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Exploring the Perspectives of Croatian Librarians on Citizen Science

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Abstract

This study explores the significance of librarian education on implementing citizen science initiatives in their own operations. The first part of the study is dedicated to reviewing global practices in certified librarian education on citizen science, highlighting the growing recognition of its importance within library education and practice. Drawing on examples from various countries, it emphasizes the importance of continuous education and training for librarians to effectively support citizen science initiatives within their communities. The second and central part of the study explores the experiences and insights gathered from a certified webinar titled *Citizen Science in Libraries*, organized by the Training Centre for Continuing Education of Librarians in Croatia (CSSU) from the National and University Library in Zagreb (NUL). A research study was conducted among the webinar participants to investigate their opinions regarding the content and effectiveness of the webinar and their attitudes towards the implementation of citizen science in libraries. A survey was conducted using an online questionnaire with the participation of 332 webinar attendees, which represents 69.31% of the total number of participants. The main conclusions highlight the positive attitudes of librarians towards the webinar and potential strategies for enhancing library participation in citizen science. The importance of continuous education and collaboration is emphasized to maximize the

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potential of libraries in promoting citizen science and raising awareness of its importance in the community. The findings can serve as an incentive for other libraries to implement similar educational programs and encourage librarians to participate in such initiatives. Additionally, the proposed research model can be valuable for libraries already conducting educational activities, as they can translate and incorporate it as an integral part of their program.

Keywords: citizen science; librarians' education; professional development of librarians

1. Introduction

Citizen science is the practice of public engagement and collaboration in scientific research aimed at advancing scientifically grounded knowledge. Although public participation in science has existed for centuries, the term "citizen science" was coined in the 1990s and has since gained popularity. Evolving from the involvement of "amateur citizens" in scientific research across various disciplines and built upon the foundations of crowdsourcing, today the concept of citizen science is situated within the broader realm of open science. Citizen science is recognized as an established and valid approach to scientific inquiry (Ivanjko et al., 2024). Libraries have the potential to conduct citizen science projects at the local and regional level by connecting citizen scientists and researchers (Divyashree & Nellam, 2021). Given the broad scope of library operations, which includes organizing activities and programs for users, events, workshops, conferences, and the like, they have ample experience that can help them in organizing citizen science projects (Mumelaš, 2023).

Libraries have numerous advantages for organizing citizen science, such as: recognition as partners in various fields of science, advocacy, teaching citizen science, developing partnerships, attracting new library users, media recognition, enriching existing library collections and developing new services, utilizing existing competences of employees, and personal and professional development of employees (Mumelaš & Martek, 2024). However, organising citizen science activities and projects within the context of libraries presents a multifaceted challenge, requiring librarians to possess a diverse skill set and knowledge base.

As custodians of knowledge and facilitators of community engagement, librarians play a pivotal role in fostering scientific inquiry and public participation in research endeavours. However, to effectively support citizen science initiatives, librarians must be equipped with specialised competencies and insights into the unique dynamics of citizen science within the library setting. This necessitates tailored education and training programmes focused on citizen science in libraries, designed to empower librarians with the necessary tools and strategies to navigate this emerging field. Against this backdrop, this paper explores the experiences and insights gleaned from the National and University Library in Zagreb's (hereinafter NUL) certified webinar titled *Citizen Science in Librarie*s. The webinar was organised by the Training Centre for Continuing Education of Librarians in Croatia (hereinafter CSSU). CSSU was founded in 2002 and since then has been providing educational support for participants from libraries and heritage institutions all over Croatia.

By introducing free webinars for all participants in 2018, intention was to make education and professional development in the field of librarianship more accessible. For participants from all corners of Croatia, this approach facilitates the acquisition of new knowledge and skills. The aim was also to encourage participants to embrace new technologies as well as to facilitate the exchange of professional experiences in this manner (Filipeti, 2021).

Through examination of participant feedback and research findings, this paper aims to analyse the challenges, opportunities, and best practices associated with integrating citizen science into library services and programming.

2. Librarian Education on Citizen Science – Case Studies

The presence and dissemination of education on citizen science for libraries across various countries underscore a growing recognition of its significance in bridging the gap between scientific research and public engagement. These educational initiatives aim to equip librarians with the knowledge and skills necessary to effectively integrate citizen science practices into their professional activities. This chapter presents global practices in certified librarian education on citizen science. It is important to note that the cases mentioned here are well-known, and information about them can be found online in

English. There may be other similar educations worldwide, but they are not clearly highlighted on the web or described in published journals.

One globally renowned platform for citizen science is SciStarter (https://scistarter.org/training), a research affiliate of North Carolina State University and Arizona State University. It is a dedicated website providing information about citizen science and related projects on a global scale. Scistarter's mission is to contribute to real science through participation in scientific research. With over 3,000 registered projects, tools, and events accessible to all interested citizen scientists, including students, SciStarter facilitates involvement in specific projects as part of academic programs. Collaboration extends to schools, colleges, universities, museums, and libraries (Divyashree & Neelam, 2021). The SciStarter website features an online training module titled *Foundations of Citizen Science*, developed and sponsored by the National Library of Medicine (NNML) and the National Institutes of Health, Department of Health and Human Services. This two-hour, on-demand online class, serves as an introduction to citizen science for librarians, staff, and leaders of community-based organizations. The module provides explicit, detailed instructions and case studies on how libraries or organizations of varying sizes can implement citizen science activities in programs in their communities. The training aims to emphasize participants' role in scientific research for real-world issues, complete citizen science projects with critical skills, introduce citizen science to communities and promote health information sharing, raise awareness and engagement in citizen science, and support others in citizen science activities addressing societal needs through libraries and sites (National Library of Medicine, n.d). After completing *the Foundations of Citizen Science* training module (which will be discussed in following chapter), participants can choose follow-on training such as *Building Data Literacy through Community and Citizen Science*, *Libraries as Community Hubs for Citizen Science*, *Teaching in Higher Education with Citizen Science*, and *Data Ethics for Practitioners* (SciStarter).

One notable example is also *Citizen Science and Scientific Crowdsourcing: an Introduction* developed by the Extreme Citizen Science (ExCiteS) research group at University College London (UCL), as highlighted among valuable resources for training project designers (Lorke et al., 2019). This 30-hour online course is designed for UCL staff members and students, focusing on those engaged in citizen science, public engagement with science, and scientists contemplating the development of citizen science projects. The course

covers the fundamentals of citizen science and scientific crowdsourcing, delving into the history, theoretical foundations, and practical aspects of project design and implementation. By the conclusion of the course, participants are expected to demonstrate knowledge of citizen science and scientific crowdsourcing, understand relevant social science theories, grasp the technologies employed in these practices, gain practical experience, and acquire skills in evaluation techniques (UCL, n.d.).

Information about citizen science in Slovakia is being made available to the broader public through the activities of the Slovak Center of Scientific and Technical Information (SCSTI). The Center is defined on its website as "a national information centre and specialised scientific library of the Slovak Republic focused on natural, technical, economic, and social sciences" (SCSTI). Given that knowledge of citizen science is insufficiently disseminated in Slovakia, the focus is placed on the relationship between science and society, as well as on building collaboration in gathering valuable data, developing knowledge and skills, and establishing mutual trust. In line with this, the education on citizen science named *Let's Start with Citizen Science* is being organized in 2021 through the Massive Open Online Course (MOOC), hosted on the EU-Citizen Science Moodle platform (Stozicka et al., 2022). The course lasts 2 hours and consists of five sections: the concept of citizen science, how to design citizen science projects, how to find partners, data and ethics issues, and citizen science project impact (EU-Citizen.Science, 2021).

