Enhancing Diversity Through Design Education: A Mixed-Methods Case Study of the Development of a Design-Learning Tool for Minority Youth

By

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ABSTRACT

Design-focused research has shown how diversity-related considerations are central to the design process; yet and still, racially minoritized individuals are largely absent from the field of professional design. Such existing disparities in racial representation are not due to a shortage of potential designers of color, rather a lack in access to design education and resources within racially minoritized communities. With this in mind, this study highlights and disrupts the minimal focus on design education within communities of color. In addition to enhancing diversity within the design industry, expanding the reach of design education is also beneficial students' personal development. Grounded in the notion that teaching design thinking aids individuals in building key skills that translate to a variety of situations beyond design, this thesis explores the development and application of a design toolkit and programmatic model which aims to facilitate design education in focal communities. Minorities' Opportunity to Learn Design (MOLD) is an equity-driven platform that delivers a physical and digital experience to design thinking and learning. Using an exploratory sequential approach, this mix-methods case study examines the development and application of MOLD in real-world settings. The study's hypothesis asserts that providing design access and resources to racially minoritized students will increase their awareness of design, perceived value of design, and knowledge of the design thinking process. The findings of this case study support the research hypothesis, as the results indicate that awareness and perceived value of design increased among participants' after their interactions with the MOLD design-learning platform.

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CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

The initial impetus for this project stems from my personal journey into the field of design. Despite my ability to grow into a competent designer, I have always felt behind the curve with regard to design-related skills. Like many students of color, my limited knowledge of design can generally be attributed to a lack my awareness of the field and the multiple career options made possible by studying design. This notion, coupled with the benefits I received from an education driven by design-thinking, are largely what compelled me to question the accessibility of design education among minority students. When the term minority is used throughout this study, it is used to identify the underserved and marginalized groups in America, as defined by race or ethnicity. In this study, the term minorities include people of African American descent and people of Latinx descent who often originate from underserved communities.

Due in part to the United States (U.S.) inability to perform well on international student assessment as compared to other industrial countries, many educators and policymakers posit that the country is in need of educational reform. In fact, data from the *Trends in International Mathematics and Science Study* (TIMSS) (2015), shows how the U.S failed to rank among the top ten countries in mathematics or science achievement. Further, as the country continues to grow, so does the education achievement gap between minority students and their counterparts. “For a brief time during the mid-1970s, the college attendance rates for Whites, African Americans, and Latinx were equivalent. Unfortunately, as investments and resources for urban and rural education were substantially reduced in the 1980s, the gaps in student outcomes began to increase again” Howard (2017, p.74). If the United States ever wants to close the education achievement gap in this country and those situated in the top ranks of student achievement, change is required within the education system as a whole, and a specific focus on minority students learning is required.

Many design scholars believe design-based learning can play a role in educational reform efforts as teaching design and design thinking to all students can help them build key skills that apply to life beyond design. Design-related skills such as critical thinking, working collaboratively, and being able communicate your ideas are essential to success and personal development. These same skills are tools that many minority students may lack as a result the disparities in access and awareness surrounding design-based education. With this in mind, the purpose of this study is to examine the creation and application of a design tool and program model that aims to enhance knowledge and awareness of design principles and professional possibilities among minority students and educators who serve within marginalized communities. Moreover, this research employs an exploratory mix-methods sequential research approach to study user engagement. According to Creswell (2014, pg, 44):

> "In the exploratory sequential approach, the researcher first begins with a qualitative research phase and explores the views of participants. The data are then analyzed, and the information used to build into a second, quantitative phase. The qualitative phase may be used to build an instrument that best fits the sample under study, to identify appropriate instruments to use in the follow-up quantitative phase, to develop an intervention for an experiment, to design an app or website, or to specify variables that need to go into a follow-up quantitative study. Particular challenges to this design reside in focusing in on the appropriate qualitative findings to use and the sample selection for both phases of research."

1.2 CONCEPTUAL FRAMEWORK

This study is grounded in a transformative worldview, a paradigm that places emphasis on the non-inclusive nature of traditional research approaches and seeks to advance knowledge in a manner that disrupts inequality among marginalized populations (Creswell, 2014).

Anchored in such transformative notions, this research posits that the lack opportunities and exposure to design-based learning experienced by minority students is largely driven by systemic inequities in education, and can be remedied through intentional, race-conscious interventions.

Many individuals from minoritized racial and ethnic backgrounds experience a variety of personal, social, and economic obstacles that can drastically impact their career goals and opportunities. Furthermore, many of the educational institutions in the United States are brimming with inequality issues that often leave minority students at a disadvantage relative to their majority counterparts. “Schools serving large numbers of low-income students and students of color have larger class sizes, fewer teachers and counselors, fewer and lower-quality academic courses, extracurricular activities, books, materials, supplies and computers, libraries and special services (Darling-Hammond., 2004).” Issues such as disparate educational funding, lack of career awareness, and systemic abandonment of predominantly minority-school systems, can severely affect both short-term and long-term student outcomes. This phenomenon of not providing design-based education opportunities to minority students has contributed to the lack of professional designers of color and has hidden a powerful tool from a community of people that could directly benefit from knowledge of design-related careers and the benefits of design thinking.

A primary goal of this research is to examine the issues surrounding the lack of diversity in the design professions and create a design tool to help overcome many of the obstacles minorities face in pursuing design education and careers. The current study focuses on evaluating the development, implementation, and assessment of a design toolkit for minority students. The overarching research framework utilized in this study is an exploratory sequential mix-methods approach. The method was chosen because “researchers choose to use an exploratory design when they need to first explore a phenomenon qualitatively before they can measure or test it (Plano-Clark, et al., 2008. p.1544).” The purpose of this framework was to first

qualitatively explore the benefits of design-based education and the education needs of minority students. Exploratory mix methods design “is often used when developing an instrument and is an essential aspect of the overall study (Creswell et al., 2004).” These qualitative discoveries will be used to develop a design tool that is tested through quantitative analysis. This study design allowed for the collection of both qualitative and quantitative information using expert interviews and surveys as the main tools to gather data and facilitate analysis of the MOLD platform’s impact on design-based learning. The research sequence for this study is depicted in Figure 1.

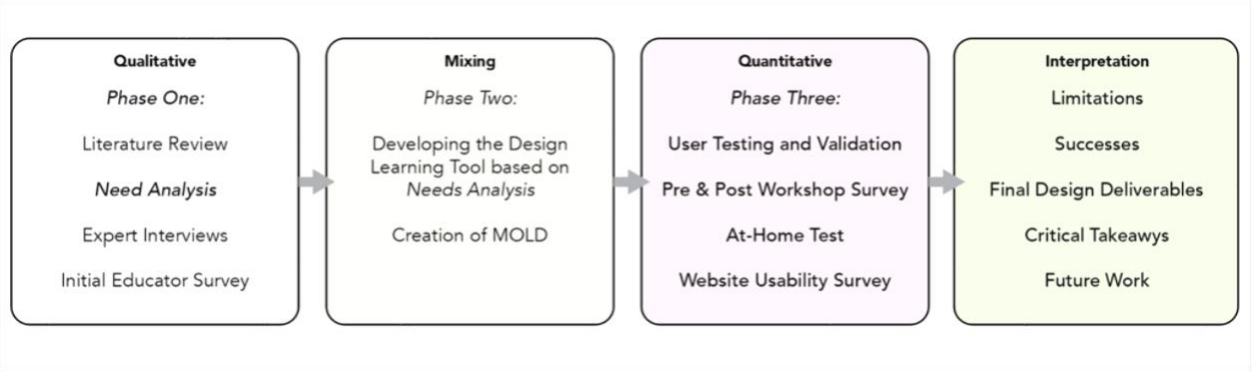


Figure 1 *Research Methodology Sequence*

1.3 SIGNIFICANCE OF STUDY

This study is significant as it addresses the need to provide students and educators in underserved communities with a tool to help close equity gaps in design education. This research hypothesizes that doing so will ultimately yield more awareness of design-related professional opportunities and increase the perceived value of design learning principles. This study employs a mixed-methods case-study methodology that explores how design and design-thinking can be introduced to minority students. A major aim of this research is that this case study will provide empirical evidence and inspiration for other professionals in the design field searching for practical resources to close the diversity equity-gap. This study also contributes to

the design-education literature-based by helping to close the gap in published work on diversity in design education.

CHAPTER 2: LITERATURE REVIEW

2.1 LACK OF MINORITIES IN DESIGN PROFESSION

The racial and ethnic demographics of the United States are ever-changing, as the *U.S. Census Bureau* (2015) projects that the size and composition of the U.S. population will cause the nation to become more diverse than ever before between the years 2022 and 2060. Yet the field of professional design remains encumbered by a legacy of demographic homogeneity with regard to racial identity. Professional designers spend their lives creating for society and listening for feedback and despite the field's creative and ubiquitous nature, racial and ethnic representation has not evolved to match the current and future demographic reality.

As a result of the nation's shifting demographics, it is imperative that the field of design works to become more representative if ever to meet the needs of the those served through design innovation. In 2014, Antoinette Carroll stated, "diversity in design means diversity of experience, perspective and creativity, otherwise known as diversity of thought" Diversity of thought is essential to the creation of accessible services and products that serve the needs of all mankind. Further, data collected from a *2018 U.S. Department of Labor* report of 983,000 designers shows that the percentage of total employed African American designers is 5.7%. The same report reveals that just 11.3% of the total employed design workforce identifies as Latinx.

2.2 DESIGN INDUSTRY BARRIERS FOR MINORITIES

Mitchell-Powell and Miller (1991) published an *AIGA* essay titled, *Why is graphic design 93% White?*, which postures the specific barriers that have kept minorities out of the graphic design industry. Mitchell-Powell and Miller argue that the strongest barriers are minority students are due to a lack of access to resources. They went on to explain how fear, guilt, stereotypes and "good old boys" network has led to ignorance in the hiring process. Mitchell-

Powell and Miller also discussed the lack of design role models, and awareness to design as a profession also attribute to the lack of minorities in design.

Nearly 30 years later, this research remains relevant as many of these barriers continue to prevent underserved minorities from studying design. Throughout the country's history, underserved minority communities have constantly been burdened by lack of access, resources, and opportunity. These barriers to access and resources have denied minority students of career opportunities, creative development opportunities, and the ownership of their ideas. Data from *Adobe's Creativity's Diversity Disconnect* (2017) research indicates that "young creatives of color are twice as likely to perceive a lack of access to tools and training as a significant barrier".

Outside of the issue of access remains additional social factors that serve as barriers to design education such as bias and systemic exclusion. According to Myrold (2017), these factors "stall women and people of color and homogeneity prevails, impacting the work we produce and the advancement of our (design) industry".

2.3 IMPORTANCE OF DIVERSITY IN DESIGN PROFESSION

According to the *Bureau of Labor and Statistics* (2019), nearly 80 percent of professional designers identify as white. However, the diversity problem in design is not solely comprised of problems with numerical representation as Carroll (2014) asserts that the diversity problem also includes a "lack of diverse opportunities, mentors and public awareness—which leads to apathy, insensitivity and even discrimination". To remedy this issue, the design process for products must include diverse experiences; however, that is not possible due to the dearth in designers of color. Furthermore, diversity is essential within the design industry because of the way the design process works. Diversity within design promotes innovation, as homogeneity often fails to breed new ideas, while the convergence of unique and diverse experiences and knowledge often does.

2.4 MINORITY DESIGNERS' JOURNEY MAP

Walker (2016) has published much research on the process underserved minorities take to enter design related fields. Walker's (2016) heavily cited *Design Journey Map* contains four color-coded passages that overlapped with career competency components that aim to simultaneously cultivate the soft skills and hard skills youth need to learn along the journey to a design career. Her research details the journey to become a designer and can serve as basic principles of many potential solutions for closing the diversity gap in the design industry. The development of the foundation stage shown on Figure 2 represents the primary focus in this study.

Figure 2 *Design Journey Map. Walker (2016)*

2.5 DESIGN-BASED EDUCATION PHILOSOPHY

A design-based education can help all students; however, it can be especially beneficial to minoritized groups. The design thinking process is often characterized as "a powerful methodology for innovation" which "is human-centered and simultaneously uses diverse points-of-view in problem solution" (Steinert, & Leifer, 2011 as cited in Luka, 2014. p.1) In educational spaces, this type of framework is often referred to as design-based learning or design-based pedagogy.

Design-Based Pedagogy

According to Royal (2017), Design-based Pedagogy (DBP) is an “educational environment with instructional scaffolds that allow students to solve problems through the practice of design. It encompasses a learning environment that allows educators to teach design to non-designers” (p.2). The researcher posits that DBP has five main attributes. The first attribute of this pedagogy is the audience, that primarily exists for non-designers. The second attribute discussed was the challenges, these are projects that open-ended and exist in a context that extends beyond the classroom. The next attribute focuses on teamwork to allow the students to work primarily in interdisciplinary teams. The fourth attribute of the DBP is practice in which the students problem solving process is driven by principles that designers typically engage in. The last main attribute of the DBP focuses on creativity which is the desired outcome of this philosophy.

In classrooms that use a design-based pedagogy, students are expected to exhibit the behaviors of designers in order to solve problems. Additionally, a collaborative group effort is often made to accomplish the work at hand. DBP is a flexible approach that can exist within an educational course, a workshop, or may even serve as the basis for an entire curriculum. Moreover, Design-Based Pedagogy is also highly contextualized because students work on real-world challenges. When compared to other well-known educational frameworks, DBP proves to be “robust” and provides a “learning environment that invites students to practice design in order to explore and expand the boundaries of their creativity” (Royalty, 2017. p.2)

2.6 BENEFITS OF DESIGN-BASED EDUCATION

Teaching design to non-designers has been stated as a way to increase innovative and creative thinking. A design-based education creates environments that invite students to develop their critical thinking skills, creativity as well as their confidence, and grit.

