

Makerspaces: An examination of
collaborative partnerships between public
libraries and schools

BY

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Abstract

Problem

Makerspaces are gaining prevalence in school environments, but teachers are often overwhelmed with new digital technologies, often describing themselves as “self-confessed technophobes” (Ministry of Education, 2015). Given that knowledge sharing is the heart of the maker movement (Ministry of Education, 2015), drawing on a wide range of expertise and human resources is a useful way to help support designing, developing, and sustaining makerspaces. If teachers have the relevant support, this will assist them to learn their way through using the technology often found in makerspaces. Looking into the collaborative partnerships between public libraries and schools allows for further understanding of how libraries are willing to support local schools and their access to resources and knowledge.

Methodology

Semi-structured interviews were conducted with seven public librarians from six different libraries about their experiences with or barriers to collaborating with school staff regarding makerspaces or other STEAM related activities. The interview data was analysed using a thematic analysis methodology to identify overarching themes. The interview data was then compared against findings from existing research.

Results

Although the sample size for this research was small and did not include as many participants as initially desired, the results still contribute to an understanding of the experience and benefits towards building collaborative partnerships between libraries and schools regarding the development, design, and sustainment of makerspaces. The findings illustrate how a couple of libraries have built and developed collaborative programmes with schools, and the willingness to share knowledge with their local schools and community around the access to the tools available in library makerspaces. The librarians interviewed are willing to support their communities by aiding school staff and students with digital technologies.

Implications

Areas identified for further research include further exploration of this topic is employing either a longitudinal study or mixed method design. Also interviewing and exploring how school staff feel about partnership and collaboration with librarians could provide further

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understanding around this subject, as well as the relevance of makerspaces and makerspace type activities in schools. Additionally, a longitudinal case study approach of how schools design, develop or sustain their makerspaces may also provide further insight into the ongoing growth, and use of makerspaces in schools.

KEYWORDS: makerspaces, partnership, collaboration, public libraries, collaborative partnerships, schools, teachers, school staff

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Introduction

This research aimed to investigate how public libraries and librarians have collaborated and coordinated with school staff in terms of designing, developing, and sustaining the relevance of makerspaces or makerspace related activities in school settings.

Rationale

Makerspaces are gaining prevalence in school environments, but teachers are found to be describing themselves as “self-confessed technophobes,” (Ministry of Education, 2015) and they feel, that with anything new, “they need to know before they try with their kids” (Ministry of Education, 2015). Given that knowledge sharing is often the heart of the maker movement (Ministry of Education, 2015), drawing on a wide range of expertise and human resources is a useful way to help support designing, developing, and sustaining makerspaces. Additionally, if teachers have the relevant support, they will feel empowered through learning their way around the technology often found in makerspaces. This can then allow them to incorporate their own learning journeys around maker culture and the maker movement into their teaching practise.

The idea of continuous learning and educational growth is ubiquitous in mission statements for both public libraries and schools (Amann & Carnesi, 2012). This professional and learning development can commonly be achieved through relationship building and collaboration. Public libraries often aim to provide customers with “the collections, services and programmes they need to satisfy their curiosity to continue to learn throughout their lives” (Ames Public Library Board of Trustees, n.d.). Therefore, this outreach can be achieved by collaborating with schools, where a bulk of library customers can be found. For instance, the digital divide frequently impacts public rural schools and local libraries can therefore allow for these impacted students to have access to digital technology, such as the resources often included in a makerspace that these schools may not have otherwise.

While teachers and libraries partially share the same goals and tasks, their methods differ towards achieving these goals (Tikkinen & Korkeamäki, 2021). This is because a teacher’s expertise involves the teaching and knowledge of their students, while a librarian’s expertise often involves resources and information literacy and teaching these skills to their customer base (Donham & Green, 2004). Thus, public librarians could serve as expert consultants in a school’s makerspace environment, especially if they are involved with their own library’s makerspace.

While it has been demonstrated that teachers' and librarians' interest in working together has increased (Montiel-Overall & Grimes, 2013), it would be beneficial to determine how these partnerships are growing, in particular with the development of makerspaces. Collaboration between schools and public libraries positively influences the communities of young people (Jones, 2005) and helps to serve the youth by applying the best of human and professional resources (Jones & Shoemaker, 2001). Through learning how this can be achieved with a combination of knowledge, experiences, and resources, librarians can provide schools and their students with a broader learning foundation and more effective services (Jones, 2004). By investigating how public libraries are collaborating with schools and teachers in terms of designing, developing, or sustaining the relevance of makerspaces, this can further the understanding of the relevance and development of maker culture within a school environment.

Additionally, in reference to this study's research questions, having a better understanding of the motivations behind why and how librarians choose to develop such collaborative partnerships with school staff for makerspace related activities will be advantageous. Researching into a librarian's outcomes of such partnerships will allow for future public librarians to evaluate how they can enable longer term and more sustainable collaborative partnerships between libraries and schools.

Literature Review

Most published literature relating to schools and public libraries working together focuses on school librarians and public librarians working together to combine and share services or resources and rarely documents the actual experience of the librarians who collaborate (Kammer & Moreland, 2020). This literature review will begin by looking at defining makerspaces in schools, followed by various definitions of collaboration and its impact in libraries and working together. Next discussed will be examples of research done around institutions collaborating and their outcomes. Lastly, a summary of the framework that will be used to guide this research will be provided.

Makerspaces in schools

While the focus of this research is on examining the collaboration between public libraries and schools and not on makerspaces themselves, it will still be useful to have an understanding of how makerspaces in schools operate. For the purpose of this investigation makerspaces are defined by Maker Media (2012, p. 2) as:

“...Collaborative workshops where young people gain practical hands-on experience with new technologies and innovative processes to design and build projects. They provide a flexible environment where learning is made physical by applying science, technology, math and creativity to solve problems and building things.”

Makerspaces in schools can thus be any space where students, staff and teachers come together to create, invent, prototype, design, tinker, explore, discover, code, build, draft, draw and more. Students can work either individually or collaboratively using a variety of high and low-tech tools and materials. While makerspaces typically have a STEAM focus (Science, Technology, Engineering, Art, and Maths), they are still an ideal platform for projects that work across all subject areas (Ministry of Education, n.d.).

Definitions of collaboration and reasons to collaborate.

Breeding (2015) discusses how libraries are organisations that are often open to many forms of collaboration, as partnerships can often help gain mutual benefits, such as making the most of funding or resources. These projects can also strengthen the impact of libraries on their communities (Breeding, 2015).

The term collaboration is used broadly in library literature to describe cooperative relationships between two parties (Kammer & Moreland, 2020), but also commonly incorporates the notion of working towards common goals (American Association of School Librarians, 2018). Pandora and Hayman reiterate that collaboration also helps to “enhance services for all patrons” (2013, p. 3). The ideas of cooperation or coordination can also be included in the concept of collaboration, as often collaboration is a greater partnership where parties work towards shared or unique goals (Mattessich & Monsey, 1992). The broader definition that encompasses two institutions working together, cooperatively, will be used within this investigation, for the purpose of researching how public librarians work with school staff to build and develop school makerspaces.

While librarians are often encouraged to collaborate, it has been discovered that the more each party believes in the value of collaboration, the more successful the outcomes are. Therefore, positive attitudes and an interest towards collaboration are critical (Kammer & Moreland, 2020). Both organisation’s attitudes towards collaborations can affect the outcome of the collaborative partnerships (Brown, 2004). It is thus advised that a commitment needs to be made by all involved, and that the timing needs to be favourable, as it could make or break the partnership’s success (Larrance, 2002).

