ABSTRACT

This document focuses on Citizen Science and its involvement in curricula of Higher Education Institutions in Southeastern Europe. It provides an analysis of the current practices in Library and Information Science studies, using data from a landscape research and a survey involving students from various parts of Europe.

Analysis of Current Practice in CeOS Uptake in Higher Education Curricula and Teaching Practice in Library Studies in SE Europe

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Citizen-enhanced Open Science
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Contents

Introduction

This report is delivered in the frame of Project Result 5 (PR5) "Uptake of Citizen Science in Higher Education Curricula and Open Science Practice in SE Europe". It wishes to address one key priority of the project, namely "Building inclusive higher education systems", which is a priority for transformations in the Higher Education area.

Resonating with the key European priority regarding innovation and collaboration in an open world, CeOS_SE wishes to contribute to building more inclusive Higher Education systems, focusing on the role of research libraries in South Eastern Europe. This can be demonstrated through innovative Higher Education curricula and scholarly communication practices that can be improved as a result of CeOS_SE activities. In order to raise the matters of Citizen Science and to exhibit how research libraries can engage and make citizens active contributors, there has to be an early awareness of the potential benefits. This will help the concepts and practices of Citizen Science to root deeply and to become sustainable. Other stages of the CeOS_SE project have been shown to transform key social dynamics into training opportunities for academic and library staff, Higher Education management, research and teaching staff, and students (PR3) and to increase support for a specific region in South Eastern Europe due to a demonstrated lack of expertise and resources (PR4). In this stage, the project investigates its role into proposing transformative changes for better Higher Education curricula, practices in academia, especially linked to Library and Information Science studies (PR5), by studying what the current landscape is and what students and faculty members believe about the presence of Citizen Science in their courses.

Therefore, in this report, we see how Citizen Science can bring about changes within Higher Education Institutions, focusing on the curriculum, and how this can equip the next generations of librarians with knowledge, skills and competencies on the topic. We do so with the robust belief that a strong presence of Citizen Science in the curriculum of a Library Department can benefit the sustainability of its practices, upgrade the innovative nature of formal education, and create strong connections between HEIs, libraries and society.

The report provides an analysis of the current practices in Library and Information Science studies in the South Eastern countries of Europe. We do this analysis based on landscape research and a survey with students from across the European continent. The report is complemented by the outputs of PR5A2 "Digital showcase of integration of CeOS in HE Curricula in SE Europe", where the opinions of Faculty

Members are gathered and presented. While the digital outputs may be found on the CeOS_SE YouTube channel, the key findings of these interviews are integrated in a final matrix to address the key questions.

We would like to acknowledge the support of all project partners that helped us reach students and faculty members.

Aim and scope

This report serves to draw a picture of the degree of penetration of CeOS (Citizen-enhanced Open Science) in Higher Education curricula in departments of Library Studies of the participating institutions in South Eastern Europe (in some countries these belong to Information Science Studies, but in the project we will use the term Library Studies to encompass both). A questionnaire survey helps to outline the current situation and identify reasons impeding Higher Education departments from embedding new knowledge about Citizen Science in curricula. Therefore, we question:

- To what degree do Higher Education curricula and teaching practices refer to Citizen Science?

- Which are the identified obstacles that Higher Education staff mention as impeding them to embrace a citizen-enhanced Open Science dimension in Library Studies?

- Are Citizen Science initiatives part of the accredited curriculum or are they side materials or secondary resources not yet integrated to the formal set of resources?

- Which type of curricula embed a citizen-enhanced Open Science dimension (courses, modules accompanying materials, additional readings, use cases, material to support traineeships or activities outside Higher Education Institutions)?

Landscape research

Before diving into creating the survey and analysing it and before the video interviews were created, landscape research was conducted online. The survey was

conducted in order to collect data on whether Citizen Science is mentioned in the curricula, and specifically in curricula in South Eastern Europe.

