TLEF Project – Final Report

Report Completion Date: (2022/04/23)

1. PROJECT OVERVIEW

1.1. General Information

Project Title:	Integrated Design Learning through Making & Building @SALA: Bringing design-making and building infrastructure (tools and expertise) directly to students in the classroom, studio, and in the field		
Principal Investigator:	Blair Satterfield		
Report Submitted By:	Blair Satterfield		
Project Initiation Date:	04/01/2017	**Project Completion Date:**	08/31/2020
Project Type:	☒ Large Transformation ☐ Small Innovation ☐ Flexible Learning ☐ Other: [please specify]		

1.2. Project Focus Areas – *Please select all the areas that describe your project.*

☒ Resource development (e.g. learning materials, media)

☒ Infrastructure development (e.g. management tools, repositories, learning spaces) – "virtual assets"

☒ Pedagogies for student learning and/or engagement (e.g. active learning)

☐ Innovative assessments (e.g. two-stage exams, student peer-assessment)

☐ Teaching roles and training (e.g. teaching practice development, TA roles)

☒ Curriculum (e.g. program development/implementation, learning communities)

☐ Student experience outside the classroom (e.g. wellbeing, social inclusion)

☒ Experiential and work-integrated learning (e.g. co-op, community service learning)

☐ Indigenous-focused curricula and ways of knowing

☐ Diversity and inclusion in teaching and learning contexts

☐ Open educational resources

☒ Other: [Created teaching and learning infrastructure to support design studios and other hands-on (applied) design courses using Miro as a digital platform. This work was done as an extension of the TLEF mission and after the COVID19 pandemic hit.]

1.3. Final Project Summary

An interdependence of “excellent designing” and “excellent making” has been a core value of SALA’s pedagogy since the school’s inception in the 1960s. However, contemporary “making” practices and technologies (3D printing, laser-cutting, robotic milling, actuated media, VR, AR, etc.) have radically shifted and SALA’s integration of these technologies into our curricula has been piecemeal and limited. Demand far exceeds supply and the education and experience we offer students lags behind their expectations and the expectations of their future employers. IDLMB@SALA will transform the ways that SALA teaches and integrates its core design, design media, and design technology curricula. Faculty, staff, and students must be meaningfully engaged and educated by this initiative from the outset. As we are not a large or well-resourced community, we will need a supplementary consultative and research apparatus to help us establish best practices for the teaching of technology and software as pedagogical options. Our intent is to apply support from this TLEF grant to address these shortcomings, and in doing, position SALA students as leaders in the use and application of design media and technology. We formed a steering group with representatives from Academic Infrastructure and Academic Affairs (curriculum), both committees within our school comprised of students, faculty, and staff. Our students and technical (shop) staff have also been central to our effort. This core group led a school wide effort to accomplish the objectives outlined. Year one established our baseline, and included assessing all SALA courses that might benefit or be impacted by our collective efforts.

- Year one also saw the collection of data campus wide, including a survey and mapping of all the publicly accessible shop and fabrication resources on campus. Years one and two also saw the development of video assets and a tool glossary designed to engage and orient people to the SALA fabrication ecosystem.
- In Year Two we continued to populate resources established in year one. The team also worked with professors on the redesign of core courses (introductory design studios and courses in the instruction of design media) to include assets developed and to increase focus on making in design exercises. Small portable tool kits were also created and situated (placed) in student work spaces.
- Year Three focused on refining, expanding, and underpinning our efforts. Year Three also saw the arrival of COVID19, and with it an immediate curtailing of in-person learning and instruction. The IDLMB@SALA team reached out to the TLEF Committee and asked for an extension to our proposal timeline, specifically to design and develop a virtual platform for teaching design, holding desk critiques and formal reviews, and for conducting select shared design and making related community activities.
- Year Three + (extended time granted by the TLEF Committee) saw the team refine these assets, built using Miro. Our new platform became a virtual twin of our studios and other classrooms, and allowed the school to continue functioning in the spaces of making and representation even though we could not access our physical shops and studios. This final phase has proven crucial to our operations as a school and has allowed the school to function in times of limited access.

