lang/ling
Collecting data from human subjects	Low	Medium	Low	Low-medium	General
Text processing	Low-medium	High	High	Medium-high	General and lang/ling
Statistics	Medium	High	High	High	General
Machine learning	Low	High	High	High	General
Data repositories and standards	Low	Low	Low-medium	Low-Medium	General
Linguistic theory	Medium	Medium	Medium	Medium	Lang/ling
Research and data management	Low	Medium	Low-medium	Low	General

Table 7. Skill requirements vs. coverage in the existing materials

5. Suggestions for integrating existing materials and concluding remarks

A deeper study of the existing materials is planned as an initial step in task 3.2 (creation of new learning content), where it will be taken over by the partners in charge of specific topics. Based on the analyses outlined above, the following action points can be summarised as suggestions for that activity:

- Details about material format and the target audience should be double-checked
- The materials for which no additional licence information can be obtained should be treated as copyrighted
- For the programming subtopic and the cross-cutting component linguistic theory, where sufficient existing materials appear to be available, the primary focus should be on modifying and integrating these materials in UPSKILLS (rather than creating new materials)

- For the subtopics language data science, machine learning and data standards and repositories, special attention should be paid to the extent to which the general materials can be used with language and linguistics students and to any possible modifications towards language-related content; data standards and repositories in particular should be emphasised as an important component of data handling skills, as awareness of this appears to be lacking
- For the subtopics introduction to scientific research, analytical thinking and project management, the initial focus should also be on the possibility of using the available general resources in language- and linguistics-related contexts, but more new materials could be needed
- For the topics collecting data from human subjects and text/speech processing, partners sharing the work should try to evaluate the materials jointly and reach a more uniform decision on how to proceed
- For the cross-cutting component research and data management, it would be useful to try to separate it from the research and data handling skills and re-evaluate the existing resources

Finally, the information collected about already existing materials will not be used only to inform decisions about learning content to be created within UPSKILLS, but it will also be published within Task 3.4, dedicated to learning content dissemination. To ensure long-term sustainability, in addition to the project website, we will consider uploading the table to the SSHOC marketplace of training materials (<https://sshoc-marketplace.acdh-dev.oeaw.ac.at/search?categories=training-material&order=label>).

References

- Bernardini, S. & Miličević Petrović, M. (2021). Toward a new profile for twenty-first century language specialists: Industry, institutional and academic insights. *UPSKILLS Task Report*. <https://doi.org/10.5281/zenodo.5030873>
- Ferraresi, A., Aragrande, G., Barrón-Cedeño, A., Bernardini, S. & Miličević Petrović, M. (2021). Competences, skills and tasks in today's jobs for linguists: Evidence from a corpus of job advertisements. *UPSKILLS Task Report*. <https://doi.org/10.5281/zenodo.5030879>
- Gledić, J., Đukanović, M., Miličević Petrović, M., van der Lek, I. & Assimakopoulos, S. (2021). Survey of curricula: Linguistics and language-related degrees in Europe. *UPSKILLS Task Report*. <https://doi.org/10.5281/zenodo.5030861>

Main websites consulted (last accessed on 25 April 2021)

Project catalogues

Tempus projects: https://eacea.ec.europa.eu/sites/2007-2013/tempus-programme_en,
https://wayback.archive-it.org/12090/20210122032758/https://eacea.ec.europa.eu/sites/2007-2013/tempus-programme_en

Erasmus+ projects: https://ec.europa.eu/programmes/erasmus-plus/projects_en

Horizon projects: <https://ec.europa.eu/programmes/horizon2020/en/h2020-sections-projects>

FP7 projects: https://ec.europa.eu/eurostat/cros/content/fp7-projects_en

ERC projects: <https://erc.europa.eu/projects-figures/erc-funded-projects>

SNSF projects: <http://p3.snf.ch>

The Gateway to Research by UK Research and Innovation: <https://gtr.ukri.org>

European infrastructures

CLARIN ERIC: <https://www.clarin.eu>

DARIAH ERIC: <https://www.dariah.eu>

CESSDA ERIC: <https://www.cessda.eu>

Digital Humanities Course Registry: <https://dhcr.clarin-dariah.eu>

SSH Training Discovery Toolkit: <https://training-toolkit.sshopencloud.eu>

Public platforms

FutureLearn: <https://www.futurelearn.com>

Coursera: <https://www.coursera.org>

edX: <https://www.edx.org>

Udemy: <https://www.udemy.com>

Annex 1 – List of existing materials identified by UPSKILLS

Primary topic	Type	Title	URL	Language	Licence
Data acquisition skills	Online course	Introduction to Text Processing and Analysis	https://learn.digiling.eu/course/view.php?id=9	English	CC-BY
Data acquisition skills	Online course	Introduction to Python for Linguists	https://learn.digiling.eu/course/view.php?id=7	English	CC-BY
Data acquisition skills	Online course	Computational Lexicology and Lexicography	https://learn.digiling.eu/enrol/index.php?id=6	English	CC-BY
Data acquisition skills	Online course	Introduction to Text and Data Mining	https://www.fosteropenscience.eu/node/2263	English	CC-BY
Data acquisition skills	Online course	Python Programming for the Humanities	https://github.com/sonofmun/FK-python-course/	English	CC-BY
Data acquisition skills	Online course	Get Data Off the Ground with Python	https://openedx.seas.gwu.edu/courses/course-v1:GW+EngComp1+2018/about	English	CC-BY
Data acquisition skills	Online course	Introduction to Computer Science and Programming in Python	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-0001-introduction-to-computer-science-and-programming-in-python-fall-2016/	English	CC-BY-NC-SA
Data acquisition skills	Online course	Using Corpora For Language Research	https://ocw.metu.edu.tr/course/view.php?id=98	English	CC-BY-NC-SA
Data acquisition skills	Online course	Laboratory in Cognitive Science	https://ocw.mit.edu/courses/brain-and-cognitive-sciences/9-63-laboratory-in-cognitive-science-fall-2002/	English	CC-BY-NC-SA
Data acquisition skills	Online course	Qualitative Research: Design and Methods	https://ocw.mit.edu/courses/political-science/17-878-qualitative-research-design-and-methods-fall-2007/	English	CC-BY-NC-SA
Data acquisition skills	Online course	Computational Models of Discourse	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-892-computational-models-of-discourse-spring-2004/	English	CC-BY-NC-SA
Data acquisition skills	Online course	Advanced Natural Language Processing	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-864-advanced-natural-language-processing-fall-2005/	English	CC-BY-NC-SA
Data acquisition skills	Online course	Introduction to Computational Thinking and Data Science	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-0002-introduction-to-computational-thinking-and-data-science-fall-2016/	English	CC-BY-NC-SA
Data acquisition skills	Online course	SI / Coursera - Programming for Everybody	https://open.umich.edu/find/open-educational-resources/information/si-coursera-programming-everybody	English	CC-BY-NC-SA