The online platforms used during this search were Open Syllabus, Class Central, TheUniGuide and Europass EU. All these platforms had their own challenges with the most prominent one being that they were available only in English as the curriculum in it. During the search, the keywords and phrases used were:

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citizen research, citizen science, open science, information
science, citizen engagement, library science and citizen
participation, with scholarly engagement and public engagement
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The bigger and most known platform containing curriculums out of all of them is Open Syllabus. Open Syllabus is a non-profit research organisation that collects and analyses millions of syllabi to support novel teaching and learning applications. All of the syllabi in the current collection are English language documents – including from universities where English is not the primary teaching language. Most results in the landscape research were taken from this platform as it was the most thorough in regards to its results. The filtering options were taken into account. The results were separated as a) "Total Results" from the beginning of Open Syllabus in 1990 to 2018 which is the last date available to search through, and b) "2014-2018" as we explore the most recent years to check the evolution of the curriculum, if there was any.
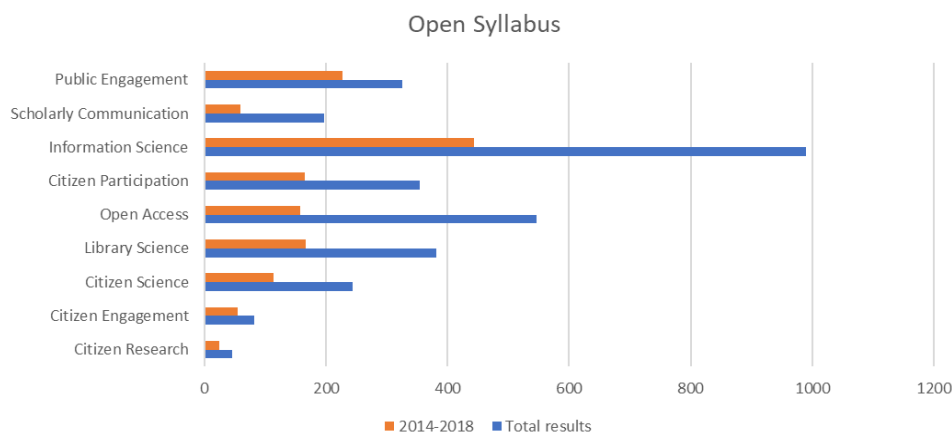

Figure 1. Search results of the previous keywords and phrases in Open Syllabus

In a general overview of the platform after searching the keywords the total results show that the most common keyword is "Information Science" with 990 results. Coming second is "Open Science" with 546 results. Continuing we see "Library Science" with 382 results, "Citizen Participation" with 354 results, "Public Engagement" with 326 results, "Citizen Science" with 244, "Scholarly

Communication" with 197 results, "Citizen Engagement" with 82 results and "Citizen Research" with 46 results. These results are on the worldwide scale of Open Syllabus.

In Appendix 1, a quick overview of the curricula in eleven Higher Education Institutions can be found. This overview examined the use and/or mention of Citizen Science in the curricula of the HEIs.
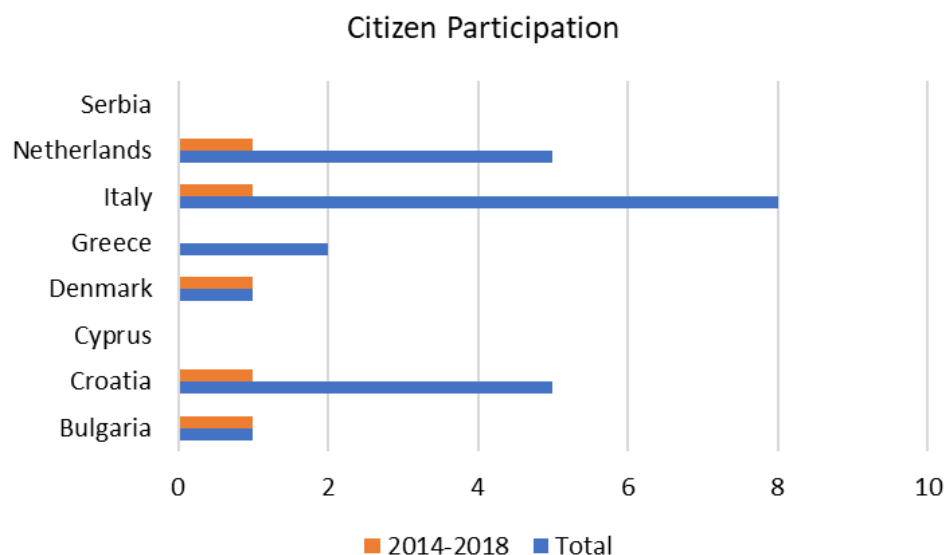

Figure 2. "Citizen Participation" phrase search results for the CeOS participating countries in Open Syllabus

In this graph, we observe that, out of the countries participating in the CeOS_SE project, the results are not high. Italy has the highest figure with eight results, followed by the Netherlands and Croatia with five results each, Greece with two results, Denmark and Bulgaria with one result each and Cyprus and Serbia with no results returned. There was only one result for the Netherlands, Italy, Denmark, Croatia and Bulgaria in the years between 2014-2018.