1.4. Team Members – *Please fill in the following table and include **students**, undergraduate and/or graduate, who participated in your project.*

The team for our TLEF project was robust and inclusive. We had input from multiple faculty and staff members. The assets and initiatives were executed primarily by students under the direction of Professor Satterfield.

Name	Title/Affiliation	Responsibilities/Roles
Greg Johnson	Sr. Instructor, SALA	Design Build and Architectural Technology (consulted and assisted with course design)
Graham Entwistle	Workshop and Digital Fabrication Technician, SALA	Assisted with shop related assets and pedagogical goals
Nicholas Scott	Workshop Manager	2018 support (retired)
Bill Pechet	Lecturer in Practice	2019, 2020 Course production and design
Thena Tak	Lecturer	2019, 2020 Course production and design
Dave Zielnicki	Instructor	Course production and design
Emma Fennell	Manager, Communications and Outreach, SALA	2019, 2020 Web support
Tracy Satterfield	Manager, Financial Administration	2019 Voice narration for videos
Adriana Ermi-Sprung	Workshop Technician	support
Ron Kellett	Director, SALA	Advisory and support
Michael Barton	External Consultant	Advisory Video (2018)
Students		
Lisa Kusaka	MARCH Student	Team leader 2018 & 2019 Course redesign/video content production, direction, filming, and finishing. Organization and development of web assets including new blog https://blogs.ubc.ca/salafab/
Alana Pavan	MARCH Student	2019 video content production, direction, filming, and finishing (with Kusaka)
Kara Verbeek	MARCH Student	2018 SALA Maker Map and Maker Guide – Graphic Design coordination
Marina Schulman	MUD	2018 Support for Joe Dahman and redesign of ENDS 221
Jacob Darowski	MARCH Student	2019 tool production (w/Mavis)
Emily Soder-Duncan	MLA Student	2018-19 Digital Sandbox project with Instructor Dave Zielnicki

Colin Jones	MLA Student	2018-19 Digital Sandbox project with Instructor Dave Zielnicki
Yekta Tehrani	MARCH Student	Digital Fabrication Research
Derek Mavis	MARCH Student	2019 Tool design and assembly (costs covered by in-kind support within SALA)
Parker Albanese	MARCH Student	2019 & 2020 Course redesign and 2020 generation of Miro Boards for Design Media, Studio, and Making activities (COVID-19 response). Team leader.
Sebastien Roy	MARCH Graduate	2018 Diagramming and production. Web asset development (with Kusaka)
Stuart Lodge	MARCH Graduate	2018 Diagramming and production, tool productions. Web asset development (with Kusaka)
Jon Ackerley	MARCH Student	2020 Course redesign support and generation of Miro Boards for Design Media, Studio, and Making activities (COVID-19 response) – (w/Albanese)
Emma Durham	MARCH Student	Assisted with the production of syllabi and research
Alex Preiss	MARCH Student	2018 Diagramming and production, tool productions
Samantha Hart	MARCH Student	2018 SALA Maker Map and Maker Guide – data gathering and production (w/Verbeek)
Neal Quiongyu Li	MARCH Student	Assisted with the production of syllabi and research - 2018 Course redesign
Anna Goodman	MARCH Student	2019 Solar Decathlon application research and outline. Mobile Maker Infrastructure
David Mickeljohn	Graduate	2019 Mobile Maker infrastructure
Amy Wu	MARCH Student	2019 video content production, direction, filming, and finishing (w/Kusaka)
Riley Baechlor	Graduate	2019 & 2020 Thermo-former production

1.5. Courses Reached – *Please fill in the following table with **past**, **current**, and **future** courses and sections (e.g. HIST 101, 002, 2017/2018, Sep) that have been/will be reached by your project, including courses not included in your original proposal (you may adapt this section to the context of your project as necessary).*

The TLEF Initiative impacted a number of courses. Some directly through the design of new lessons. Some indirectly through the generation of new virtual teaching assets and platforms.