There is an example of librarian education on citizen science that emerges as a product of an international project. The project, titled *University Libraries Strengthening the Academia-Society Connection Through Citizen Science in the Baltics* (LibOCS, EU-Citizen.Science), is currently underway from 1st January 2022 to 30th June 2024, funded under the Erasmus+ KA2 Strategic Partnerships programme. The project involves the participation of seven international project partners: University of Tartu, University of Latvia, Kaunas University of Technology, Vytautas Magnus University, Tallinn University of Technology (TalTech), Web2Learn, Immer Besser GmbH (LibOCS). Among other objectives, the project addresses the role of librarians in citizen science projects, librarians' skills and competencies in implementing citizen science projects, and how to strengthen the connection between university libraries and citizen engagement (Tautkeviciene et al., 2023). The project collaborators have developed an electronic course for librarians titled *Citizen Science for Librarians: Self-Paced Learning Course*. The electronic course is organised

by the Kaunas University of Technology Library in cooperation with Vilnius County Adomas Mickevičius Public Library in Lithuania. The target group comprises librarians from university and public libraries. The main goal of the training is to determine the key competencies that librarians need to have in the context of engaging in citizen science. The course consists of five modules: Skills for Librarians Involved in Citizen Science Projects, Project Management Skills for Citizen Science, Engagement and Communication in Citizen Science Projects, Research and Data Management Skills for Librarians Involved in Citizen Science Projects, and Final Knowledge Check. After completing the course, attendees can receive certificates (Kaunas University of Technology Library, n.d.).

The Citizen-Enhanced Open Science in Southeastern Europe Higher Education Knowledge Hubs (CeOS_SE, https://ceosse-project.eu/consortium/) is a project funded by Erasmus+ Key Action 2: Cooperation among organisations and institutions, with the goal of increasing awareness of open science and citizen science among research libraries in Southeastern Europe. Recognizing a perceived deficiency in knowledge regarding prevalent citizen-enhanced open science practices in the region and beyond, the CeOS_SE project aims to empower research libraries to evolve into knowledge hubs or BESPOC offices for both open science and citizen science. Operating from January 1st 2022 to January 1st 2025, the CeOS_SE project seeks to gather empirical data on current practices and perceptions (Kaarsted et al., 2023). The project partners are LIBER (Netherlands), University Library of Southern Denmark (Denmark), University of Torino (Italy), University of Patras (Greece), University of Cyprus (Cyprus), University Library "Svetozar Marković" (Serbia), National and University library in Zagreb (Croatia), and the University of Library Studies and Information Technologies (Bulgaria) (CeOS_SE Project). Recognizing the importance of citizen science for libraries, some project partners have decided to introduce certified courses and webinars in their own institutions to empower the library community in this field. The University Library "Svetozar Marković" in Belgrade, Serbia, developed the accredited in-person course *Citizen Science: Librarians as a Bridge Between Science and Citizens* in 2023. By highlighting best practices on both international and domestic levels and presenting potential ways to involve librarians in citizen science processes, the course aims to inspire librarians to embrace modern scientific trends and activities in the field of citizen science. No special qualifications or prior knowledge are required for librarians to enrol in the course, which is designed for a minimum of 5 and a maximum of 16 participants

and lasts 6 hours. The course's objective is to motivate librarians to participate in contemporary scientific practices within the field of citizen science by referencing good practices in international and domestic contexts and presenting possible ways to involve them in the processes of conducting citizen science. (Dakić & Trtovac, personal communication, 2023). As a result of numerous activities related to citizen science within the project, the webinar *Citizen Science and libraries* has been prepared for librarians in 2023 by the University of Torino. The webinar covers the concept of citizen science and provides information on citizen science platforms and projects, illustrating how it can be implemented in libraries. The webinar also addresses the relationship between citizen science and public libraries and the relationship between citizen science and university libraries. This webinar is fee-based and divided into three sessions lasting 90 minutes each. At the end of the webinar, participants receive a certificate of attendance (Editrice Bibliografica, https://www.editricebibliografica.it/scheda-corsi/maria-cassella/citizen-science-e-biblioteche-Form_C47-580986.html). In Croatia, National and University Library in Zagreb developed the *Citizen Science in Libraries* webinar which is included in the educational plan of the CSSU for 2023 as an accredited program. Targeting librarians from all types of libraries, its primary objective is to familiarize the librarian community with the concept of citizen science and offer practical support. The duration of the webinar is 90 minutes, during which participants are actively encouraged to pose questions to the lecturer. The webinar aims to explain the role of citizen science as a key component of open science, showcase prominent global and Croatian examples of citizen science initiatives, and provide participants with insights into the skills required for conducting citizen science activities. By participating in this webinar, attendees acquire knowledge and skills in organizing and providing new services for users, as well as developing generic competencies such as creative and systematic thinking, innovation, as well as personal and civic responsibility (CSSU). This webinar will be presented in detail in the following chapter, considering that a comprehensive evaluation of the webinar and research has been conducted.

Based on the examples of global practices in educating librarians about citizen science, it can be concluded that there is a growing recognition of the significance of this field within library education and practice. These initiatives demonstrate a concerted effort to equip librarians with the knowledge and skills necessary to engage effectively in citizen science projects, highlighting the evolving role of libraries as key facilitators of citizen engagement

and scientific collaboration. Moreover, they underscore the importance of continuous education and training for librarians to adapt to emerging trends and effectively support citizen science initiatives within their communities. By providing librarians with the tools and resources to integrate citizen science into their services, these programs contribute to building stronger connections between academic institutions, libraries, and the public, ultimately fostering a more informed and engaged society.

3. Research on Croatian Librarians

The webinar *Libraries and Citizen Science* is conducted within the CSSU. A total of 7 webinars was held from February 28th, 2023, to March 8th, 2024. During this period, the webinar was attended by 479 participants, and the survey was answered by 332, which represents 69.31% of the participants.

After the webinar, a standard evaluation was conducted, focusing on participants' satisfaction with the organization and materials provided during the webinar. Considering that citizen science is a relatively unfamiliar concept in Croatian libraries, the evaluation was expanded with additional questions related to citizen science. The evaluation was conducted via a questionnaire using Google Forms.

Completing evaluation questionnaires was not mandatory, meaning obtaining participation certificates was not dependent on completing the questionnaire. As a result, the total number of completed evaluation forms is lower than the total number of participants.

3.1. Research Methodology

Besides providing insight into the quality of the webinar content itself, the research aims to explore librarians' attitudes towards implementing citizen science in libraries.

The main research questions were:

> RQ1: *What is the opinion of librarians regarding the content and effectiveness of the webinar?*

RQ2: *What are the attitudes of librarians towards the implementation of citizen science in libraries?*

The purpose of the research was to analyse the opinions of librarians in Croatia regarding the webinar *Citizen Science in Libraries* and to determine their views on the implementation of citizen science in their own libraries. Based on these findings, the research can contribute to decision-making regarding potential improvements to the webinar content. Additionally, it may influence changes in the business organisation of library staff towards the development of citizen science activities in their own libraries.

The method used for the research was a survey, with the technique being a questionnaire set up in an online format using Google Forms. The questionnaire was sent by CSSU to the personal addresses of all participants of the *Citizen Science in Libraries* webinar immediately after the webinar ended.