In order for libraries to benefit the people they serve, librarians should also have the desire to work with other organisations (Wepking, 2009). Not only does this increase a library's value for their patrons, but it also helps to increase and improve the level of the librarian's job satisfaction. Collaboration can often lead to collaborative partnerships, new friendships, support and new ideas (Pandora & Hayman, 2013). Additionally, collaboration can also "help secure the support needed for resources, such as funding, materials, space, equipment, staff and programming" (Kammer & Moreland, 2020, p. 34). Collaboration can similarly mean sharing services and resources which as a result can help save money (Knipp et al., 2015). Furthermore, collaboration allows for "the expansion of learning opportunities for students, faculty, and staff; the additional knowledge and expertise gained [...] and the synergy that often occurs" (Larrance, 2002). Each organisation can have unique resources on offer, and sharing resources can set a precedent for continued collaboration as, "leveraging resources is not just about sharing or dividing resources; rather it is the synergetic process of making more from what is available" (Larrance, 2002, p. 3).

While the value of collaboration is understood, the reality is there are many systematic challenges to sustaining these partnerships. For example, changes in library staffing, schedule conflicts, minimal staffing, particularly in rural libraries or a lack of familiarity with the system in which the other individual worked were some of the reasons stated as challenges towards established effective and collaborative partnerships, specifically between school and public libraries (Kammer & Moreland, 2020). An additional barrier could also be that it may be difficult to bridge the communication boundaries between teachers and librarians, as they have different disciplinary backgrounds. This means, that while the two professions share similar goals and tasks, their methods of reaching these goals can differ (Montiel-Overall & Grimes, 2013).

Librarians and collaborative partnerships

There are many ways libraries and librarians can collaborate and share a partnership between institutions and organisations. One example of collaboration between schools and public libraries is demonstrated by the Manawatū District libraries. Johansen (2021) notes that libraries are more than just an avenue for books; they are a community hub where people can learn, create, feel safe and engage with others. As a result, the Manawatū District libraries wanted to connect better with the young people in their region, through using their connections with local schools, and focusing strongly on digital literacy. Johansen noted that their local schools were finding it harder to make visits to the Fielding public library, so

instead, the staff started taking their STEAM programmes to the schools as “it was far easier to send a library team member out to the schools with a programme kit than to try and bus 30 children into town” (2021). By using this approach, they have noticed children engaging in programmes far more often. An added benefit of this collaboration was that the public schools’ budgets are not affected, as all the equipment and resources used are supplied by the visiting library. This digital outreach programme is a demonstration of how public librarians can work with a variety of community organisations to deliver services as required within the community (Kammer & Moreland, 2020). As a result, this research chooses to encompass both digital technologies, such as STEAM or coding activities and more hardware technologies, for example, sewing machines or CNC routers, when examining collaboration between public libraries and schools around the development of makerspaces or related activities.

Another example of collaboration, is how librarians from St. Petersburg College in Florida, teamed up with the local public library to host a two-day convention for anime and comics enthusiasts on the college campus. Their aim was to bring together and increase the visibility of both communities, as educating the local community and establishing the libraries as places of interest (Knipp et al., 2015). They discovered, through planning the event, that the collaboration seemed to grow organically. Two librarians initially met over coffee and over time more individuals were brought into the planning committee, bringing with them varied talents and ideas that helped the event exponentially. Staff members from both institutions were able to recommend people to lead workshops, give presentations and help with planning. They also discovered, that through collaborating on an event, attendance at both venues was afterwards encouraged. In other words, the community had the opportunity to explore its local college, and the college students were able to discover what the local public library had to offer. The college also used this opportunity to increase exposure, as this event was a chance to recruit future students.

A study undertaken by Tikkinen and Korkeamäki (2021) examined qualitatively, how teachers and public librarians worked together in Finland following the conclusion of a government reading and literacy engagement programme in primary schools. The programme involved school and library partnerships where the participants developed, selected, and tested a wide range of participatory literacy activities. Afterwards, these activities were presented in seminars for sharing ideas on how to increase children’s reading enjoyment levels. Tikkinen and Korkeamäki (2021) analysed their interview data and described the

depth of the partnerships using a theoretical model that distinguished levels of cooperation, coordination, and collaboration. They suggested using the term partnership as an alternative to collaboration, as there are differences in the way teachers and librarians understand the concept due to the differences in their education (Tikkinen & Korkeamäki, 2021). They also further established that in order to enhance the continuity of improved practices, teachers and librarians needed to develop a mutual understanding of the importance of working together, as these partnerships are important for promoting students' literacies.

It was also noted, that without a formal programme as incentive, the level of working together decreased after the programme concluded. Even though the school-public library pairs expressed interest in remaining committed to promoting reading motivation and to working together, there was found to be an absence of joint planning, implementation and evaluation and a lack of time to complete these tasks (Tikkinen & Korkeamäki, 2021). These are further hurdles to working partnerships and collaboration. Additionally, teachers think that the most effective way of working together entails both parties taking care of their own responsibilities, and that planning on their own is faster and easier than planning with librarians (Kuhlthau, 2004; Pietikänen et al., 2017). Another study, undertaken by Kammer and Moreland (2020) interviewed librarians about their experiences of collaboration between school and public libraries in the rural Midwestern United States. Their findings demonstrated that while both school and public librarians want to work together more they are impacted by systematic and regional constraints that in turn, affect the depth and frequency of collaboration (Kammer & Moreland, 2020).

Theoretical framework

Understandably, while the importance of collaboration is widely recognised (Elliott, 2001), there is limited understanding of the concept and the process involved in a collaborative partnership (Jenni & Mauriel, 2004). As a result, there are many ways of conceptualising collaboration in research and practice. Common themes that often emerge are partnership, alliance, cooperation and coordination, and are sometimes used interchangeably (Tikkinen & Korkeamäki, 2021).

One difference between collaboration and cooperation, identified by Dillenbourg et al. (1996), is based on how the division of labour is handled. They define cooperation as dividing a task into independent sub-tasks, and coordination is necessary when connecting smaller results to form complete output entities. On the other hand, collaboration involves

working together through the process, with the occasional spontaneous division of labour (Dillenbourg et al., 1996).

Montiel-Overall (2017) focuses on collaborations between teachers and librarians and proposes a definition of collaboration that highlights the involvement of joint work throughout the teaching process. Montiel-Overall thus defines collaboration as “a trusting, working relationship between two or more participants involved in shared thinking, shared planning and shared creation of innovative integrated instruction” (2017, p. 260). This implies that for the most part, collaboration appears to be the primary concept used when describing teachers and librarians’ mutual working methods (Tikkinen & Korkeamäki, 2021). This study aimed to examine the nature of public librarians’ partnerships with school teachers or staff in terms of knowledge sharing and assisting with the development or implementation of makerspaces or similar activities in schools. Therefore, the term collaboration in this research encompasses less ambitious activities, and examines the trusting, working relationship between the necessary participants, and the level of knowledge achieved by these partnerships.

Literature review conclusion

Makerspaces provide opportunities for their users to create, design and gain hands-on experience with a variety of different technologies, and collaborative partnerships with libraries with developed makerspaces or related activities are one way for schools to be able to better develop similar spaces and activities in their building. Therefore, teachers and school staff could benefit from organisational collaboration, for example, through knowledge sharing, especially as libraries are often demonstrated wanting to assist with providing their communities with access to such information, as demonstrated by Montiel-Overall (2017) for instance. Public libraries will also benefit from sharing their resources, as it helps to achieve the goal of serving their local community and spreading awareness of what resources they have to offer, as displayed by the anime and comics convention (Knipp et al., 2015).

However, collaboration across institutions does not come without its challenges, for example, lack of time, frequency of collaborating, conflicting schedules, and depth of collaboration.

This literature review has helped to prepare and design the methodology and analysis of the findings for this research topic and examine if previous research supports these claims.