Primary topic	Type	Title	URL	Language	Licence
Data acquisition skills	Online course	Text Encoding and the Text Encoding Initiative	https://teach.dariah.eu/course/view.php?id=23	English	CC-BY-SA
Data acquisition skills	Online course	Python from Scratch	https://aoe.fi/#/materiaali/436	English	CC-BY-SA
Data acquisition skills	Online course	Introduction to Speech Processing	https://aoe.fi/#/materiaali/1121	English	CC-BY-SA
Data acquisition skills	Online course	Introduction to Python	https://learn.saylor.org/course/view.php?id=439	English	CC-BY-SA
Data acquisition skills	Online course	Introduction to Digital Humanities	https://teach.dariah.eu/course/view.php?id=26	English	CC0
Data acquisition skills	Online course	Programming Methodology	http://ocw.snu.ac.kr/node/2574	English	Copyrighted materials
Data acquisition skills	Online course	Programming Basics	http://codeandyouth.iit.demokritos.gr/enrol/index.php?id=2	English	Unknown
Data acquisition skills	Online course	Field Experiments & Observations	http://www.disaster-resilience.net/knowledgehub/	English	Unknown
Data acquisition skills	Online course	Data Collection Method	http://www.disaster-resilience.net/knowledgehub/course/view.php?id=18	English	Unknown
Data acquisition skills	Online course	Corpus Linguistics: Method, Analysis, Interpretation	https://www.futurelearn.com/courses/corpus-linguistics	English	Unknown
Data acquisition skills	Online course	Computer Programming for Everyone	https://www.futurelearn.com/courses/computer-programming-for-everyone	English	Unknown
Data acquisition skills	Online course	Learn to Code for the Web	https://www.futurelearn.com/courses/learn-to-code-for-the-web	English	Unknown
Data acquisition skills	Online course	Computer Programming for Everyone	https://www.futurelearn.com/courses/computer-programming-for-everyone	English	Unknown
Data acquisition skills	Online course	Data Structures & Algorithms course	https://www.edx.org/course/data-structures-algorithms-iv-pattern-matching-dijkstras-mst-and-dynamic-programming-algorithms	English	Unknown
Data acquisition skills	Online course	Introduction to Data Science using Python	https://www.udemy.com/course/introduction-to-data-science-using-python/	English	Unknown
Data acquisition skills	Online course	Introduction to Digital Humanities	https://www.edx.org/course/introduction-to-digital-humanities	English	Unknown
Data acquisition skills	Online course	Understanding English Dictionaries	https://www.futurelearn.com/courses/understanding-dictionaries	English	Unknown
Data acquisition skills	Online course	NLP Course For You	https://lena-voita.github.io/nlp_course.html	English	Unknown
Data acquisition skills	Online course	Code	https://code.org/	English	Unknown
Data acquisition skills	Online course	Introduction to Psychological Research Methods	https://www.edx.org/course/introduction-to-psychological-research-methods	English	Unknown
Data acquisition skills	Online course	Natural Language Processing Specialization	https://www.coursera.org/specializations/natural-language-processing	English with multilingual subtitles	Unknown
Data acquisition skills	Online course	Text Mining and Analytics	https://www.coursera.org/learn/text-mining	English with subtitles	Unknown

Primary topic	Type	Title	URL	Language	Licence
Data acquisition skills	Online course	Code Yourself!	https://www.coursera.org/learn/intro-programming	English with subtitles	Unknown
Data acquisition skills	Online course	Python for Everybody	https://www.coursera.org/specializations/python	English with subtitles	Unknown
Data acquisition skills	Online course	The Language Band of Finland	https://www.kielipankki.fi/support/raining/	English & Finnish	Copyrighted materials
Data acquisition skills	Online course	Υπολογιστική Γλωσσολογία (Computational Linguistics)	https://opencourses.uoa.gr/courses/NOC79/	Greek	CC-BY-NC-SA
Data acquisition skills	Online course	Leksičko prepoznavanje u obradi prirodnih jezika	http://edx.baektel.eu/courses/course-v1:UB+UB5+2015/about	Serbian	CC-BY-NC-SA
Data acquisition skills	Online course	Introduction to Corpus-Based Methods in Linguistics	https://phil.openedx.uzh.ch/courses/course-v1:PHIL+ReLDI102+2018/about	Serbian	CC-BY-SA
Data acquisition skills	Online course	Introduction to Experimental Methods in Linguistics	https://phil.openedx.uzh.ch/courses/course-v1:PHIL+ReLDI103+2018/about	Serbian	CC-BY-SA
Data acquisition skills	Online course	Elektronski kurs za programski jezik Pajton	http://edusoft.matf.bg.ac.rs/ePython/	Serbian	Unknown
Data acquisition skills	Other	Programming with Python	https://swcarpentry.github.io/python-novice-inflammation/	English	CC-BY
Data acquisition skills	Other	Plotting and Programming in Python	http://swcarpentry.github.io/python-novice-gapminder/	English	CC-BY
Data acquisition skills	Other	Programming with R	http://swcarpentry.github.io/r-novice-inflammation/	English	CC-BY
Data acquisition skills	Other	Text Analysis in Python	https://carpentries-incubator.github.io/python-text-analysis/	English	CC-BY
Data acquisition skills	Other	Python for Humanities	https://carpentries-incubator.github.io/python-humanities-lesson/	English	CC-BY
Data acquisition skills	Other	Introduction to TEI	https://carpentries-incubator.github.io/tei-xml/	English	CC-BY
Data acquisition skills	Other	Introduction to Working with Data (Regular Expressions)	https://librarycarpentry.org/lc-data-intro/	English	CC-BY
Data acquisition skills	Other	Workshop: Python Programming for Linguists	https://www.oercommons.org/courses/workshop-python-programming-for-linguists	English	CC-BY-SA
Data acquisition skills	Other	Python Programming for Linguists	https://github.com/IngoKl/python-programming-for-linguists	English	CC-BY-SA
Data acquisition skills	Other	Programming 101	https://www.merlot.org/merlot/viewCoursePortfolio.htm?id=1378575	English	CC-BY
Data acquisition skills	Other	ARIA Framework Tutorial	https://github.com/ARIA-VALUSPA/AVP/wiki/ARIA-Framework-Tutorial#running-the-default-scenario	English	Unknown
Data acquisition skills	Other	Course Curricula	http://erasmus-class.eu/out-course-curricula/	English	Unknown
Data acquisition skills	Other	Kodu Game Lab	http://www.kodugamelab.com/	English	Unknown
Data acquisition skills	Other	TeachPsychScience	https://teachpsychscience.org	English	Unknown

