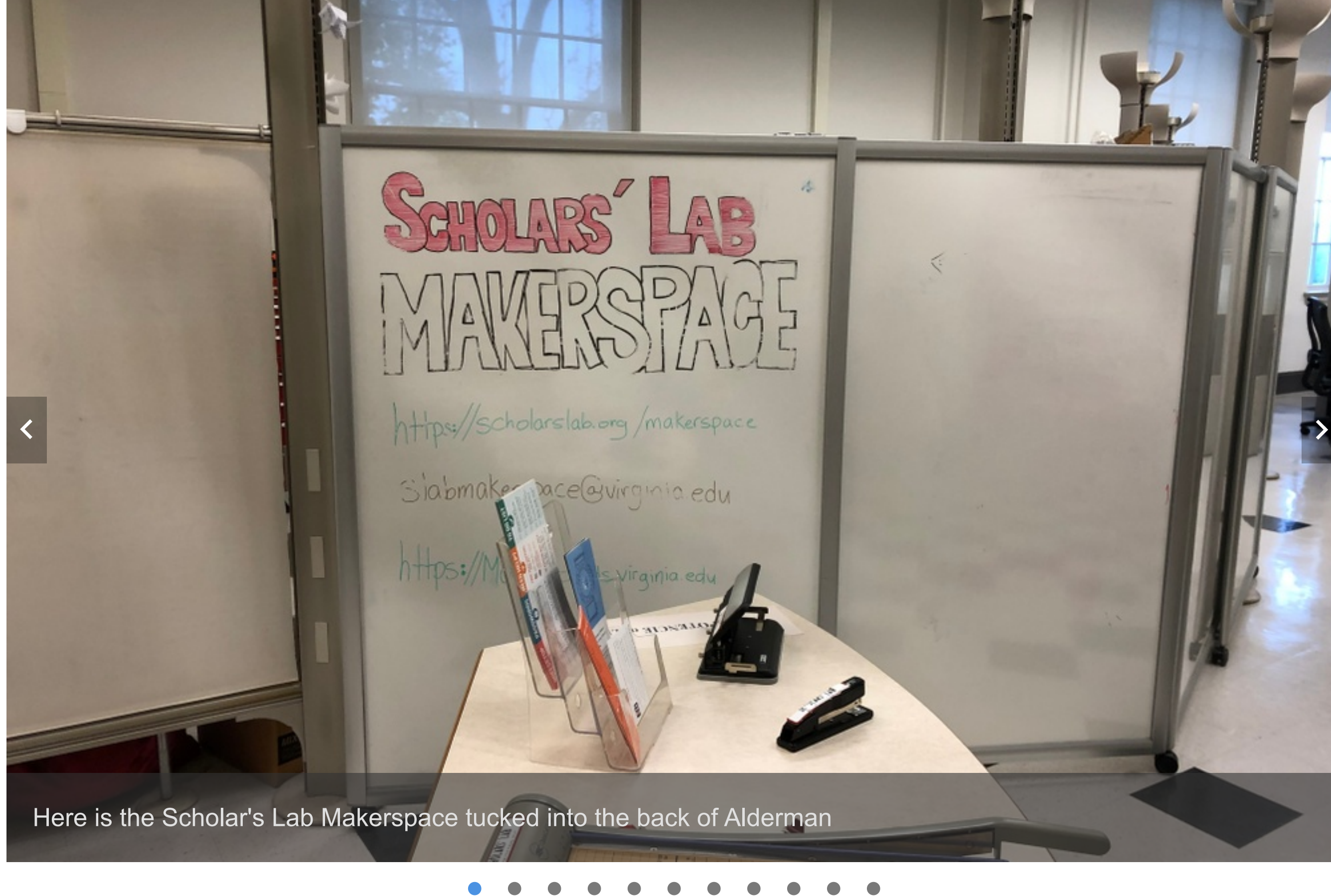


## Scholars Lab Makerspace in Alderman Library



Here is the Scholar's Lab Makerspace tucked into the back of Alderman

## Virtual Tour of Alderman Makerspace



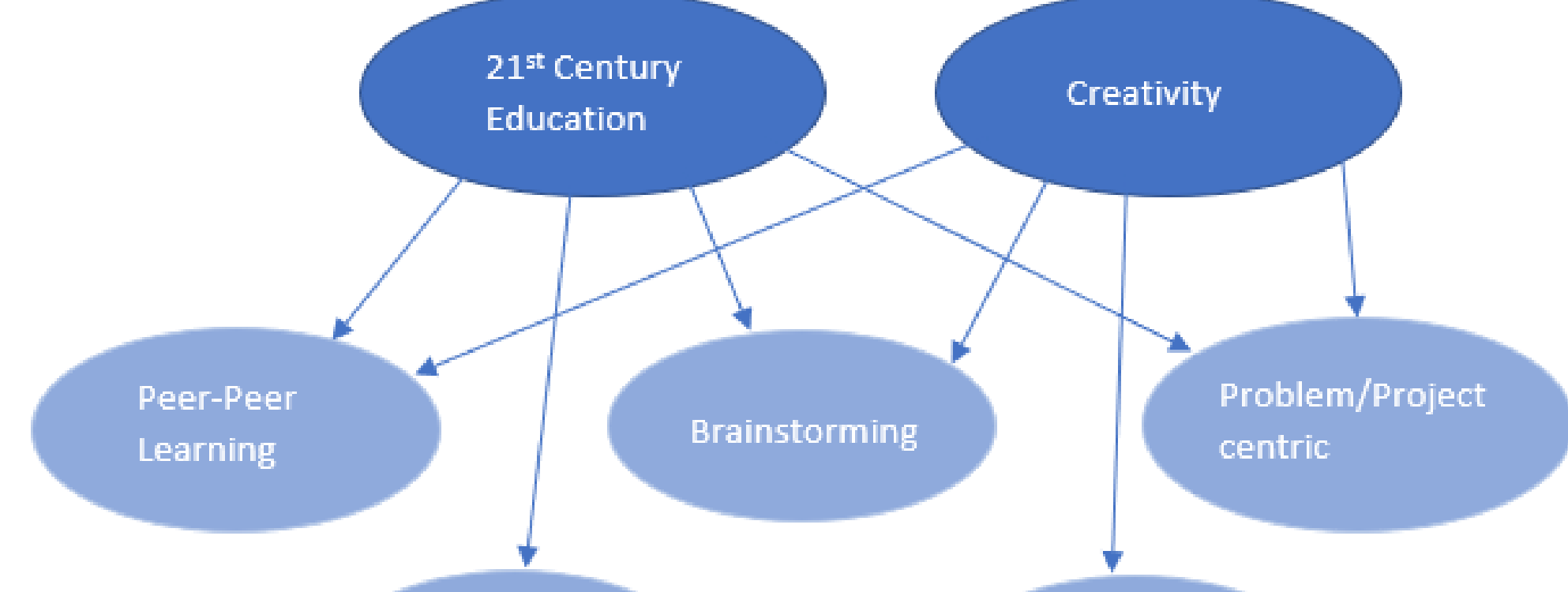
### What is a makerspace?

**Vision Statement:** Makerspaces promote problem solving, encourage STEM education, and provide a collaboration space for people to tackle different problems. They provide opportunities for individuals to learn/utilize resources that are otherwise inaccessible due to socioeconomic conditions or lack of school resources. We propose a blueprint for implementation of makerspaces into libraries in and around Charlottesville public schools.

**Makerspace Design Components:**  
Our Makerspace's design is based on the values that we want to exemplify through the project. By focusing on 21st education and embracing creativity, our Makerspace design intends to facilitate the needs of the community around it and provide students with these values. Ideally, our Makerspace would be in a dynamic space, or even be mobile with the ability to change locations quickly. This would allow the Makerspace to adapt with new technologies and also be flexible to accommodate for various circumstances. In addition, our makerspace would be complementary to a school by design, ensuring that it is accessible to anyone around that community space. Finally, through the use of effective scheduling technologies, we hope to design locations and consistent times to set up workshops, tutorials, and maybe even perform some type of training. By setting up the open space with consistent workshops and tutorials, we hope to encourage creativity within the "makers".