Course	Section	Academic Year	Term (Summer/Fall/Winter)
ARCH500-Intro Studio	Four Sections – 48 students annually	2018-present	Fall
ARCH515-Design Media	60+ students	2018-present	Fall
LARC 501	Two sections – 24 students total	2019, 2020, and forward	Fall
Course	**Section**	**Academic Year**	**Term (Summer/Fall/Winter)**
ARCH517-Design Media 2	Four sections – 100 students total (2019) Three sections – 50 students (2020)	2019, 2020, and forward	Winter
ARCH501, 520, 521, 540 – Design Studios	Multiple sections (up to 14 per semester), 12 per section (over 150 students per term)	2019 forward	Fall and Winter
ARCH 502-Introductory Workshop	All MARCHs, 60 students annually	2019-forward	Fall
LARC 511 – Introductory Workshop	ALL MLAs, 30 students	2019-forward	Fall
DES 101 – Introductory Workshop	ALL BDES, 60 students	2020-forward	Fall
ARCH 597-Design Build	Varies – 15 - 30 students per	2019-forwared	Summer
ENDS 320-Design Media	30 students	2019-2020 (ENDS program sunsets, replaced by BDES)	Fall
DES 211-Design Media 1	60 students	2020 – forward	Fall
DES 212-Design Media 2	60 students	2021 – forward	Winter
DES 201, 202, 301, 302, 401, 402 – Design Studios	60 student each	2020 – forward	Fall and Winter
ARCH577 – Advanced Topics in Media	Varies – elective courses built around design media	2020 – forward	Winter, Summer

2. OUTPUTS AND/OR PRODUCTS

2.1. *Please **list** project outputs and/or products (e.g. resources, infrastructure, new courses/programs). Indicate the current location of such products and provide a URL if applicable.*

Product(s)/Achievement(s):	Location:
https://blogs.ubc.ca/salafab/ SALA-Fab web blog organizes tutorials, tool glossaries, tool and room booking (including shops), and other fabrication, making, and building resources.	Online - SALA
ARCH500 – Course redesigned to include lesson focused on TLEF objectives	School of Architecture
ARCH515 – Course redesigned to include specific foundational lessons focused on material logic and making, and architectural material strategies (Sticks, Skins, Solids)	School of Architecture
DES 200 – designed lesson and lectures used in large open enrollment design course	Open Course delivered by SALA
"D-Constructed Map" and "D-Constructed Glossary" https://blogs.ubc.ca/salafab/dconstructed/ Both provide down-loadable and printable pdf files that describe different digital tools, fabrication logics (additive, subtractive, etc.), and terminology. The map attempts to locate tools and shops on UBC's Point Grey Campus.	Online - SALA
Tutorials and support to create safety protocols within the SALA shop.	
Sustainability by Design (ENDS 221) Redesigned lessons for large open enrollment design course.	
https://miro.com/app/board/o9J_kp7zt0E=/ Design Media Kickstart Board – an interactive online resource that introduces all incoming SALA students to tutorials, supplies, support for software use, a list of designers with whom to become familiar, and a short bibliography (added during COVID19)	Online – SALA Built using Miro as platform
Tutorials on physical modelling, photography, and other forms of representation and making.	Online
Shop specific tutorials and workshops offered	Online

2.2. Item(s) Not Met – *Please list intended project outputs and/or products that were not attained and the reason(s) for this.*

Item(s) Not Met:	Reason:
Mobile Cart Infrastructure	Prototypes were designed. Viability of carts questioned, especially when the 2-year undergraduate ENDS program closed and the 4-year BDES began. Architectural infrastructure efforts shifted to converting one of the spaces in Lasserre into a shop-centric teaching space

3. PROJECT IMPACT

3.1. Project Impact Areas – *Please select all the areas where your project made an impact.*

☒ Student learning and knowledge

☒ Student engagement and attitudes

☒ Instructional team-teaching practice and satisfaction

☐ Student wellbeing, social inclusion

☐ Awareness and capacity around strategic areas (indigenous, equity and diversity)

☐ Unit operations and processes

☐ Other: [please specify]

3.1. What were you hoping to change or where were you hoping to see an impact with this project? – *Please describe the intended benefits of the project for students, TAs, instructors and/or community members.*

CONTEXT FOR ANSWER: SALA has seen a shift in how architects, landscape architects, and those working in allied fields execute their work. We see increased interdisciplinary collaboration and digital tool use, and a shift from computerization to computation. These changes have also increased access to fabrication tools and their logics. These forces are transforming offices. They are also transforming architecture pedagogy. SALA faculty saw a need to augment our teaching by presenting opportunities for students to do more hands-on making using digital tools in applied design work. We think integrating these tools and techniques into more of our teaching will really benefit our students.