Research Questions and Objective

The objective of this research was to explore collaborative partnerships between public libraries and school staff or teachers towards the development or sustainment of makerspaces and makerspace type activities in school environments. This was guided by the following research questions:

- How have public librarians collaborated with school staff in terms of developing, designing, or sustaining a school's makerspace or running makerspace type activities?
- If there is no collaboration or partnerships with local schools regarding such activities, why not?
- What are public librarians' experiences of collaborating with local school staff regarding makerspaces and related activities? What have been the outcomes, or what do public librarians hope to achieve?
- What challenges do public librarians face around collaborating with schools and their staff?
- What is the motivation for public librarians to consider collaborations with schools around developing, designing, or sustaining their makerspaces or makerspace related activities?

Delimitations

The delimitations of this study include the focus only on public librarians' anecdotal experiences with collaboration with schools through interviews and does not examine the perspectives of school staff and teachers.

Research Design

This research gathered data through semi-structured interviews with public library staff who had experience either overseeing their library's makerspace or similar activities in their library space. The interview participants were encouraged to discuss their experience with collaborating and partnering with local schools around developing or sustaining the school's makerspace areas, or similar activities. If there was no established collaboration with local schools despite an effort to reach out, the barriers around this were discussed. The semi-structured interview format began with a defined questioning plan but eventually shifted in order to follow the natural flow of conversation, in the form of "guided conversations" (Yin, 2014, p. 110), encouraging the conversation to stay along the topic of the main objective of the research.

Qualitative research using interviews has been used successfully by researchers such as Tikkinen and Korkeamäki (2021) and Kammer and Moreland (2020). These qualitative studies have allowed for insights into the types of issues encountered when public libraries try to establish collaborative partnerships with schools, as well as the challenges and benefits of such relationships. By conducting interviews with library staff, it allowed for a deeper understanding of the scenarios and enabling the researchers to “explore the depths and nuances” (Guest et al., 2013) of the topic but also allowing the participants to “speak in voices that are clearly [...] representative” (Strauss & Corbin, 1998, p. 56). As a result, a qualitative methodology was a sound fit for the objective of this research in order to explore how and why public libraries approach collaborative partnerships with schools regarding makerspaces or makerspace activities, and the benefits or barriers around these collaborations. Interviews allowed the researcher insight into the participants’ experiences. This structure also allowed for collection of the data as intended plus the emergence of other interesting information or anecdotes from the interviewees (O’Leary, 2017). These insights helped towards understanding the reasons and experiences around collaboration.

The interviews were conducted remotely, using either Zoom or Microsoft Teams.

Interviews

The focus of the interviews was around the librarian’s experience with collaborating and partnering with local school teachers or staff around designing, developing, and sustaining the relevance of the makerspaces and makerspace type activities in schools. The discussions focussed on the librarian’s successes, challenges, reasons for collaboration and the benefits that have evolved from such experiences. Some examples of the questions are:

- Have you coordinated with schools and teachers, in terms of designing, developing and/or sustaining the relevance of their school's makerspaces?
- If there is no experience of collaboration with local schools, why not?
- What have been the benefits and challenges of collaborating and sharing makerspace activities with schools?
- Tell me about your biggest success stories regarding collaborating or partnering with schools, regarding sharing makerspace activities/digital technologies.

Follow up questions were asked as needed during the interview process.

Sampling and participant recruitment

Interview subjects were sourced by contacting public libraries in New Zealand and Australia via e-mail that were noted by the researcher to have established makerspaces in their organisations, in order to draw meaningful conclusions from the data. The criterion for participants was for them to be involved with their library's makerspace area and for them to have at least a year's experience with the makerspace and library employment. Some experience in the field was to allow for profound discussions from the participants while undertaking the interviews. The interviewees were also required to have either experience with collaborating with local schools or to have at least considered or attempted collaboration with schools around makerspaces and makerspace type activities.

Information about the research study was e-mailed to public libraries, with the request to pass the information on to the relevant staff members and inviting them to participate. Participants were also offered the option of having a summary of the results sent to them on completion of the project. In total, seven librarians were interviewed, with two participants working within the same organisation.

Ethical considerations

Human Ethics Committee approval was applied for and granted by the Victoria University School of Information Management before data collection commenced. Prior to carrying out any interviews, the research requested formal agreement with the participant before proceeding. Participation was voluntary and the identity of participants was only known to the researcher. Data was gathered through one-on-one interviews with the participants and were conducted online. The researcher used an interview guide (see Appendix c), each participant was provided with an information sheet about the research product (See Appendix a) and a consent form to agree to (see Appendix b). Participants were given the option to withdraw from the research up to two weeks after an interview had taken place and were advised that if they chose to do so, all data gathered relating to them would be destroyed. None of the participants chose to withdraw from the study.

Notes, interview recordings and transcripts were stored securely in a password protected electronic file and only available to the researcher. All raw data will be destroyed up to two years after completion of the research.

The participants' privacy is protected through interview transcripts not being identified by the participant's name or other identifying details. Care has been taken to ensure that any

information or direct quotes from the interviews used in this account of the research cannot be identified to an individual participant.

Pilot interview

A pilot interview was conducted before interviewing actual participants. This was to help boost the interviewer's confidence and highlight potential issues, such as question clarity and structure (O'Leary, 2017). Feedback was requested from the volunteer interviewee to allow for modifications before continuing or to solve any other troubleshooting problems.

The volunteer participant suggested further clarification on the questions between asking whether the librarian had previous experience or if they have not, in terms of collaborating with schools. They also suggested framing that specific question in a more open-ended way to encourage further discussion in future interviews. The volunteer also suggested a few additional questions, such as discussing their colleagues' and the community's perceptions of these collaborations, as well as how do they measure the success of the collaborative partnerships with the schools. These additional questions were also beneficial towards ensuring to ensure that the interview went on for a decent amount of time, in order to encourage optimum data collection from the interview.

Methodology and methods

Once participants who fit the sampling criteria were sought, and they were thus informed about the research study via the participant information sheet (see Appendix a), a Zoom interview was arranged and e-mailed, along with a copy of the participant consent form (see Appendix b). They were also given the opportunity to any further questions or comments. The participant's consent to the interview was also acquired via the e-mail exchange before the scheduled interview took place. These documents were sent ahead of time to allow for the participants to read through it and ask any questions before the interview began.

Each interview was conducted using the interview question guide (see Appendix c). Follow up or probing questions were used when necessary to elicit more detail, redirect or clarify the participants' response. Each interview was recorded upon the participant's confirmation and approval. Once the interviews were finished, the video recording was stopped, and the participants were then asked if they had any further questions about the research project or their part in it. The interview audio was later transcribed by the researcher. Participants were

also either sent a copy of the video file or transcript if they had requested it when gathering consent.

Data analysis

Once the interviews were transcribed, the following data was then organised, coded and sub-coded in order to search for meaning through thematic analysis and thus, draw conclusions (Leedy & Ormrod, 2015; O'Leary, 2017), using the three stages as described by King, Horrocks and Brooks (2019): descriptive coding, interpretive coding, and overarching themes. The researcher first read through the transcripts, copying out the interview text and organising it into an Excel spreadsheet against different themes. In the descriptive coding stage, the themes were first developed around the questions from the interview guide.

Additional themes were identified based on the researcher's knowledge of the data gathered. Further themes were added by the researcher if they were identified as necessary, while the interview transcripts were worked through simultaneously. Some data was also coded to more than one theme. All interviews were worked through individually and coded against the same themes. The data was copied into the same spreadsheet, using a new column for each interview. This allowed for the interview data under each theme to be easily viewed next to each other.

In the interpretive coding stage, the initial themes identified were clustered together, and overarching themes were derived which encompassed one or more of the earlier identified themes. The overarching themes were developed based on the interview data and influenced by the researcher's knowledge of the existing research. The coding and summarising were then further reviewed and revised as the researcher worked through the analysis of the data against the research questions and the existing research. The data coding schema is included in Appendix e.