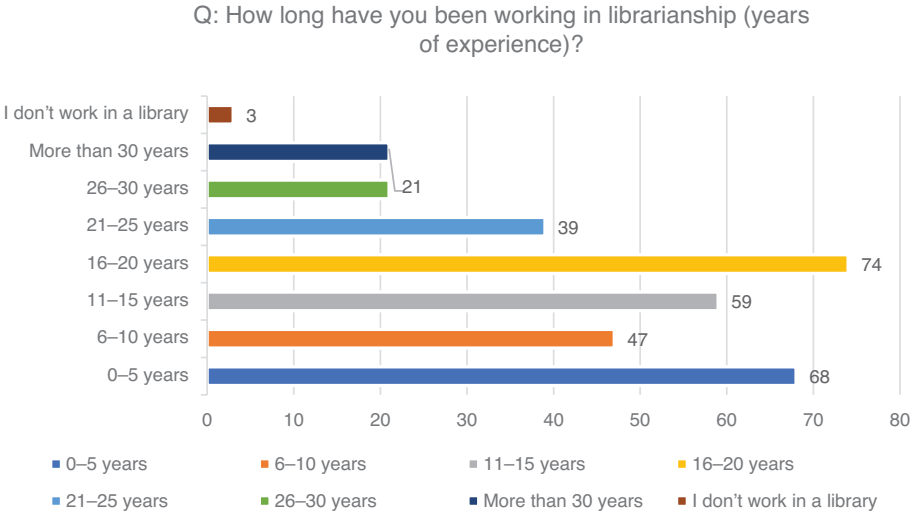
The survey was completed by librarians of various educational levels, with varying levels of professional experience and of different types of libraries, along with a few students. The questionnaire consisted of 19 questions in three sections: general information, evaluation of the webinar, opinion on citizen science in libraries. As for the types of questions, the majority of the questionnaire consisted of closed-ended questions, including 9 single-choice questions and 8 Likert scale questions. The questionnaire also included 2 open-ended questions in the form of short answers.

3.1.1. Results: Opinion of Librarians Regarding the Content and Effectiveness of the Webinar

The results of the first part of the survey relate to the standard CSSU questionnaire sent to participants of all webinars organized by CSSU. In this way, CSSU learns about the level of acceptance of individual webinars by participants, and any other information that can help reshape existing and design new webinars. The first question investigated the years of experience in librarianship, and the responses are found in Figure 1.

An approximately 22.3% of respondents reported having 16–20 years of experience in the field, followed by those with 0–5 years of experience, comprising 20.5%, of the respondents. There was a notable decrease in the number

Fig. 1: Overview of years of experience in librarianship.



of respondents with 21–25 years of experience, accounting for only 11.7% of the total. Additionally, there were smaller percentages of respondents with 6–10 years (14.2%), 11–15 years (17.8%), 26–30 years (6.3%), and more than 30 years (6.3%) of experience in librarianship. Finally, only 0.9% of respondents indicated that they do not work in a library.

The second question pertained highest attained professional qualification (Figure 2). It's worth noting that CSSU is open to the public, including students and professionals from the GLAM field. The majority of respondents (84.9%), comprising approximately 84.9%, reported holding a Master's degree, Additionally, there were smaller percentages of respondents with qualifications such as completed secondary education (4.8%), MA by Research (4.2%), Bachelor's degree/3.3%), and PhD degree (2.7%).

In Croatian librarianship, there are several levels of librarianship. The lowest level is a Library Technician, while the highest is a Library Consultant. The third question explored the professional titles of the participants (Figure 3).

The largest proportion of respondents, (60.5%), identified themselves as Librarians. Library Assistant accounted for 10.5% of the respondents, while Senior Librarian were reported by 10.2% of respondents. Library Technicians

Fig. 2: Overview of highest attained professional qualification.

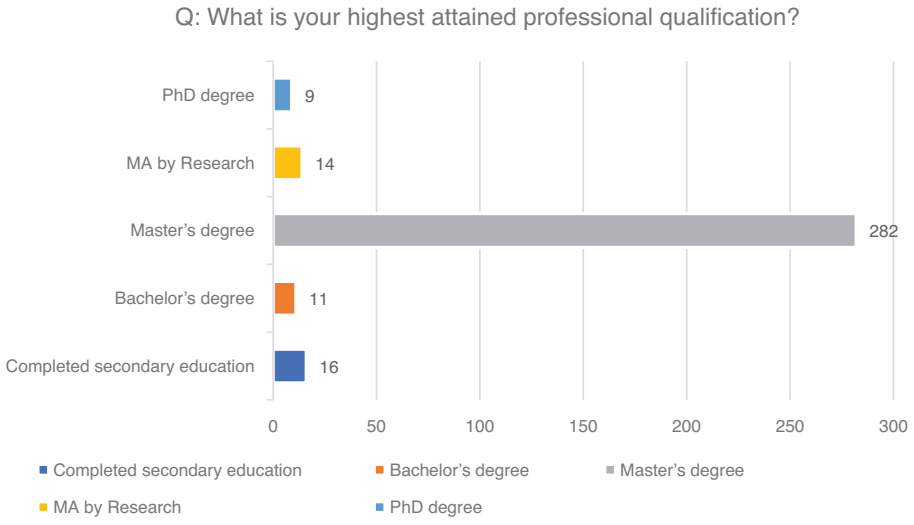
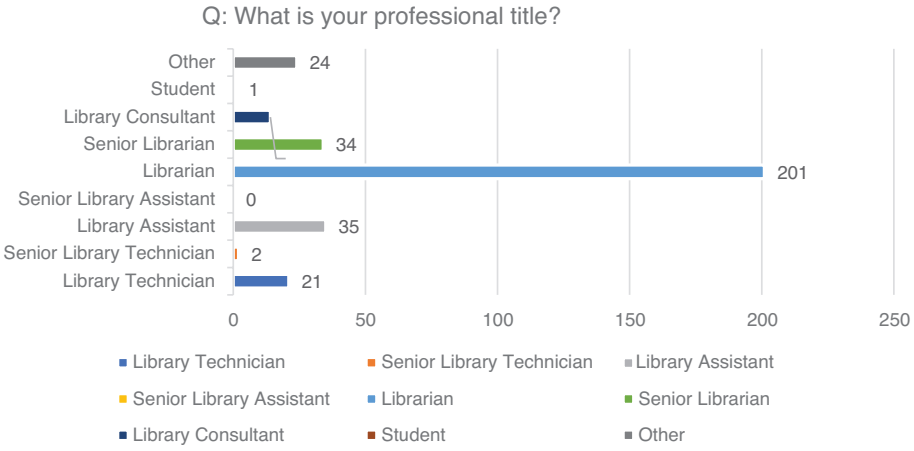


Fig. 3: Overview of the respondents professional title.



were reported by 6.3% of the respondents, and Library Consultants accounted for 4.2% of the sample. Other professional titles, such as Senior Library Technicians, Students, and those categorized as "Other", represented smaller proportions of the surveyed population.

Table 1: Overview of library types in which respondents are employed.

Q: In what type of library do you work?		
	Respondents	Percentage
School library	111	33.5%
Public library	128	38.7%
University library	39	11.8%
Special library	20	6%
Research library	8	2.4%
National and University library in Zagreb	15	4.5%
Archive employee	2	0.6%
Museum employee	1	0.3%
Student	1	0.3%
Other	7	2.1%

Croatia hosts numerous types of libraries, and it was interesting to see which types of libraries the majority of participants come from. The results received are presented in the Table 1.