Carroll et al. (2010) claims that “design thinking is an approach to learning that focuses on developing children’s creative confidence. Students engage in hands-on projects that focus on building empathy, promoting a bias toward action, encouraging ideation, and fostering active problem solving. Using one’s imagination is central” (p. 38). The author also argues that teaching design-based thinking through a design-based education offers a tremendous tool that can be used in various situations and professions. Further, Owen (2005) highlights the many other benefits of learning design thinking such as enhanced ability to visualize, being conditioned for inventiveness, gaining the ability to use langue as a tool and developing a bias toward adaptivity.

2.7 EDUCATION NEEDS OF MINORITY STUDENTS

Throughout the last few decades many researchers have documented many of the unique learning characteristics of minority students. “The persistence of the educational achievement gap imposes on the United States the economic equivalent of a permanent national recession” (McKinsey & Company 2009, 6).

In 1987, William B. Johnston hypothesized that “without substantial adjustments, Black and Hispanics will have a smaller fraction of the jobs in the year 2000 than they have today, while their share of those seeking work will have risen” (p.114). Sadly, their dismal vision of the future has come true, as racial disparities within the the design field remain quite significant. In *Key Issues in Minority Education,* Cross et al. (1989) addressed four major themes that are still prevalent today: 1) Legal access for minorities; 2) Access and retention of minority faculty and staff; 3) Access and retention of minority graduate students; and, 4) The role of standardized testing in the admission of minority students. This literature is important because it demonstrates how racial minorities have struggled with access to professional spaces for many years. In recent years the study of culturally-responsive teaching pedagogy that uses “the cultural characteristics, experiences, and perspectives of ethnically diverse students as conduits

for teaching them more effectively" (Gay, 2002). This ideology, developed by Ladson-Billings (1994), has emerged as a prominent way to approach educating minority students. Within this type of learning environment, teachers are now facilitators for student engagement and assist students in achieving course success by redesigning curriculum to embrace the cultural uniqueness students bring into the classroom. According to Woodley, Hernandez, and Parra (2017), "Culturally responsive teaching is all about educating the whole person. By providing comprehensive and multi-dimensional learning opportunities, instructors create dynamic activities that foster student engagement" (p.473).

2.8 SUMMARY OF LITERATURE REVIEW

The review of literature helps set boundaries for the development of this research case study. Prior work from design scholars supports this study's major suppositions, specifically the lack of minorities in design profession, the importance of diversity in the field of design, and barriers to enhancing diversity within the field. This literature review was also used to formulate and develop a list of minority educational needs to reviewed by educators that work primarily with minority student populations later in the process. Those needs include: 1) Students working together. 2) Critical thinking. 3) Rich complex curriculum. 4) Engagement and competitiveness. 5) Ability to impose order on chaotic data. 6) New standards on assessments.

CHAPTER 3: RESEARCH METHODOLOGY

To facilitate the exploratory sequential approach, the research first began with a qualitative phase to determine the education needs of minority students and the benefits a design-based education. In phase one or the needs analysis phase, qualitative data was gathered through minimally structured expert interviews conducted in a conversational style over the phone. Participants were recruited using snow-balling techniques. The interviews were recorded and transcribed and then coded to identify themes that would later serve as guidelines to facilitate the design of the tool. The next three phases of research are illustrated in Figure 3.

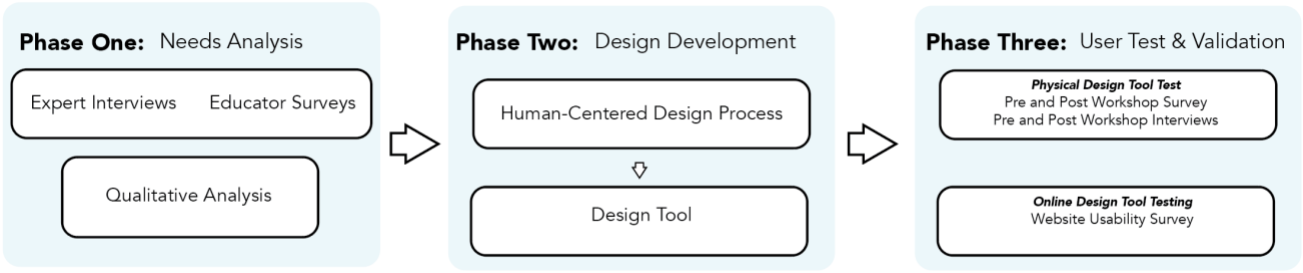


Figure 3 Research Study Methodology

Online surveys with educators that work primarily with minoritized student groups were also conducted. Relying on the list of needs identified through prior research, these surveys were used to gain further knowledge of students' educational needs as observed by active classroom educators. The participants for this test were found through recruitment on social media platforms. Following the needs analysis, a prototype design tool was made based on the themes developed from phase one. This design tool would be tested with minority students, educators, and designers in phase three.

In phase three of the study, the final prototype design tool was tested with users at the Hall Center for Education in Aldine during a design workshop guided by the researcher. The

racial and ethnic demographic make-up of the educator's classroom fit the demographics of this study's focus. Workshop participants completed a before and after survey about their design awareness and their perceived value of design. Their reactions and feedback about the prototype design tool were recorded through both qualitative and quantitative responses. The participants' teacher was also interviewed to collect their feedback on the physical design tool experience. In response to a demand for stay at home learning activities, a slight pivot was made to focus on the at-home and online experience of the design tool. The "at-home" adaptability for the physical design tool was tested by a participant, under the supervision of their parent. The recruitment strategy for the participants in the at-home test was through social media and word-of-mouth.

In the last stage of phase three the online experience of the design tool was tested by conducting a website usability survey. There were three different versions of the online usability survey. The first survey targeted minority students, the second survey targeted educators, who work with primarily minority students, and the third survey targeted designers. These participants were also recruited through word-of-mouth and social media platforms.

3.1 NEEDS ANALYSIS FOR MINORITY STUDENTS AND DESIGN TOOL

During the needs analysis phase, the researcher relied on data collected through two experts for interviews to help determine the direction of the design tool. Interview one was with a Houston-based entrepreneur that created a non-profit organization to teach design thinking techniques to entrepreneurs. Interview two was with a Ph.D. student in the Educational Policy and Planning program in the College of Education's Department of Educational Leadership and Policy at the University of Texas at Austin. His research focuses on K-12 educational leadership preparation, the role of principals, and school improvement. **T**he responses from these interviews helped develop guidelines for the design tool. These interviews were transcribed and then coded and recoded before being put into groups that lead to three themes that were incorporated into the development of the design tool.

The initial educator survey for the needs analysis was conducted with nine educators, three of which have over six years of experience working with minority students. The responses from this survey were used to validate the minority education needs found throughout the literature review.

3.2 EXPLORING THE VIABILITY OF THE DESIGN LEARNING TOOL

After the needs analysis phase was complete, prototypes for the design learning tool or (DLT) were developed based on themes created by the expert interviews. Several iterations of the physical and online experience of the design learning tool prototypes were made. Initial revisions were made to the prototypes through personal testing conducted by the researcher until the final design was ready to test with the student participants. The testing and validation phase of the physical experience of the DLT were executed during a workshop that lasted 90 minutes at the Hall Center of Education in Aldine, Texas. Before the workshop began the eight student participants were asked to take a survey about their current design awareness and perceived level of value of design. Once the workshop began the participants were given an introduction to the design and design thinking process through videos created by the researcher. Next, the participants received verbal and written instructions as to how to use the prototypes. The design learning tool challenge options were presented, and the participants were instructed to break up into groups based on the challenge they chose. During the workshop they were asked to record their design thinking process and journey through the workshop in the student notebook that is included in the DLT. At the end of the workshop, the participants completed an exit survey which served as a tool to collect their feedback about the workshop and the changes in their perceptions about design.

The pre-workshop survey asked the participants a series of questions pertaining to them self and their knowledge of design and design thinking. In the post workshop survey, the

participants were asked another series of questions to analyze changes in the participants' awareness and value of design. The researcher also gathered information about the participants' desire to continue learning about design or any changes that should be made to the DLT. The questions that were asked in the pre workshop survey is shown in Table 1 and the questions asked in the post workshop survey are asked in Table 2.

Pre Workshop Survey Questions
Name, Age, Gender and Zip Code?
What is your favorite item you own? And why?
Would you rather read or watch a video to learn something new?
Have you ever designed anything on your own?
Would you rather work individually or in groups?
Do you know what design means?
On a scale from 1-10, how valuable is design to you?
On a scale from 1-10, how well do you currently know the design thinking process?
Do you believe design is useful?
How many design careers do you know about?
Are you interested in learning more about design?

Table 1 Pre Workout Survey Questions

Post Workshop Survey Questions
Has your definition of design after participating in the MOLD workshop? If so, please write your new definition?
On a scale from 1-10, how valuable is design to you?
On a scale from 1-10, how well do you currently know the design thinking process?
How many design careers do you know about?
Are you interested in learning more about design?
How well do you understand the MOLD IT design thinking process on a scale of 1-10?
Can you list the MOLD IT design thinking steps?
Do you believe the MOLD IT process is useful to bring your ideas to life?
How much did you enjoy the MOLD sneaker workshop on a scale 1-10?
What was your favorite thing you learned about during the MOLD sneaker workshop workshop?
Would you do the workshop again for a different product?
Is there anything you would change about the workshop?

Table 2 Post Workout Survey Questions

Approximately 24 hours after the workshop was conducted, the researcher interviewed the educator of the student participants from the Hall Center for Education in Aldine to ask their thoughts on the effectiveness of the DLT. Questions about MOLD's impact on students and if MOLD could be incorporated into a school's curriculum were also asked.

MOLD At-Home Test

With a recent surge in the need for distance learning options resulting from the Covid-19 Pandemic, a heavier focus was placed on the at-home experience of the design learning tool. This experience was tested with participants that were found through word-of-mouth. The DLT workshop was facilitated by the parent for the participant without the researcher involved. This test was completed in three hours spaced over a three-day period. An over-the-phone interview was used to collect information on their experience working with the DLT The questions asked during the interview are detailed in Table 3 on the following page.

Student Participant Interview Questions	What did you learn during the workshop? Do you feel like the toolkit had everything you needed to complete the workshop? Would you do the workshop again? What did you think about the MOLD IT design thinking process? Were you able to follow that process easily? Do you think learning that process could help you bring your ideas to life? Is there anything that you would change about the workshop? Were the workshop instructions easy to use? Was the shoe easy to put together?
Parent Particpant Interview Questions	How was the design workshop workshop a quality learning experience for your son (participant)? What type of things do you feel like he learned? How much would you say you helped him during the workshop? Did the MOLD tool have all the necessary items needed to complete the workshop? Would you recommend this program? Anything that you would like to add about the MOLD design tool or workshop experience?

Table 3 *Questions for Interview with Participant and Parent of At-Home"Test*

Usability Test

The online experience was designed with the same principles in mind as the physical version. To test and validate the online experience, three separate usability tests were conducted on the website by educators, designers and students between the ages 10-16 to test the online experience. They were asked to examine the online experience of the DLT for five minutes, then answer the questions to the usability test. The questions asked during the usability test are presented below in Table 4.

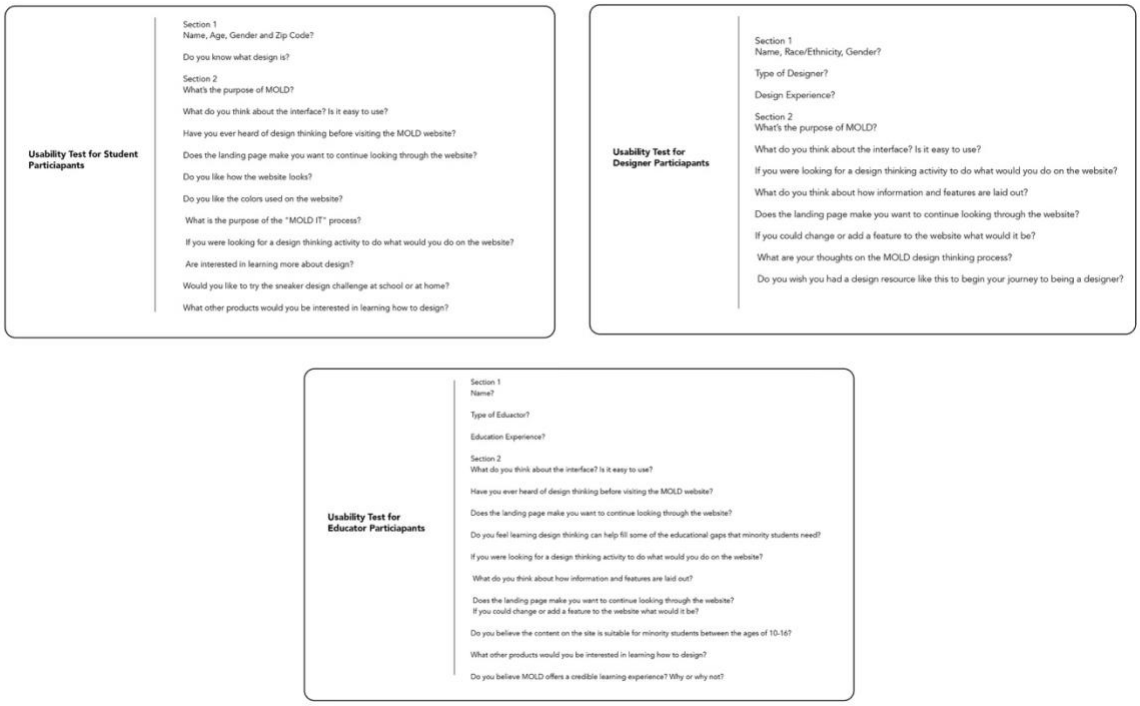


Table 4 *Usability Test Questions for Educators, Students, and Current Designers*

CHAPTER 4: RESULTS FROM NEEDS ANALYSIS FOR DESIGN LEARNING TOOL

4.1 EXPERT INTERVIEW ANALYSIS

Coding analysis was done to identify themes to serve as guidelines for the design learning tool. Codes were created after transcribing and annotating the interviews. Special codes were highlighted. Special codes were selected if there were seen throughout the literature review or educator survey responses. Frequency of the codes and special codes were taken into consideration when developing categories. These categories were then integrated in three main themes that needed to be considered through the creation of the DLT , 1) Learning to think, 2) Culture and humanity, 3) Access to profound experiences. The process of translating the codes found during interviews into themes is displayed in Table 5. The research tools used and responses collected during phase one are displayed in Appendix A.