Primary topic	Type	Title	URL	Language	Licence
Data acquisition skills	Other	CLASSLA CLARIN knowledge centre	https://www.clarin.si/info/k-centre/	English	Unknown
Data acquisition skills	Other	DARIAH consent for wizard	https://consent.dariah.eu/	English	Unknown
Data acquisition skills	Other	CLARIN K-Centre CKLD materials	https://ckld.uni-koeln.de/materials	English	Unknown
Data acquisition skills	Other	Consent forms	https://ace.ruhosting.nl/consent-forms/	English	Unknown
Data acquisition skills	Other	Annotation guidelines	https://corli.humanum.fr/en/annotation-guides/	English	Unknown
Data acquisition skills	Other	Standards and formats	https://www.clarin.eu/content/standards-and-formats	English	Unknown
Data acquisition skills	Other	TeLeMaCo stands for Teaching and Learning Materials Collection	https://telemaco.clarin-d.uni-saarland.de/hub/	English & German	CC-BY-NC-SA
Data acquisition skills	Other	Introduction to Natural Language Processing	https://u.cs.biu.ac.il/~89-680/	Hebrew	Unknown
Data acquisition skills	Slides	Multi- and cross-platform data analysis with 4CAT (4cat.oilab.eu)	https://www.mis.mpg.de/fileadmin/pdf/slides_ody2_4768.pdf	English	Unknown
Data acquisition skills	Slides	See the forest AND the trees - Domain-driven language documentation	https://engagedhumanities.al.uw.edu.pl/wp-content/uploads/2016/03/7_march_2016.pdf	English	Unknown
Data acquisition skills	Slides	Introduction to Natural Language Processing in Python	https://www.coursera.org/projects/intro-natural-language-processing-nlp-python	English	Unknown
Data acquisition skills	Slides	Text Classification Using Word2Vec and LSTM on Keras	https://www.coursera.org/projects/text-classification-word2vec-lstm-keras-tensorflow	English	Unknown
Data acquisition skills	Slides	Training Part 3. Natural Language Processing	http://erasmus-class.eu/out-training-material/	English	Unknown
Data acquisition skills	Slides	LCT teaching materials	https://lct-master.org/contents_2014/teaching-material.php	English	Unknown
Data acquisition skills	Video lecture(s)	MIT 6.00 Introduction to Computer Science and Programming - Fall 2008	http://videlectures.net/mit600f08_intro_computer_science_programming/	English	CC-BY-NC-SA
Data acquisition skills	Video lecture(s)	The TEI Guidelines: Born to be Open	https://campus.dariah.eu/resource/the-tei-guidelines-born-to-be-open	English	CC-BY*
Data acquisition skills	Video lecture(s)	Speech Processing and Machine Learning Workshop	https://www.tapas-etn-eu.org/events/te2	English	Unknown
Data acquisition skills	Video lecture(s)	Data Collection, Management and Ethical Practices training	https://www.tapas-etn-eu.org/events/te3	English	Unknown
Data acquisition skills	Video lecture(s)	Programming Methodology (Lectures 1-28)	https://www.youtube.com/playlist?list=PL84A56BC7F4A1F852	English	Unknown
Data acquisition skills	Video lecture(s)	Stanford CS224N: Natural Language Processing with Deep Learning Winter 2019	https://www.youtube.com/playlist?list=PLoROMvody4rOhcuXMZkNm7j3fVwBBY42z	English	Unknown
Data acquisition skills	Video lecture(s)	Stanford CS224U: Natural Language Understanding Spring 2019	https://www.youtube.com/watch?v=tZ_Jrc_nRjY&list=PLoROMvody4rObpMCir6rNNUIFAn56Js20	English	Unknown
Data acquisition skills	Video lecture(s)	Partitur Editor Video Tutorial [en]	https://www.youtube.com/watch?v=IfNCQnq2Op4	English	Unknown

