Mobile makerspaces as a catalyst for fostering STEAM activities in the community

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EXECUTIVE SUMMARY

This report describes the findings from an exploratory study to evaluate the impact of using mobile makerspaces and digital/electronic learning kits to foster community awareness and engagement with STEAM (Science, Technology, Engineering, Arts and Mathematics) activities within a library setting. Three questions guided the study:

1. To what extent do participants in the LAB (Libraries' mobile makerspace programme) perceive the programme to be effective in fostering (i) STEAM learning, and, (ii) digital awareness and skills?

2. What are users' suggestions for change and improvement to the current programme?

3. What might more sustainable approaches to conducting the LAB programme look like?

Evidence to inform the study was collated from an online survey and focus group interviews with caregivers /parents of children participating in the LAB programme, and, four observations of the LAB programme in action during March to May 2018. The focus of the analysis of data was on the value of the programme in fostering children's participation in STEAM learning. The nature of activities that were engaging and challenges and opportunities that could inform a more sustainable approach to the programme into the future were also identified. The use and the usefulness of the electronic kits in fostering digital learning skills was also a specific focus. The findings are reported in two sections: the first focuses on the evaluation of the LAB programme, while the second section is related to the value of the electronic kits in fostering children's digital skills.

Six themes emerged from the findings in relation to participants' access to and reasons for enrolling in the LAB programme, the aspects of the programme which they deemed to be useful for children's learning, the learning and skills children obtained as a result of participating in the programme, and the best and least liked aspects about the programme. Participants' further discussed features of electronic kits that could be introduced as part of the library's resources. Overall, participants (parents of participating children in the LAB programme) were unanimous in their support for the programme and positive about the informal learning gains their children developed from participating in the programme.

Based on the overall findings, five recommendations are offered for refining the programme to enhance support for participant experience and inform more sustainable future approaches to conducting the LAB programme. These relate to the: 1) Programme visibility, scheduling and venues, 2) Quality of facilitation in the programme, 3) Nature of activities, 4) Facilitating children's coding skills and Internet safety awareness, and, 5) Ongoing community feedback.

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INTRODUCTION

In mid-2017, Hamilton City Libraries (Libraries hereon) introduced a mobile makerspace programme to foster community interest in STEAM (science, technology, engineering, arts and mathematics) activities and digital literacy skills. This aligns with part of their Strategic Plan 2015-2025 aimed to:

- Support Hamiltonians to be information literate, technologically competent and digitally aware,

- Stimulate imagination, creativity and literacy-based learning for children and young people.

The library's free mobile makerspace programme is known as "The LAB – Libraries' mobile makerspace" (the LAB hereon) and is an interactive programme that uses STEAM-based activities to engage young people (8 years and older) to problem solve, think creatively, and develop innovative ideas through a variety of hands-on and technology-based activities (e.g. using *Lego Mindstorm* sets controlled by an iPad to promote robotics and coding skills, various practical science experiments, electronic kits, normal Lego blocks, practical and drawing activities). The programme rotates weekly around the different community libraries and community centres (6 community libraries and 3 community centres) in Hamilton during the school term (10 weeks). Each session is an hour and a half long and focused on a different science and arts theme. The programme is advertised on the library's website and due to space limits, parents/caregivers need to register their child beforehand to attend a session at a particular library after school hours. The LAB programme conducted at community centres is structured similarly but is also open to adult participants. It does not require prior registration for participation.

With the current government, local council, societal and tertiary providers interest in making STEM (science, technology, engineering and mathematics) and STEAM activities more accessible to a wider population, this collaborative effort to investigate the impact of introducing the LAB programme to the community through the library's services is timely and of strategic interest. A key recommendation on engaging young people in STEM education is to encourage them to gain expertise and engage with STEM activities across the whole STEM ecosystem, both within and beyond school. The ecosystem includes STEM industries, government funded initiatives, non-profit organisations, and hobby and leisure organisation such as Forest and Bird (Chapman & Vivian, 2017; Falk et al., 2014). This project is a small step towards understanding the nature and value of involvement in STEM and STEAM via a community organisation.