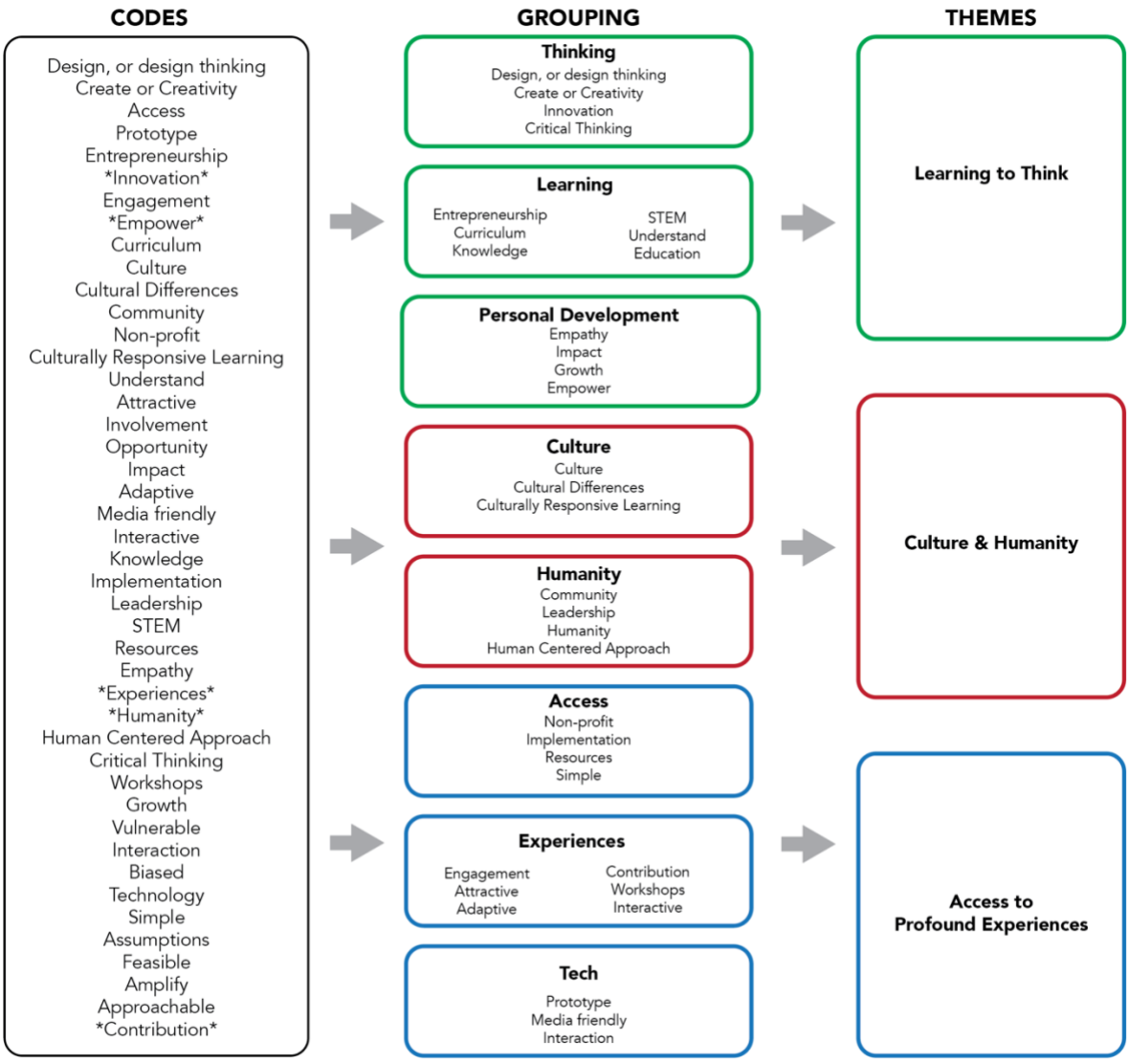


Table 5 *Analysis of Expert Interviews*

4.2 THEMES FOR DESIGN LEARNING TOOL

Learning to Think

It is well known that the current model of education stems from the industrial revolution, this factory mindset attributed to the lack of thinking skills many minority students develop. In traditional classrooms, students sit in rows to learn and regurgitate what their instructor tells them to. During expert interview B the participant stated “One of the biggest key issues that I've

noticed is we're not allowing our students to be creative thinkers in the education process" (2020). This lack of dedication to critical and creative thinking skills in the classroom leaves minority students unengaged on the average school day. "We're not allowing them the opportunity to design and to create something that's going to have an impact on personal impact on them and the spaces in which they occupy" James also explained. Since many of the current education frameworks do not leave room for this type of educational and personal development it is in our societies best interest to implement a system that allows from building creative and critical thinking skills. The development of these skills will be a priority of the development of the DLT to empower minority youth with a process to solve complex problems.

Culture & Humanity

Some believe good design can save the world. This belief stems from the human-centered approach of the design that IDEO made popular. The company defines it as "a creative approach to problem solving… it's a process that starts with the people you're designing for and ends with new solutions that are tailor made to suit their needs" (IDEO, 2020). Although saving the world is quite optimistic using a design centered approach has infiltrated a wide array of professions and industries. The following was stated in an interview A:

> "I ran across the human centered design toolkit. This may have been 10 years ago now and I was doing it as research and looking for methodologies to kind of streamline how I was doing the work that I was doing. I realized it's something I could use every day and then as I started progressing with that work, and I realized this is something that I wish I had much earlier in my life. And so what I decided to do was while I'm actually pursuing my entrepreneurial Pursuits. I decided to go ahead and put together some framework to actually start educating people on how to use this process to develop."

Employing a human centered design approach within the DLT will ensure the participants focus is on bettering a community. It would start to develop a feeling of empathy within the users. Focusing on this approach will give the user the opportunity to create something that could make a difference in another person's life.

While it’s important to recognize how much all humans have in common, it is also crucial that we celebrate our differences as well. Culture is intertwined into the fabric of everyone’s life. It influences their moral values, their perspectives, and their dreams and ambitions. “There are cultural differences when you speak to someone coming from a similar background. It's easier to connect so you have to get past that trust barrier easier.” John Jenkins stated in his interview. Culture is what ties people together and the better you can relate to a student, the easier it's for them to open up exchange knowledge. The minority students' culture must influence the overall direction of the tool otherwise they won't engage with it.

Access to Profound Experiences

It can be said that the lack of access to knowledge and opportunity for underserved minority communities are tied to racial tensions and social injustices that have always been prevalent in America. This is why access is so important. You cannot fall in love with something you have never experienced. In interview B, it was explained “one thing that I love about UT (University of Texas at Austin) is that you can take design thinking workshops. However, these workshops are really expensive, you are looking at like seven hundred to a couple thousands of dollars for these workshops.” The cost of associated with such workshops are just one more barrier to access for minoritized groups who often come from low-income backgrounds. Many minority students face the struggle of figuring out their dreams let alone trying to figure out how to finance it. It is the same with design, the opportunity to learn design skills is far and few between. A leap to change the current educational framework to a more design driven approach is appropriate, because it will give access to design skills that were hidden from minorities for decades. In interview B the following was said:

> “Nobody remembers the handout that they did where they had to answer fifty plus questions. "Nobody remembers the times they had to read out loud in class, unless you’re me and had stuttering problems. So, what are the memories that we are creating in schools that students will remember and that they would cherish and take on with them…that’s where design

thinking comes in; it allows them to have the opportunity to develop a meaningful interaction with education."

Providing a profound experience was one of the biggest goals of the DLT. Homing in on this will ensure the tool is effective at maintaining engagement with the participants.

4.3 INITIAL EDUCATOR SURVEY

This survey was conducted by the research with nine different educators who work primarily with underserved minority youth to see if the educational needs of minority students found in literature are accurate. These findings will serve as the pillars to constructing the design tool as well. Lack of critical thinking skills and access are the most consistent themes and are represented in Figure 4.

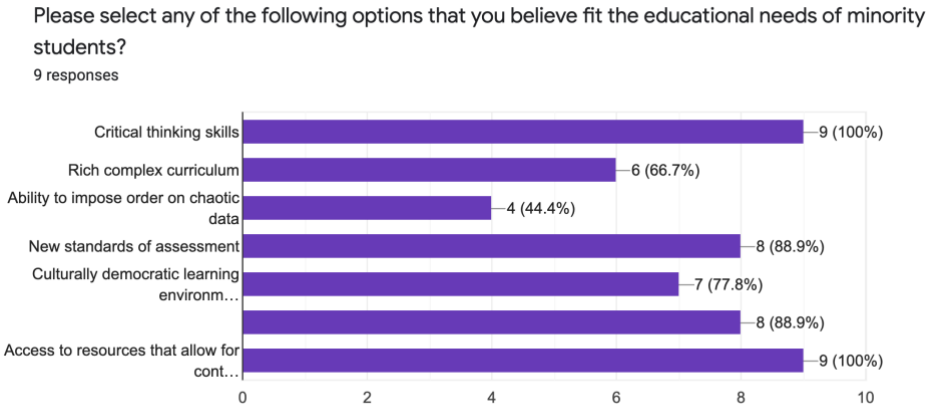


Figure 4 *Responses to the Minority Education Needs Derived from Literature*

The educator participants were are also asked what they believed were some of the education needs of minority students. Many of the survey responses had the common theme of lack of assess. One of the participants stated, "There is an educational need for access to technology, financial resources to fund post-secondary education, and representation of their communities in subject interests." Another participant said, "I believe majority of the students' I worked with lacked support and access to resource. Let alone the school I taught at itself lack

accessible resources. So a lot of our students' were behind in every aspect of education." The need of personal development and new methods for assessment were also described by this participant, "A lot of the minorities that I work with need social/emotional learning. When they aren't equipped with coping skills then it's hard for them to learn things such as critical thinking skills or how to work in groups."

Focus for Design Learning Tool Development

The expert interview participants were asked for their ideas of how and why they believe implementing design education can benefit underserved minority students. Educators were also surveyed to gauge if the educational needs of minority students aligned with what was found in the literature review. From there interviews themes for the DLT were determined through coding methods. Those themes*: Learning to Think*, *Culture and Humanity*, and *Access to Profound Experiences,* along with the educational needs of minority students are the focuses for the DLT.

CHAPTER 5: “MOLD” DEVELOPMENT AND DESIGN APPROACH

The goal of this project was to develop a design learning tool or platform that would provide design awareness and value to underserved minority youth. These prototypes must provide access to a profound learning experience. This experience must force the user to think critically, and with empathy. Therefore, the primary approach to creating the DLT was to incorporate their educational needs of minority students into a workshop. This workshop will combine their culture in a learning system that embodies a human centered design framework. The following considerations were identified and served as the foundation of the ideation and prototyping phases of the design process. The research tools used and responses collected during phase three of this study are displayed in Appendix B.

5.1 DESIGN CONSIDERATIONS

Problem-Centered Curriculum

Based on the expert interview responses developing the design learning tool’s curriculum is a vital part of delivering a credible learning experience to the participants. This DLT will employ a problem-centered design curriculum because it puts emphasis on teaching students how to identify a problem and try to figure out solutions to the problem. In this type of curriculum the participants will be exposed to real-life issues, which should help them develop skills like critical thinking. Tracking the engagement of the student and how effectively they present their research and prototype will serve as a means of assessment.

Adaptable

Based on the expert interview responses the DLT experience must be adaptable in the manner of being able to be delivered in person or online to increase accessibility. The DLT must be adaptable in the manner of being able to be completed at school or at home.

Feasible Access to Profound Experience

Based on the expert interview responses the DLT experience must be feasible in the manner of providing the necessary tools that are needed to excel in the learning experience. The DLT must be feasible in the manner of cost affordable to underfunded school systems and underserved communities.

Culture-Driven

Based on the expert interview responses the DLT experience must be culture-driven in the manner of making the content relevant based on the life experiences of the participants.

5.2 DESIGN PROCESS

Ideation

The primary goal of the initial design phase of this study was to create a DLT that provided quality yet inexpensive and adaptable learning experience. The end goal for this DLT is to live both physically and digitally.

Access to Design Learning

MOLD an acronym for a minorities opportunity to learn design. MOLD is an initiative focused on providing design resources to under-served minority populations through a problem-centered learning curriculum. The design learning tool or DLT will be referred to as MOLD throughout the remainder of this study. MOLD was developed to provide design learning access, resources, opportunities and value to minority students. These four pillars will serve as the foundation to the MOLD experience.

Adaptable Learning Experience

One of the design challenges this project faced was to develop a learning experience based on a problem-centered design curriculum. The focus was design the experience to serve the educational needs of minority students. The design learning experience must be adaptable enough to be implemented in different settings. This process was displayed in Table 6 on the next page. Student and teacher handbooks were developed to guide the participants along the desired process to reach these goals.