SALA's goals with this TLEF: To increase access to contemporary fabrication tools and processes for all students in the program. Improve fabrication literacy within the student population and better connect abstract exercises to concrete outcomes. Integrate both traits into student design processes. We hope to see improvement at all points of the program, but especially want to see impact in later semesters, when students are working at a more comprehensive level on design work (considering integrated systems and structures), undertaking hands-on opportunities in design (design-build and fabrication courses for example), and doing independent research. We hope to see a different range and type of employment opportunity for our graduates who have had the advantage of a TLEF informed curriculum.

We are invested in students having the experience of making things and using tools. We want students to connect input (digital models and drawings) to output (fabrication). We want every SALA student to have the chance to actually construct or prototype something at a scale and in a way that makes the design process more tangible. We already have some programs that afford this kind of opportunity.

3.2. Were these changes/impacts achieved? How do you know they occurred? – *How did you measure changes/impacts? (e.g. collected survey data, conducted focus groups/interviews, learning analytics, etc.) Describe what was learned from this process. You are encouraged to include copies of data collection tools (e.g. surveys and interview protocols) as well as graphical representations of data and/or scenarios or quotes to represent and illustrate key themes.*

At the most basic level, we have seen an increase in hands-on lessons that include making and building within the school. This is measured through an assessment of lessons taught within each program and independent design-build projects offered per year. SALA purposefully reworked ARCH500, ARCH515, and ARCH517 to increase opportunities for hands-on making and building at SALA. A specific lesson involving shoes and other found objects was inserted into the sequence. This was published in a peer reviewed paper (see below). 4/5ths of all students who enter our MARCH program pass through ARCH500 and ARCH515 (Core Studio and Design Media 1). This means all were guaranteed a "disassembly and assembly project" as part of their foundational training in their first studio. Design Media 2 (ARCH517) also includes a lesson that is taught using the SALA shops. The last two years have seen an increase in the number of "design-build" opportunities at SALA. The summer of 2021 saw a two-tiered design build that deployed teams in the SALA Shop (largely analog and mechanical tools with some digital fabrication capacity) and the Centre for Advanced Wood

Processing (CAWP), which is a wood-centric advanced fabrication facility in Forestry that includes CNC mills and robotics. Two LARC 503 sections (studios run with 12-15 students each) ran separate design build initiatives. One section of ARCH 520/540 (studio) also ran a design-build program with a Summer 2022 build as an added activity that includes some BDES students. Summer 2022 also has a single build scheduled. All were accomplished with COVID19 restrictions in place. COVID protocol severely hampered our opportunities to pursue hands-on collaborative projects (which typically require a high degree of contact and an external actor or client).

3.3. Dissemination – *Please provide a list of **past** and **upcoming** scholarly activities (e.g. publications, presentations, invited talks, etc.) in which you or anyone from your team have shared information regarding this project. Be sure to include author names, presentation title, date, and presentation forum (e.g., journal, conference name, event).*

The TLEF project, and lessons generated for the TLEF have been presented and published in peer-reviewed papers and conferences:

Blair Satterfield, Daniel Friedman (U. of Hawaii, Manoa), Marc Swackhamer (U. of Colorado, Denver) – "Cadaver as Pedagogy" presented at **The National Conference on the Beginning Design Student** (NCBDS36) *Texas A&M University*, College Station, TX, USA (Presented April 2021 due to COVID 19)

Blair Satterfield, Daniel Friedman (U. of Hawaii, Manoa), Marc Swackhamer (U. of Colorado, Denver) – "Theater of Bodies: Cadaver as Pedagogy" presented at **American Collegiate Schools of Architecture (ACSA) 2019 Fall Conference** – Less Talk | More Action: Concious Shifts in Architectural Education, *Stanford University*, Stanford, CA, USA (Sept 12-15, 2019)