A makerspace generally describes a place where people gather to create or make things that are of learning interest. Makerspaces might focus on "electronics, robotics, woodworking, sewing, laser cutting, programming or some combination of these skills" (Roslund & Rodgers, 2014, p.9). Makerspaces tend to have a STEM (science, technology, engineering, mathematics) foci but are not necessarily limited to this as they could foster interdisciplinary-based project work spanning all subject areas. Makerspaces can be created in a classroom, a library, a community hub, or even in a standalone building. Many communities now have makerspaces for public use at venues such as libraries and community centres, as well as private centres. The values that underpin the makerspace movement include collaboration, sharing, and creating (Hatch, 2014). Hence, makerspaces typically:

- Promote learning through play, exploration, practical hands-on activities (participatory learning);

- Facilitate informal learning opportunities and connections between home, school, and community contexts;

- Allow for collaborative learning where educators and students share knowledge and skills including the tasks of teaching and learning; and

- Develop a culture of creating as opposed to consuming (Hatch, 2014).

Although gaining in popularity, makerspaces can be expensive to staff and resource. Increasingly, educational institutions and public libraries are considering the idea of mobile makerspaces to make STEM ideas and activities more accessible to a wider community.

RESEARCH QUESTIONS

This study evaluated the extent the introduction of the LAB programme has been effective in achieving the Hamilton City Libraries' strategic goals and scoped possibilities for enhancing the programme including identifying more sustainable approaches to running the programme. To this end, three research questions were formed:

1. To what extent do participants (including caregivers) in the LAB programme perceive the programme to be effective in fostering (i) STEAM learning, and, (ii) digital awareness and skills?
2. What are participants (including caregivers') suggestions for change and improvement to the current programme?
3. What might more sustainable approaches to conducting the LAB programme look like?

The findings will be useful to inform further refinements to the LAB programme (e.g. planning, conduct, resources used, staff expertise needed) and identify sustainable approaches to maintaining and running the programme.

PARTICIPANTS

Participants who volunteered to participate in the study were five Library staff who facilitated the LAB programme, 16 parents who completed the online survey, and two parents who took part in the follow up focus group interview.

This study obtained ethical approval from the Faculty of Education University of Waikato Human Ethics Committee (27th February 2018). All participants took part on a voluntary basis.

DATA COLLECTION AND ANALYSIS

Data for this study were collected through: an online survey, focus group interview and observations of the LAB programme in action.

Survey

Parents of children who participated in the LAB programme and adults who participated in the LAB programme at community centres during the school Term 1 were asked to take part in a survey regarding their perception and/or experience of the programme. Sixteen agreed. The link to the online survey (created using Survey Monkey, see https://www.surveymonkey.com/r/LDN7JZ5) was made available on the Library Facebook page as well as paper-based (for participants' convenience). IPads were provided so that participants could complete the survey. Survey participants were asked to

indicate their interest in participating in a follow-up focus group interview (see Appendix 1 for survey questions).

Focus group interview

Parents of children who participated in the LAB programme were invited to attend a focus group interview at the end of Term 1 to obtain a more in-depth understanding of their survey responses and their perceptions of the effectiveness of the programme in fostering their child/s engagement with STEAM understanding and digital skills. Their recommendations for improving, refining and sustaining the programme were also sought. Additionally, parents were asked to evaluate the extent the new electronic kits available at the Library were useful in fostering their children's digital awareness and skills (see Appendix 2 for interview questions). Two parents participated in the focus group interview which was also attended by two staff from the Library.

Observations

Observations (field notes and photos taken) of the LAB programme in action were conducted: 1) children participating in the LAB programme at community libraries and community centres, and 2) library staff/volunteers who facilitate the LAB programme. This observations served to triangulate participants' experiences and to gain further insights into the way the programme is being conducted with a focus on improving the programme's design for future iterations. The educational researchers undertook four observations during the study period (Term 1 2018) at different community libraries and community centres around the city (St. Andrews and Pop Central Library, Enderley and Glenview community centres).