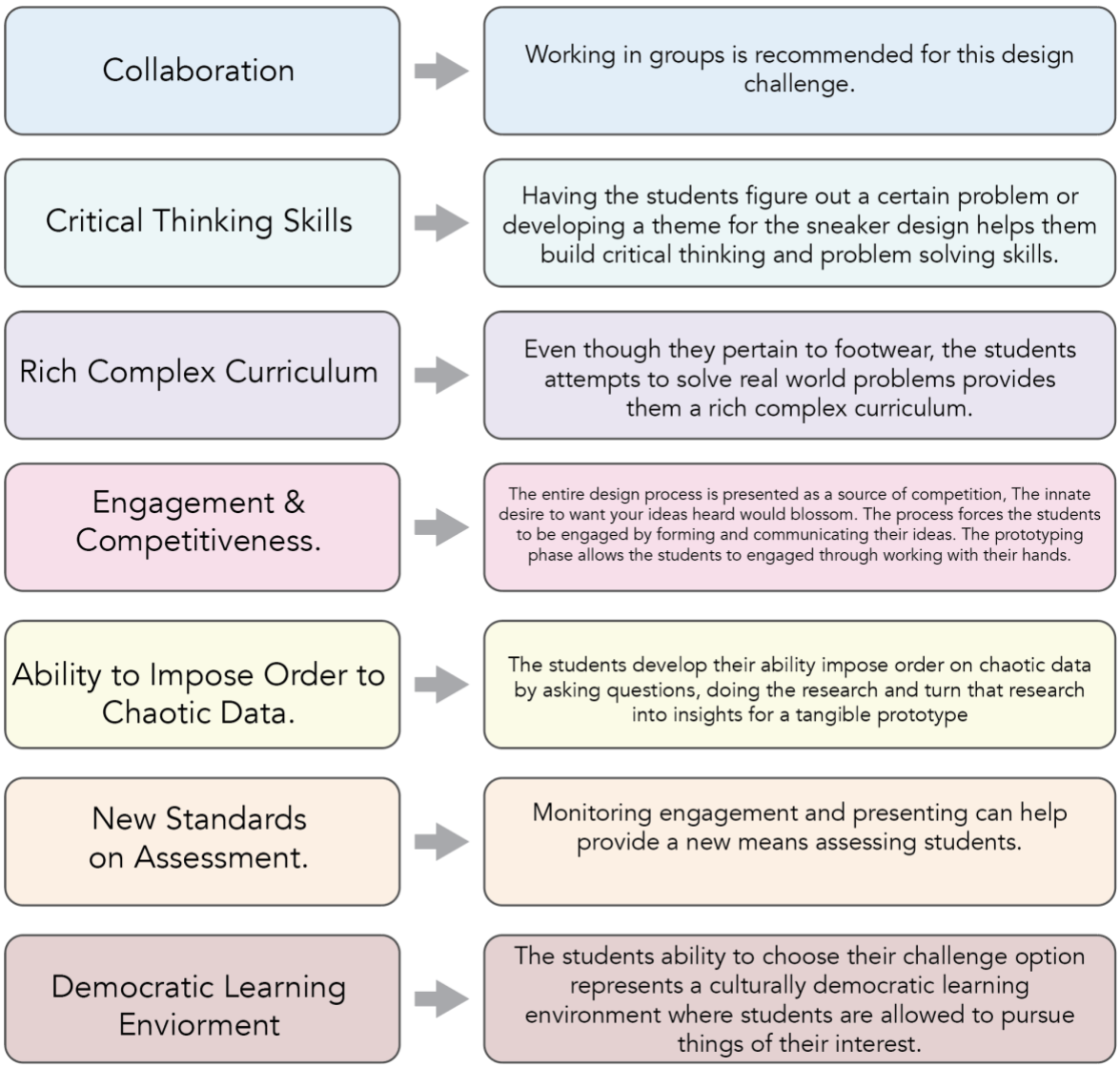


Table 6 *Comparing Education Needs of Minorities to Goals of Design Learning Tool, aka MOLD*

Culture-Driven Integration

To bring in the culture element, the MOLD's initial challenge focused footwear design. Sneakers and urban minority culture have been integrated for over 40 years. Launching the initial challenge as a sneaker will help explain design with products that most of the participants already know about.

Video Content

The integration of video content was also vital to developing the learning experience. The current culture of content revolves around video and story-telling. A video to explain the theory of design was created and edited by the researcher to serve as introduction.

MOLD's Physical Experience

The ideation process for the physical experience of the MOLD consisted of a combination of building simple models with cardboard, foam core, tape, and other inexpensive materials to build mock-ups to be explored. The first prototype for the physical DLT utilized recycled products found in the University of Houston's Industrial Design Graduate studio. These products included: bubble wrap, tape, denim, upholstery foam, waxed string, and duct tape. Using miscellaneous material could allow for more adaptability, but it could also sacrifice the control the instructor has over the workshop. Images from this process are displayed in Figure 5.

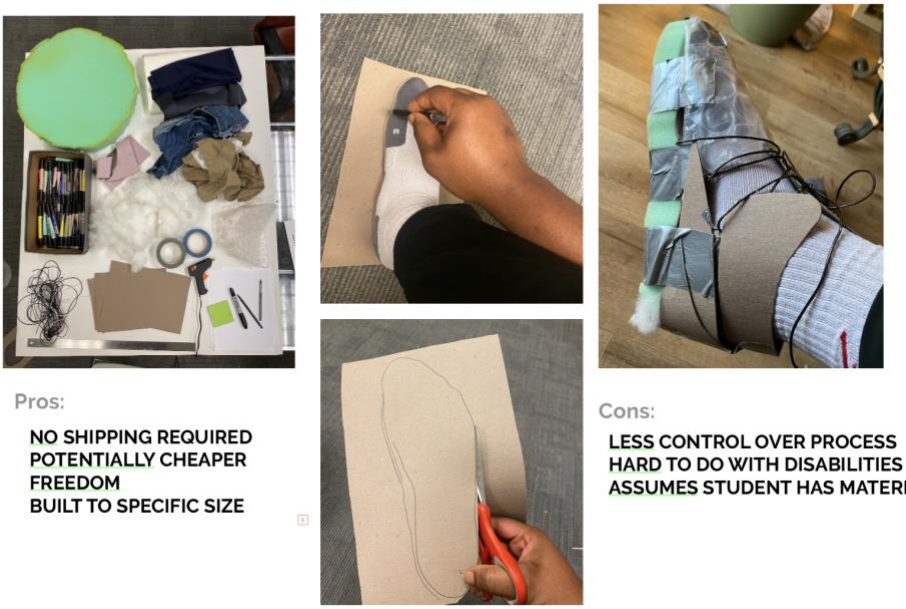


Figure 5 *Prototype One "Random Materials"*

The next part of this ideation phase focused on more of a structured approach to the DLT experience. The structured approach allows more control and direction in the process, allows for anyone to participate even with certain disabilities, and it ensures the participant has the needed tools to complete all tasks. Figure 6 and Figure 7 illustrate the process of designing a more structured prototype.

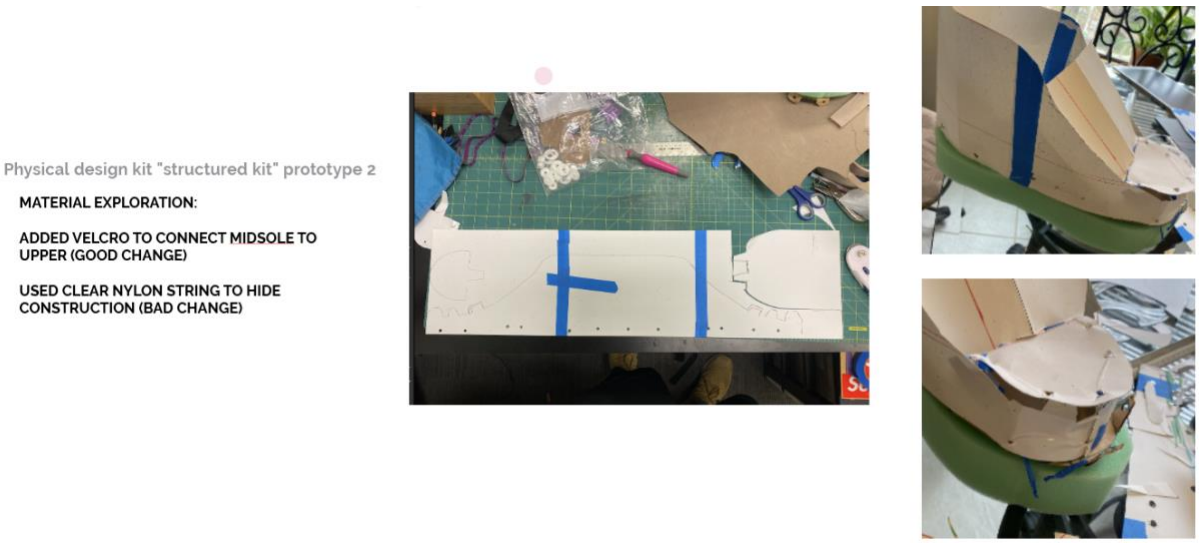


Figure 6 *Prototype Two "Structured Materials"*

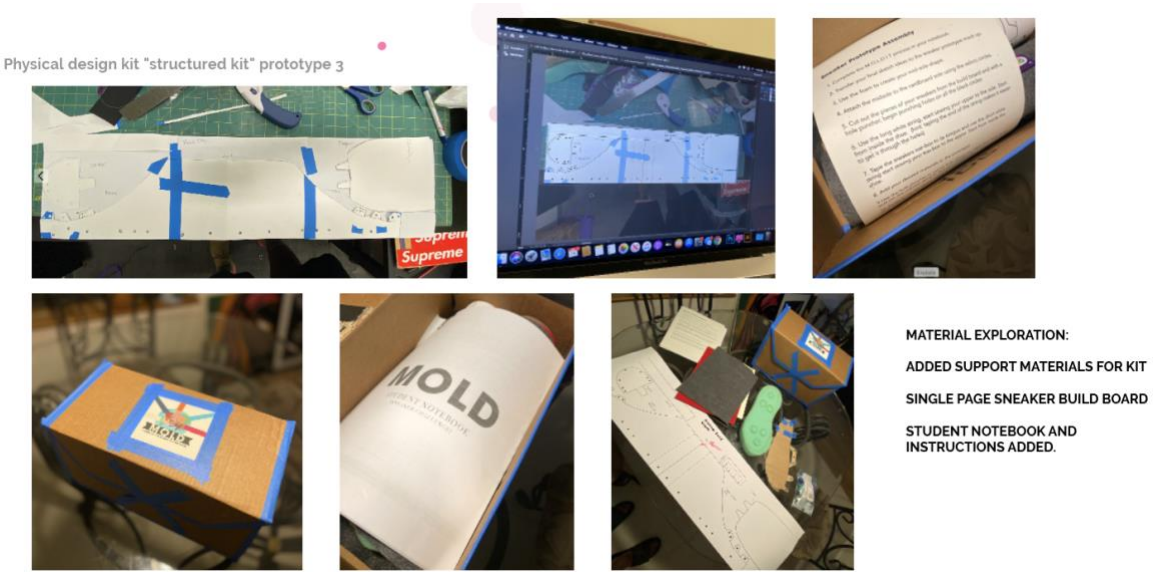


Figure 7 *Prototype Three "Structured Materials"*

Although the structured kit would introduce another overhead cost to launch the DLT, it was believed that it would provide a better overall learning and engaging learning experience for the participants. Along with the physical prototype design. The desired physical experience for MOLD is displayed in Figure 8.

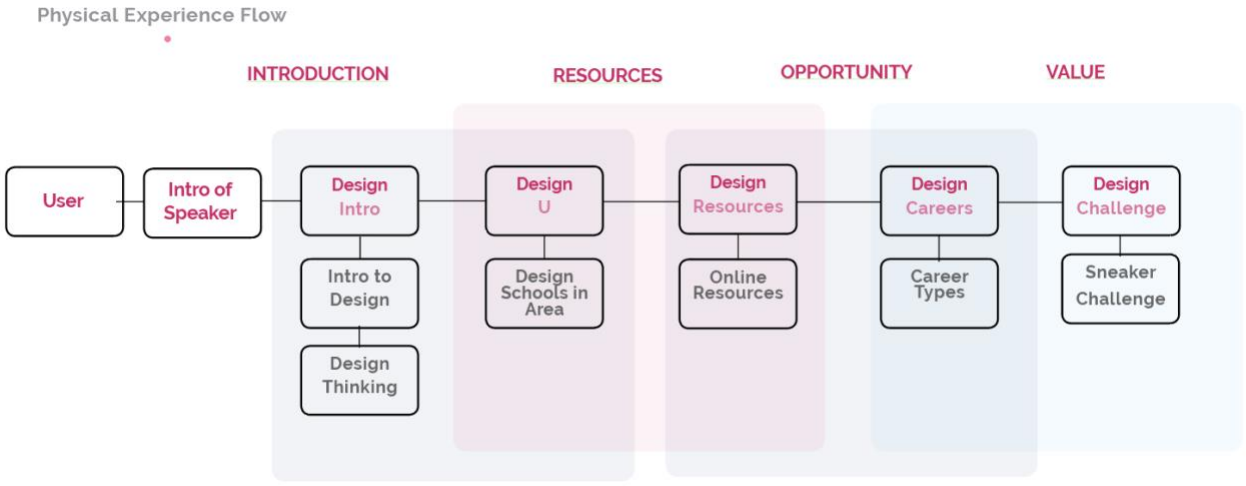


Figure 8 *Desired Physical Experience*

MOLD Online Experience

The ideation process for the online experience of the MOLD consisted of a combination of wireframing with sticky notes, testing different web hosting platforms, video editing, and curating design resources to build an online experience worth being consumed. The online experience was designed using information architecture principles published by Adobe in 2020.

The online design approach centered around the inquiry: How can MOLD deliver design learning content in a fun, coherent and interactive way? Since this will serve as an educational platform user research first targeting people who work to educate minority students to develop the content requirements. Then, user personas were created through this interview process. Next, market research was done on different online educational platforms that target a similar demographic shown in Figure 9.