Regarding the other platforms, Class Central is a listing of online courses. They aggregate courses from many providers to make it easy to find the best courses on almost any subject, wherever they exist. This platform is also only in English and mentions only online courses. TheUniGuide is a course finder for UK universities and not applicable to our mission as it is limited only to the UK. Europass EU has information about courses from countries that submit them to Europass such as Belgium, Czechia, Estonia, France, Germany, Greece, Hungary, Iceland, Ireland, Latvia, Lithuania, Malta, the Netherlands, Norway, Poland, Portugal, Serbia, Slovenia,

Sweden and Turkey. It is not fully fledged yet as it exists only in a beta version for now and is not yet accurate in its search.

(Last access to these websites/platforms and their functions took place in August 2023).

Methodology

In the first part of our survey, we addressed the student population. The aim was to listen to what the students know about Citizen Science and if they would think that it could help their studies and future career. Given the target of sustainable Citizen Science practices in research libraries, it seemed essential to hear what future library professionals, the future carriers of the Citizen Science agenda, had to say. Therefore, a survey was developed to gather information about Citizen Science, their opinion and if and how it could be part of HEI curricula.

The research was carried out on a pan-European level, meaning that we addressed students beyond the South East European countries that are addressed in CeOS_SE. As we wanted to have the largest possible participation, we opted for a short and targeted instrument. Therefore, the time to complete the survey, which was completely anonymous through a secure questionnaire platform, was designed to be approximately three minutes. The call for participation was distributed through the project partners and their connections to Library and Information Science academic departments, as well as through the members of the Citizen Science Working Group of LIBER.

Findings

The survey gathered 277 responses, the majority of which came from countries of CeOS_SE partners. The results have been organised, analysed and visualised in an open and interactive Google LookerStudio (previously known as DataStudio) report, which can be found at https://lookerstudio.google.com/s/nJJCaBjzau4. We opted for only the relevant demographic properties, such as the level of education and the country of origin. We did not want to collect personal demographic information, such as age or gender, as we thought that these should not play an important role in the interpretation of the findings.

Figure 3 shows the distribution or responses per country. Most of the participants came from the project partner countries, at least from those who have LIS departments and courses. The most respondents came from Croatia (n=111), Bulgaria (n=86), Republic of Serbia (n=45) and Greece (n=24). Fewer responses came from Denmark (n=3) and Italy (n=2). While more information about the educational level follows, the majority of the replies of the Croatian participants were graduate students (98 out of 111), while in Greece and the Republic of Serbia, the distribution was more balanced between the three main categories of formal education. It was also observed that in Bulgaria there was an equal number of participants between undergraduate and graduate students (n=24).

From the countries that do not partake in CeOS_SE, there were only a few replies (Slovenia (n=2), Hungary (n=1), Portugal(n=1), Slovakia (n=1) and Poland (n=1)).
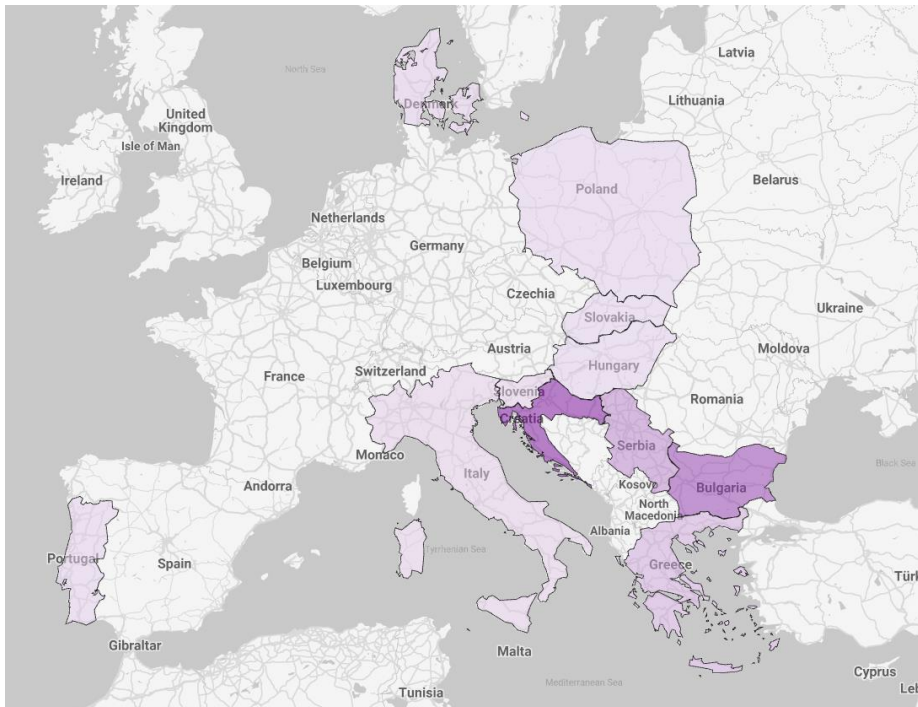