### Value Sensitive Design

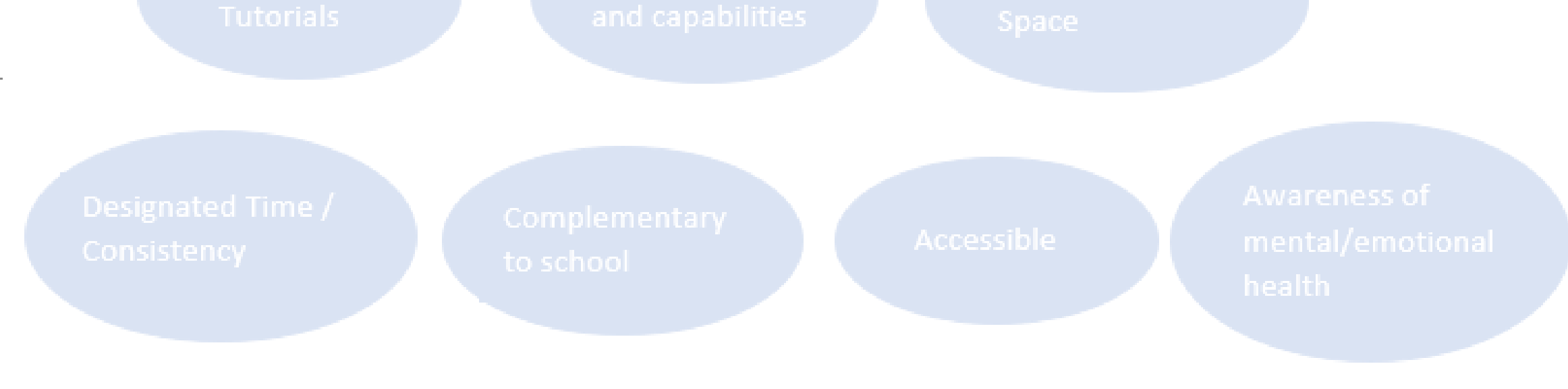
#### Values



#### Norms



#### Design



We created this starting with major values that we pulled from our analysis and discussion of the smart city values wheel. From there we identified relevant norms with a focus on the connections between people in the space. Finally we identified some general design requirements, while these aren't especially specific, they

### Background research and Literary Review

- <http://www.ala.org/acrl/sites/ala.org/acrl/files/content/conferences/confsandpreconfs/2017/MakerspaceorWasteofSpace.pdf>
- <https://repository.library.northeastern.edu/files/neu/q82r1598/fulltext.pdf>

These serve as several case studies analyzed to better understand makerspaces and their role in the community. See below.

#### "Makerspace or Waste of Space: Charting a Course for Successful Academic Library Makerspaces"

Main points:

- Space**
- Most makerspaces have their own dedicated room, though there are a large number that are located as part of a school's library
  - Almost all of these spaces are refurbished, with few being built as new spaces

- Funding**
- The costs of makerspaces are typically covered by either grants, university, library funding, and very rarely state government

- Reasons for success**
- Leaders who can clearly envision and communicate the purpose of the makerspace (especially for funding)
  - Developing the space around the needs of the community (i.e. making sure that purchased technology creates the most valuable opportunities for users) (this ties in with our emphasis on community engagement)
  - Developing relationships with community members first, beginning with a modest start (low-cost equipment), piloting maker programs, and gauging receptiveness of community for such programs
  - A supportive and sustainable staffing model
  - Trusting users, along with giving them autonomy

"The majority of respondents, 21 out of 25, considered their makerspaces to be successes."

**Main takeaway of the article is the need to develop the makerspace around the community and their needs. Forming partnerships with individuals, faculty, and student-led groups are necessary in order to be successful and sustainable.**

#### "WE ARE ALL MAKERS: A CASE STUDY OF ONE SUBURBAN DISTRICT'S IMPLEMENTATION OF MAKERSPACES"

This report analyzes a school district's implementation of makerspaces with the goal of understanding the impact, limitations, and future design of makerspaces.