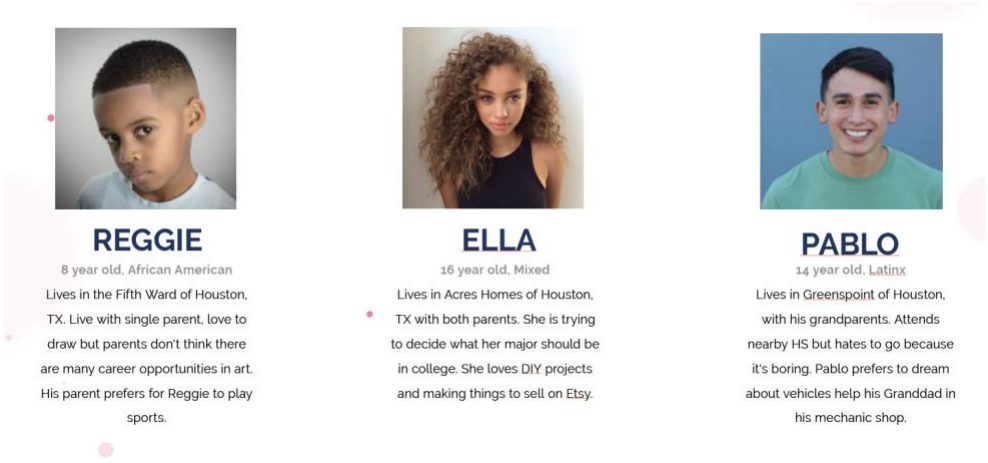


Figure 9 *User Personas for Design Development*

The goal of MOLD is to give minorities access to the power of design and design thinking through education, and resources. The goal of the experience aligns with this. Before the website layout was constructed the MOLD's content was inventoried and audited. The content was evaluated in terms of value that it provides for users which helped create a hierarchy of information for the website. Next the content was grouped and labeled to

investigate any potential relationships between the content. This relationship is presented in Figure 10 shows the priority of each section of content.

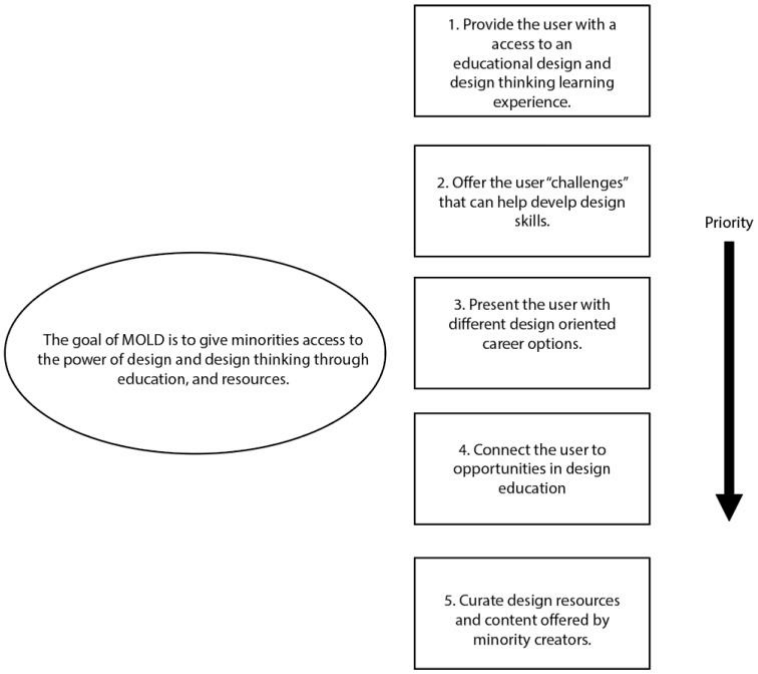


Figure 10 *Priority of Content Delivery for MOLD Online*

The grouping of content gave insight into what to begin labeling and how to prioritize navigating the content delivery. From there wireframing was done based on that content navigation insight. This part of the process' goal is to create a visual representation of a layout for online experience of MOLD that is seen in Figure 11 on the following page.

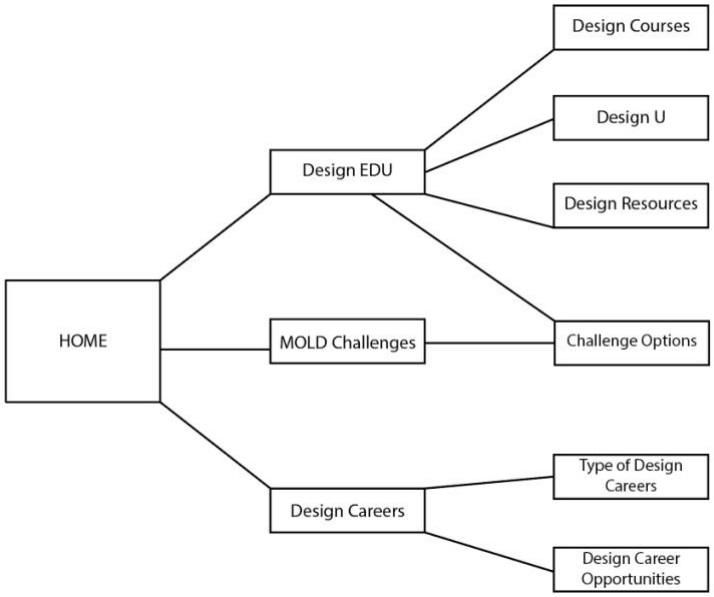


Figure 11 *Information Architecture for MOLD Online*

5.3 MOLD PROTOTYPE

After several iterations the final design for the physical and digital experience were solidified and ready to be tested. The MOLD prototype has several parts that work cohesively together. Introductory design courses, design challenge, and a design thinking framework branded MOLD IT were created for the platform.

MOLD IT Process

MOLD IT is the framework to teach the design thinking process to underserved minority youth developed for MOLD. The design process includes simplifying the human-centered design process into steps that are easier to consume. This process is represented in Figure 12 served as a foundation to developing the content of the design tool.

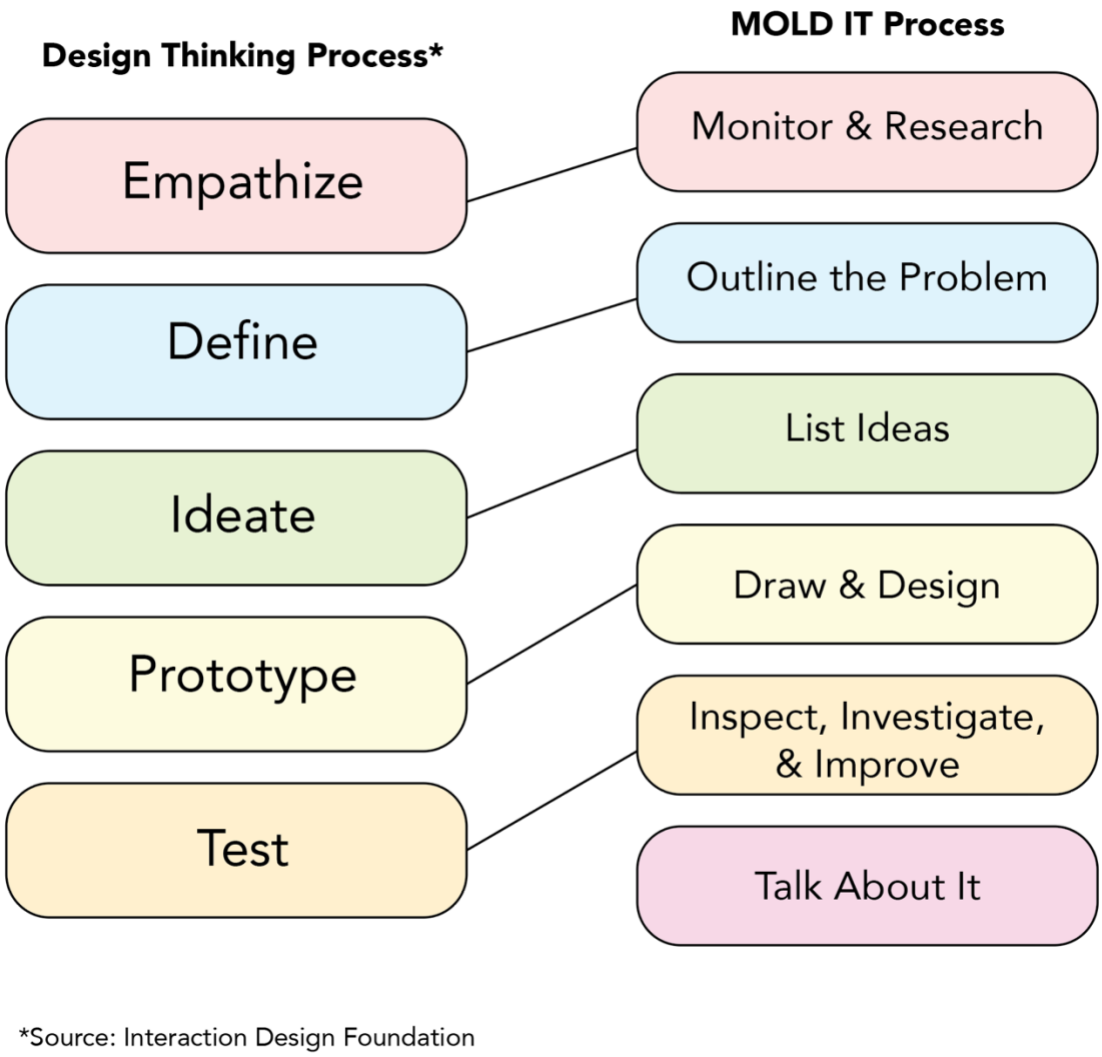


Figure 12 *MOLD IT Design Thinking Framework*

Design Courses

MOLD's design thinking courses give underserved minority students access to gain a design thinking approach for innovation and developing ideas. Introductory courses focused on "What is Design?" and "MOLD IT Design Thinking Process" The design course will be

implemented during presentation during the physical experience testing and offered in digital experience through an online course.

Design Challenges

MOLD's design thinking challenges are developed using a problem-solving framework to get students thinking, while solidifying their collaboration, and building skills. The initial MOLD design challenge focused on footwear design. The design challenges will be implemented during the physical experience testing. Handbooks that serve as lesson plans and guides were created to model the MOLD IT process.

The challenge offered three options to themes tied to creating the shoe to provide the user with a culturally democratic learning environment. The challenge options focused on real world problems. Option one was science and anatomy based; it asks the user to create a shoe prototype for a person with missing digits on their foot. The second option focused on business and branding. This option asks the user to create a shoe for someone looking to start a shoe company inspired by animals. The last challenge option allowed the user to freestyle their prototype based on a theme the user comes up with.

Student Handbook

The student handbooks were designed with the MOLD IT framework in mind. This handbook takes the user through the entire MOLD IT process and sets the foundation for the building the shoe prototype. Figure 13 represents a snippet from the MOLD student handbook. It can be seen in entirety in Appendix A. This handbook and lesson were reviewed and revised by a Ph.D. student in the Educational Policy and Planning program in the College of Education's Department of Educational Leadership and Policy at the University of Texas at Austin.

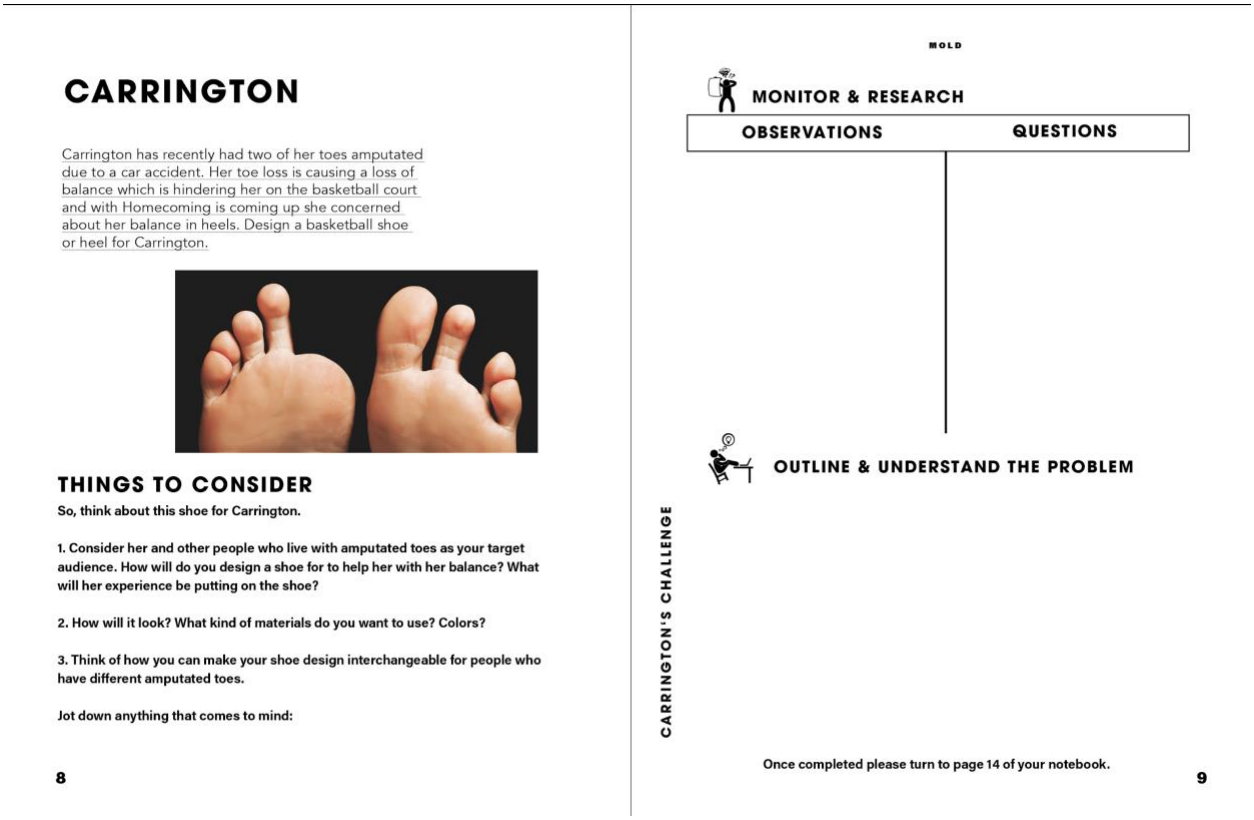
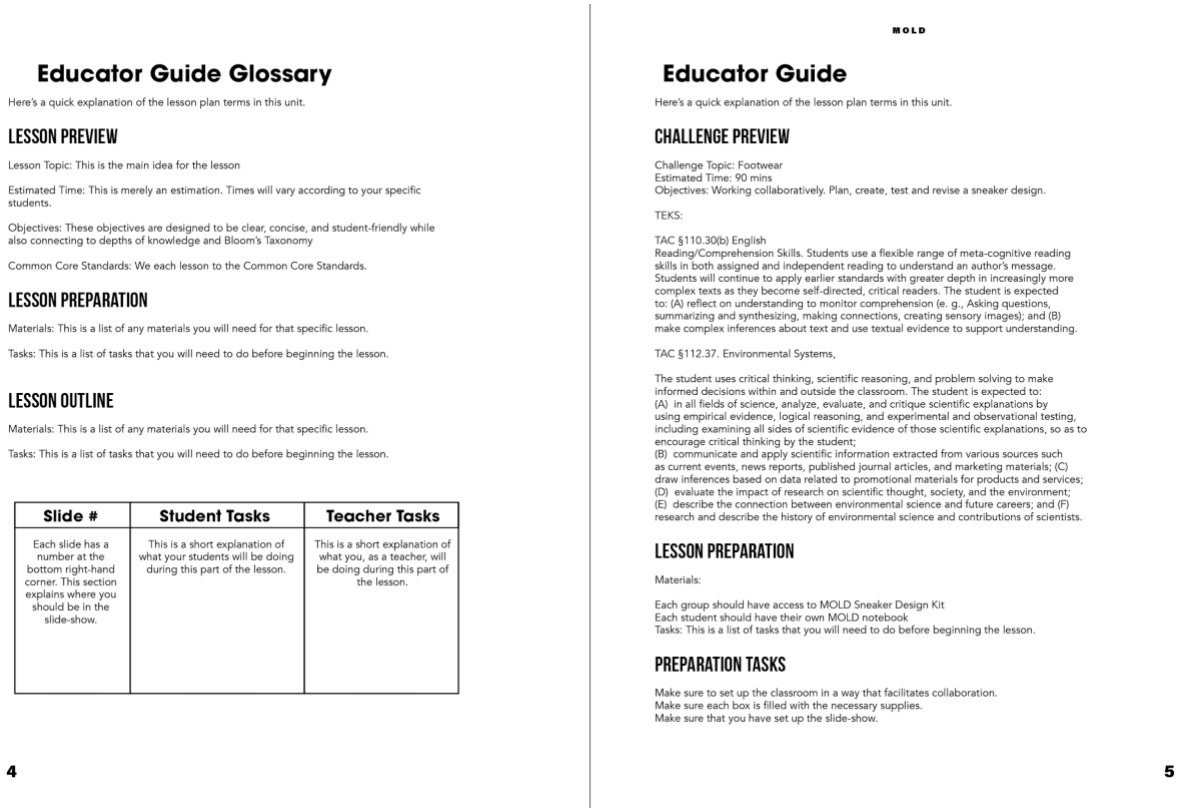