The largest proportion of respondents, comprising approximately 38.7%, indicated working in public libraries, showcasing a substantial representation within the surveyed group. School libraries were also well-represented, with 33.5% of respondents. University libraries accounted for 11.8% of the respondents, while special libraries and the National and University Library in Zagreb represented 6% and 4.5% of the sample, respectively. Research libraries were reported by 2.4% of the respondents, whereas employees from archives and museums each constituted less than 1% of the surveyed population. Finally, a small proportion of respondents identified themselves as Students or categorized their workplace under "Other".

In the following question, we examined the rating of quality of the webinar content, and the results are presented in the Figure 4.

A significant majority of respondents, approximately 78.6%, rated the content as Excellent, Additionally, around 19% of respondents rated the content as Good. Only a small proportion of respondents, approximately 2.4%, rated the content as Fair, indicating some room for improvement but still indicating a generally positive perception.

In webinars, it is crucial how presentation materials are displayed, as they should be able to maintain participants' attention for extended periods.

Fig. 4: Overview of quality ratings for webinar content.

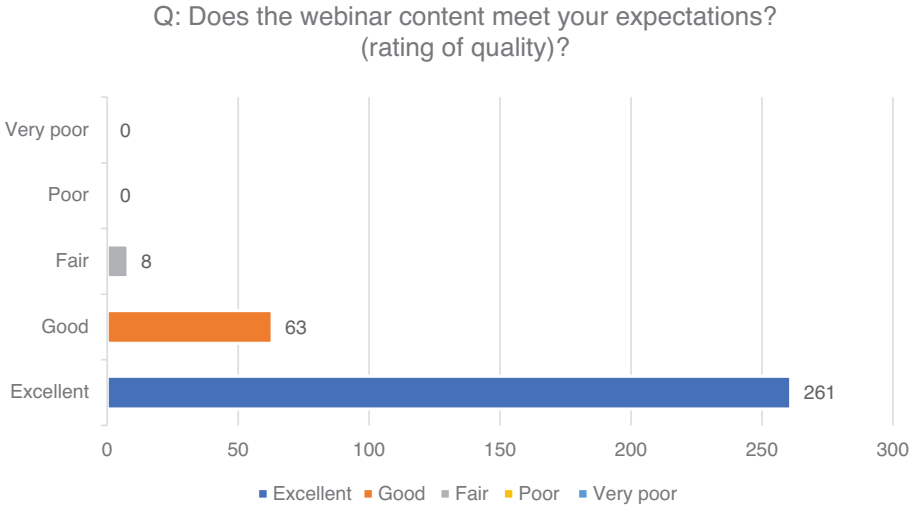
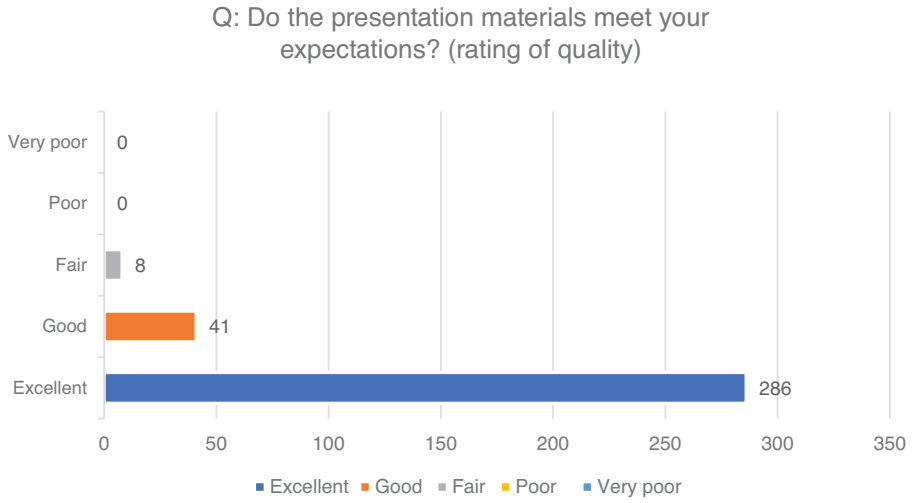


Fig. 5: Overview of the ranking of presentation material quality.



Therefore, CSSU always checks whether participants are satisfied with the presentation materials, and for the webinar *Libraries and Citizen Science*, the results are shown in the Figure 5.

A significant majority of respondents, approximately 86.1%, rated the presentation materials as Excellent. Additionally, around 12.3% of respondents rated the materials as Good, indicating a favourable perception overall. Only a small proportion of respondents, approximately 1.5%, rated the materials as Fair.

Also, the likelihood of how applicable the learned content can be in the workplace was investigated, and the results are presented in the Figure 6.

A significant majority of respondents, comprising approximately 70.1%, expressed high confidence in applying the course content in their workplace, with 36.1% indicating that they can definitely apply it and 33.7% stating that they can probably apply it. Additionally, around 25.6% of respondents mentioned the possibility of applying the content, while only a small percentage (4.5%) indicated uncertainty or reluctance in applying the course material. Specifically, 3.3% of respondents stated that they probably will not apply it, and 1.2% mentioned that they definitely will not apply it.

In the following question, respondents were asked to rate the lecturer. They could choose a rating ranging from excellent to very poor, and the results are presented in the Figure 7.

Fig. 6: Overview of the likelihood of applying course content in the workplace.

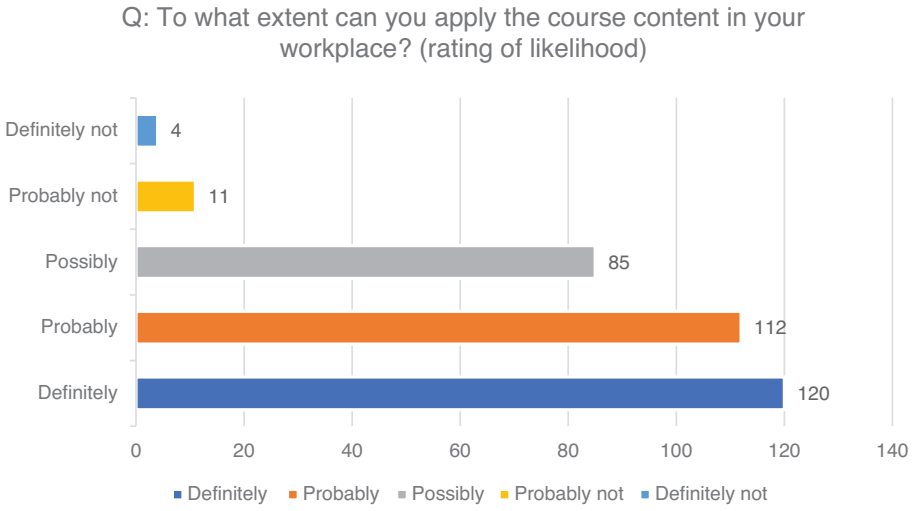
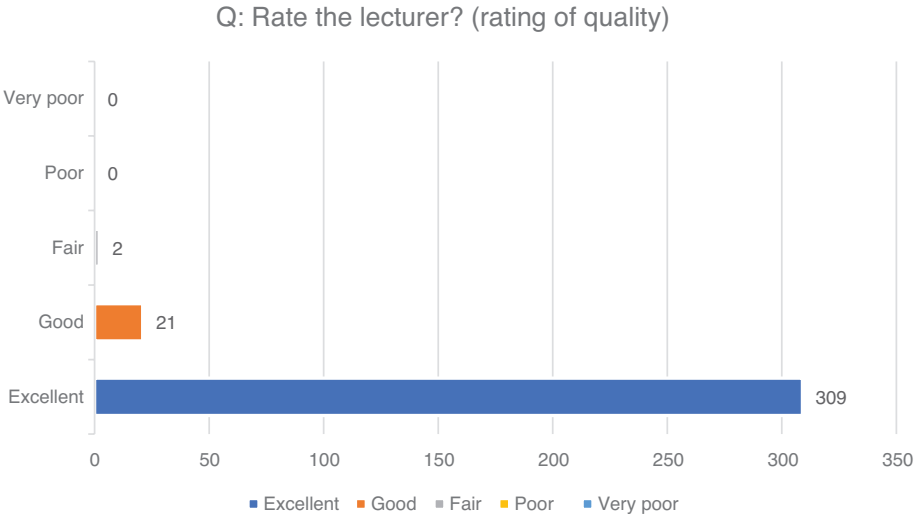