Primary topic	Type	Title	URL	Language	Licence
Data acquisition skills	Video lecture(s)	TEI training	https://lectures.ms.mff.cuni.cz/index.php?cat=82	English	Unknown
Data handling skills	Educational game	Puzzling It Out - Collaborative Review Activity for Introductory Statistics	http://www.ssrc.org/files/2019-12/StatPuzzles-AllFiles.pdf	English	CC-BY-NC-SA
Data handling skills	Educational game	Matish game	https://erasmus4maths.com/matish.html	English	Unknown
Data handling skills	Online course	Strojno učenje	https://strojnoucenje.takelab.fer.hr/	Croatian	CC-BY-NC-SA
Data handling skills	Online course	Machine Learning Crash Course	https://developers.google.com/machine-learning/crash-course	English	CC-BY
Data handling skills	Online course	Open Science courses	https://www.fosteropenscience.eu/courses	English	CC-BY
Data handling skills	Online course	Managing and Sharing Research Data	https://www.fosteropenscience.eu/node/2328	English	CC-BY
Data handling skills	Online course	Rsearch Data Management Training	https://mantra.edina.ac.uk/	English	CC-BY
Data handling skills	Online course	Probabilistic Systems Analysis and Applied Probability	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-041-probabilistic-systems-analysis-and-applied-probability-fall-2010/	English	CC-BY-NC-SA
Data handling skills	Online course	Open Science: Sharing Your Research with the World	https://www.edx.org/course/open-science-sharing-your-research-with-the-world	English	CC-BY-NC-SA
Data handling skills	Online course	Topics in Statistics: Statistical Learning Theory	https://ocw.mit.edu/courses/mathematics/18-465-topics-in-statistics-statistical-learning-theory-spring-2007/	English	CC-BY-NC-SA
Data handling skills	Online course	Out of Context: A Course on Computer Systems That Adapt To, and Learn From, Context	https://ocw.mit.edu/courses/media-arts-and-sciences/mas-963-out-of-context-a-course-on-computer-systems-that-adapt-to-and-learn-from-context-fall-2001/	English	CC-BY-NC-SA
Data handling skills	Online course	Machine Learning	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-867-machine-learning-fall-2006/	English	CC-BY-NC-SA
Data handling skills	Online course	Quantitative Research Methods: Multivariate	https://ocw.mit.edu/courses/political-science/17-874-quantitative-research-methods-multivariate-spring-2004/	English	CC-BY-NC-SA
Data handling skills	Online course	Pre-University Calculus	https://ocw.tudelft.nl/courses/pre-university-calculus/	English	CC-BY-NC-SA
Data handling skills	Online course	Math Explained	https://ocw.tudelft.nl/courses/math-explained/	English	CC-BY-NC-SA
Data handling skills	Online course	Open Science: Sharing your research with the world	https://ocw.tudelft.nl/courses/open-science-sharing-research-world/	English	CC-BY-NC-SA
Data handling skills	Online course	Data and processes in computing	https://www.open.edu/openlearn/science-maths-technology/computing-ict/data-and-processes-computing/content-section-0?active-tab=description-tab	English	CC-BY-NC-SA

Primary topic	Type	Title	URL	Language	Licence
Data handling skills	Online course	More working with charts, graphs and tables	https://www.open.edu/openlearn/science-maths-technology/mathematics-statistics/more-working-charts-graphs-and-tables/content-section-0?active-tab=description-tab	English	CC-BY-NC-SA
Data handling skills	Online course	Digitizing Dictionaries	https://teach.dariah.eu/course/view.php?id=20	English	CC-BY-SA
Data handling skills	Online course	Math 131A: Introduction to Probability and Statistics (English)	http://ocw.uci.edu/courses/math_131a_introduction_to_probability_and_statistics.html	English	CC-BY-SA
Data handling skills	Online course	Spreadsheet	https://learn.saylor.org/course/view.php?id=58	English	CC-BY-SA
Data handling skills	Online course	Spreadsheets II: Formatting and Functions	https://learn.saylor.org/course/view.php?id=450	English	CC-BY-SA
Data handling skills	Online course	Introduction to Statistics	https://learn.saylor.org/course/view.php?id=28	English	CC-BY-SA
Data handling skills	Online course	Introduction to Machine Learning	https://openlearninglibrary.mit.edu/courses/course-v1:MITx+6.036+1T2019/about	English	Copyrighted materials
Data handling skills	Online course	Introduction to Deep Learning	http://introtodeeplearning.com/2020/index.html	English	Copyrighted materials
Data handling skills	Online course	Machine Learning	http://ocw.snu.ac.kr/node/2221	English	Copyrighted materials
Data handling skills	Online course	Elements of AI	https://www.elementsofai.com	English	Copyrighted materials
Data handling skills	Online course	Sampling	http://www.disaster-resilience.net/knowledgehub/course/view.php?id=17	English	Unknown
Data handling skills	Online course	Big Data: Measuring And Predicting Human Behaviour	https://www.futurelearn.com/courses/big-data	English	Unknown
Data handling skills	Online course	Digital Skills: Artificial Intelligence	https://www.futurelearn.com/courses/artificial-intelligence	English	Unknown
Data handling skills	Online course	Augmented Data Visualization with Machine Learning	https://www.udemy.com/course/machinelearning-analytics/	English	Unknown
Data handling skills	Online course	Research Data Management and Sharing	https://www.coursera.org/learn/data-management?action=enroll	English	Unknown
Data handling skills	Online course	Data Science: Machine Learning	https://www.edx.org/course/data-science-machine-learning	English	Unknown
Data handling skills	Online course	Data Science: R Basics	https://www.edx.org/course/data-science-r-basics	English	Unknown
Data handling skills	Online course	Data Science: Linear Regression	https://www.edx.org/course/data-science-linear-regression	English	Unknown
Data handling skills	Online course	Introduction to Probability	https://www.edx.org/course/introduction-to-probability	English	Unknown
Data handling skills	Online course	CS50's Introduction to Artificial Intelligence with Python	https://www.edx.org/course/cs50s-introduction-to-artificial-intelligence-with-python	English	Unknown
Data handling skills	Online course	Quantitative Methods	https://www.coursera.org/learn/quantitative-methods	English	Unknown
Data handling skills	Online course	Statistics and probability	https://www.khanacademy.org/math/statistics-probability	English	Unknown
Data handling skills	Online course	Quantitative Methods	https://www.coursera.org/learn/quantitative-methods	English	Unknown