Figure 13 *MOLD Student Handbook*

Educator Handbook

The educator handbooks were designed as a step by guide for the workshop facilitator. This handbook takes the user through the objectives of the lesson and the state assessment goals that are achieved through completing the workshop. What is displayed on Figure 14 is an excerpt from the MOLD educator handbook. It can be seen in entirety in Appendix D. This handbook and lesson were reviewed and revised by a Ph.D. student in the Educational Policy and Planning program in the College of Education's Department of Educational Leadership and Policy at the University of Texas at Austin.



Educator Guide Glossary

Here's a quick explanation of the lesson plan terms in this unit.

LESSON PREVIEW

Lesson Topic: This is the main idea for the lesson

Estimated Time: This is merely an estimation. Times will vary according to your specific students.

Objectives: These objectives are designed to be clear, concise, and student-friendly while also connecting to depths of knowledge and Bloom's Taxonomy

Common Core Standards: We each lesson to the Common Core Standards.

LESSON PREPARATION

Materials: This is a list of any materials you will need for that specific lesson.

Tasks: This is a list of tasks that you will need to do before beginning the lesson.

LESSON OUTLINE

Materials: This is a list of any materials you will need for that specific lesson.

Tasks: This is a list of tasks that you will need to do before beginning the lesson.

Slide #	Student Tasks	Teacher Tasks
Each slide has a number at the bottom right-hand corner. This section explains where you should be in the slide-show.	This is a short explanation of what your students will be doing during this part of the lesson.	This is a short explanation of what you, as a teacher, will be doing during this part of the lesson.

4

MOLD

Educator Guide

Here's a quick explanation of the lesson plan terms in this unit.

CHALLENGE PREVIEW

Challenge Topic: Footwear
Estimated Time: 90 mins
Objectives: Working collaboratively. Plan, create, test and revise a sneaker design.

TEKS:

TAC §110.30(b) English
Reading/Comprehension Skills. Students use a flexible range of meta-cognitive reading skills in both assigned and independent reading to understand an author's message. Students will continue to apply earlier standards with greater depth in increasingly more complex texts as they become self-directed, critical readers. The student is expected to: (A) reflect on understanding to monitor comprehension (e. g., Asking questions, summarizing and synthesizing, making connections, creating sensory images); and (B) make complex inferences about text and use textual evidence to support understanding.

TAC §112.37. Environmental Systems,

The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:
(A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;
(B) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials; (C) draw inferences based on data related to promotional materials for products and services; (D) evaluate the impact of research on scientific thought, society, and the environment; (E) describe the connection between environmental science and future careers; and (F) research and describe the history of environmental science and contributions of scientists.

LESSON PREPARATION

Materials:

Each group should have access to MOLD Sneaker Design Kit
Each student should have their own MOLD notebook
Tasks: This is a list of tasks that you will need to do before beginning the lesson.

PREPARATION TASKS

Make sure to set up the classroom in a way that facilitates collaboration.
Make sure each box is filled with the necessary supplies.
Make sure that you have set up the slide-show.

5

Figure 14 *MOLD Educator Handbook*

Physical Experience Prototype

The structured process of the design tool was refined to be a more attractive, and engaging experience. After testing various materials through the build process these materials posted below Figure 15 were selected to be included into the design tool.

Contents of Design Tool Prototype

Student Notebook.*	Paper & Cardstock.	Four Fabric Sheets of Various Colors.
Sneaker Build board. *	Mechanical Pencil.	Pipe Cleaners.
Chipboard Sole Connector. *	30" Black or Green Shoe String.	Clear Tape.
25" White Cotton String.	Foam Midsole.	Single Hole Puncher.
	Velcro Connectors.	Glue Stick.

*Unique to MOLD **Cost Per Design Tool = $6.47**

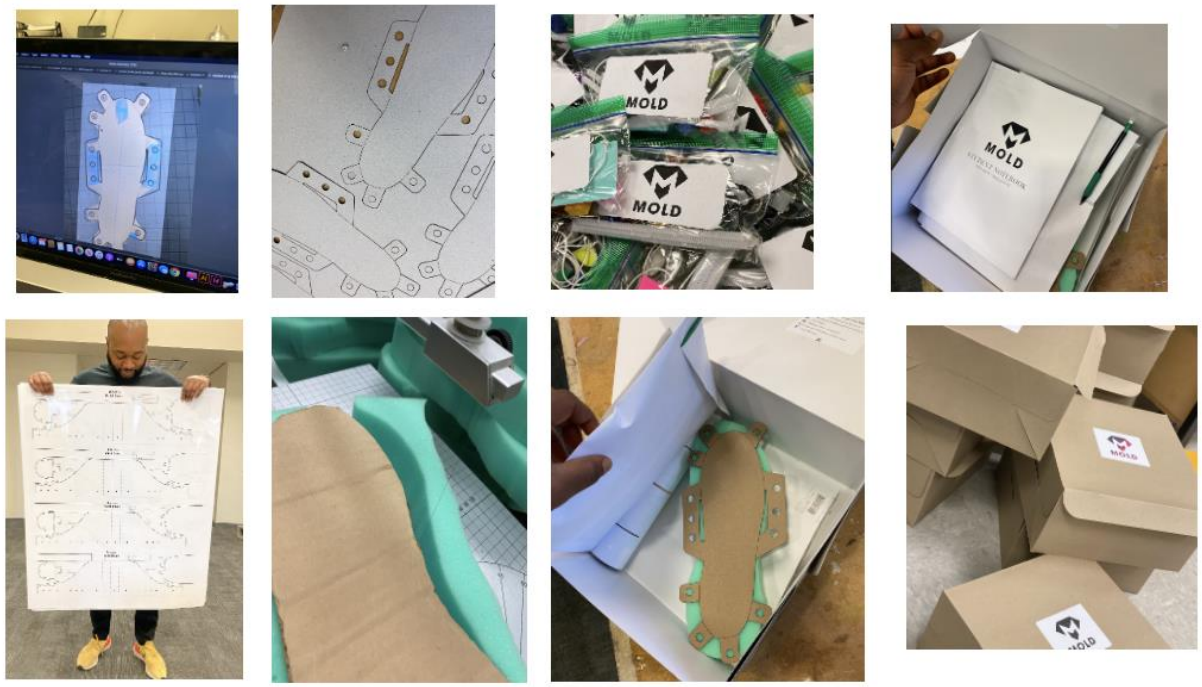


Figure 15 *Contents of the MOLD Physical Design Tool*

Online Experience Prototype

MOLD's online experience was developed through focusing on giving design access and resources to minority students. The website utilized a clean aesthetic that emphasizes the content on the page. Figure 16 represents the desired online experience wanted for MOLD.

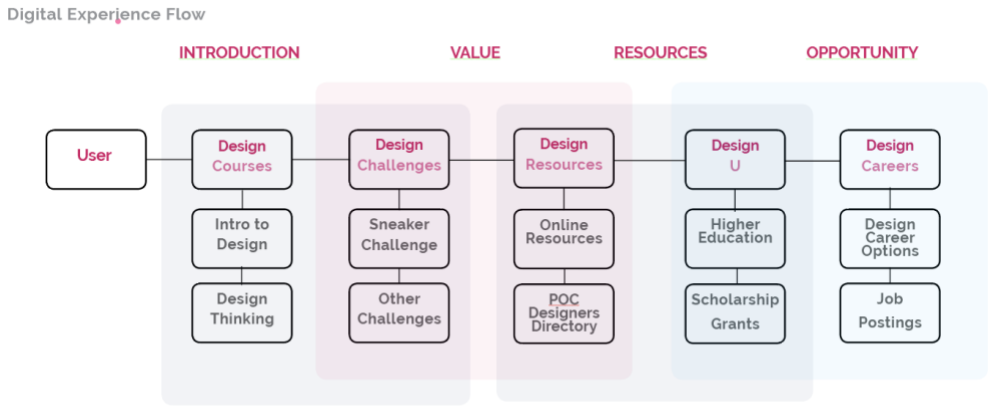


Figure 16 *Desired Online Experience Flow*

Accent colors are a subdued palette of primary colors to be non-gender specific. The MOLD landing page employs a hero video of the design workshop to entice the user to continue on through the website. The initial layout of the MOLD online experience is shown in Figure 17.

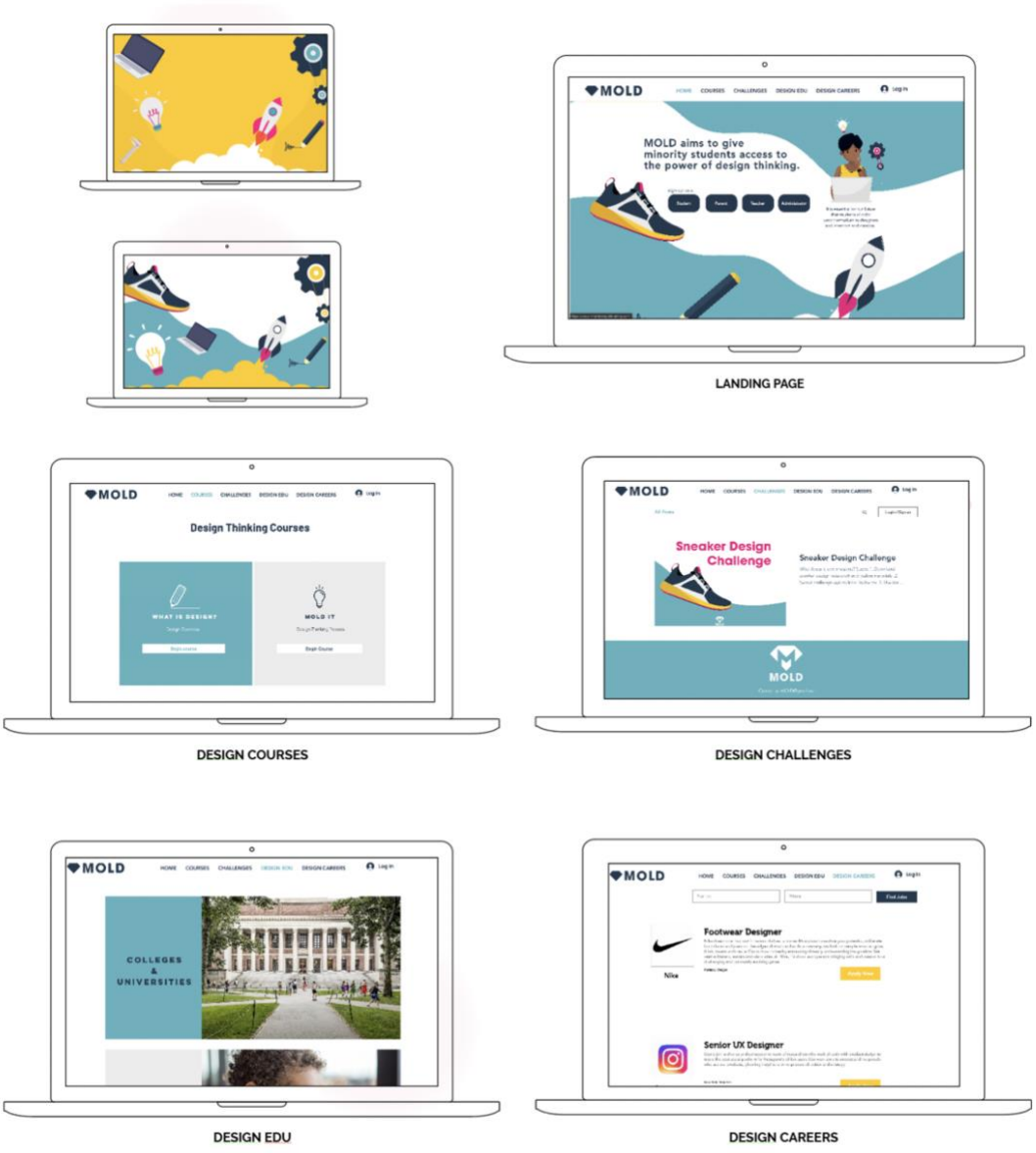


Figure 17 *Initial MOLD Online Prototype*

For the second online prototype a different website builder was used. Along with a more simplified approach that focused more on aesthetic and user interaction. The second online experience for MOLD is presented in Figure 18.