Key points of from the focus group interview were shared with participants to verify their ideas. Emergent themes (thematic analysis) from the transcribed interviews were identified through a process of inductive reasoning (Braun & Clarke, 2006). The educational researchers from WMIER undertook the analysis, interpretation and reporting of the data.

FINDINGS

The following findings are reported according to key emerging themes observed across the data sets. The first section reports on parents' evaluation of the LAB programme while the second section reports on parents' evaluation of the Library's electronic/digital kits. For each theme, the survey data are reported first (where relevant) and then supplemented by the focus group and observation data.

Evaluating the Lab Programme

Finding out about the LAB programme

When asked how they found out about the LAB programme, parents mainly referred to the Library's Facebook page (seven survey responses) followed by the Library website and posters for information about the programme (two responses each). In the focus group interview, parents highlighted the usefulness of the Library's Facebook page, and A5 flyer advertising with the LAB's colourful symbol which they considered was eye catching and effective advertising.

Participants' Age

The age groups of the children participating in the programme were mostly 8-10 years of age (11 responses), followed by 11 years and older (four responses) and finally 7 years and under (one response).

Reasons for enrolling in the programme

Reasons parents offered for enrolling their child in the LAB programme were to:

- Encourage their child's learning of STEAM skills (14 responses)
- Encourage their child's learning of digital skills (nine responses)
- They were curious (eight responses)
- The fact the programme was free (six responses)
- Keep their child occupied (four responses)
- Encourange their child to get to know like-minded others (three responses)

Other reasons for enrolling included the programme was an opportunity for children who were homeschooled, their parents have programming/coding skills and are supporters of STEM/STEAM, their parents encouraged visits to different libraries and to support their interest in the LAB (four responses).

In the focus group interview, parents valued the fact the programme was:

- Free and their children can be involved in hands-on activities with other children. There was no preconceived idea about expectations of behaviour (unlike in formal learning settings) from the LAB tutors/facilitators which is conducive for children who are active or may have special needs (e.g. ADHD).
- An opportunity to use expensive equipment which they could not utilise at home or could not afford at home. Children could participate in programming, coding Lego Mindstorms, playing with Lego which they may not be able to do at home. Importantly, the programme offers/has elements of science, fun and interaction with peers.

Nature of the LAB Programme

Parents in the focus group interview valued that:

- The LAB activities were mostly hands-on and easy activities that can be followed up at home using common materials (e.g. string, cardboard). Children could be introduced to concepts which they can follow up by taking the materials home to complete tasks or investigations without needing parental supervision.
- Their children could try different LAB activities, meet other children and adults, and learn to complete a task systematically from beginning to end. They considered the different hands-on activities/projects from arts and crafts to Lego to be appropriate and convenient for their children to participate in.
- The Lego Mindstorms activity importantly fostered on computational thinking and the need to be specific in coding. For example, the programme's facilitators introduced children to computational concepts such as 'Try 5 steps forward', 'Do we need more or less steps forward?' 'What do you need to change?'. They suggested basic Lego Mindstorm instructions could usefully be more explicit. For example, 'Take 5 steps THEN turn'.

Parents saw the advantage of the above kinds of interaction in prompting children to consider their actions/potential change of action and behaviour. An added advantage was that the need to work with others to address a challenge translated into their child's developing more appropriate social skills. They reported that the process taught their children to pause and consider their own behaviour before acting and to think about different ways of problem solving.

Learning benefits of the programme

Eleven parents, in their survey responses, reported that the LAB programme was "very helpful" while another four thought it was "helpful" to encourage their child's learning about STEAM skills. Reasons given for this were:

- The programme was easy to access and was free, e.g. "Got to do and play with things we can otherwise not afford, e.g. Makey Makey kit, Lego Mindstorms" (five responses).
- The activities fostered and extended their child's learning interest, e.g. "J loves science and he is always making his own experiments at home. This gave him an opportunity to extend his interest", and, "My son had no experience with coding - after doing the Lego Mindstorms he's interested and wanting to learn more" (five responses).
- The activities were practical and engaging, e.g. "hands on, different activities encouraging thought processes" (two responses).
- The instructions given were explained with an information sheet about the activity available on the table (one response).