Primary topic	Type	Title	URL	Language	Licence
Data handling skills	Online course	Improving your statistical inferences	https://www.coursera.org/learn/statistical-inferences	English	Unknown
Data handling skills	Online course	Consortium for the Advancement of Undergraduate Statistics Education	https://www.causeweb.org/cause/resources	English	Unknown
Data handling skills	Online course	Statistics and probability	https://ocw.vu.edu.pk/CourseDetails.aspx?cat=Probability+%26+Statistics&course=STA301	English	CC-BY-NC-SA
Data handling skills	Online course	Data Analysis and Presentation Skills	https://www.coursera.org/specializations/pwc-analytics	English with subtitles	Unknown
Data handling skills	Online course	Advanced Machine Learning Specialisation	https://www.coursera.org/specializations/aml	English with subtitles	Unknown
Data handling skills	Online course	Getting Started with AWS Machine Learning	https://www.coursera.org/learn/aws-machine-learning	English with subtitles	Unknown
Data handling skills	Online course	Introduction to Statistics for Language Data	https://phil.openedx.uzh.ch/courses/course-v1:PHIL+ReLDII04+2018/about	Serbian	CC-BY-SA
Data handling skills	Other	Deep Learning	http://www.merlot.org/merlot/viewCoursePortfolio.htm?id=1378612	English	CC-BY
Data handling skills	Other	Introduction to Research Infrastructures	http://training.parthenos-project.eu/sample-page/intro-to-ri/	English	CC-BY
Data handling skills	Other	Management Challenges in Research Infrastructures	http://training.parthenos-project.eu/sample-page/management-challenges/	English	CC-BY
Data handling skills	Other	Introduction to Collaborations in Research Infrastructures	http://training.parthenos-project.eu/sample-page/introduction-to-collaboration-in-research-infrastructures/	English	CC-BY
Data handling skills	Other	Manage, Improve and Open up your Research and Data	http://training.parthenos-project.eu/sample-page/manage-improve-and-open-up-your-research-and-data/	English	CC-BY
Data handling skills	Other	Formal Ontologies: A complete novice's guide	http://training.parthenos-project.eu/sample-page/formal-ontologies-a-complete-novices-guide/	English	CC-BY
Data handling skills	Other	Digital Humanities Research Questions and Methods	https://training.parthenos-project.eu/sample-page/digital-humanities-research-questions-and-methods/	English	CC-BY
Data handling skills	Other	MATH 146 – Introduction to Statistics	http://opencourselibrary.org/math-146-introduction-to-statistics/	English	CC-BY
Data handling skills	Other	R for Reproducible Scientific Analysis	http://swcarpentry.github.io/r-novice-gapminder/	English	CC-BY
Data handling skills	Other	Data Organization in Spreadsheets for Humanities	https://carpentries-incubator.github.io/spreadsheet-humanities-lesson/	English	CC-BY
Data handling skills	Other	Data handling tutorials	https://mantra.edina.ac.uk/software/practicals.html	English	CC-BY
Data handling skills	Other	MaDiH: Research Software Engineering Training'	https://campus.dariah.eu/resource/rse2019	English	CC-BY

Primary topic	Type	Title	URL	Language	Licence
Data handling skills	Other	Guides	https://www.dcc.ac.uk/guidance	English	CC-BY-NC-SA
Data handling skills	Other	Statistics 250 - Introduction to Statistics and Data Analysis	https://open.umich.edu/find/open-educational-resources/statistics/statistics-250-introduction-statistics-data-analysis	English	CC-BY-NC-SA
Data handling skills	Other	Statistical Thinking	https://nobaproject.com/modules/statistical-thinking	English	CC-BY-NC-SA
Data handling skills	Other	Introduction to artificial intelligence	https://aoe.fi/#/materiaali/2	English	CC-BY-SA
Data handling skills	Other	Data Management Expert Guide	https://www.cessda.eu/Training/Training-Resources/Library/Data-Management-Expert-Guide	English	CC-BY-SA
Data handling skills	Other	Training Resources	https://www.cessda.eu/Training/Training-Resources	English	CC-BY-SA
Data handling skills	Other	DARIAH Pathfinder to Data Management Best Practices in the Humanities	https://campus.dariah.eu/resource/dariah-pathfinder-to-data-management-best-practices-in-the-humanities	English	CC-BY*
Data handling skills	Other	Tutorial for using the viky.ai tool	https://www.viky.ai/doc/	English	Copyrighted materials
Data handling skills	Other	MachineLearningTutorial	https://github.com/jsnajder/MachineLearningTutorial	English	Copyrighted materials
Data handling skills	Other	CLARIN Standards Information System	https://clarin.ids-mannheim.de/standards/index.xq	English	Unknown
Data handling skills	Other	MERLOT	https://www.merlot.org/merlot/index.htm	English	Unknown
Data handling skills	Other	Perceptron	https://github.com/Christof93/perceptron	English	Unknown
Data handling skills	Other	Curriculum Innovation: Integrating QM into undergraduate programmes in Linguistics in the School of Languages and Social Sciences, Aston University	https://otr.ukri.org/projects?ref=ES%2FJ011975%2F1	English	Unknown
Data handling skills	Other	MT-ECOGUIDE: The practical Guide through the Machine Translation EcoSystem	http://www.lt-observatory.eu/sites/default/files/docs/D5_3.pdf	English	Unknown
Data handling skills	Other	Best Practice Guide on LRs for Automated MT	http://www.lt-observatory.eu/sites/default/files/docs/D1_3.pdf	English	Unknown
Data handling skills	Video lecture(s)	Neural networks for machine learning	https://www.youtube.com/playlist?list=PLoRl3Ht4JOcdU872GhiYWf6jwrk_SNhZ9	English	Unknown
Data handling skills	Video lecture(s)	Learning from data	http://work.caltech.edu/lectures.html#lectures	English	Unknown
Data handling skills	Video lecture(s)	Stanford CS229: Machine Learning - Autumn 2018	https://www.youtube.com/playlist?list=PLoROMvodv4rMiGQp3WXShtMGgzqpfVfbU	English	Unknown
Data handling skills	Video lecture(s)	Concepts in Statistics	https://www.hippocampus.org/HippoCampus/?user=mhit2016&playlist=Concepts+in+Statistics	English with subtitles	Copyrighted materials
Other	Educational game	Citizen Science at School Making an Educational Escape Room Guide	https://ec.europa.eu/programmes/erasmus-plus/project-result-content/0fdf1677-ab3e-415b-8a13-	English	Unknown