Figure 3. Map of distribution of the participants according to their country.

The first question of the survey was about the current education level of the participants. Figure 4 provides a heatmap of the distribution of the level of the respondents.

Figure 4. Heatmap of distribution of the participants according to their educational
level.

The education levels that the participants had the option to choose from were: a)
undergraduate, b) graduate, c) postgraduate, d) PhD candidate, e) postdoctoral. The
total number of answers received to this question is 270 out of the possible 277, out
of which, almost 60% of the participants were undergraduate (n=161, 59.6%),
followed by the postgraduate students (n=26, 9.6%) and the PhD candidates (n=15,
5.6%). It was encouraging to see that students that had recently completed their
formal education and remained active participated in the study. Specifically,
approximately 16% of the respondents were graduates (n=43, 15.9%) and nearly 10%
were postdoctoral students (n=25, 9.3%)

We asked the participants if they knew what Open Science is. The total answers we
received to this question are 275 out of the possible 277. As it can be seen in Figure
5, the majority of the students do not know what Open Science is, to the rate of
approximately 60% (n=158, 57.5%). However, there was also a significant rate of
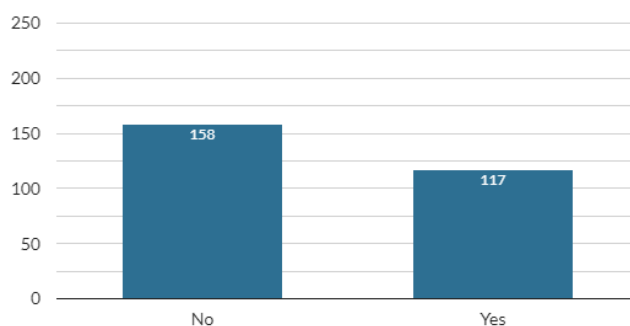participants that voted "Yes" (n=117, 42.4%).

Figure 5. Knowledge of Open Science

Looking at the figures, one can see that the higher the education level, the higher the
knowledge on Open Science. The students that affirmed their knowledge on Open
Science were mostly postdoctoral (n=23), postgraduate (n=16) and PhD students

(n=11). In terms of origin, the highest levels of Open Science knowledge were recorded in Bulgaria (n=50) and Greece (n=21).

Following this, we asked the participants if they know the concept of Citizen Science. Here, all the participants responded to the question and we had 277 out of 277 responses. The "No" responses (n=223, 80.5%) far outweigh the "Yes" ones (n=54, 19.5%). With the exception of undergraduate students, in the rest of the categories there were more respondents who reported that they knew about Citizen Science than those who did not. According to EU reports like "Promoting excellence science in the Western Balkans", Southeastern European countries are less developed in terms of Citizen Science. So, as most of the undergraduate students came from Croatia and Bulgaria, it is very natural that a lack of knowledge is recorded from these two countries.
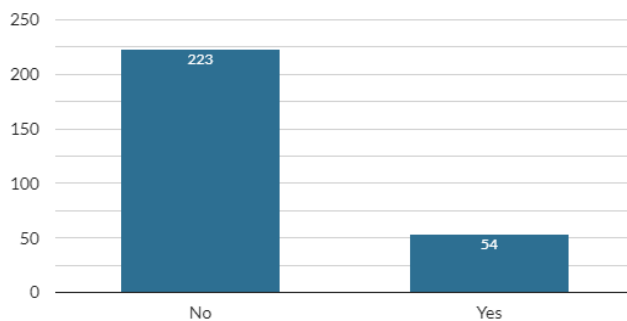

Figure 6. Knowledge of Citizen Science

The results show that there are reported important gaps in the knowledge of the students, both on the general framework of Open Science and the specific concept of Citizen Science.