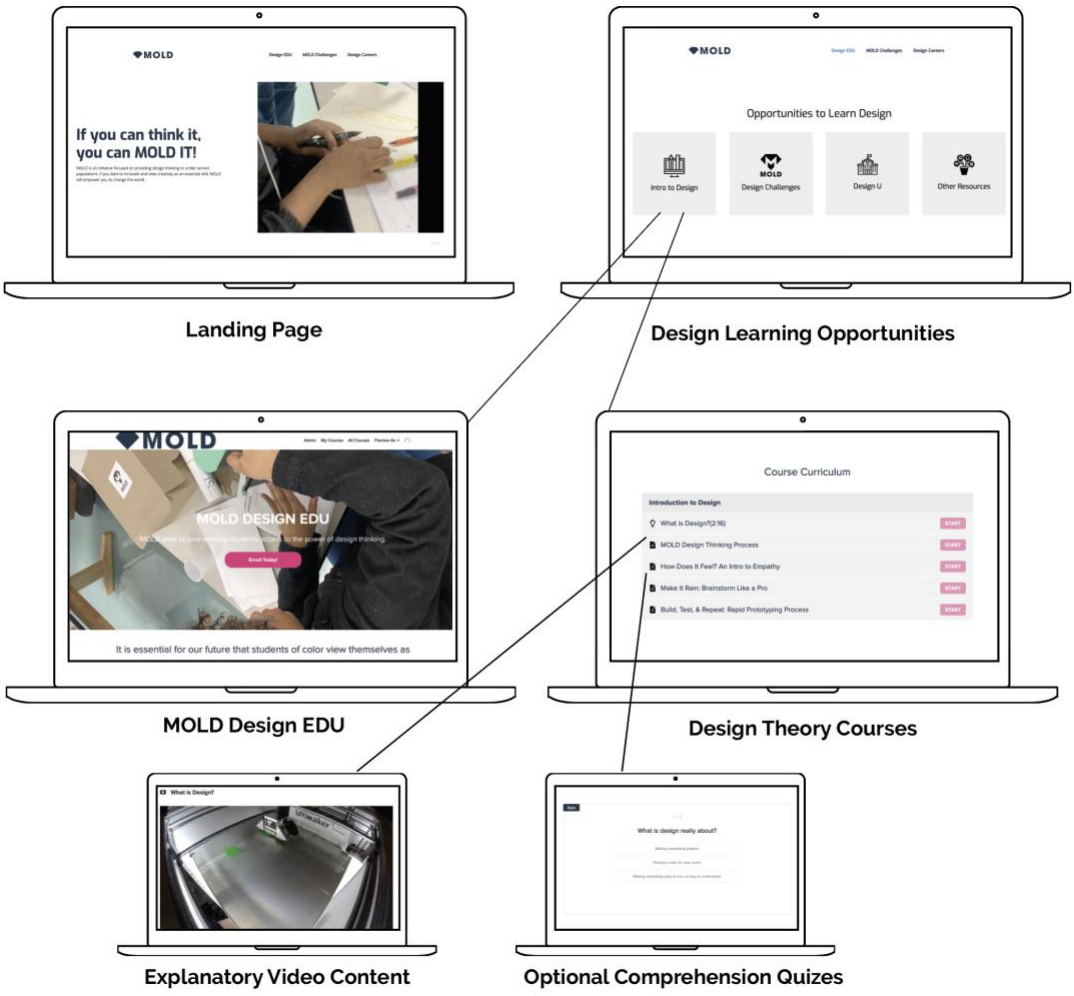
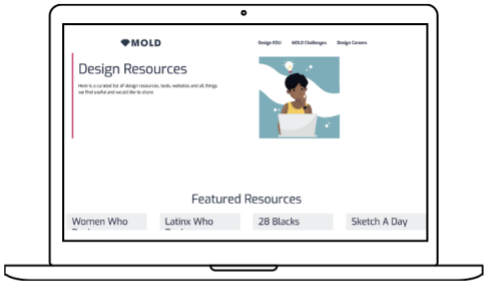


Figure 18 *Second MOLD Online Prototype*

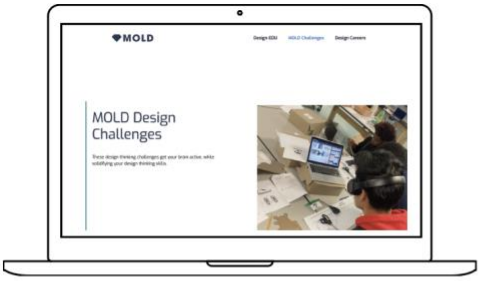
Design U



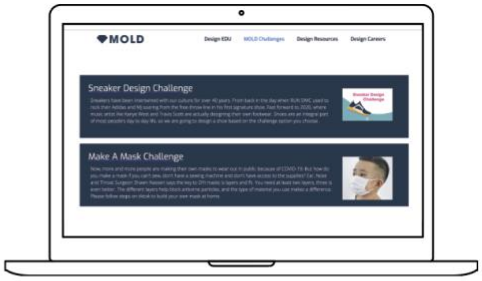
Design Resources

Design Opportunities

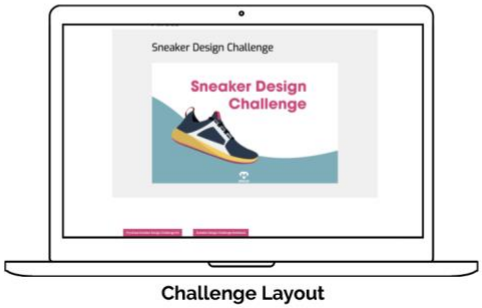
Design Careers



Design Challenges



Challenges Options



Challenge Layout

Figure 18 (Continued) *Second MOLD Online Prototype*

CHAPTER 6: MOLD TESTING AND VALIDATION

Prototype testing happened in three phases. Phase one was conducted with a group of students to validate the content and physical experience of the prototype. Phase two also looked to validate the content and physical experience of an at home user. Phase three of testing examined the usability of the online experience by students, educators and designers.

6.1 MOLD CLASSROOM TEST

The content and physical experience component of the tool were tested at the Hall Center of Education in Aldine, Texas. David Landry, an educator, helped facilitate the workshop and his homeroom students served as the participants. The eight participants were surveyed before and after a ninety-minute design workshop and their feedback was collected. The workshop stemming from the tool was performed in two parts. The first part of the workshop consisted of a presentation of the MOLD content. The second part of the workshop focused on the sneaker design challenge and contents of the design tool. The surveys collected information on the participants' knowledge and awareness of design, demographics and workshop experience. Participants were also invited to conduct one on one interviews with the researcher, if desired. The participants provided positive and negative feedback that was collected about experience in both written verbal responses. David Landry was also interviewed about his experience with the workshop.

MOLD Classroom Test Responses

To validate the content and learning experience we examined the participants' value and awareness of design before and after the workshop. Every participant stated they found the MOLD IT process to be useful in bringing their ideas to life. This confidence is key to developing

critical thinking skills. After being asked if their personal definition of design changed after taking the workshop, one of the participants stated “yes, d*esign is everything.”* Another participant said the workshop “really opened my mind to how I could create different things, in different ways.” The information displayed below in Table 7 represents the quantitative data collected from the participants during MOLD’s classroom test.

PAIRED T-TEST

Value of design

Student ID	Design value before	Design value after
AD 022720 01	5	10
AD 022720 02	5	8
AD 022720 03	7	10
AD 022720 04	6	10
AD 022720 05	8	9
AD 022720 06	10	10
AD 022720 07	10	10
AD 022720 08	10	10

t-Test: Paired Two Sample for Means

	Design value before	*Design value after*
Mean	7.625	9.625
Variance	4.839285714	0.553571429
Observations	8	8
Pearson Correlation	0.425499559	
Hypothesized Mean Difference	0	
df	7	
t Stat	-2.828427125	
P(T<=t) one-tail	0.012731781	
t Critical one-tail	1.894578605	
P(T<=t) two-tail	0.025463562	
t Critical two-tail	2.364624252	

H_0 = Minority students value of design was not effected by the MOLD design workshop

p = 0.0127

Reject the null hypothesis.

Career Awareness

Student ID	Design awareness before	Design awareness After
AD 022720 01	0	5
AD 022720 02	0	3
AD 022720 03	2	4
AD 022720 04	0	5
AD 022720 05	2	10
AD 022720 06	1	5
AD 022720 07	0	5
AD 022720 08	1	4

t-Test: Paired Two Sample for Means

	Design awareness before	*Design awareness After*
Mean	0.75	5.125
Variance	0.785714286	4.410714286
Observations	8	8
Pearson Correlation	0.479617686	
Hypothesized Mean Difference	0	
df	7	
t Stat	-6.700394612	
P(T<=t) one-tail	0.000138669	
t Critical one-tail	1.894578605	
P(T<=t) two-tail	0.000277337	
t Critical two-tail	2.364624252	

H_0 = Minority students design career awareness was not effected by the MOLD design workshop

p = 0.00014

Reject the null hypothesis.

Design Thinking Knowledge

Student ID	Design thinking process before	Design thinking after
AD 022720 01	3	10
AD 022720 02	6	8
AD 022720 03	7	10
AD 022720 04	1	6
AD 022720 05	1	8
AD 022720 06	5	10
AD 022720 07	5	10
AD 022720 08	5	7

t-Test: Paired Two Sample for Means

	Design thinking process before	*Design thinking after*
Mean	4.125	8.625
Variance	4.982142857	2.553571429
Observations	8	8
Pearson Correlation	0.495638546	
Hypothesized Mean Difference	0	
df	7	
t Stat	-6.363961031	
P(T<=t) one-tail	0.00019006	
t Critical one-tail	1.894578605	
P(T<=t) two-tail	0.000380121	
t Critical two-tail	2.364624252	

H_0 = Minority students design thinking knowledge was not effected by the MOLD design workshop

p = 0.00019

Reject the null hypothesis.

Table 7 *Quantitative Results from MOLD Classroom Test*

A few of the participants' favorite parts of the workshop was the sneaker design challenge. One participant explained the most memorable part of the workshop was “making a sneaker for someone with missing toes.” The sneaker design challenge gave the participants an option of three human centered problems they can try to solve with the design tool. The student notebook in the design tool took them through the MOLD IT process. The participants were asked if they would change anything about the experience. The majority replied no, one participant went further and stated “No, I mess with it, it’s fun.” The participants interacting with MOLD physical design tool are presented in Figure 19.

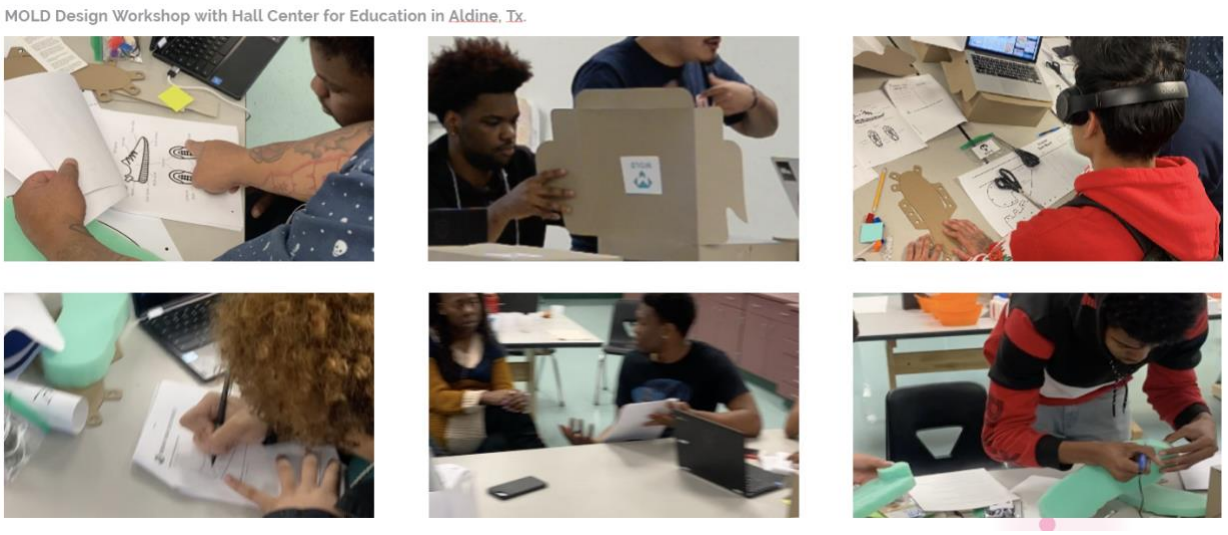


Figure 19 *MOLD Design Workshop with Hall Center for Education*

Educator of MOLD Classroom Test Participants Response

After the workshop was over the educator of the classroom participants was interviewed to receive feedback on what he saw transpire during the MOLD workshop. When asked about MOLD's overall experience, the educator of the participants "I think it was awesome, my kids were extremely receptive to everything that you were instructing them to do It was something completing different than what they are used to. You can see that they were challenging themselves creatively and mentally throughout the process." When asked do you feel like the students were more engaged during the challenge compared to a normal class day, they stated, "Definitely. I even had kids in my classroom that aren't normally in my class. The students were texting their friends to invite them over because they could already see how cool it would be to them to do." The educator of the classroom test participants also stated "Yeah, I would love for MOLD to be implemented in classrooms, especially for our school because we don't have as many electives. So it was definitely better to be able to do something completely different and their engagement kind of showed me that this might be something that they actually need in their day-to-day curriculum." That educator also believed the MOLD experience "Will have an

impact on my student's lives. This was a great activity for them to really identify all the steps that go into creating anything, and that will be useful."