Primary topic	Type	Title	URL	Language	Licence
			e3d54775b7be/CSS%20Escape%20Room_EN.docx		
Other	Educational game	Phrase detective	https://anawiki.essex.ac.uk/phrasedetectives/index.php	English	Unknown
Other	Educational game	Spent	http://playspent.org/	English	Unknown
Other	Educational game	Town of Salem	https://www.blankmediagames.com/	English	Unknown
Other	Educational game	Games for Change	https://www.gamesforchange.org/games/	English	Unknown
Other	Educational game	GeoGuessr	https://www.geoguessr.com/	English	Unknown
Other	Educational game	Flipgrid	https://info.flipgrid.com/	English (but can be used for any language)	Unknown
Other	Online course	Basque language learning and ICTs	https://ikasgela.santurtzius.com/course/view.php?id=223	Basque	Unknown
Other	Online course	Variability of Languages in Time and Space	https://learn.digiling.eu/course/view.php?id=10	English	CC-BY
Other	Online course	Localization Tools and Workflows	https://learn.digiling.eu/enrol/index.php?id=5	English	CC-BY
Other	Online course	Post-Editing Machine Translation	https://learn.digiling.eu/enrol/index.php?id=8	English	CC-BY
Other	Online course	Mining and Managing Multilingual Terminology	https://learn.digiling.eu/enrol/index.php?id=4	English	CC-BY
Other	Online course	The Virtual Linguistics Campus (OER)	https://oer-vlc.de/	English	CC-BY
Other	Online course	Active Learning for Soft Skills Development	https://www.pok.polimi.it/courses/course-v1:Polimi+SSD101+2021_M1/abouut	English	CC-BY
Other	Online course	English and Digital Literacies	https://opencourses.uoa.gr/courses/ENL10/	English	CC-BY-NC-SA
Other	Online course	Dungeons and Discourse	https://lor.instructure.com/resources/9b95010bd3954127a76f2d79fef3429/summary	English	CC-BY-SA
Other	Online course	Open Science Mooc	https://opensciencemooc.eu/	English	CC0
Other	Online course	Fundamentals of Project Management	https://alison.com/course/fundamentals-of-project-management-revised-2017	English	Copyrighted materials
Other	Online course	Learning center	https://translationcommons.org	English	Unknown
Other	Online course	Training Catalogue	https://ideal-phd-project.eu/	English	Unknown
Other	Online course	Lumen Learning	https://lumenlearning.com	English	Unknown
Other	Online course	Introducing How Computers Work	https://www.khanacademy.org/computing/code-org/computers-and-the-internet/how-computers-work/v/khan-academy-and-codeorg-introducing-how-computers-work	English	Unknown
Other	Online course	Linear algebra	https://www.khanacademy.org/math/linear-algebra	English	Unknown

Primary topic	Type	Title	URL	Language	Licence
Other	Online course	Machine Translation	https://www.coursera.org/learn/mac-hinetranslation	English (with multilingual subtitles)	Unknown
Other	Online course	Developing AI Applications on Azure	https://www.coursera.org/learn/developing-ai-applications-azure	English with subtitles	Unknown
Other	Online course	Applied Data Science	https://www.coursera.org/specializations/applied-data-science	English with subtitles	Unknown
Other	Other	Citizen Science in the (Digital) Arts and Humanities	https://training.parthenos-project.eu/sample-page/citizen-science-in-the-digital-arts-and-humanities/	English	CC-BY
Other	Other	Open Course Library	http://opencourselibrary.org/course/	English	CC-BY
Other	Other	eTransFair e-module on Entrepreneurship	https://etransfair.eu/entrepreneurship-e-module	English	CC-BY
Other	Other	eTransFair e-module on Localisation	https://etransfair.eu/localization-e-module	English	CC-BY
Other	Other	eTransFair e-module on Quality Management	https://etransfair.eu/quality-management-e-module	English	CC-BY
Other	Other	eTransFair e-module on Revision	https://etransfair.eu/revision-e-module	English	CC-BY
Other	Other	eTransFair e-module on Terminology	https://etransfair.eu/information-mining-and-terminological-competence-module	English	CC-BY
Other	Other	eTransFair e-module on Translation Technology	https://etransfair.eu/translation-technology-e-module	English	CC-BY
Other	Other	The Unix Shell	http://swcarpentry.github.io/shell-novice/	English	CC-BY
Other	Other	Version Control with Git	http://swcarpentry.github.io/git-novice/	English	CC-BY
Other	Other	INSYSTEDED pedagogical framework – Instructional booklet	https://zenodo.org/record/4085237#.YCYveWhKiUI	English	CC-BY
Other	Other	Wikiversity	https://en.wikiversity.org/wiki/Wikiversity:Main_Page	English	CC-BY-SA
Other	Other	Controlled Vocabularies and SKOS	https://campus.dariah.eu/resource/controlled-vocabularies-and-skos	English	CC-BY*
Other	Other	Educandy	https://www.educandy.com/#	English	Copyrighted materials
Other	Other	Digital Transformation in Humanities	https://www.digihuman.eu/	English	Unknown
Other	Other	Braineos	http://www.braineos.com/	English	Unknown
Other	Other	Play ancient games online	https://locusludi.ch/play-ancient-online-games/	English	Unknown
Other	Other		https://www.ccoer.org/learn/find-oer/general-oer/	English	Unknown
Other	Other	Unreal Engine	https://www.unrealengine.com/en-US/	English	Unknown
Other	Other	Inklewriter	https://www.inklestudios.com/inklewriter/	English	Unknown
Other	Other	Gamestar Mechanic	https://gamestarmechanic.com/	English	Unknown