Qualitative research required the researcher to make pertinent decisions and judgements throughout the data analysis process; deciding what data was likely to be noteworthy and how to evaluate and code specific pieces of data (Leedy & Ormrod, 2015), while also keeping the research question and the bigger picture in focus (O'Leary, 2017). It was also imperative to identify and mediate any personal biases so as to not influence any of the findings, as it is difficult to completely separate the process of data collection from analysis (Leedy & Ormrod, 2015; O'Leary, 2017; Yin, 2014).

Basic demographic data of the participants

In total, seven participants took part in this study with two of them working for the same public library, so they were interviewed together. Six of the participants were based in New Zealand and one was based in Australia. Most of them had been in their field for five years or more, except for one librarian who had been in their makerspace role for one year but has been employed at said library for five years. Four of the librarians were male and three were female. The participants have various positions and titles ranging from Library Learning Specialist to Makerspace Librarian. They were all in middle-level positions.

Data limitations

Finding librarians who fit the sampling criteria turned out to be more difficult than anticipated. While the many libraries that were contacted have makerspaces, through surmising from the responses to the researcher's recruitment e-mails, many of them had not even considered the idea of building into a collaborative partnership surrounding makerspace activities with their local schools, as it was not in their library's current vision. Other limitations were either the availability of the approached librarians and their delayed responses to the recruitment e-mails. In the end, only seven participants took part in this study. Given the small size of this study, this means that the results are difficult to generalise.

Owing to the small-scale of this project and the limited amount of interview participants, further research that investigates the development and sustainment of school makerspaces as well as how parties collaborate and develop partnerships across organisations would be useful for both researchers and practitioners. Further investigation into interviewing and exploring how school staff feel about partnership and collaboration could also provide a bigger picture surrounding this subject, as well as the relevance of makerspaces and makerspace type activities in schools. Additionally, instead of collecting data solely from interviews, also collating further data by using a longitudinal case study approach of how schools design, develop or sustain their makerspaces may provide further data and information, as well as how libraries and schools could sustain collaborative partnerships.

Results and Findings

Answering the research questions

How have public librarians collaborated with school staff in terms of developing, designing, or sustaining a school's makerspace or running makerspace type activities?

The participants who had worked with schools were asked to describe the different ways they had managed to collaborate with local schools in ways related to running makerspaces or similar activities, whether this collaboration was ongoing or not. The varying responses from the librarians who have collaborated with teachers and how their organisations have worked with schools were:

- Teaching school staff and students how to use software such as Adobe products.
- Makerspace consulting in schools to design or improve their space.
- Running or assisting with professional development for teachers to teach them how to use unfamiliar technologies.
- “Programme, Design and Delivery” – an outreach programme designed by the library that worked towards liaising with schools to get them further involved with using and implementing innovative technologies or programmes, such as e-sports.
- Organising schools to come and visit the library makerspace and use their equipment on a regular schedule.
- Various school lending resources packs that contained technology equipment such as Sphero robots or similar
- Visiting schools to run lunchtime or after school workshops, STEM clubs or Makers’ clubs.
- Running coding or robotics clubs or similar at the library to fill gaps that have been noticed to be missing from local schools.

If there is no collaboration or partnerships with local schools regarding such activities, why not?

Four out of the six libraries interviewed did not have any ongoing collaboration with their local schools. Of these four libraries, three of them expressed interest or consideration in attempting to further develop such relationships. The biggest reason articulated by these interview participants towards establishing collaborative partnerships was not being able to build ongoing relationships with the school staff to work upon such projects. Attempts to work together would be made by either party, and then the focus would eventually dwindle and fall of the radar, as other priorities or obligations begin to occupy each party’s time.

Otherwise, by deducing from responses to the researcher’s recruitment e-mails, collaboration with schools regarding makerspace type activities were never considered by the library, as it was just not in the vision or plan for the library’s makerspace. Furthermore, the remaining

librarian of the four librarians interviewed was forthcoming in detailing the reasons why working with schools was currently not in his goals for the foreseeable future. This specific library is based in the centre of a large city, and because of their location and the position that they “hold within the wider library infrastructure, there are less schools for us to engage with.” As a result, this library tends to focus more on the “wider ecosystem and what the needs of the community are” rather than working with schools to develop makerspace programmes.

What are public librarians’ experiences of collaborating with local school staff regarding makerspaces and related activities? What have been the outcomes, or what do public librarians hope to achieve?

The interviewees were asked what the nature of their collaborations with schools was, such as how did the collaboration occur and what stemmed its beginning. One librarian was responsible for a specialist team that essentially works towards developing “good programmes” and being “ahead of the pack.” He had been in this role for about 10 years. The role also involves liaising directly with schools to get them involved with the programmes that his team have developed and implemented. Their reputation in their community has set them up as forerunners in makerspaces and digital technology. For example, they have even been approached by the Ministry of Education to host professional development for school teachers, specifically on how to implement e-sports in the classroom. As they seem to have already developed a strong rapport with schools and the community, collaboration falls in place naturally for them, as they are now often approached by a lot school staff for consultations or similar.

The other librarian that also had an established collaborative partnership with their local schools has been in this role for about four years. They visit schools on a regular schedule to run lunchtime Makers’ and STEAM clubs. They also have a wide collection of technology school lending resources. The project stemmed from a library staff member who had a child who worked at one of the local schools and got them in touch with a relevant staff member who was supportive of the concept. After time, they started adding their programme to other schools as well. Again, their library seems to have gained a reputation amongst school teachers in the community for what they offer to schools, and the programme has naturally grown and developed. They are now frequently approached by other school teachers and staff for assistance and consultation with digital technologies.

The other libraries that are still working towards regular collaboration with schools have approached school staff frequently but are still attempting to establish continuity. One librarian also stated that she was the one always doing the outreach, and not the other way around, as, “it takes a long time to build up that relationship where they start seeking you out.” While the schools seem to be interested when they are made aware of what the library can offer them, once the responsibility lies with the school teachers, one librarian noted that the exchange eventually dissipates. These librarians also frequently expressed that they understand that teachers are phenomenally busy and that they also do not want to, “tread on any toes” or appear to be too overbearing.

Other additional outcomes that the interviewed librarians experienced or hoped to gain from collaborating with school staff were:

- General enjoyment of the activities offered, “you just have to look around and see the kids working with each other and obviously enjoying the challenges of it.”
- People coming back repeatedly because they are enjoying what is being offered, “I would want the kids to be keen to come back.”
- Growing the participants in their own programmes at the library, for instance, “another reason to get more involved with schools would be to encourage more kids into the library and get them for our robotics club and [our library] makerspace. So, getting the word out, that helps.”
- Seeing the students that our involved in these library and school collaborations succeeding, learning, and valuing the access to such resources. For example, one librarian discussed about how he was approached by a company who was hosting a school film competition about opening their library to allow participating schools to have access to the library’s film making equipment. This librarian was concerned that the schools that always come and get access to their equipment were the ones that already know about it and have parents that will bring the kids in to the space, in particular high-decile schools. The librarian maintains if this were the approach they used, it would be “business as usual.” In the end, he negotiated with the company and proposed that they approach a low-decile school and allow them all the access to their resources and see how this school performs. This school ended up winning the national conference and the film competition. As a result, he believes that these children gained real value from this experience, and says, “if you focus your resources on who needs them, I think there’s a big story there. That’s my key.”

What challenges do public librarians face around collaborating with schools and their staff?

The biggest challenge that was mentioned by every one of the librarians interviewed when asked about challenges or barriers around collaborating with schools was time, especially coordinating schedules to meet with teachers. One participant particularly expressed it was difficult because of the days she worked, “So because I only work Tuesday through to Saturday, a lot of the teachers that I have spoken to, they have their PD [professional development] days on a Friday, but we’re open [our makerspace] to the public here on a Friday.” All the librarians also reiterated that they understood that school teachers are busy and that meant in order to get a foot in the door they would have to follow up with the teachers repeatedly. They also expressed that the staff turnover rates at some schools were another hindrance that would leave the librarians back at square one again. Another challenge expressed was lacking the staff capacity at the library to take on such commitments.

