# Makerspace Education: <u>Using Digital Fabrication to Engage Second Grade Learners</u>

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#### Introduction

Making is an approach to education where learners construct their own knowledge by creating and interacting with the physical objects around them. The CCI Makerspace at UNCC i welcoming environment that encourages Making in the following ways: 3D modeling, electronics, robots, sewing, e-textiles, and woodworking. As teacher researchers, we were immersed in this environment to design fabrication lessons ar an evaluation tool to support learning in the second grade classroom.

## Research Goals

- To understand effective digital fabrication methods
- To design fabrication activities to support learning in the second grade classroom
- To create a rubric to evaluate makerspace learning

# Methods

Over a period of two days, a small sample of participants were invited to engage in two digital fabrication lessons. Participant were evaluated using a rubric designed to assess content

standards and Making skills.



# Acknowledgements



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	Designed Lessons
is a	Lesson 1– Community Lesson Objective: Students will understand the differences between physical and human features of rural, urban and suburban communities. Content Standard: 2.G.1.2 Interpret the meaning of symbols and the location of physical and human features on a map.
	Overview: Teacher guides a discussion in specific differences in types of
nd	communities (rural, suburban, and urban).
	Students design a structure on paper to fit in their assigned community.
	Students use the Tinkercad web program to design and then fabricate
	using a 3D printer.
5	Image: Subscription of the second
	Why would you find this structure in this community? I would fill Sky Scrapen in an urban ommunity because the course the course off as your use this checklist to help troubleshoot printing neck off as your finish your structure! I used the "Group Tool" to make su my structure was one piece. I designed my structure so it wou stand by itself on the workshope
nte	Workplane. I have thought carefully about how my structure will print.
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	<u>Lesson 2- Severe Weather</u>
	<b>Lesson Objective:</b> Students will be able to understand severe weather and the
	conditions that affect the community.
	<b>Content Standard:</b> 2.E.1.3 Compare weather patterns that occur over time
	Overview.
	Teacher guides a discussion of severe weather concepts and how communities can prepare for these events
	<ul> <li>Students design a structure on paper that would withstand the conditions</li> </ul>
	of a specific type of severe weather.
	Students use the Tinkercad web program to design and then fabricate
	using a 3D printer.
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### Results and Future Implications

- Participants created 3D structures using content knowledge
- Participants developed Making skills through the design process
- Lessons met research goals
- Lessons will need to be repeated in a larger, authentic classroom setting to gauge effectiveness
- Interdisciplinary content standards were also met through the tinkering process
- Researchers gained the perspective of newcomers to the Making process

Research shows that Making should be used as a medium for learning. Students are engaged, intentional, innovative and show solidarity with other learners when using a Makerspace. As educators we will use this knowledge to improve our future classrooms by designing lessons that incorporate the Makerspace setting.

of day and time of year.					Tinkering Skills			
Behavior Observed	1-Developin g	2-Progressing	3-Mastery	4-Exemplary Mastery	Observed Behaviors	1-Developin g	2-Progressing	3-Mastery
Student differentiated between types of severe weather conditions.			Student A Student C	Student B Student D	Engagement/Initiative: Student was <u>engaged</u> in the assignment (had a desire to create/tinker). Student had a positive attitude. Intentionality/Learning: Student was <u>intentional</u> in creating a structure using			Student A Student B Student D
Student created a structure that could withstand severe weather.			student A Student C Student D	Stydent B- Structure could withstand multiple types of weather				Student A- created flood structure
Student Self-Checklist					fabrication tools. Student showed knowledge of fabrication processes.			student C+D- cneated tornoclostic
I persevered (did not give up) until I finished my design.					Innovation/ Creativity: Student was <u>innovative</u>			Student A- house on mount
I created a 3-D design on a digital tool.					Student showed creativity.			Student C- tornado culline student D-
My design shows creativity.					Solidarity/Community:			safe hous
L communicated well with my team.					together with his or her			A-Dall



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