We also questioned the participants on how they think that Citizen Science could be connected to the Library and Information Science profession. There was an almost perfect record in the response to this question with 276 out of 277 possible answers.
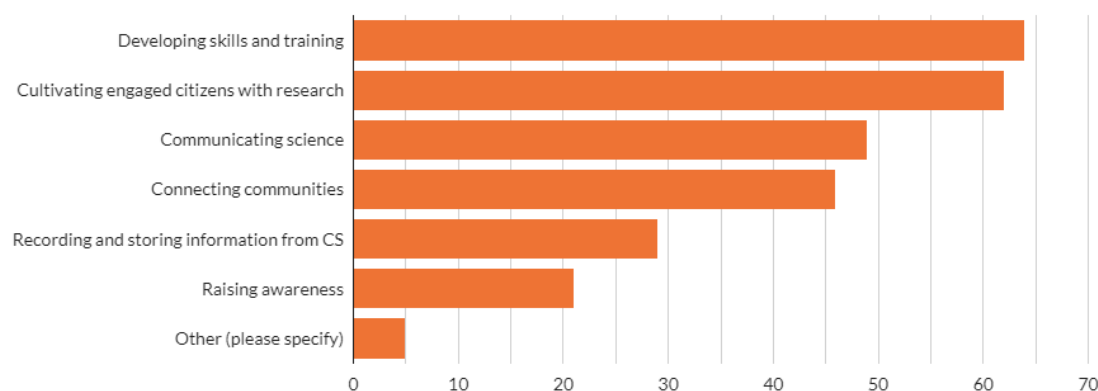
Figure 7. Ways of connection of Citizen Science with the Library profession.

Students could select from the following options: a) developing skills and training (64 responses), b) cultivating engaged citizens with research (63 responses), c) communicating science (49 responses), d) connecting communities (46 responses), e) recording and storing information from Citizen Science (29 responses), f) raising awareness (21 responses), and g) 'other' responses (5 responses).

Key tasks of the library, such as providing skills and training, were highlighted, while a new role appeared; the cultivation of engaged citizens with research. The latter was particularly high for undergraduate (23% of their responses) and postgraduate students (34.6% of their responses), and the former very high for graduate students (39.5%). The responses of postdoctoral students were quite balanced in their distribution, as they reported 20% for skills and development, raising awareness and connecting communities.

The next question gathered responses on whether students have ever noticed concepts and/or practices of Citizen Science being used as part of their curriculum. Figure 8 shows the distribution of the responses to this question (276 out of the possible 277). Students from all categories mentioned that they have not noticed Citizen Science practices in their courses (n=247, 89.5%) and only few of them responded that they have (n=29, 10.5%).
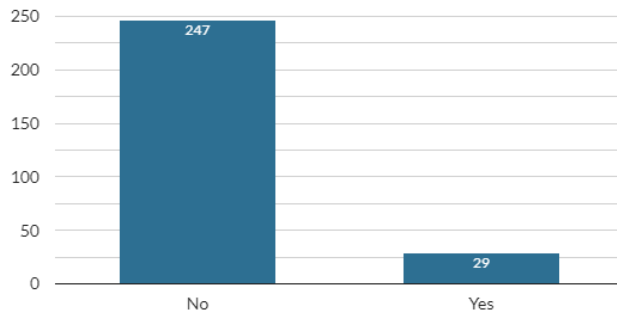
Figure 8. Experiences with Citizen Science concepts in the curriculum

The highest (89.5%) was from undergraduates (96.9%) and the lowest from PhD students (73.3%), showing a counter-relational link between the experiences and the level of education. Most of the students that had experiences of Citizen Science in their courses were from Bulgaria, Croatia, Greece and the Republic of Serbia.

Regarding the curriculum, we asked the students to tell us what educational level they think would be the most appropriate for Citizen Science to be taught in.
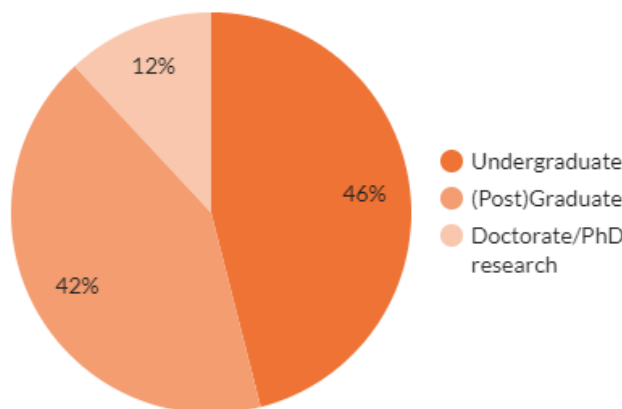

Figure 9. Preferred level

The responses are as follows: 127 (46%) of the answers consider the undergraduate level the most appropriate for Citizen Science to be taught in. These results were followed by 116 responses (42%) that the (post)graduate level is the most appropriate and 33 (12%) that Citizen Science should be taught in doctorate/PhD courses. Respondents from Croatia and Greece prefer to receive courses at the undergraduate level, with most of the respondents from the Republic of Serbia being eager to receive them at the post-graduate level.