Fig. 7: Overview of respondents ratings for the educator.



Approximately 93.1% of respondents rated the lecturer as Excellent. Additionally, around 6.3% of respondents rated the lecturer as Good. Approximately 0.6%, rated the lecturer as Fair, suggesting minor areas for improvement but still indicating a generally positive perception.

The CSSU aimed to assess the success of the webinar organization by having participants rate the quality of the organization, as presented in the Figure 8.

Approximately 91.3% of respondents rated the organization of the webinar as Excellent. Additionally, around 7.8% of respondents rated the organization as Good, Approximately 0.9%, rated the organization as Fair.

CSSU announced the *Libraries and citizen science* webinar through several channels, and it was interesting to explore through which channels the webinar participants learned about its occurrence. All CSSU educations are published on the official website. When education is organized for the entire Croatia, notifications are sent to subscribers via newsletter. When education is organized for an individual county or several specific counties, notifications are sent from the parent office. Individuals can share notifications about educations on social media. The results are presented in the Figure 9.

Fig. 8: Overview of respondents ratings for the webinar organization.

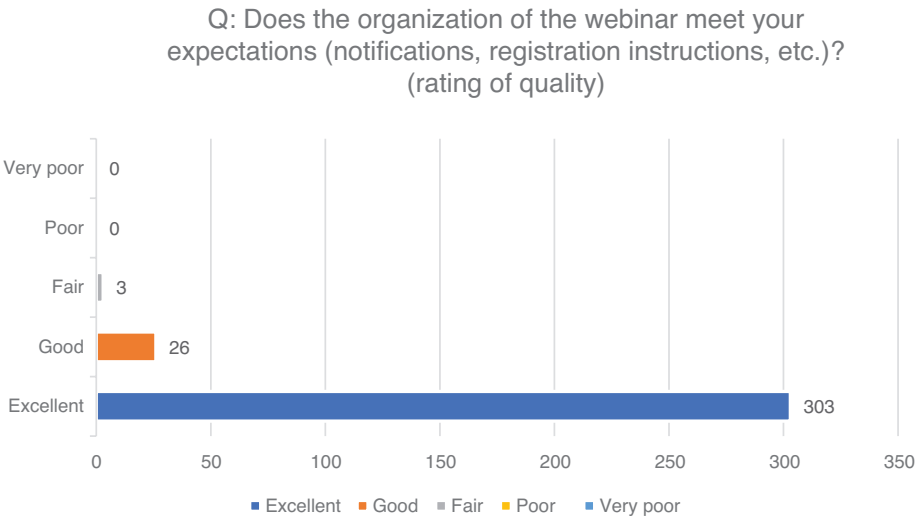
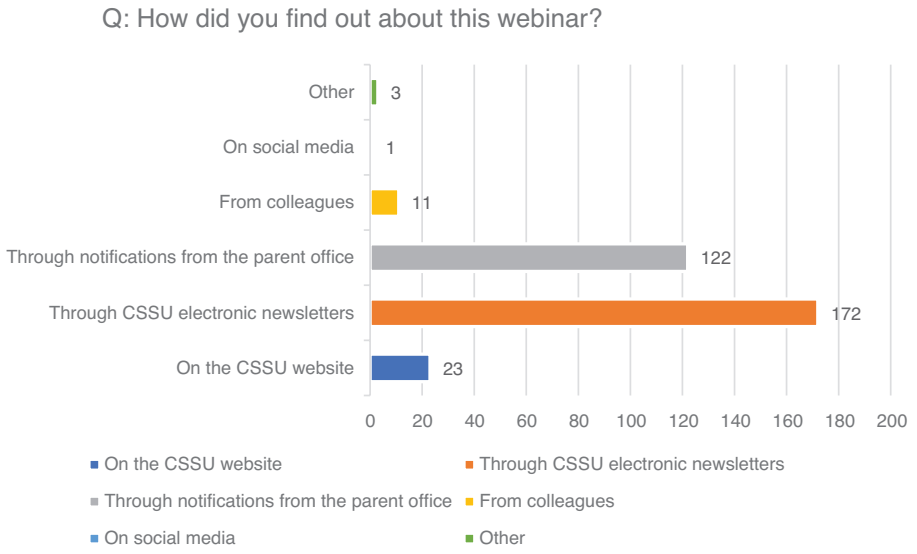


Fig. 9: Overview of channels where respondents found out about the webinar.



Majority of respondents (51.8%), discovered the webinar through CSSU electronic newsletters. Notifications from the parent office also played a significant role, with 36.7% of respondents indicating this as their source of information. A smaller proportion of respondents, around 6.9%, found out about the webinar directly on the CSSU website. Additionally, a few respondents (3.3%), learned about the webinar from colleagues, while an insignificant number mentioned discovering it on social media or through other means.

CSSU is an important part of lifelong education for librarians in Croatia, and in the following question, an attempt was made to determine whether webinar participants had also attended CSSU webinars in the past. Respondents' answers are presented in the Figure 10.

A majority of respondents, approximately 96.1%, indicated that they have attended webinars before, and about 3.9%, reported not having attended webinars in the past.

In the next question, webinar participants were asked to rate how empowered they feel in terms of implementing citizen science activities in their

Fig. 10: Overview of whether respondents have attended webinars in the past.