Parents thought their children gained the following skills/abilities as a result of participating in the LAB programme; the fact their children could:

- Build things for a purpose including following instructions and procedures (10 responses).
- Work with other children/adults and share ideas (nine responses).
- Think creatively to problem solve (eight responses).
- Explain what they know/understand about STEAM to someone (three responses).
- Learn to ask for help when they need it (two responses).

Other responses included the programme was an "opportunity to explore equipment and ideas not usually available to my home schooled children" and the fact their children were "learning about technologies and finding out they really enjoy discovering them. Things we don't have at home. They have really enjoyed the sessions."

All parents unanimously agreed that the skills their children gained would be helpful in their future. Reasons for this included:

- Their children were learning future-oriented skills which included life and digital skills (five responses). For example;
  - "The world is changing so fast, we don't know what jobs we are preparing our children for",
  - "Creativity, problem solving, teamwork [are] essential to our future",
  - "Life is full of rules and instructions that are not negotiable. I believe today's children have a lot of say in their environment and can choose to opt out of opportunities if the challenges don't meet their expectations. Learning rules in play reinforces the purpose and importance of rules and procedures to get the results or achieve the required outcome."
- The skills learnt supported their current interest (one response), such as; "He loves math, reading, and science only, so I support and encourage him in what he's interested/good in".

In the focus group interview, parents thought the programme:

- Exposed their children to all types of learners including different people from different backgrounds. They thought their child learnt a lot from seeing the way other children interact and had opportunities to learn about respect.
- Had led to their children's increasing interest in STEAM along with transfer of general learning and interest into other areas at home, e.g. completing school art work at home, engaging with chemistry kit at home, following instructions on art/kits to get to the end result.
- Allowed parents (mums) themselves to talk/socialise amongst themselves while their children work on LAB activities (benefit of social interaction amongst caregivers of similar interest children).

Best part of the LAB programme

When asked to rank the BEST part of the LAB programme, parents thought it was the following (from highest to lowest rank):

- Building and engineering challenges
- Lego Mindstorms
- Running science experiments
- Making circuits
- Arts and craft activities
- Playing with Lego blocks

Parents in the focus group interview further mentioned activities such as 'Flex tangles', and hands-on experiment with a vibrating toothbrush that their children had especially enjoyed in the programme.

Least liked aspect of the LAB programme

When asked what they liked LEAST about the LAB programme, parents, in the survey, conveyed the following:

- Issues related to the space/venue (four responses), such as having to "move around" the different libraries/venues/location each week, venues that were small and 'cramped' and can become crowded, venues where there was a double up of activities - potential for use by other groups during LAB sessions (seen as undesirable), venues that were were viewed as 'not safe for kids' if a parent was not there (issue of safety and supervision of children).
- There was inadequate time to try all the activities (three responses). Some participants found the time inadequate to complete the activities. There were also some requests for more sessions and at different times and days.
- There were not enough Lego Mindstorm sets (one response). Participants highlighted the lack of Lego Mindstorm kits during the programme - "Could there be more kits made available during each programme session?"
- Need for more participating children (one response).

The focus group parents raised these matters along with questions about the age for entry into the programme. There was some confusion around the age limits as earlier LAB advertisements had mentioned the programme was suited for those from 5 years but the current advertisement highlighted it was more appropriate for children from 8 years onwards.

There was some confusion about the need to register for the LAB programme. Parents were not aware that if a LAB programme was held at a library that pre-registration was required due to limits of space but if the programme was held at a community centre, no registration was required. This could be made clearer in the programme's advertisement.

Parents wondered if the programme could cater for older teenagers (e.g. 15 years old), "Can the programme be tailored for older teenagers?", or consider tapping into the expertise of competent teenagers to help run parts of the programme. They speculated that they would be a helpful resource, especially if the teenagers were waiting for younger siblings who were participating in the LAB.

Clarifying the focus of a LAB session in the advertisement was also raised by parents. For example, some participants were not sure what 'circuits' meant in the advertisement and mistook the nature of the session – "kids were afraid it was silly games and changing in a minute" (one response).