When asked about the scope of Citizen Science education, the number of responses were more widely spread. 110 (40%) respondents believed that the right way to achieve this would be to be part of a broader course. Most of these respondents were graduate students, followed by postgraduate students. On the other side, the number of people who believe that Citizen Science could stand as its own standalone course was 61 (22,2%), with many of them being undergraduate and graduate students.
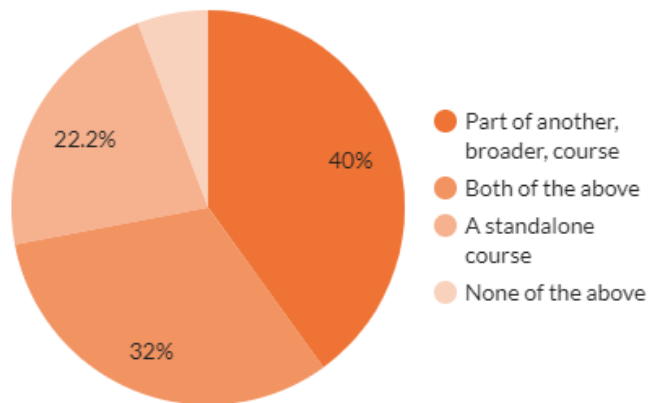

Figure 10. Preferred structure

Moreover, 88 (32%) of the students think that Citizen Science could work both as a standalone course and as a part of another course. There are also those (n=16, 5,8%), who believe that it is not possible for Citizen Science to become part of the curriculum in either of the above ways.
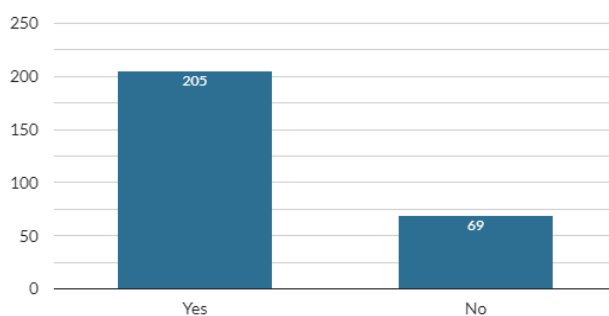

Figure 11. Willingness to take part in Citizen Science projects/activities.

The participants were then asked whether they would participate in a Citizen Science project, if one were to take place during one of their classes. The majority of the responses, 205 (74.8%) answered that "Yes" they would be interested, while 69

15

(25.2%) responded that "No" they would not be interested. This strong interest was evenly expressed by all categories of respondents and from all countries.

In the final survey question the participants were asked about what skills they expect to acquire if they ever participate in a Citizen Science course.
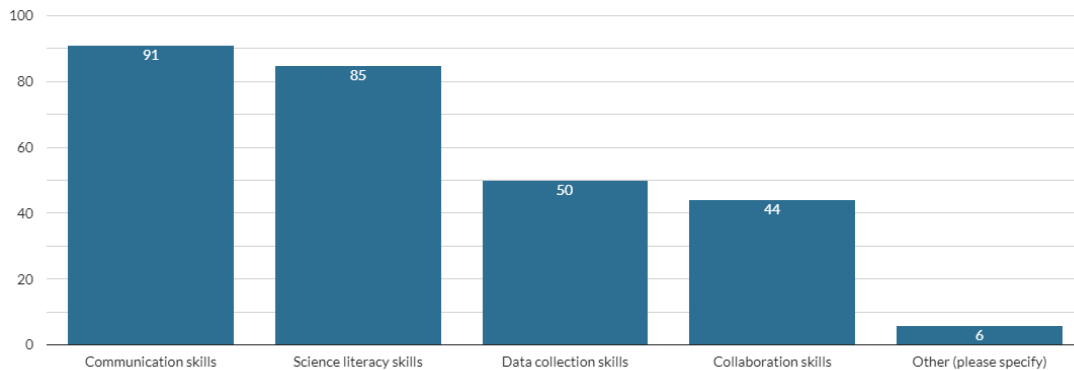

Figure 12. Anticipated skills to acquire after attending a Citizen Science course.