Primary topic	Type	Title	URL	Language	Licence
Other	Other	Edutopia	https://www.edutopia.org/	English	Unknown
Other	Other	Quizizz	https://quizizz.com/	English	Unknown
Other	Other	Plickers	https://www.plickers.com/	English	Unknown
Other	Other	Kahoot	https://kahoot.com/?utm_name=controller_app&utm_source=controller_app&utm_campaign=controller_app&utm_medium=link	English	Unknown
Other	Other	Flippity	https://www.flippity.net/	English	Unknown
Other	Other	Lingoboingo	https://lingoboingo.org/game-landing-page/	English & French	Unknown
Other	Slides	Copyrights in Education	https://aoe.fi/#/materiaali/58	English	CC-BY-SA
Other	Slides	Slides from various trainings of the EXPERT project	https://www.slideshare.net/riilp	English	Unknown
Other	Slides	Games and Learning Sprint Course	https://sites.google.com/view/gamesandlearningsprint/home	English	Unknown
Other	Video lecture(s)	The Virtual Linguistics Campus	https://www.youtube.com/user/LinguisticsMarburg	English	CC-BY
Other	Video lecture(s)	Speech Pathologies and Therapies Training	https://www.tapas-etn-eu.org/events/tapas-training-event-1-speech-pathologies-and-therapies	English	Unknown
Other	Video lecture(s)	Human-Centered Systems Design and Unconscious Bias training	https://www.tapas-etn-eu.org/events/te4	English	Unknown
Other	Video lecture(s)	Videolectures net	http://videolectures.net	Multilingual	CC-BY-NC-ND
Research skills	Educational game	Quandary	https://www.quandarygame.org/	English	Unknown
Research skills	Online course	Being a researcher (in Information Science and Technology)	https://www.pok.polimi.it/courses/course-v1:Polimi+BAR101+2021_M1/about	English	CC-BY-NC
Research skills	Online course	Research Methods	https://online225.psych.wisc.edu/	English	CC-BY-NC
Research skills	Online course	Cross-Cultural Investigations: Technology and Development	https://ocw.mit.edu/courses/anthropology/21a-801j-cross-cultural-investigations-technology-and-development-fall-2012/	English	CC-BY-NC-SA
Research skills	Online course	Creative Problem Solving and Decision making	https://ocw.tudelft.nl/courses/creative-problem-solving-and-decision-making/	English	CC-BY-NC-SA
Research skills	Online course	Information Literacy I	https://ocw.tudelft.nl/courses/information-literacy-i/	English	CC-BY-NC-SA
Research skills	Online course	Information Literacy II	https://ocw.tudelft.nl/courses/information-literacy-ii/	English	CC-BY-NC-SA
Research skills	Online course	Information Literacy for Master's and PhD students	https://ocw.tudelft.nl/courses/information-literacy-for-masters-and-phd-students/	English	CC-BY-NC-SA
Research skills	Online course	Case Study Methodology	https://www.pok.polimi.it/courses/course-v1:Polimi+CASESTUDY101+2021_M1/about	English	CC-BY-NC-SA

Primary topic	Type	Title	URL	Language	Licence
Research skills	Online course	Survey Research Methodology	https://www.pok.polimi.it/courses/course-v1:Polimi+SURVEY101+2021_M1/about	English	CC-BY-NC-SA
Research skills	Online course	Research methods	https://ocw.vu.edu.pk/CourseDetails.aspx?cat=Probability+%26+Statistics&course=STA630	English	CC-BY-NC-SA
Research skills	Online course	Introduction to research in linguistics: theory, logic, method	https://phil.openedx.uzh.ch/courses/course-v1:PHIL+Movetia101+2046/about	English	CC-BY-SA
Research skills	Online course	Research Skills Tutorial	https://subjectguides.esc.edu/researchskillstutorial/welcome	English	CC-BY-SA
Research skills	Online course	Introduction to Critical Thinking and Logic	https://learn.saylor.org/course/view.php?id=410	English	CC-BY-SA
Research skills	Online course	Practicing Design Thinking & Making	https://teach.dariah.eu/course/view.php?id=58	English	CC0
Research skills	Online course	Time Scheduling and Project Management	http://www.axesslearning.eu/ficha.php?id_ficha=4	English	Copyrighted materials
Research skills	Online course	Research Methods and Methodologies	http://www.disaster-resilience.net/knowledgehub/course/view.php?id=30	English	Unknown
Research skills	Online course	Philosophy of Science	http://www.disaster-resilience.net/knowledgehub/course/view.php?id=29	English	Unknown
Research skills	Online course	Applied Research	http://www.disaster-resilience.net/knowledgehub/course/view.php?id=28	English	Unknown
Research skills	Online course	Social Network Analysis	http://www.disaster-resilience.net/knowledgehub/course/view.php?id=27	English	Unknown
Research skills	Online course	Management of Research	http://www.disaster-resilience.net/knowledgehub/course/view.php?id=31	English	Unknown
Research skills	Online course	Policy Brief	http://www.disaster-resilience.net/knowledgehub/course/view.php?id=25	English	Unknown
Research skills	Online course	Leadership in the Public Sector	http://www.disaster-resilience.net/knowledgehub/course/view.php?id=24	English	Unknown
Research skills	Online course	International Collaboration and Teaching	http://www.disaster-resilience.net/knowledgehub/course/view.php?id=26	English	Unknown
Research skills	Online course	Get Creative with People to Solve Problems	https://engagedhumanities.al.uw.edu.pl/wp-content/uploads/2016/03/Researching-young-peoples%E2%80%99-minority-language-practices.pdf	English	Unknown
Research skills	Online course	Introduction to Social Research Methods	https://www.edx.org/course/introduction-to-social-research-methods	English	Unknown
Research skills	Online course	On Being a Scientist	https://www.coursera.org/learn/scientist	English	Unknown
Research skills	Online course	Being a researcher (in Information Science and Technology)	https://www.coursera.org/learn/being-researcher	English	Unknown