Blair Satterfield - "Liminal Learning: Teaching building and fabrication in, outside, and around the classroom." Full paper presented at **The National Conference on the Beginning Design Student** (NCBDS35), The College of Architecture and Planning at the *University of Colorado Denver*, Denver, CO, USA (March 14-16, 2019)

4. TEACHING PRACTICES – *Please indicate if **your** teaching practices or those of **others** have changed as a result of your project. If so, in what ways. Do you see these changes as sustainable over time? Why or why not?*

My teaching has evolved to include more hands-on material lessons in my course structure. This is most evident in the design of these lessons to include more students. This includes establishing lesson sequences that build skill, interest, and capacity within students in early phases, and lead to more involved and robust opportunities for making and building in later lessons (within a single course) and later courses (as students move through the programs within SALA.
Many faculty have joined in this ambition (when appropriate to their course content).

This is sustainable (as evidenced by the efforts by the school to improve shops and shop access and to increase the number of staff available to students).

5. PROJECT SUSTAINMENT – *Please describe the sustainment strategy for the project components. How will this be sustained and potentially expanded (e.g. over the next five years). What challenges do you foresee for achieving the expected long-term impacts listed above?*

NOTE: The following items are initiatives and efforts related to the TLEF effort in that they can be traced to more robust engagement on the part of SALA faculty and staff to increase opportunities for Integrated Design Learning through Building and Making @ SALA. The reorganization of curriculum and other teaching assets is the tangible and identifiable mission of the TLEF effort. A related effort is improvement and expansion of the infrastructure required to deliver these lessons. The efforts listed below have been positively impacted or emerged from a cultural shift at SALA. The TLEF has helped usher in that shift.

1) One related outcome of the TLEF effort is an increased focus on our making and building infrastructure by SALA leadership. This has led to SALA upgrading and reorganizing its own holdings to improve access to leading-edge digital design tools & skill-building opportunities. These upgrades are necessary if SALA is to increase opportunities for hands-on training and design training through making and building.

   Included in this effort has been the hiring of two new staff members who co-manage the shops and shop infrastructure. There are now three people working in our shops.

2) A second effort to expand our capacity (outside our space-strapped holdings on campus in Lasserre, McMillon, and the Annex) is the creation of the **Digital Design & Fabrication Lab** (DD&FL). The DD&FL is a joint CHBE / SALA / Dean's Office proposal for a building expansion in the CHBE courtyard intended to benefit all APSC programs. The proposed expansion will be purpose-built and equipped to: create a unique learning and training environment that will foster professional development and creative complex design capacities in APSC students; provide significant footprint for SALA to deliver the high caliber fabrication space required to maintain accreditation & their position as a world-leading architectural school; offer a soft infrastructure test-bed opportunity to advance of the larger Applied One concept; and add flexible long-term net-new space to the Faculty's portfolio.

3) A third effort is underway at Lasserre. This involves the conversion of Room 9 (the old reading room for the School of Architecture) into a materials library and teaching/learning space for shop and materials related activities. A proposal is in the works for this project.

One of the primary challenges in the next five years are related to money and reestablishing the making culture at SALA post COVID19.

- Design Build and hands-on making and prototyping is expensive. It requires materials, tool access, and, at the scale of architecture and landscape, coordination and consultation with external groups. UBC SALA has worked over the past five years to build relationships with the Point Grey Campus and entities outside the university to generate opportunities to build pavilions and small buildings. This takes time, commitment, and resources.
- Time is also an issue. Project timelines are not predictable and they do not map cleanly over semester calendars. These activities also require focus extra to the requirements of a professional degree. The school of architecture is working at a curricular level to create a second path through SALA, one that extends the program one year to build in a "Design Build" option for students who are able to engage it. This demonstrates a commitment to IDLMB@SALA, at the individual, course, and curricular level.
- Culture. One real consequence of COVID19 has been the suspension of in-person, in-shop, and in-field learning at SALA. This has created a continuity gap for the program. Expertise in making and building is

learned from faculty, but also through student collaboration and engagement. We have a three-year gap (roughly equivalent to one generation of students) in the in person component of our curriculum. We will need to rebuild this cultural component of our mission.