Out of the options available to the respondents, communication skills received most of the answers with 91 responses, followed by science literacy skills, which garnered 85 responses, data collection skills (n=50), collaboration skills (n=44), and others (n=6). Communication skills were expected to be essential by undergraduate and graduate students, with the former being in favor also of collaboration skills. Finally, science literacy skills were considered essential to postgraduate and PhD students.

Conclusions

Most of the responses in our survey came from the area of South Eastern Europe. We believe that the design of the survey (opting for a short and targeted questionnaire) gives us an accurate view of what the student population of this area think about the integration of Citizen Science in their curricula. Another design, with more questions, perhaps would give some more insightful views, although with dubious accuracy.

The results of this survey show that the overwhelming majority of students have never noticed concepts of Citizen Science in the curricula. While the level of knowledge about Open Science is more balanced, experiences with Citizen Science are very low. However, it is encouraging that the students stated they want Citizen Science to be part of their curriculum. Therefore, students should have more opportunities to learn about Citizen Science; there is a gap in their knowledge and

there is a willingness to learn. HEIs' staff should be encouraged to create innovative initiatives to engage the students in activities regarding Citizen Science (Zourou, K. and Tseliou, A. 2020).

It comes as a natural conclusion that the students see Citizen Science as being linked with the LIS profession. In particular, they believe that it can be linked with Science Communication, with Training and Skills Development, and with Citizen Engagement with Science and Research. The central role of libraries in building up the skills and competencies of their users and in disseminating knowledge that will facilitate scientific and rational thinking is a widespread belief in the profession.

As the level of education increases, the anticipated skills needed change. Managerial skills, such as the aforementioned, play a big part in centralising libraries' role in the development of Citizen Science (Ignat, T., et al. 2018). Undergraduate students are eager to know more about communication, post-doctoral and PhD students are more interested in science literacy skills and data science. The undergraduate students would like to receive courses within other broader ones, for example on Open Science, whereas graduates would prefer Citizen Science to be a standalone course. PhD students and post-doctoral students would opt for both; either a standalone, or an integrated course.

Most of the undergraduate students believe that the best possible level to learn about Citizen Science is their own. This is iterated on other levels too, for instance teaching Citizen Science at the postgraduate level was preferred by most of the graduate and postgraduate students. This level was also preferred by most of the postdoctoral students, while the PhD students believe that it should be taught at undergraduate level.

Table 1 presents how Citizen Science is embedded in the LIS curricula, according to the evidence sources of our study. As a natural conclusion one can understand that Citizen Science is currently a practice in the field and has not yet been processed to widely reach classrooms. The few cases that have been reported are based on the exhibition of project cases that show what Citizen Science is in the frame of broader topics, such as Open Science. Therefore, much more is needed in order to develop fully organised courses on Citizen Science and address the willingness of students to learn more about the concept. In general, it appears that both the students and the faculty members are eager to work in the field and that the concept and practices of citizen-enhanced Open Science are promising for the profession.

Table 1	Websites	Students	Faculty
At what degree Higher Education curricula and teaching practices refer to Citizen Science?	Small degree Only in one source, but not to a great extent. (See Fig.1)	Small degree The students in our survey reported that they are not familiar with the term	Small degree It appears that many of the surveyed faculty members are not knowledgeable of the term Citizen Science
Which are the identified obstacles that Higher Education staff mentions as impeding them to embrace a Citizen enhanced Open Science dimension in Library Studies?	As observed, not enough access and available material	There is no knowledge of Citizen Science whatsoever. Students are rarely exposed to it and therefore can not engage with its practices	Some of the main obstacles are the lack of funding and the lack of specialized knowledge. Faculty members are mostly knowledgeable on Open Science and in some cases Open Access.
Are Citizen Science initiatives part of the accredited curriculum or are they side materials or secondary resources not yet integrated to the formal set of resources?		Students reported that they do not have many experience with Citizen Science	Some Faculty members mentioned research projects being used as input to the curriculum to help advance the main lesson.
Which type of curricula embed a Citizen enhanced Open Science dimension (courses, modules accompanying materials, additional readings, use cases, material to support traineeships or activities outside Higher Education Institutions)?	Limited to just courses and their materials.		Examples of Citizen Science projects (use cases) are used in the curriculum

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Appendix 1. Evidence in CeOS Curricula

Croatia

Department of Information and Communication Sciences, Faculty of Humanities and Social Sciences, University of Zagreb

The topic of Open Science is mentioned in two courses in the graduate programme. The course of "Digital Library II" is mandatory and the course of "Journals and Scientific Communication" is an elective one.