##### What is a makerspace? Makerspace motivation?

- An area where individuals can learn through experimentation and hands-on experience in a collaborative setting
- "No two makerspaces are the same" - different technological emphases. Some may focus on robotics and electronics, while others may emphasize the arts (e.g. music production)
- Commonality: Allow for exploration and learning through self-experience and trial/error
- Help individuals develop problem solving skills, creative thinking, and teamwork experience
- Promote development of 4C's: communication, creativity, collaboration, and critical thinking
- Development of skills that cannot be acquired through traditional schooling

##### Major Findings of Research

**"Availability of challenging projects and resources opens doors to deeper learning and engagement."**

- Incorporation of makerspace learning opportunities with material learned in the classroom spurred increased student interest in the topic that extended beyond the classroom (outside of school)
- Parents reported students showed increased enthusiasm and makerspace projects were topics of conversation at home

**"Administrative support ensures makerspaces are used to full potential."**

- Successful makerspaces require consistent support and maintenance from administrative staff, to include but not limited to, meetings to address proper funding, proper training of teachers working in the makerspaces, teacher encouragement of using makerspaces, etc.

**"Makerspaces meet multiple learner needs."**

- The casual and low-pressure environment of Makerspace learning opportunities were beneficial for student learning
- Teachers noted that some students who were not as active in the traditional classroom thrived in makerspace opportunities, surprising and impressing teachers

**"Makerspaces support development of 4C's skills."**

- Students helped other students, and this learning is not as accessible in a traditional classroom setting, promoting team work and independent communication
- Students reported that other students help was sometimes more insightful than the teacher's assistance

**"Makerspaces support independent learning."**

- Teachers may not have the opportunity to address every single student's problems – this inherently forced students to try to figure out things themselves

**"Makerspaces support development of STEM skills."**

- Inclusion of modern technology such as 3D printers and electronic circuits encouraged students interest in STEM – also provide access to technologies to financially underprivileged

**"Makerspace scheduling is a challenge."**

- Some students mentioned that they found it difficult to find the time when they could go to the makerspaces
- Makerspace projects often take some time to complete, library time for each class was also limited
- Participants encourage that makerspace opportunities be integrated into the common curriculum to enable students to have the opportunity to learn and experiment in the makerspace
- Makerspaces need advertising and promotion in order to spread the word about opportunities and help get students excited about using the space