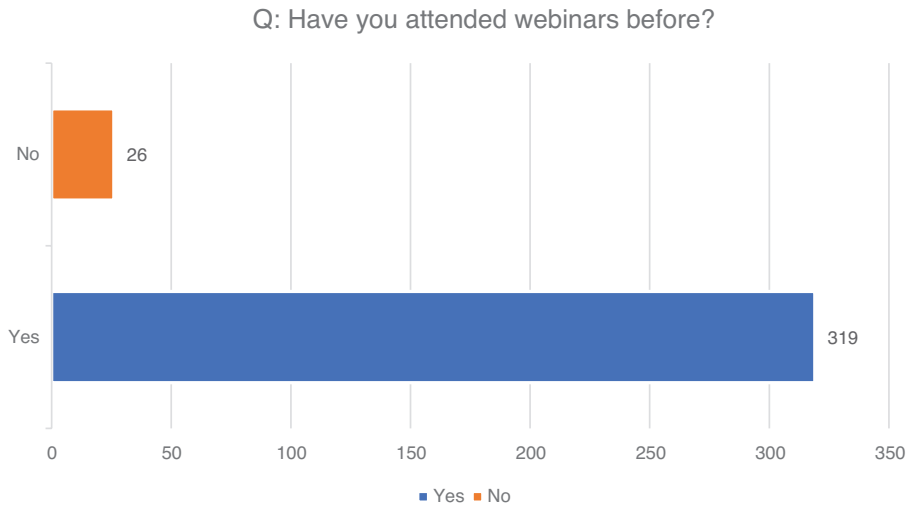
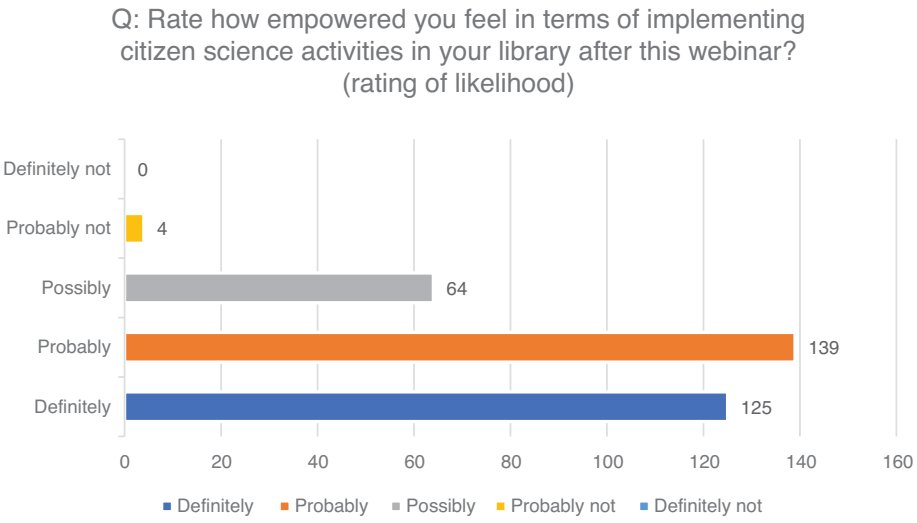


Fig. 11: Overview of the likelihood of implementing citizen science activities in respondents' libraries.



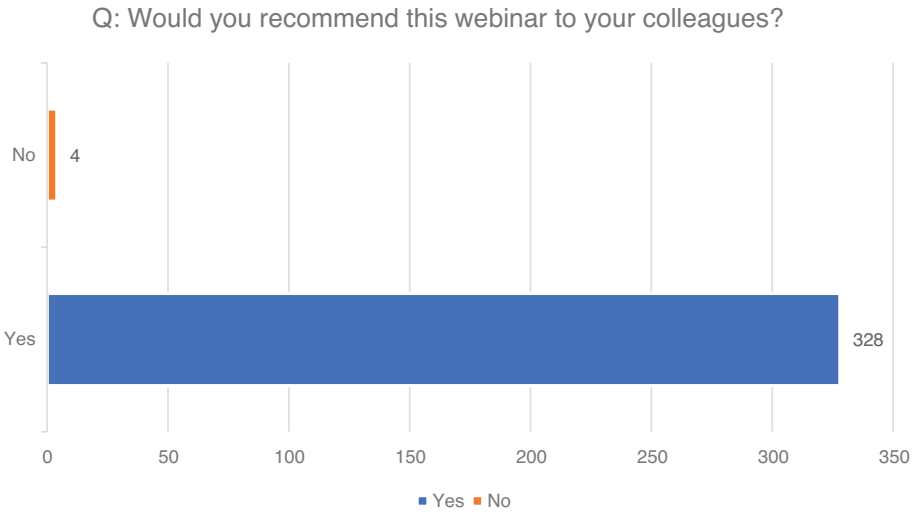
library after attending the *Libraries and Citizen Science* webinar. Respondents could rate their likelihood, and the results are presented in the Figure 11.

A notable majority of respondents, accounting for approximately 79.6%, rated their level of empowerment as either Definitely (37.7%) or Probably (41.9%) in terms of implementing citizen science activities in their library after attending this webinar. Additionally, around 19.3% of respondents expressed a possibility of empowerment in this regard. Approximately 1.2%, indicated a likelihood of Probably not feeling empowered, while none reported Definitely not feeling empowered.

Afterwards, webinar participants were asked whether they would recommend the webinar to their colleagues, and their responses are presented in the Figure 12.

Majority of respondents (98.8%) expressed their willingness to recommend this webinar to their colleagues. Only a small minority, approximately 1.2% of respondents, indicated that they would not recommend the webinar to their colleagues.

Fig. 12: Overview of whether respondents would recommend the webinar to their colleagues.



The final question, which pertained to the opinion of librarians regarding the content and effectiveness of the webinar, was "Please provide any additional suggestions for the webinar." This question was not mandatory, and out of 332 participants, 87 responded, which is 26.2%. Below are selected responses that have been analysed and categorized.

a) Satisfaction with the webinar:

Great topic and lecturer. Clear, precise, specific, and useful presentation.

The best webinar in a long time! Very interesting topic, supported by excellent literature and even better examples. The lecturer is interesting and approachable… all the praise. Bravo, bravo, bravo!

Interesting and professional presentation on a topic I knew nothing about before.

The webinar was successful, the topic was well covered and presented.

No suggestions, only praise, the presentation was excellent and I learned a lot about a topic I knew very little about before the webinar. Much success in your future work and more of such and similar topics.

b) Satisfaction with the lecturer

Compliments to the lecturer because her tone shows motivation, she conveyed the data excellently, and provided a good amount so we would be informed, but not overwhelmed again. It is evident that the lecturer is well-versed in the topic.

Compliments to the lecturer

The webinar is praiseworthy and it was truly a pleasure to listen to it. Congratulations to the lecturer

Definitely one of the most interesting topics lately and an excellent lecturer. Thank you!

The lecturer was clear and specific, and delivered a quality and interesting webinar, all praise!

c) Desire for more examples and information:

More Croatian examples.

More news.

Additional explanations for partnerships with experience in citizen science projects. From this lecture, we learned about one institution in Croatia that conducts them, which is NUL. Are there any other similar experiences at the national level that could be partners?

Additional sessions on the same topic would be helpful.

Possibility of more examples of citizen science activities in Croatia.

Additional explanations for partnerships with experience in citizen science projects.

More detailed description of projects in the next webinar.

I am interested in examples of citizen science for specific types of libraries, especially for academic libraries.

d) Suggestions for improvement:

Certainly, it would be useful to hold face-to-face courses.

We would greatly benefit from live workshops on this topic!

A live workshop would be very interesting and educational.

Greater possibility of entry to the webinar.

These categories encompass the various sentiments and suggestions expressed by the respondents regarding the webinar.

3.1.2. The Attitudes of Librarians Towards the Implementation of Citizen Science in Libraries?

The second part of the research involved questions beyond the standard CSSU webinar participant form. The aim was to determine the opportunities for Croatian libraries to implement citizen science and the general opinion of Croatian librarians on the topic of citizen science. Therefore, several statements were added for respondents to rate using a Likert scale. The researched statements were:

- Statement a: "I am responsible for working with users in the workplace."[1]
- Statement b: "I am responsible for handling library materials in the workplace."
- Statement c: "I have been involved in organizing events, gatherings, and activities at my library."
- Statement d: "I have experience in organizing citizen science activities/projects."
- Statement e: "I am interested in organizing and conducting citizen science activities in the future."