Other barriers mentioned were transportation for the children, for example, schools needing to organise school buses to get the school students to come in to use the library’s makerspaces; space within the library to store all the technology equipment; the impact and repercussions of COVID-19 lockdowns; schools lacking suitable areas to host Makers’ clubs and the distance of schools from the library. For example, “the school is not in the same area. Like a lot of libraries that I’ve worked with in the past have had schools within 200 metres of the library, but here, that’s not the case.” The lasting relevance of what was being offered was also mentioned. For example, the library that offered schools digital lending kits mentioned that often once a school borrowed something, some schools saw the value in the loaned equipment and would later purchase the items for themselves, therefore no longer requiring the library’s services. One librarian also mentioned that they “don’t understand curriculum, so realistically, if we don’t understand what schools are doing with Makery, [...] how can we support that?” Another barrier, when asked if they had ever been approached by school staff was, “how would they know I exist? How would they know what I do? My role is very niche. The library makerspace is very niche. There is definitely a lack of awareness around what the library does in that space.” Because of this lack of awareness, he reasoned that most would still associate libraries with books and research, not robotics and 3D printers, thus presenting a further challenge.

What is the motivation for public librarians to consider collaboration with schools around developing, designing, or sustaining their makerspaces or makerspace related activities?

When asked why the librarians considered collaborating and reaching out to schools regarding makerspaces, several different motivations were mentioned. These motivations for considering outreach were:

- To share knowledge, as participants often noted that “the teachers are so time-poor that they haven’t learnt the software [or equipment] really well, so they can’t actually deliver that knowledge to a person in a coherent way” and “the teachers tend to get just as much information out of one of our sessions as the students do.” A few of the librarians also mentioned changes to the New Zealand Curriculum and that schools can see that “this is where the curriculum is going, but they’re old-school teachers and don’t know how to start implementing that into their curriculum. They don’t know where to start with lesson planning for things around 3D printers” etcetera.
- Developing the customer base and building relationships. A few of the librarians also saw it as a method of advertising, as schools are “where our customers are” and that they run these programmes to “encourage more kids into the library” and that it “helps remind them that the library exists!”
- Allowing the children to be exposed to and giving them opportunities to engage in different ways and with various technologies. One librarian mentioned that a school missed out by not collaborating with them and that it was “a shame, it really is, in all manner of respects, because they’re missing out on so many resources.”
- Other librarians also saw these collaborations as a good way to share ideas from other spaces and from the teachers as well. They had mentioned a backwards collaboration with a school, where they got lots of ideas from a teacher for their own robotics club.
- Serving the community was also a large focus for these librarians and describing how this could be achieved by collaborating with schools as well as discussing how these collaborations could bridge the digital divide. Some of the examples that emerged from the interviews were:
 - Working with schools in order to create awareness in the community of what else libraries can provide, for example, “I really just want everyone to know that this stuff is here, and it is available for anyone to use. Like, libraries aren’t just about books, libraries are so much more than that. Working with the schools, but then also giving the parents of those students, the knowledge that we are here as well.”

- Creating programmes to fill needs that schools in the area seem to be missing. For example, one librarian interviewed mentioned liaising with schools to find out what is lacking and therefore supporting them in that regard. They explained that “one of the impetuses for setting up our robotics club is to bridge a gap that we can see. The high school has a robotics club, but a lot of the kids are too young for that, [...] by collaborating, you can create a full spectrum, rather than accidentally creating the same group demographic.”
- Libraries in rural areas mentioned how they were searching for ways to provide access to resources and serving the wider community. An example of this is, “we are always looking for ways to collaborate and build and stretch our stuff beyond the building, because we are very aware there are people out there in the community, like the country schools and things, that it’s not so easy for them to come in to us.”
- Bridging the digital divide and enabling further access to technology to those who would otherwise not be able to afford it; “my feeling was that makerspace is and access to equipment that would ordinarily be out of their reach, financially, is just the same as getting access to books. In the old days, it was only the rich could afford books, now it’s only the rich can afford, you know, their own gaming rig or a 3D printer or a laser cutter [...] it’s democratisation of that stuff, access to people – equity.”

Discussion

The primary objective of this study was to explore how public librarians have collaborated with schools to help design, develop, or sustain the relevance of makerspaces or makerspace type activities. This research intended to further understand how these collaborations between schools and librarians developed, what were the challenges and barriers preventing such collaborations, what were the motivations behind collaborating with schools and how librarians could improve and develop such collaborations in the future, specifically around the development of STEAM learning and makerspace education in school curriculums.

The following is a discussion of the findings from the interview data which will be analysed according to the overarching themes that were identified and referring to the relevant literature and framework.

Experiences and outcomes from collaboration

The first aim of this research was to discover what kind of experiences public librarians had when collaborating with schools in terms of makerspaces or makerspace type activities, more specifically, what the nature of the collaboration was, how the collaboration came to fruition, whether the librarians approached the school staff first or vice versa and what kind of activities the librarians were doing with the schools. The researcher was also interested in what the librarians' motivations for collaborating with the schools were and what outcomes were achieved or desired.

In this study, two of librarians interviewed had established ongoing collaborations with the local schools. Kammer and Moreland, in their study of school and public library collaboration noted that "the school and public librarian's experience of collaboration was not linear, but was instead often described as an informal and fluid relationship that occurred from living within the same community" (2020, p. 43). One of these librarians discussed how word of mouth spread around the schools from teachers making use of the resources that the library offered, and their digital programmes seemed to grow organically from there. The other librarian mentioned how a lot of school staff followed him from a previous role that was not in libraries, but because the school staff still valued his expertise, that network was able to continue developing. This highlights the importance of strong networking and relationship building towards lasting collaboration, but also how all parties need to share a common vision.

Upon discussing with the librarians about how they collaborated with schools regarding makerspaces or related activities, they typically discussed the value that this outreach had by serving their local community. Again, this was similar to Kammer and Moreland's research where their participants "did not describe levels of collaboration or did not explain which level of collaboration their practices fell into. Instead, they described the value of working together and serving the same patrons" (2020, p. 43). The interview participants all reiterated that libraries are more about books, and they valued being able to serve their community in a myriad of ways, especially through sharing digital technologies.

When the other librarians who were not in a long-established collaboration with school staff were asked to describe how they had collaborated with local schools regarding makerspaces or similar activities, the majority discussed the outreach projects they had done with schools, either by schools visiting their library to use their makerspace, or even just use general library

resources. This tended to highlight the serendipitous nature of how the librarians ended up networking with school staff. On the other hand, two librarians did discuss undertaking planned meetings where teachers were coming in for professional development sessions, or they made intentional efforts to meet in more formal settings such as presenting at school staff meetings. However, most of ongoing communication and further outreach appeared to take place via e-mail exchanges or talking on the phone.

While the collaborations or partnerships that were described by the participants do not fit the definitions provided in previous literature in that there is no formalised professional and institutional collaboration (Mattessich & Monsey, 1992; Montiel-Overall, 2007, 2008, 2017), it was evident that the librarians valued the opportunities through these interactions with schools by being able to share resources, information, knowledge, and ideas as well as also serving the needs of their local community. Furthermore, at least four of the librarians interviewed had expressed wanting to develop further collaboration with schools, especially in the hopes of growing their library makerspace or programming's outreach. This aligns with how collaborative partnerships can strengthen the impact that libraries have on their communities (Breeding, 2015).

Two of the librarians interviewed also discussed their eagerness to build relationships with schools, as public libraries are often open to many forms of collaboration, because partnerships can often help gain mutual benefits, such as making the most of funding or resources, (Breeding, 2015). One librarian, while envisioning the outcomes from future partnerships with schools, wonders, "if we could collaborate on equipment, we might be able to collaborate on funding applications. There are different organisations that we could apply to, if we put in like a bulk application, we might be able source equipment in bulk."