Overall experience in the programme

Overall parents thought the LAB programme experience was "Awesome" (11 responses), "Very good" (four responses), and "Good" (one response).

All parents were unanimous that the activities in the LAB programme were pitched at "just the right level" for their children. Not only did their child benefit in terms of learning and socialising with others but the focus group parents were generally satisfied that their expectations of the programme were being met. They became more comfortable and formed friendships with other parents of children attending the programme.

Evaluating the Electronic Kits

In the focus group interview, parents were asked to evaluate their experiences/their child's experiences with the Library's electronic kits. Their responses included:

- Given the Library is introducing digital kits and intends to foster children's digital skills then introducing children to online safety needs to go hand in hand with this initiative. Children need to understand, for example, that they should not share passwords and usernames or connect with strangers online. Strategies to develop these understandings need to be built into the Library's programme. Parents cited resources from NETSAFE, CROW Lab (Cyber Security Researchers of Waikato, University of Waikato) as easily accessible resources that offer advice in language appropriate for children that the Library could draw from.

- Electronic kits that require parents to set up an online account are not favoured as they raise online safety issues. Parents choose not to use/borrow such kits. This includes the Deejay kit as it is difficult to use and parents need to install the software and software fixes to use the kit.

- Parents suggested trialling potential digital kits purchases with a group of children to see if the kit is user-friendly and appropriate.

- Some examples of electronic kits that children enjoyed were Little Bits, electric guitar kit, Sphero, dot and dash kit, VR fun. Other potential kits for consideration include GIGO (water and air powered (hydraulics) machinery, volcanic kits.

RECOMMENDATIONS FROM THE RESEARCH

Based the overall findings, the following recommendations are offered. These encompass suggestions from parents for the refinement and extension of the LAB programme to enhance community access to and participation in STEAM and digital-based activities:

Recommendation 1: Enhance programme visibility and clarify programme focus, scheduling and venues

Enhance the LAB **programme visibility** to the public by:

- reviewing the advertising for and explanation of the programme on the library website/online;
- advertising on EventFinda (the online Hamilton event calendar) which is free and can categorise events under 'Free' or 'Under $20;
- communicate with nearby/surrounding schools and/or advertise in school newsletters; and
- networking with local companies, coding organisations for support with staffing/resourcing.

Review and clarify the explanation of the programme on the website/online.

- Clarify the need for registration.
- Clarify the age limits.
- Consider / reconsider the space/venue for the LAB, including school hall use.
- Consider scheduling including duration of the programme.

Recommendation 2: Quality of facilitation in the programme

Increase support for volunteers and library staff by **offering training on how to work with groups of (young) children** to:

- ensure a shared understanding amongst facilitators of the learning goals and clarify the possible learning outcomes for the different activities;
- ensure instructions are clear and widely available to participants - children and their parents/caregivers. These could be communicated using video clips, a paper-based visual step-by-step explanation, audio instructions and written instructions;
- explain the task and learning potential of an activity to the children.;
- scaffold children towards a solution, including posing questions that ask children to reflect on their solutions;
- possible training foci are:
  - with the Lego Mindstorms activity children need to be clear what they were trying to get the Lego to do;
  - for the coding activities, scaffold children to use systematic trial-and-error-and-review;
  - break down the the objectives and the elements of an activity and then prompt children to consider: "What information do we need to have to do this step?";

o work through the sequence of actions and ideas needed to achieve a problem solving task; and

o ask children to act out instructions that mirror computational thinking before they start coding to help them develop an understanding of what they need to do. For example, "stand over there and tell me the logical step if you want to get from X to Y".

Consider involving older children - they could provide a role model but would need to be trained as to how to work with younger children. This might be especially valuable for engaging young boys in the programme (two survey responses).

Ensure that facilitators have had adequate experience in using the resources and with the activities (e.g. the Makey Makey kit).

Note: Some parents considered other parents may not bring their children to the LABs if they thought they would need to help out with the activities because they were afraid they might make mistakes.