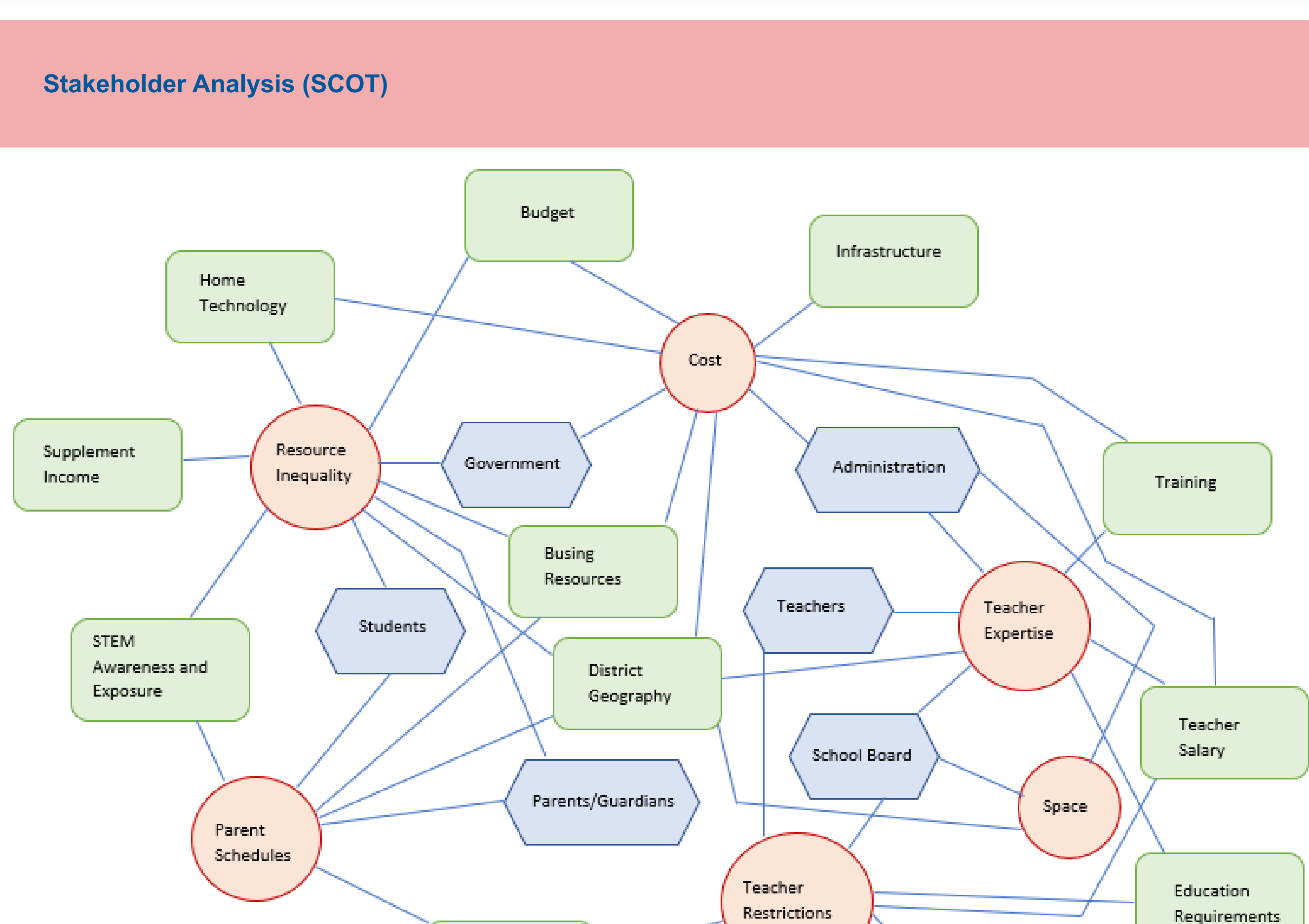
In order to better understand the impact that Makerspaces could have, I researched a paper published at the University of Ottawa regarding the impact of makerspaces on student communities. The article is written by Dr. Mohammed Ahmed, an engineering professor at the University of Ottawa, and Dr. Hanan Anis, a professor who was previously a CTO for an engineering firm. The article goes through the study of a Makerspace built close to students, and studied the participants at the makerspace, documenting their reactions, responses, and usage of the space.

<https://peer.asee.org/impact-of-makerspaces-on-cultivating-students-communities-of-practice-abstract.pdf>

### Research Questions

1. Coke: Does Charlottesville's education system do enough to account for STEM education, especially at a younger age? Is it really hands-on/interactive enough?
2. Brian: How can we quantify or assess students learning in a makerspace without limiting their freedom and creativity?
3. Cameron: Does Charlottesville's education address the learning gap between privileged and underprivileged children? Does it advance only those who already have resources, or does it strive to pull up children without access?
4. Connor: What is the current trend in Chinese elementary education with respect to technology, design, and creative thought? How does this relate to Chinese success in the international science and engineering community?
5. Matt: What is the best strategy to promote and advertise the use of makerspaces within schools?
6. Parv: Are makerspaces an effective use of community resources in respect to the gains in creative thinking and student benefit? How do the previous attempts at creating Makerspaces in China and the USA affect the scope of future Makerspaces?

### Stakeholder Analysis (SCOT)



Our strategy in creating this SCOT analysis was to start with the relevant stakeholders (blue hexagon). We believe that since our project is first and foremost a space that brings together people with different ideas, experiences, and skills that this was the most appropriate way to frame our ideas. From there we looked at the issues or restrictions (red circle) that face these groups in regards to STEM curriculum, makerspaces, and general infrastructure changes. Finally, we added relevant current conditions or artifacts (green rectangles) that exists in this ecosystem. From this preliminary diagram we see that teacher expertise, cost, and resource inequality are all highly connected conflict nodes.

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- Candice Benjes-Small, L. M.-W. (2017). *Makerspace or Waste of Space: Charting a Course for Successful Academic Library Makerspaces*. Baltimore.
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- Galaleidin, M. A., & Anis, H. (2017). Impact of Makerspaces on Cultivating Students' Communities of Practice Abstract. *American Society for Engineering Education*.