Notably, the two librarians that had the most established programmes and collaboration with schools mentioned that they had supportive management who were willing to take risks. One of them even had their manager convince upper management, "my manager was able to convince other managers, who, you know – there are some very forward-thinking people in council, which is fantastic, so we're lucky. I feel lucky because I couldn't have done it without their input." Having supportive upper management could help with developing a more formal long-term partnership. Tikkinen and Korkeamäki reiterated this in their findings, stating that supportive management is key and that "for the partnership between teachers and librarians to involve more features of collaboration, long-term development work must

be devoted to enhancing the process of working together. Successful integration of librarians into instruction necessitates administrative-level support” (2021, p. 13).

These findings suggest that, for a collaborative partnership between teachers and librarians to become more established and ongoing, perhaps developing a formal programme through strategic planning could be useful, such as the programme, design, and delivery team that one of the interview participants supervised. Having a dedicated outreach team that establish programmes that they believe will be beneficial for the libraries and their communities means that the librarians’ experience of these collaborations is less spontaneous or serendipitous. If it something that the organisation would like to grow further, it would be beneficial to formally elaborate on the desired goals and outcomes. Of course, it is also crucial for both parties also need to believe in the value of the collaboration for it to be successful (Brown, 2004), and this can be difficult to achieve when many schools are still discovering the benefits of makerspaces and makerspace activities, or struggling to understand how such digital technologies operate. Further challenges will be discussed in the following overarching theme.

Challenges faced when trying to achieve collaborative partnerships with schools

Another objective of this study was to highlight what some of the challenges that public librarians faced when trying to build collaborative partnerships with schools. While many of the librarians who were interviewed were keen to further their programmes and their collaborative partnerships with the local schools, many of them expressed difficulty in maintaining ongoing conversations with the schools, due to school teachers being “phenomenally busy” and that they often had to be followed up continuously in order to get a “foot in the door.” Many librarians also mentioned the difficulty in coordinating schedules with the school staff because they work weekends, for example, “I work Sunday through to Wednesday, so the teacher might say, well actually, I have time on Thursday and Friday and I have to say, well sorry [...] I can’t make it in.” Kammer and Moreland (2020) also highlight the difficulty of working around school schedules, and that to work with students in schools, the timing had to be exact. Because of the rigid school schedule, a lot of the librarians opted on either lunchtime or after school clubs, in order to get the best participant uptake possible.

The most notable challenge that was mentioned by all the librarians, however, was schools being busy and having “their own stuff going on.” One librarian even discussed how he would often present at teacher staff meetings. Subsequently, he would often observe that the

principals would address the teachers at the end and make it noticeably clear that “they are handing it over to the teachers and it is up to them to make use of it.” Yet, he would very rarely get any uptake from the school teachers afterwards. His solution was to keep a list of which schools he has approached, what he has done with them and gently follow up with them, as necessary.

Another librarian mentioned how she used to visit schools in the past to run lunchtime makers’ clubs, but she lost a colleague in a restructure and thus no longer has the staff capacity to maintain such programmes. As a result, her focus has shifted to other projects. Two librarians also mentioned that once they had managed to get a network built up with the local schools and formed relationships, they either ended up going on extended annual leave or become side-tracked by taking on a different project. Consequently, they would lose contact and the established network building would become undone. Another two of the interviewed librarians mentioned the staff turnover rate in schools. These participants discussed how they would then lose their contact with the school because the teacher they had built a relationship had moved on elsewhere. This meant that any ongoing collaboration with the schools would come to an end.

A few of the librarians also mentioned distance and transport being an issue, especially for getting the schools to come into their library to use their makerspace or resources. One teacher discussed how, “we can’t expect them to come in. We need to either get them buses and get them actually bussed in where it’s not going to cost them, or go there – so outreach model, which we are doing. They’re the barriers.” He even discussed how he was working with a lower decile school, and he set up a “two-day course where they learn software and did hardware training as well [...] but the teacher who was bringing them, literally had to go to their houses in the morning and pick them up. That’s how bad it is!” The difficulty around getting schools into the library is why the rural librarian who was interviewed focusses on bringing the library out to the community instead, and visits schools regularly. However, this approach is not always possible for all librarians, and they may be required to be present in their buildings for most of the workday. This can also demonstrate how systemic and regional constraints can also affect the depth and frequency of collaborations (Kammer & Moreland, 2020).

Another challenge towards building collaborative partnerships is the teachers’ view of the traditional role of the librarian, which includes tasks such as providing materials and giving

book talks, as opposed to what librarians are recommended to do, in terms of programming and outreach (Montiel-Overall & Grimes, 2013). To elaborate, there is a misunderstanding between what librarians are recommended to do and the educators' knowledge of librarians' role (Montiel-Overall & Grimes, 2013). Two interview participants discussed the lack of knowledge around the community knowing what kind of work libraries do with schools, and how many still schools still view the library as a place for "help with essays and research" not "creative programming activities." He discussed how the idea of library makerspaces is still very niche and, in his opinion, there is a lack of awareness around what the library does in that space. That said, every librarian interviewed expressed how beneficial these resources were, and they wished that more people in the community were aware of their availability. They all expressed how libraries are about access to information, and that information can now be encompassed in all kinds of forms. One librarian expressed this notion when he stated, "all this equipment and all this access is still providing information, it's information, and you can't have that information if you haven't got that equipment. You can't read a book, if you haven't got a book. You can't learn about a laser cutter, if you haven't got a laser cutter. So, it's information still, it's just a different format." Perhaps through future successful collaboration between schools and public libraries and helping them design, develop, and sustain their makerspaces, that these perceptions will become less polarising. This leads on to the next identified theme, which discusses the benefits of collaborating with schools, regarding makerspaces and similar activities.

Perceived benefits of building collaborative partnerships with schools

The interview participants were asked to discuss what they felt were the benefits of collaborating and sharing makerspace activities with schools. The responses from the librarians overwhelmingly discussed how many teachers and school staff tend to get just as much information from attending makerspace activities or programmes at libraries, as many of them are still coming to terms with learning and understanding such technologies. In this sense, building these collaborative partnerships between schools and libraries is mutually beneficial as it breaks down barriers. The schools are gaining access to resources that they may not be able to afford, depending on their socio-economic status, as well as knowledge that school staff are otherwise too "time-poor to learn how to use well." At the same time, "developing professional relationships is a major benefit for librarians who collaborate" as it is a chance to support others and their community by sharing their resources, knowledge, expertise and becoming advocates for their patrons (Kammer & Moreland, 2020, p. 34).

Two librarians especially emphasised the recent changes to the New Zealand curriculum that have a stronger focus on digital technologies to ensure that learners have the skills, knowledge and capabilities they need to become “fully participating citizens and successful workers in our increasingly digital society and economy” (Ministry of Education, 2020). As a result, these librarians believed the school staff would benefit if they knew that there are places and people, like libraries and librarians, that are willing to assist where they can, whether it is by offering professional learning and development for the teachers, or simply access to further resources.

Through public libraries working with schools, especially ones in either rural or low socio-economic areas and assisting them with the implementation of makerspaces or makerspace type activities can demonstrate how public libraries can bridge the digital divide, by focussing on issues of social development rather than focussing on gaps that need to be overcome by providing access to technical equipment (Aabø, 2005). Public libraries can have the potential to make an impact on social inclusion if they are proactive and interventionist and target their services at excluded and marginalised social groups and communities (Muddiman et al., 2000). This aligns with how the interview participant who worked on targeting his programmes towards low-decile schools. He believed that these students would receive the most benefit from accessing such equipment, as they would gain more value and learning from these experiences, and as a result, feel more empowered by their successes.

Advice for building collaborative partnerships with schools

The interview participants were asked what advice they would give to other public librarians who were interested in building collaborative partnerships with schools. They were also guided to frame their answers around the realms of any kind of partnerships with schools, not just in the schemes of designing and developing makerspaces.