Recommendation 3: Nature of the activities

Consider the variety of activities planned. Parents would like to see the LAB programme encompass more of the following:

- Science-based activities (science experiments, interactive electronic circuit kits, understanding how things work) (three survey responses).

- Arts and craft activities (one response).

- Coding and technology-based activities (Lego Mindstorms and more robots and robotics science) (two responses). Also consider exposing children to other coding activities e.g. Hour of Code. There was a comment that there are many coding resources online that could be tapped into to offer a simple introduction to coding which would benefit children before they began working with Lego Mindstorms.

- Ensure instructions are clear and widely available to participants. It is useful to have copies of any information sheets so that participants can take these home to follow up from the programme (one survey response).

- A **portable mobile makerspace cart** containing an assortment of current resources available from the Library. For example, a child-friendly sewing kit, handy tool kit, fabric, basic electronic coding kits, and so forth with a few suggestions of activities to provide opportunities for children to have a more child-led 'tinkering and making' experience. This mobile cart could be for children's free use in addition to the current pre-planned LAB STEAM activities for the term. Depending on the activity, some adult assistance will have to be included.

Recommendation 4: Facilitating children's coding skills and Internet safety awareness

Consider networking with other **local/national organisations** promoting STEM and STEAM-based activities in the community for more resource and voluntary assistance in terms of teaching coding as part of the Lego Mindstorm activity and access to internet safety resources.

- NETSAFE (https://www.netsafe.org.nz/), compiles free kits for educators and runs free seminars/ services for schools/educators on a wide range of online safety issues (cyberbullying, privacy, online gaming, social media, online scams etc.)

- Waikato Engineering Careers Association (WECA) (http://www.weca.org.nz/)

- IT Professionals NZ (ITP) (https://itp.nz/)

- Code Club Aotearoa (https://codeclub.nz/)
- Digital Technology Teachers Aotearoa (DTTA) (http://nzacditt.org.nz/)
- Computer Science Students Society at University of Waikato (CS³) (https://www.facebook.com/pg/cscubed/about/?ref=page_internal)
- Girls in Computing initiative by University of Waikato (Girls in Computing) (http://girlsincnz.org/about-us/)
- University of Waikato Ladies in Computing club run by female students in the Computer Science programme (Ladies InC).

Recommendation 5: Ongoing community feedback

Adopt parental suggestions that the LAB group:

- run a survey to gauge community interests and needs: get children to say what they want to learn to inform the LAB programme's focus, offer a gift from a draw to respondents;
- survey adults/parents about what children want to learn with this survey conducted via the Library Facebook site;
- engage with local IT companies in Hamilton for ideas; and
- trial potential electronic kits with a group of children and parents prior to purchasing them to gauge their appropriateness.

The project team hopes these recommendations will go some way towards informing improvements and extension to the LAB programme.

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Appendix 1: Online survey questions for the LAB participants & caregivers/parents of child participants

Mobile makerspace as a catalyst for fostering STEAM activities in the community

Dear Parents and Caregivers,

We invite you to take part in this short survey to help improve The LAB - Hamilton City Libraries mobile makerspace programme. Your input will be helpful to understand if our activities have been valuable to you/your child's developing awareness of STEAM - Science, Technology, Engineering, Arts, Maths, and digital skills.

This study is a collaboration between Hamilton City Libraries and Wilf Malcolm Institute of Educational Research (WMIER), Faculty of Education, University of Waikato and has received ethical approval from the Faculty of Education Human Research Ethnics Committee, University of Waikato (27 February 2018).

The survey is anonymous, will take no more than 5 minutes to complete and will close by 16 April. All completed surveys will be entered into a draw to win a gift voucher valued at $20. At the end of the survey there is an option to tick if you would like to participate in a follow-up focus group interview.

By completing this survey, you will have given your consent to participate in this study.

If you have any queries about this project you may contact Aaron (aaron.martin@hcc.govt.nz) or Elaine (elaine.khoo@waikato.ac.nz). If you have further queries please contact Bronwen Cowie, the Director of WMIER (bronwen.cowie@waikato.ac.nz).

Thank you very much for your time and help.