Responses are presented in the Table 2.

A significant majority of respondents, comprising approximately 73.7%, selected the option "Strongly agree," indicating a strong consensus among participants regarding their responsibility for working with users in their workplace. Additionally, about 11.1% of respondents chose the "Agree" option, suggesting further agreement with the statement. Approximately 6.3% of respondents were "Undecided," indicating some uncertainty among a smaller portion of participants. A minority of respondents, around 2.7%,

Table 2: Overview of Likert ratings of statements of respondents related to citizen science.

Q: On a scale of 1 to 5, where 1 means "strongly disagree" and 5 means "strongly agree", please rate the following statements (rating of agreement)		
	Respondents	Percentage
Statement a: "I am responsible for working with users in the workplace."		
Strongly agree	245	73.7%
Agree	37	11.1%
Undecided	21	6.3%
Disagree	9	2.7%
Strongly disagree	20	6%
Statement b: "I am responsible for handling library materials in the workplace."		
Strongly agree	267	80.4%
Agree	36	10.8%
Undecided	16	4.8%
Disagree	6	1.8%
Strongly disagree	7	2.1%
Statement c: "I have been involved in organizing events, gatherings, and activities at my library."		
Strongly agree	244	73.4%
Agree	34	10.2%
Undecided	24	7.2%
Disagree	15	4.5%
Strongly disagree	15	4.5%
Statement d: "I have experience in organizing citizen science activities/projects."		
Strongly agree	48	14.4%
Agree	37	11.1%
Undecided	85	25.6%
Disagree	52	15.6%
Strongly disagree	110	33.1%
Statement e: "I am interested in organizing and conducting citizen science activities in the future."		
Strongly interested	136	40.9%
Interested	100	30.2%
Undecided	80	24%
Uninterested	9	2.7%
Strongly uninterested	7	2.1%

selected the "Disagree" option, suggesting a disagreement with the statement. Finally, about 6% of respondents chose "Strongly disagree," indicating a strong disagreement with the notion of being responsible for working with users in the workplace.

In response to the statement, "I am responsible for handling library materials in the workplace," a significant majority of respondents, comprising approximately 80.4%, selected the option "Strongly agree." This suggests a strong consensus among participants regarding their responsibility for

managing library materials in their workplace. Additionally, about 10.8% of respondents chose the "Agree" option, indicating further agreement with the statement. Approximately 4.8% of respondents were "Undecided," suggesting some uncertainty among a smaller portion of participants. A minority of respondents, around 1.8%, selected the "Disagree" option, indicating a disagreement with the statement. Finally, about 2.1% of respondents chose "Strongly disagree," indicating a strong disagreement with the notion of being responsible for handling library materials in the workplace.

Regarding the statement, "I have been involved in organizing events, gatherings, and activities at my library," a considerable majority of respondents, totalling approximately 73.4%, strongly agreed with the statement. This indicates a significant level of involvement in organizing events among the surveyed participants. Additionally, around 10.2% of respondents chose the option "Agree," suggesting further agreement with being involved in such activities. However, there was a notable portion of respondents who expressed uncertainty or disagreement with the statement. About 7.2% of respondents were "Undecided," indicating some ambiguity regarding their involvement in organizing library events. Moreover, approximately 4.5% of respondents selected both the "Disagree" and "Strongly disagree" options, indicating disagreement with the statement.

Regarding the statement, "I have experience in organizing citizen science activities/projects," the responses were diverse among the surveyed participants. Only a small proportion, approximately 14.4%, strongly agreed that they have experience in organizing citizen science activities or projects. Similarly, around 11.1% agreed with the statement, indicating some level of experience in this area. However, a significant number of respondents expressed uncertainty or disagreement with the statement. Notably, 25.6% of respondents were undecided about whether they have experience in organizing citizen science activities. Moreover, a considerable portion of respondents disagreed with the statement, with approximately 16.6% choosing the "Disagree" option and 33.1% selecting "Strongly disagree."

Regarding the statement, "I am interested in organizing and conducting citizen science activities in the future," the responses indicate a notable level of interest among the surveyed participants. A significant majority, approximately 40.9%, is strongly interested indicating a strong desire to organize and conduct citizen science activities in the future. Additionally, around

30.2% of respondents are interested, further highlighting a considerable level of interest in engaging with citizen science projects. Approximately 24% of respondents were undecided about their interest in organizing and conducting citizen science activities in the future. Moreover, a small proportion of respondents, comprising 2.7% who chose the "Uninterested" option and 2.1% who selected "Strongly uninterested" indicated a lack of interest in engaging with citizen science projects in the future.

Regarding the extent to which libraries are connected to various communities, respondents were asked to rate their agreement with statements related to the local community and the scientific community. The results can be seen in Table 3.

For the local community, the responses indicate a strong level of connection between libraries and their local communities. Approximately 36.4% of respondents strongly agreed that their library is connected to the local community, with an additional 31.3% agreeing with this statement. However, there were some respondents who expressed uncertainty or disagreement, with 19.5% undecided, 8.1% disagreeing, and 4.5% strongly disagreeing with the statement.

Concerning the scientific community, the responses suggest a somewhat lower level of connection between libraries and this community. While 21.4%

Table 3: Overview of respondents' assessment of the connectivity of their libraries with local and scientific communities?

Q: Rate the extent to which your library is connected to the following communities. (rating of agreement)		
	Respondents	Percentage
a. Local community		
Strongly agree	121	36.4%
Agree	104	31.3%
Undecided	65	19.5%
Disagree	27	8.1%
Strongly disagree	15	4.5%
b. Scientific community		
Strongly agree	71	21.4%
Agree	56	16.8%
Undecided	94	28.3%
Disagree	71	21.4%
Strongly disagree	40	12%

of respondents strongly agreed that their library is connected to the scientific community, and 16.8% agreed, a larger proportion of respondents were undecided (28.3%) or disagreed (21.4%). Additionally, 12% of respondents strongly disagreed with the statement, indicating a notable lack of connection between libraries and the scientific community among some participants.

The final question of the survey was open-ended and optional to answer. The question was: "Please write your opinion on the role of libraries in conducting citizen science." 120 webinar participants, or 36.1%, responded to the question. A selection of responses was analysed and categorized:

a) Advocacy for Citizen Science:

Libraries play a very significant role as a sort of communication channel between science and the public.

Libraries have all the prerequisites for conducting citizen science; however, research needs to be devised.

Libraries should get involved in citizen science projects because they definitely contribute to better visibility of libraries in the community.

b) Collaborative potential:

Libraries serve as intermediaries between their users and citizen science.

The library can be a channel that guides and assists in citizen science.

Libraries can play a significant role in bridging the needs of science and citizens willing to participate in research.

Libraries, as partners and support to the scientific community, can play a significant role in conducting citizen science.

Libraries can be of great assistance in conducting citizen science, providing accurate and verified information and serving as a bridge between the library and the local community.

c) Potential challenges:

Just the thought of having a special person or two dedicated solely to this area with users, while everything here is on one person, saddens me because I would like us to specialize in certain areas within our libraries.

Financial resources and additional support are needed.

Given that my library operates in a small community with its own specific characteristics, it might be a bit challenging to engage a broader population since the library is solely seen as an institution for borrowing books.

d) Potential opportunities

The public library has great potential in promoting citizen science, which is beneficial for science itself, the library, but most importantly, for the citizens who can benefit in multiple ways from active participation in scientific projects.