All the librarians said the first port of call was to approach schools to discover and learn what their needs are, as well as letting them know how you can assist and support them. A few of the librarians suggested approaching key stakeholders, if possible, such as school principals, as a means to getting started on the right foot. The next step was then attending staff meetings, rather than just relying on e-mails and phone calls. This way, the librarians could present to a core group of staff and outline what they are proposing and how their suggestions or resources could potentially enhance some of their students' outcomes. Another suggestion was attending parent-teacher association meetings, as a way for the word to get out about

what can be offered to families as well, which may impact the school's decision. The majority of the librarians also reiterated the importance of following up with the schools, as necessary. One librarian highlighted also how building relationships and collaborating was important and to look around and ask questions, as there are usually, "stakeholders in the community or people in your organisation that have got relationships that you can leverage."

Conversely, even though an element of determination is necessary for building collaborative partnerships with outside organisations, all the librarians were also very aware that they did not want to appear too pushy or overstep any boundaries. A lot of the advice was around being mindful of where the teachers are coming from. A sensible approach was that if the library is going to work with the school then try to work around them and their requirements, rather than the school working around the librarians. In other words, "go out and talk to them. Find out what they want, what they need and deliver back that way. Consultation first and then, don't impose views on them." Remembering how the library fits into serving the community's needs was crucial for building collaborative relationships, as one librarian stated, "we have to be responsible. We're not here to replace the Ministry of Education, we're not here to replace a school. We're here to augment that understanding."

Two librarians also emphasised asking the children in order to ensure that their programmes were relevant and that their customer needs were being met. That is, "get your outreach teams to go and talk to the schools and actually talk to the kids too. Don't forget the kids. Because they're little humans, they're little people that have got little ideas that are relevant."

If more formal, sustained collaborative partnerships are to be achieved, both regular formal and informal communication would be advantageous (Kammer & Moreland, 2020). This could also be aided by creating a procedural manual around collaboration, which could be used to document past efforts, as well as what is known about the other organisation such as key contacts, schedules and policies (Kammer & Moreland, 2020). This documentation could also help with the barriers created by staff turnover rates or extended leave taken by the librarians.

There are also several models of collaborative partnerships that can be used as guides for sustaining collaboration and frameworks which can ensure successful and sustained partnerships. These models originate from business fields and propose either 50/50 partnerships in which the organisations share planning, resources or training etcetera, intensive partnerships where one organisation does the bulk of the efforts or passive

programming, where the organisations simply communicate with each other rather than sharing resources (Dankowski, 2018). There is also the Gallup approach (Giesecke, 2012; Wagner & Muller, 2009), which outlines seven factors for successful partnerships: a common mission, fairness, trust, acceptance, forgiveness, communication and unselfishness. These seven factors ensure that the partnership aspects of a collaboration go well.

However, given that a lot of the collaboration around helping schools develop, design, or sustain the relevance of makerspaces or makerspace activities within their environment, it can be deduced that a lot of the organisational collaboration would focus on consultancy and expertise. Therefore, it is useful to note that while teachers' expertise lies in the teaching and knowledge of their students, a librarians' expertise lies in resources and information literacy and teaching these skills (Donham & Green, 2004; Tikkinen & Korkeamäki, 2021). Acting as consultants could be a way that librarians may work with schools towards developing, designing, or sustaining the relevance of their makerspaces. Librarians could then advise schools with what, or what not to do, how to use equipment and where or what equipment to source. Together, the schools and libraries could then work together to improve what is being offered, and the librarians could also work toward providing the school staff with access to resources and knowledge if required.

Conclusion and recommendations

This study was designed to public librarians' experiences around collaborating with school staff regarding the development, design and sustainment of makerspaces or similar activities in schools. It applied a basic qualitative research design using semi-structured interviews with seven participants from six different public libraries. The data gathered from this study has provided interesting insights into several public librarians' experiences of collaborative partnerships with school staff, particularly during the discussions around their experiences, the outcomes, challenges, and perceived benefits during such collaborations.

Though collaborative partnerships often require a common vision and goal, which can often occur between schools and public libraries, it may not always be easy to form lasting collaborative partnerships. This could be due to either lack of time and capacity from either party or lack of commitment and follow through from the school staff. Only two of the librarians interviewed had an established programme delivery for outreach to schools regarding digital technologies, and these seemed to stem from a prior and well-established network. These two libraries also served either rural communities or areas with low socio-

economic statuses, thus the communities profited well from these collaborations. It could be suggested that developing a formal plan or strategic vision could be beneficial to developing collaborative partnerships with schools. However, one could also question whether the work going on that was discussed by the interview participants between the libraries and schools was true collaboration, or whether it was cooperation, based on the division of labour between the organisations (Dillenbourg et al., 1996). Perhaps, it could be useful to look at cooperation and collaboration as a spectrum, and that these findings fall somewhere in between the two.

The librarians discussed the many benefits of sharing makerspaces and makerspace activities with schools as an avenue of providing their community and customers with access to resources such as tools, machines, robotic kits, and other digital technologies, as well as a form of access to knowledge and information. These librarians often witnessed many teachers and school staff finding all the new technologies available overwhelming. Consequently, the librarians all reiterated that libraries are no longer just about books and research, but they are also about providing access to information. Providing school staff with the information and ability to use and access these digital technologies would be the most beneficial way for schools and libraries to collaborate, as librarians would be able to meet their goals and serve their community, thus benefitting each institution.

While most of the interviewed librarians expressed willingness to collaborate with schools in order to share their makerspace resources and digital knowledge, they also did not want to be too overbearing. Therefore, in order to alleviate this, a future suggestion for libraries looking at undertaking collaborative partnerships with schools regarding makerspace activities would be to remember why libraries exist and that their place in the community is to augment understanding, knowledge, and access to information.

Implications

Based on the findings in this research, implications could be made for both public librarians, schools, and access to makerspaces in both types of organisations.

The findings demonstrated that most public librarians are keen to form collaborative partnerships with schools, however forming lasting, sustained collaborations is difficult. School staff on the other hand are overwhelmed and thus, coordinating schedules can be challenging. This may mean that librarians and school staff both need to be creative in

communicating, but they also need to have the same vision and goals for the collaboration to be effective. Network building is also advantageous.

Makerspaces are growing in relevance and popularity, both in schools and libraries. The growth of housing density often means that families may not have access to the same tools in their garden shed as older generations were once used to. Furthermore, digital technologies are going to continue to be an intimate part of our society and economy for years to come, which means it is imperative that school learners are given the opportunities to learn the skills their future employers will need. Through schools and libraries collaborating on makerspace and STEAM activities together, the gaps in communities caused by the digital divide can be lessened, and both organisations can benefit from such relationships.

Suggestions for further research

The findings of this study are based on the experiences of only a handful of public librarians and therefore, the study cannot be quantified. One suggestion would be to approach the late comers to the initial recruitment e-mails and invite them to participate in future similar research. Furthermore, a mixed method design could be carried out to gain more information from more participants regarding this topic. A deeper investigation into this topic would allow for better understanding of the development and sustainment of school makerspaces, as well as how parties collaborate and develop partnerships across organisations. This would be useful information for researchers, organisations, and practitioners.

This investigation also only investigated those experiences had by public librarians. To get a bigger understanding, interviewing, and exploring how school staff feel about partnership and collaboration could provide more understanding around this subject, as well as the relevance of makerspaces and makerspace type activities in schools. Additionally, instead of collecting data from solely interviews, collating further data by using a longitudinal case study approach of how schools design, develop or sustain their makerspaces, may also provide further insight into the ongoing growth and relevance of makerspaces in schools.

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Appendix a: Participant Information Sheet



Makerspaces: An examination of collaborative partnerships between public libraries and schools

INFORMATION SHEET FOR INDIVIDUAL INTERVIEWS

You are invited to take part in this research. Please read this information before deciding whether or not to take part. If you decide to participate, thank you. If you decide not to participate, thank you for considering this request.