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1. How did you hear about the LAB programme?
   Library website
   Word of mouth
   Library's Facebook page
   Poster
   Other:

2. Are you a library member?
   Yes
   No

3. Are you completing this survey as a participant in the LAB programme or on behalf of your child who is enrolled in the LAB programme?
   I am completing on behalf of my child
   I am an adult participating in the programme

4. Select your child's age group
   7 and under
   8 to 10
   11 and older

5. Please tell us why you enrolled/why your child enrolled in the LAB programme? Tick as many options that apply:
   Curious
   Encourage learning about STEAM (science, technology, engineering, arts, maths)
   Encourage learning about digital skills
   Its free
   Keep my child occupied
   An opportunity to get to know like-minded others
   Other:_____

6. We are interested to know what sort of skills you think you/your child have developed as a result of participating in the LAB programme. Please tick all that apply:
   Being able to explain what I know/understand about STEAM to someone
   Able to think creatively to problem solve
   Work with other kids/adults and share ideas
   Learning how to ask for help when I need it
   Able to build things for a purpose
   Other: _____

7. Do you think the skills you have ticked in the question above will be helpful in your/your child's future?
   Yes
   No
   Please tell us why:_____

8. What was the best part about the LAB programme? Please rank them in order (e.g. 1 = highest to 6 = lowest)
   Lego Mindstorms
   Running science experiments
   Building and engineering challenges
   Arts and craft activities
   Playing with Lego blocks
   Making circuits

9. What would you like to see more of in the LAB programme?

10. Which option best describes your/your child's experience with the activities at the LAB?
    Easy
    Just right
    Hard

11. What did you like LEAST about the LAB programme?
    Not enough time to do all the activities
    Not enough staff to help
    Not enough Lego Mindstorms
    Others (please specify): _____

12. How helpful was the programme to encourage your child's learning about STEAM skills?
    Not at all helpful
    Somewhat helpful
    Helpful
    Very helpful
    Other:_____

13. Please tell us why?_____

14. Anything else we could do to improve the LAB programme to support you/your child's engagement with STEAM ideas? _____

15. Can you rate your experience at the LAB (please circle ONE option)
     OK   Good   Very Good   Awesome

16. We would like to conduct a follow up focus group interview to get a better understanding of your views and the extent to which the LAB programme is useful to you/your child's learning. This will take no more than 45 minutes and will take place on **Monday the 23 of April** at **Pop Central Library**, 11am to 12 noon. If you would like to participate, please provide your contact details below. (Please note: your contact details will be kept separate from the other survey responses and used only for the purpose of contacting you for the focus group.
     Name:
     Email Address:
     Phone Number:

    Thanks!

Appendix 2: Focus group interview questions for the LAB caregivers/parents of child participants

For parents/caregivers in the LAB programme:

[Check if parents understand the terms 'STEAM', 'STEM', 'Digital skills/digital literacy']

Regarding the LAB programme:

1. How did you hear about the LAB programme?
2. What made you interested in signing up/signing your child for the programme?
3. What expectations did you have before embarking on the programme? [check for links to important workplace competencies expected in 21st century careers?
4. How is the LAB programme initiative beneficial/valuable to your learning needs?
5. Were your expectations regarding the programme met? Please share with us why yes/why not.
6. What did the programme encourage you to do/not do in terms of learning about STEAM?
7. What did the programme encourage you to do/not do in terms of learning to develop digital skills?
8. What are some of the ways we might be able to improve on the programme?
9. What role do you think initiatives like the LAB programme have in our community?
10. How do you think we might be able to expand the programme to meet your needs/ community needs?

Regarding Electronic Kits:

1. Have you borrowed any of the electronic/digital kits available for rent from the library ($1/week or $5 for a bestseller/week) for your child to play with/use?
2. If you did, which ones did your child particularly enjoyed? [check which one's children did not enjoy]?
3. Why was that? [check reasons and link to what skills parents thought their children developed while playing/engaging with the kit].
4. Do you have suggestions on other kinds of electronic/ digital kits that might be useful to your child's learning of digital skills/future-oriented skill?