Primary topic	Type	Title	URL	Language	Licence
Research skills	Online course	Understanding Research Methods	https://www.coursera.org/learn/research-methods	English	Unknown
Research skills	Online course	Creative Thinking: Techniques and Tools for Success	https://www.coursera.org/learn/creative-thinking-techniques-and-tools-for-success	English	Unknown
Research skills	Online course	Developing Your Research Project	https://www.futurelearn.com/courses/research-project	English	Unknown
Research skills	Online course	Critical thinking	https://www.khanacademy.org/partner-content/wi-phi/wi-phi-critical-thinking	English	Unknown
Research skills	Online course	Research Design: Inquiry and Discovery	https://www.coursera.org/learn/research-inquiry-discovery	English	Unknown
Research skills	Online course	Science Literacy	https://www.coursera.org/learn/science-literacy	English	Unknown
Research skills	Online course	Mindware: Critical Thinking for the Information Age	https://www.coursera.org/learn/mindware	English	Unknown
Research skills	Online course	Qualitative Research Methods: Conversational Interviewing	https://www.edx.org/course/qualitative-research-methods-conversational-interv	English	Unknown
Research skills	Online course	Qualitative Research Methods	https://www.coursera.org/learn/qualitative-methods	English	Unknown
Research skills	Online course	Introduction to Social Research Methods	https://www.edx.org/course/introduction-to-social-research-methods	English	Unknown
Research skills	Online course	Science Research Foundations	https://www.coursera.org/learn/science-research-foundations	English	Unknown
Research skills	Online course	Find solutions to a problem	https://allsoskilled.eu/course/course-5/	English, Greek, Italian, Lithuanian, Polish, Turkish	CC-BY-SA
Research skills	Online course	Introduction to Logic and Critical Thinking	https://www.coursera.org/specializations/logic-critical-thinking-duke	English with subtitles	Unknown
Research skills	Online course	Probability and Statistics: To p or not to p?	https://www.coursera.org/learn/probability-statistics	English with subtitles	Unknown
Research skills	Online course	Introduction to Research Methodology in Linguistics	https://phil.openedx.uzh.ch/courses/course-v1:PHIL+ReLDI101+2018/about	Serbian	CC-BY-SA
Research skills	Other	Research Methods Knowledge Base	https://conjointly.com/kb/	English	Copyrighted materials
Research skills	Other	eTransFair e-module on Project Management	https://etransfair.eu/project-management-e-module	English	CC-BY
Research skills	Other	Critical Thinking I: Exercises	http://ssric.org/node/467	English	CC-BY-NC-SA
Research skills	Other	Critical Thinking II: Resources for Critical Thinking	http://ssric.org/node/711	English	CC-BY-NC-SA
Research skills	Other	Research Designs	https://nobaproject.com/modules/research-designs	English	CC-BY-NC-SA
Research skills	Other	Research Methods in Developmental Psychology	https://nobaproject.com/modules/research-methods-in-developmental-psychology	English	CC-BY-NC-SA

Primary topic	Type	Title	URL	Language	Licence
Research skills	Other	Incorporating Soft Skills into the K-12 Curriculum	https://www.hanoverresearch.com/media/Incorporating-Soft-Skills-into-the-K-12-Curriculum.pdf	English	Copyrighted materials
Research skills	Other	Research Methods Knowledge Base	https://conjointly.com/kb/	English	Copyrighted materials
Research skills	Other	Entrepreneurship training	https://www.tapas-etn-eu.org/events/te5	English	Unknown
Research skills	Other	Syllabus Research Methodology Course	https://miletus.mnau.edu.ua/wp-content/uploads/2019/05/WP2_DE V-2.4.2_2.5.1-Research-methodology-course_PU.pdf	English	Unknown
Research skills	Other	Evaluating Sources	https://researchguides.ben.edu/source-evaluation	English	Unknown
Research skills	Slides	Researching Young Peoples' Minority Language Practices		English	Unknown
Research skills	Video lecture(s)	Refining the Thesis	https://www.hippocampus.org/HippoCampus/?user=mhit2016&playlist=Refining+the+Thesis	English with subtitles	Copyrighted materials
Research skills	Video lecture(s)	Applied Critical Analysis at the College Level	https://www.hippocampus.org/HippoCampus/?user=mhit2016&playlist=Applied+Critical+Analysis+at+the+College+Level	English with subtitles	Copyrighted materials

* <https://campus.dariah.eu/docs/dariah-campus-reuse-charter>

Annex 2 – Questionnaire

UPSKILLS feedback on existing materials - questionnaire for project partners

If you/your institution are working on multiple topics, please fill in the questionnaire separately for each topic. The questionnaire can be filled in by multiple team members from the same institution.

***Required**

Please enter your name: *

Your answer

Please select your institution: *

- UM
- UB
- CLARIN ERIC
- UniGraz
- UniRi
- UNIBO
- UZH
- UNIGE

Please select your topic: *

- Research skills - Analytical thinking and problem solving (UB)
- Research skills - Introduction to scientific research (UNIBO)
- Research skills - Project management (UB)
- Data acquisition skills - Collecting data from human subjects (UniRi, UniGraz)
- Data acquisition skills - Introduction to programming (UM, UZH)
- Data acquisition skills - Text processing; collecting and analysing corpus data (UNIBO) / Text and speech processing (CLARIN)
- Data handling skills - Introduction to machine learning (UM)
- Data handling skills - Language data science (UNIBO, UM)
- Data handling skills - Language data standards and repositories (CLARIN)
- Cross-cutting components - Research and data management component (UZH)
- Cross-cutting components - Linguistic theory component (UNIGE)

I think this topic is well covered in the existing materials: *

- Disagree 1 2 3 4 5 Agree
-

I think this topic is well covered in the existing materials: *

- 1 2 3 4 5
- Disagree Agree

(If your answer to the previous question was 3 or above) This topic is well covered:

- Generally
- In relation to languages and linguistics
- Both generally and in relation to languages and linguistics
- Other: _____

Please enter any other comments you might have on topic coverage here:

Your answer

I estimate to be able to cover the following percentage of my UPSKILLS learning content using already existing materials: *

- 0-25%
- 26-50%
- 51-75%
- 76-100%

I am likely to use the existing materials in the following way (please check all that apply): *

- By suggesting them within my own materials as additional/optional
- By linking specific parts in my own materials instead of something that I would otherwise need to create myself
- By modifying and adapting them to my own needs [where allowed by the licence]
- Other (please specify in the next question)

If you checked "Other" above, please specify how you plan to use the existing materials:

Your answer

Please use this space to mention any (sub)topics you might have not thought about before, but that are present in the list and you think it would be useful to add them to UPSKILLS:

Your answer

Please enter any additional comments here:

Your answer