Invaluable in connecting seemingly unrelated parts of the community, empowering citizens with the idea that they too can contribute to science with smart coordination and mediation.

In the case of the specific institution I work in – the Institute of Ethnology and Folklore – citizen science is already actually present in the work of scientists in the field through their relationships with informants, but there is room for formalizing (in a positive sense), expanding, and systematically organizing this if scientists wanted to. Citizens would collect material in the field (oral narratives). I need to think about how the library would be involved in this.

3.2. Discussion

Among the participants who responded to the questionnaire, the majority has between 16 and 20 years of experience. It can be inferred that these individuals have sufficient work experience and are ready to utilize their knowledge and skills to new challenges. The proportion of participants with over 20 years of work experience gradually declines, which can be explained by a lesser interest in engaging in new activities and projects among those who have been in the profession for a longer period. This may indicate that they find it harder to keep pace with new technologies and innovations in librarianship in general, but also that they have specialized in certain areas and function as library managers, department heads, mentors, and the like.

According to the reports from CSSU's website the majority of CSSU participants generally have a high level of education. Consequently, the largest number of participants are librarians, a professional title corresponding

to the qualification of a graduate librarian obtained after passing the professional exam. Such results are expected, given that CSSU programs are primarily intended for participants with higher education backgrounds. Participants of CSSU programs receive points for professional advancement, which further motivates them to progress in their profession after passing the professional exam. The highest number of participants comes from public and school libraries. Moreover, the largest proportion of CSSU participants overall are from these two types of libraries, as indicated in the report (CSSU).

Nearly 80% of participants who completed the questionnaire rated the webinar content with the highest grade, which speaks to the excellent choice of education for librarians at the national level in Croatia. There are no dissatisfied participants; none of the respondents who filled out the evaluation questionnaires rated the webinar content as poor or very poor. The same applies to the presentation materials, which received very high ratings from participants. Regarding applicability to the workplace, just over two-thirds of participants stated that they could apply the content to their job, which underscores the usefulness of education and knowledge dissemination on this topic. Participants who stated that they probably or definitely would not apply the webinar content to their workplace (totalling 4.5%) likely attended the webinar out of a desire to learn something new or enhance their knowledge on this topic. Since the webinars are free for everyone, participants who are not directly related to the topic at their workplace often enrol to advance in their profession or to change their job.

The positive ratings given to the presenter speak to the CSSU's good choice of collaborators when planning education sessions and provide encouragement for devising new educational programs on this or similar topic. Participants are also satisfied with the organization, confirming that the needs of the library community are being met satisfactorily. The vast majority of participants have already attended webinars, indicating that they find this method of professional development beneficial. The vast majority of participants would recommend the webinar to their colleagues, which is expected based on previous satisfaction with the education provided.

In their open feedback, participants expressed great satisfaction with the webinar content, as well as with the presenter and her method of delivering

the content. They also stated a desire for more examples from Croatia, additional guidance on forming partnerships in citizen science projects, and the need for further education. Additionally, they mentioned that hosting a live workshop would be beneficial. Suggestions lean towards additional education on this topic, which CSSU will certainly take into consideration and incorporate into future plans.

In discussing the results related to the attitudes of librarians towards the implementation of citizen science in libraries, it's evident that there is a strong consensus among participants regarding their responsibility for working with users and handling library materials in the workplace. This indicates a positive outlook and willingness among librarians to engage actively in their roles within the library environment. Furthermore, the high level of involvement in organizing events, gatherings, and activities at libraries suggests a proactive approach by librarians in fostering community engagement and promoting library services. This active involvement can enhance the library's role as a hub for community interaction and learning. This proactive stance reflects a dedication to creating vibrant and inclusive spaces within libraries, where community members can come together for educational, cultural, and social enrichment. Despite the diverse responses regarding experience in organizing citizen science activities, there is a notable interest among librarians in exploring and conducting such projects in the future. This interest presents an opportunity for librarians to expand their skill sets, collaborate with stakeholders, and leverage library resources to facilitate citizen science initiatives that address community needs and interests. The results also highlight the strong connection between libraries and their local communities, indicating a supportive environment for community engagement and outreach activities. However, there appears to be room for improvement in strengthening connections with the scientific community, suggesting an area for potential growth and collaboration.

Moving on to the categorization of responses to the open-ended question, the advocacy for citizen science category highlights the perceived role of libraries as communication channels between science and the public. Additionally, it emphasizes the empowering nature of citizen science in engaging citizens and bridging gaps within communities. In the collaborative potential category, responses underscore the intermediary role of libraries in facilitating citizen science projects and their potential to bridge the needs of science and

community members. These responses highlight the importance of collaboration between libraries, users, and scientific communities to promote citizen science initiatives effectively. The potential challenges category reveals concerns related to resource constraints, community perceptions, and organizational barriers that may hinder the implementation of citizen science projects in libraries. These challenges point to the need for adequate support, strategic planning, and community outreach efforts to address barriers and maximize the impact of citizen science initiatives. Finally, the potential opportunities category highlights the untapped potential of libraries in promoting citizen science, fostering community engagement, and facilitating interdisciplinary collaborations. These responses underscore the diverse ways in which libraries can contribute to citizen science efforts and leverage their unique position as trusted community resources to advance scientific literacy and community well-being.

Overall, the findings underscore the positive attitudes and potential opportunities for libraries to play a significant role in advancing citizen science initiatives. By leveraging their resources, expertise, and community networks, libraries can continue to serve as valuable partners in promoting scientific literacy, community involvement, and societal impact.

4. Conclusion

In conclusion, this study underscores the growing recognition of the importance of librarian education in integrating citizen science initiatives within library operations. The analysis of global practices in certified librarian education on citizen science highlights the increasing emphasis on equipping librarians with the necessary knowledge and skills to effectively engage in citizen science projects. The case study of the *Citizen Science in Libraries* webinar conducted by the National and University Library in Zagreb and organized by CSSU exemplifies one such initiative aimed at familiarizing librarians with citizen science concepts and providing practical support.

The research on Croatian librarians' attitudes towards citizen science implementation in libraries reveals positive perceptions and a willingness among librarians to actively participate in citizen science endeavours. The majority of participants rated the webinar content highly, indicating its relevance and

usefulness in their professional practice. Moreover, participants expressed a strong interest in advocating for citizen science, fostering collaboration, and leveraging library resources to promote scientific literacy and community well-being.

The findings highlight the pivotal role of librarians as facilitators of community engagement and scientific inquiry. To effectively support citizen science initiatives, librarians must possess specialized competencies and insights into the dynamics of citizen science within the library setting. Tailored education and training programs focused on citizen science are essential to empower librarians with the necessary tools and strategies to navigate this emerging field.

For future research, it would be beneficial to conduct longitudinal studies to assess the long-term impact of librarian education on citizen science initiatives in libraries. This would involve tracking the implementation of citizen science projects over an extended period to evaluate their sustainability and effectiveness in engaging the community.

Overall, this study emphasizes the importance of continuous education and collaboration in maximizing the potential of libraries to promote citizen science and contribute to societal impact. By leveraging their resources, expertise, and community networks, libraries can serve as valuable partners in advancing scientific literacy, community involvement, and public engagement in research endeavours.

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Note

[1] In Croatian libraries, there are librarians who are solely responsible for handling materials (subject indexing, cataloguing, etc.) and do not interact with patrons in their work. Therefore, Statement A includes those librarians who encounter patrons as part of their duties.