Who am I?

My name is Krista Yuen, and I am a Masters student in Information Studies at Victoria University of Wellington. This research project is work towards the completion of my degree.

What is the aim of the project?

This project aims to investigate how public librarians have collaborated and partnered with local schools towards helping them set up makerspace settings in school settings. Your participation will support this research by providing anecdotal evidence of such relationships and partnerships, and how it has benefited the organisation and the community. This research has been approved by the Victoria University of Wellington Human Ethics Committee #0000029439.

How can you help?

You have been invited to participate because of your experience supervising a public library makerspace. If you agree to take part, I will interview you either via Zoom or in a public location convenient to you. I will ask you questions about your experience collaborating with school staff. The interview will take about 45 to 60 minutes. I will audio record the interview with your permission and write it up later. You can choose to not answer any question or stop the interview at any time, without giving a reason. You can withdraw from the study by contacting me at any time before 1st June, 2021. If you withdraw, the information you provided will be destroyed or returned to you.

What will happen to the information you give?

Participation in this research is confidential. This means that the researchers named below will be aware of the identity of your organisation, but your organisation will not be revealed in any reports, presentations, or public documentation. The researchers will endeavour to uphold the confidentiality and report data without identifying the interviewees and organisations.

However, you should be aware that in small projects the identity of your organisation might be identifiable.

Only my supervisor and I will read the notes or transcript of the interview. The interview transcripts, summaries and any recordings will be kept securely and destroyed on 30th July 2021.

What will the project produce?

The information from my research will be used in my Master's research report. I will also provide the participant with a report summarising the results of the research. This research data could also potentially be disseminated at academic or professional conferences and/or published in an academic or professional journal.

If you accept this invitation, what are your rights as a research participant?

You do not have to accept this invitation if you don't want to. If you do decide to participate, you have the right to:

- choose not to answer any question;
- ask for the recorder to be turned off at any time during the interview;
- withdraw from the study before 1st June, 2021;
- ask any questions about the study at any time;
- receive a copy of your interview recording;
- receive a copy of your interview transcript;
- be able to read any reports of this research by emailing the researcher to request a copy.

If you have any questions or problems, who can you contact?

If you have any questions, either now or in the future, please feel free to contact either:

Student:

Krista Yuen
yuenkris@myvuw.ac.nz

Supervisor:

Associate Professor Chern Li Liew
School of Information Management
+64 4 463-5213
chernli.liew@vuw.ac.nz

Human Ethics Committee information

If you have any concerns about the ethical conduct of the research you may contact the Victoria University of Wellington HEC Convenor: Associate Professor Judith Loveridge. Email hec@vuw.ac.nz or telephone +64-4-463 6028.

Appendix b: Participant Consent Form



Makerspaces: An examination of collaborative partnerships between public libraries and schools

CONSENT TO INTERVIEW

This consent form will be held for five years.

Researcher: Krista Yuen, School of Information Management, Victoria University of Wellington.

- I have read the Information Sheet and the project has been explained to me. My questions have been answered to my satisfaction. I understand that I can ask further questions at any time.
- I agree to take part in an audio recorded interview.

I understand that:

- I may withdraw from this study at any point before 1st June, 2021 and any information that I have provided will be returned to me or destroyed.
- The identifiable information I have provided will be destroyed on 30th July, 2021.
- Any information I provide will be kept confidential to the researcher and the supervisor.
- I understand that the results will be used for a Master's research report and/or a conference presentation and/or journal publications.
- I understand that the recordings will be kept confidential to the researcher and the supervisor.
- My name will not be used in reports and utmost care will be taken not to disclose any information that would identify me.
- I understand that organisational consent has been provided and the organisation will not be named in any of the reports.
- I would like a copy of the recording of my interview: Yes No
- I would like a copy of the transcript of my interview: Yes No
- I would like to receive a copy of the final report and have added my email address below. Yes No

Signature of participant: _____

Name of participant: _____

Date: _____

Contact details: _____

Appendix c: Interview Guide

Icebreakers:

- How long have you been employed at xxxx library?
- How long have you been overseeing or supervising the makerspace?
- What equipment and resources are available in this makerspace?
- Why did you get into this area of library work?
- What skills do you believe are required for your role?

Main questions:

- How have you coordinated with schools and teachers, in terms of designing, developing, or sustaining the relevance of their school's makerspaces?
 - Who approached who? What steps were undertaken?
 - What is the nature of the collaboration? What activities are involved? Can you tell me some examples of the outcomes?

IF NOT:

- What challenges or barriers have prevented such collaborations?
- Why did you consider collaboration with schools?
- What kind of collaboration do you envision?
- What were your expected outcomes and benefits?
- Describe the collaborative experience with the school staff, if any.
- What do you feel are the benefits of collaborating and sharing makerspace activities with schools?
- What are the challenges of collaborating and sharing makerspace activities with schools?
- Tell me about your biggest success story regarding collaborating or partnering with schools, relating to sharing makerspace activities and/or digital technologies.
- What are your short-to-mid-term plans for collaborations with schools?
- Tell me about your colleagues' perceptions of these collaborations. Likewise, discuss the community's perception of such collaborations.
- How do you measure the success of the collaborative partnership with the schools?
- What advice would you give to others wanting to set up makerspaces?

- What advice would you give to other public libraries wanting to build on their collaborative partnerships with local schools?

Appendix d: Dissemination

Likely future dissemination for this research could be professional blogs, Library and Information scholarly journals, professional journals, or presentations at relevant conferences. Professional organisations such as the School Library Association of New Zealand (SLANZA) and the Library and Information Association of New Zealand Aotearoa (LIANZA) or similar may also be interested in an article outlining the study's findings.

Appendix e: Data Coding Schema

Initial themes identified	Coding	Overarching themes
Ways librarians have collaborated with school staff regarding makerspaces and makerspace activities	Libraries approaching schools	Experiences and outcomes from collaboration
	School staff approaching library staff for information	
	Teachers coming in to using the library's makerspace	
	Using schools to advertise library programmes	
	Meeting customer's demands	
	Previous relationships or connections	
	Word of mouth	
Supportive management	Supportive, forward thinking management and colleagues	
Activities involved in the collaborations	Consulting schools on their makerspaces	
How the collaboration occurs/occurred (or envisioned nature of collaboration)	Teaching both staff and students digital technologies and software	
	Professional development/training for school staff	
	Library clubs or programmes aligned with schools' visions	
	Visiting schools to run maker clubs/activities	
	Digital lending	
	Organised and regular school visits to the library's makerspace	
	Programming or lesson planning	
Examples of the outcomes	Student success and learning	
	Numbers of participants	
	Enjoyment	
	More access to STEAM type activities	
	Community outreach	
Measures of success	Relevance of programmes	
	Feedback from customers	
	Returning customers	

Challenges around collaborative partnerships with schools	Transportation and location	Challenges faced when trying to achieve collaborative partnerships with schools
	Lack of time, coordinating schedules	
	School staff turnover rate	
	Impact of COVID-19	
	School staff are busy	
	Lack of capacity	
	Space to store equipment	
	Not reaching out to community sufficiently	
Benefits from collaborative partnerships regarding makerspace activities	Teachers needing to skill-build to implement into schools	Perceived benefits of building collaborative partnerships with schools
Access to resources	Bringing the library to where the customers are	
Access to knowledge	Sharing knowledge and ideas (both ways)	
Bridging the digital divide	Sharing equipment, technology, and resources	
	Establishing relationships, building community connection	
	Access to equipment otherwise unaffordable	
	Furthering learning and education	
Advice to other libraries wanting to build collaborative partnerships with schools	Word of mouth	Advice for building collaborative partnerships with schools
	Approach key stakeholders	
	Approach teachers	
	Build relationships	
	Presentations to schools	