The concept of Citizen Science is mentioned in two lectures in the doctoral program. The title of the first lecture is "Citizen Science in Social and Humanities Research" and covers the general theme of citizen science and its specific applications in the field of Social Sciences and Humanities. The second lecture titled "Crowdwork and Gamification in Heritage Environments" refers to the process of crowdsourcing in which individuals or organisations use contributions from large groups of people, usually through a public call, to achieve certain goals.

Department of Information Sciences, University of Zadar

Open Science is a dominant subject in the University of Zadar. In the graduate studies there is an elective course titled "Open Science" and deals with all things Open Science and its influence in the research landscape including Public/Citizen Science as it is mentioned in the curriculum. The mandatory course titled "Digital Humanities" mentions Open Science and Citizen Science at its most basic level, which is crowdsourcing.

Serbia

Department of Library and Information Science, Faculty of Philology, University of Belgrade and Department of Library and Information Science, Faculty of Pedagogy in Sombor, University of Novi Sad.

In the scope of subjects related to the methodology of scientific research and library informatics, knowledge and information organisation, students learn about Open Science and Open Access. Citizen Science is not part of the curriculum for any subject in the undergraduate and master's studies.

Denmark

School of 'Library Science, IT and Communication, University of Southern Denmark

There are obligatory courses like " Design and investigative methods", "Interaction and service design", "Learning and knowledge sharing". While that could allude to a potential Citizen Science and Open Science framework, there is no connection between these courses and Citizen Science.

Greece

Department of Archival, Library and Information Studies, School of Management, Economics and Social Sciences, University of West Attica

In the undergraduate studies there is the mandatory course titled "Scholarly Communication" that focuses on Open Science, Open Access and Open Education. No mention of Citizen Science in the undergraduate level. No mention of Open Science or Citizen Science in the Graduate level.

Department of Archives, Library Science and Museology, Faculty of Information Science and Informatics, Ionian University

Although Open Science is mentioned during the undergraduate studies in a course called "Electronic Publishing", there has not been a mention of Citizen Science in any of the courses in both the undergraduate and graduate level.

Department of Library Science, Archives and Information Systems, School of Social Sciences, International Hellenic University

In the undergraduate studies Open Access is mentioned in some lectures throughout some courses like "Digital publications". There is a small mention of Citizen Science in the "Library and the society" course.

Bulgaria

Library Science Department, Faculty of Librarianship and Cultural Heritage, University of Library Studies and Information Technologies

In the Master's Degree in "Library, Information and Cultural Management" there is an obligatory course "Open Access to Scientific Information". The discipline aims to provide students with the necessary theoretical and practical training for open access to scientific information, by covering the various aspects and advantages and

clarifying the main positions, initiatives, declarations, and ways to implement open access publications. The structure and content of the course are divided into three modules. In the first module, a brief overview of the historical development of the Internet is made, as one of the prerequisites for the rapid development of open access to scientific information. The evolution of the concept of "open access" is explained theoretically, with a special place devoted to the "six essential things" that researchers need to know about open access. An important emphasis is highlighting the role of libraries in supporting open access. The impact of open access on the citation index is clarified, as well as the attitude of some publishers towards open access publishing. In the second module, the basics and definitions of open access are clarified, according to international open access declarations and initiatives. The legal framework of open access is presented, describing the four main clauses of Creative Commons contracts and the variety of contracts derived from these clauses. The current state of information sources in Europe published in the digital space under a Creative Commons contract has been tracked. A number of analyses have been carried out and conclusions and summaries have been formulated. The third module is devoted to the basic ways of publishing open access. The theory and practice of implementing open access through the two main ways – the "Green Path" and the "Golden Path" are presented. The term "open science" is discussed extensively, while the term "citizen science" is just mentioned but not fully developed. During this module, from 2022, the CeOS_SE project is presented.

Italy

School of Humanities and Education, University of Florence

There is an undergraduate programme "History and preservation of archaeological, artistic, archivial and library heritage" and a master's programme "Archivial and library sciences". In none of these programmes, Citizen Science is mentioned in the curricula.

Department of Letters and modern Cultures, School of Arts and Humanities, Sapienza University of Rome

There is no mention of Citizen Science in the graduate programme of "Archive and Library Theory and Management".