The principal of the Hall Center for Education stopped by during the MOLD workshop after the workshop they stated "I am extremely proud of how the kids were and that is not always the case. That they are receptive to something new. Actually engaging, and doing something outside the box."

6.2 MOLD AT-HOME TEST

To examine the design tool's instructions and physical experience of an at-home user, a test was done without the researcher's direct involvement. The participants for this test included a parent and student living in North Houston. Photos of the participant's experience, workbook and finished product are presented in Figure 20.

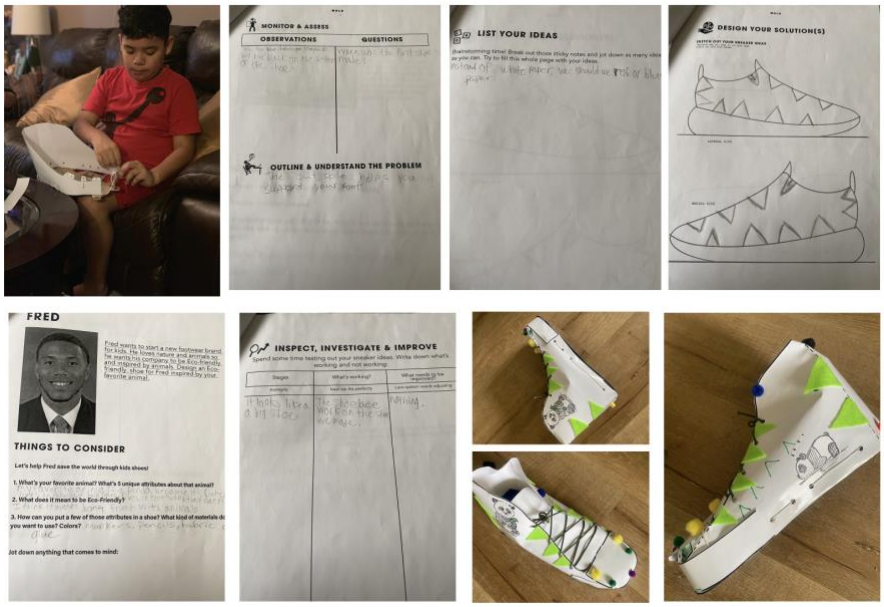


Figure 20 *At-home Test of MOLD's Physical Experience*

After the completion of the design tool process, the participants were interviewed about their experience. The student participant stated, “I learned how to design my own shoe and make the shoe.” That participant stated learning this process could help them bring their ideas to life and the hardest part of the whole process was putting the shoe together at the end. The responses from the parent interview stated they believe this was a quality learning experience for their student and that they “learned out to put something together off of reading it, and built it on his own.” They also noted the MOLD sneaker challenge box had all the necessary tools to complete the challenge and they would recommend MOLD to other parents.

6.3 MOLD’s ONLINE USABILITY TEST

The usability of the online experience was examined by six students in the target age group, nine educators who work primarily with underserved minority students and nine designers of different backgrounds. The usability test consisted of an exploration of the MOLD website and content and follow up questions to collect positive and negative user feedback. This feedback generated relates to design aesthetic, interface, interest in learning more about design and desire to complete the design challenge from viewing the website.

MOLD’s Student Online Usability Test Responses

Six student participants were asked to browse the MOLD website for five minutes and then take a usability test to collect feedback about the MOLD online experience. The six participants of the student usability test age ranged from eleven to sixteen, five of them identified and female and the other as a male. The race or ethnicity of the participants were three African American, two Latinx and one bi-racial. Four of the six participants had never heard of design thinking before visiting the website. The responses from the student usability test detailed six of six participants stated that the landing page made them want to continue through the website, liked how the website looked, and thought the interface was easy to use.

Five of the six student participants stated they would like to try MOLD's sneaker design challenge and four of the participants stated they would like to learn more about design. One of the participants described the purpose of the MOLD IT process as "to transform ideas into reality through a creative process." This response aligns directly with MOLD's mission.

MOLD's Designer Usability Test Responses

Designer participants were asked to preview the MOLD website for five minutes then asked to take the test without looking back at the website. There were nine participants in total from eight different types of design fields that include, industrial design, UX design, and graphic design. The designer participants identified from five different race or ethnicities. The responses from the designer usability test showed that purpose of MOLD was understood by all participants. Negative responses and design critiques were collected through the designer participants when asked what would they change about the MOLD website. One of the participants stated "Stronger home page & navigation. Breaking up some of the content into its own page (there is a lot of varied information on one page, could help to give it its own home i.e., an about page, a journey/plan page, a resources page, etc)." While another participant said they would add "A place where students can upload their completed designs, maybe a gallery. Also, maybe a meet a designer/mentor." Positive responses from the designer participants included, "MOLD is practical, doable, realistic, and I can see this included in a school project within in a class or curriculum." Another participant stated "I love the idea of this! I think early exposure is key in developing design talent." When asked about MOLD's design learning content layout one of the designer participants stated "The content is organized very well and the design is bold and engaging." The designer usability test concluded by asking each participant if they wished they had a design resource like MOLD to begin their journey to becoming a designer and ten of ten participants said yes they would.

MOLD's Educator Usability Test Responses

The same nine educators who participated in the initial educator survey were asked to also take the usability test. They were asked to preview the MOLD website for five minutes then required to take the test without looking back at the website. Only one of the nine educator participants were aware of the design thinking or design-based learning before visiting the MOLD website. After visiting the MOLD website six of the nine educator participants believed design thinking or design-based learning could help fill some of the education gaps of the minority students they work with. All of the educator participants were able to explain the purpose of MOLD and thought MOLD's online content was suitable for minority students between the ages of ten and sixteen. Negative responses and design critiques were collected from the educator participants when asked what would they change or add to the MOLD website. One of the participants stated "Add more photographs related to the content so the user can envision the target audience for MOLD. Representation matters. If this is a local or global experience, I think that should be highlighted with careers and more activities." Another participant said "I would give multiple examples and pictures of the possible designs that the students could make to get them hooked into designing on the landing page." A majority of the educator participants believed MOLD offers a credible learning experience, one of them responded, "Yes I do. I believe so because MOLD is aligning its education to today's world. It's being more creative with its educating. While still challenging students' creativity and thinking. It's giving students' a new experience in education." That participant also added "We all know it has been way overdue for education to make changes, and MOLD is stepping in and doing just that."

6.4 DISCUSSION

Limitations of the Study

As with most research, there were several factors that presented as limitations and should be considered when interpreting the findings of this study. The participants of the test conducted at the Hall Center of Education were not able to complete the final phase to the MOLD IT process due to the Covid-19 related transition from face-to-face to remote learning. This phase focuses on the presentation part of the design process and would have been used as a tool of evaluation for the researcher. Completing this phase may also have changed the way the participants felt about the overall experience. Since the participants were not able to complete the last phase they were allowed to take the design tool home to continue working on them.

Another factor that could have affected the study is the participants that conducted the website usability test were not in a controlled environment. The experience taking the usability test varies from each participant.

An additional limitation of the study proved to be the number of participants testing the physical experience of the design tool. A total of nine participants were able to test the physical design kit. It would have been ideal to have a larger number of participants to receive more feedback for further development. Another limitation in this study was website development. The online platform used to build the final online experience had a steep learning curve. Not all of the recommendations were able to be included into the final design direction because of the researchers lack of experience.

Another factor that might have affected the consistency of the study, is the positionality of the researcher. Specifically, considerations for the researcher's identity as African-American male exploring a topic related to racial diversity and minoritized populations. While the rigor of the study demonstrates MOLDs effectiveness and impact on minority students, the researcher's race and appearance may have created bias from the participants.

Successes of the Study

Throughout testing, the participants excelled at staying engaged through the entire process. Their feedback on the content and usability of the designs lead to significant insight. The student participants were incredibly receptive throughout the testing process. The educator participants' belief in the benefit of design education and the student participants' strong desire to want to learn more about design was also reassuring.

CHAPTER 7: DESIGN REFINEMENT

Based on the responses received from the three phases of testing, there was a clear need to focus on the online experience more. The designer and educator participants of the online usability test made many great recommendations as to how the website could be made better..

7.1 FINAL DESIGN DIRECTION

Several of the recommendations from the online usability test were taken into consideration in the design refinement stage that ultimately let to the final design. Design refinements that were made are presented in Figure 21.

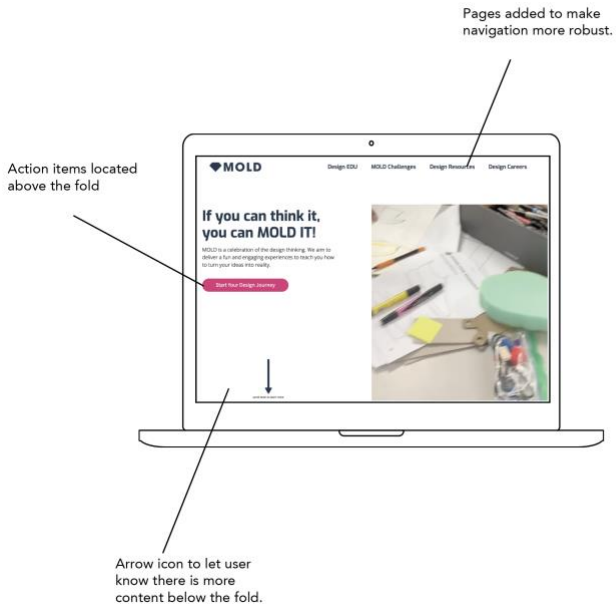


Figure 21 *Design Refinements Made to MOLD Design Tool*

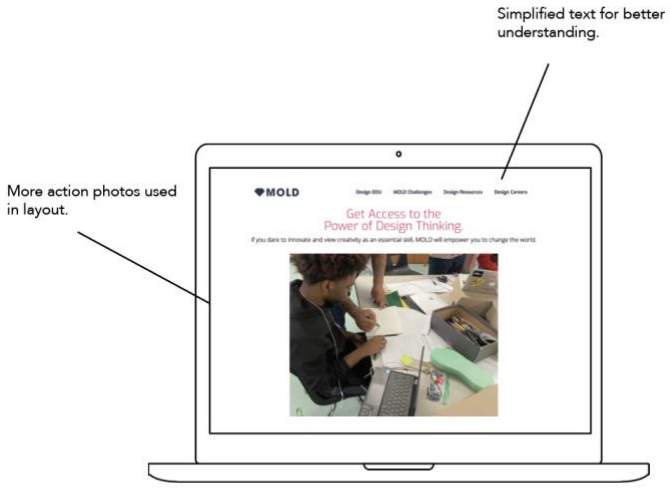


Figure 21 (Continued) *Design Refinements Made to MOLD Design Tool*

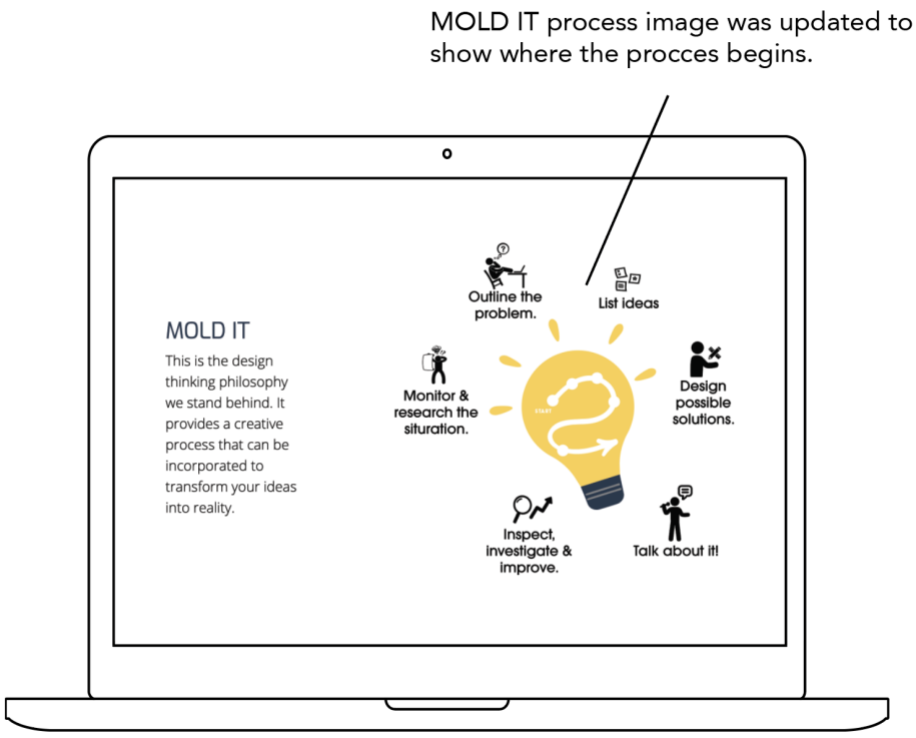


Figure 21 (Continued) *Design Refinements Made to MOLD Design Tool*

7.2 FINAL DESIGN DELIVERABLES

To offer a profound design learning experience, MOLD offers different ways to interact with the world of design. The culture-driven design challenges developed for MOLD, offer a hands-on design learning approach. MOLD's online experience delivers a credible design learning experience and feasible access to valuable design resources.

MOLD Sneaker Design Challenge Kit Contents

The overall concept for the sneaker challenge kit and process were kept the same. The only change to the sneaker design challenge kit was the midsole that was previously made of green upholstery foam was switched to a denser type of project foam. This switch was made to make the sneaker prototype easier to construct. The contents of the final MOLD sneaker challenge workshop are illustrated in Figure 22.

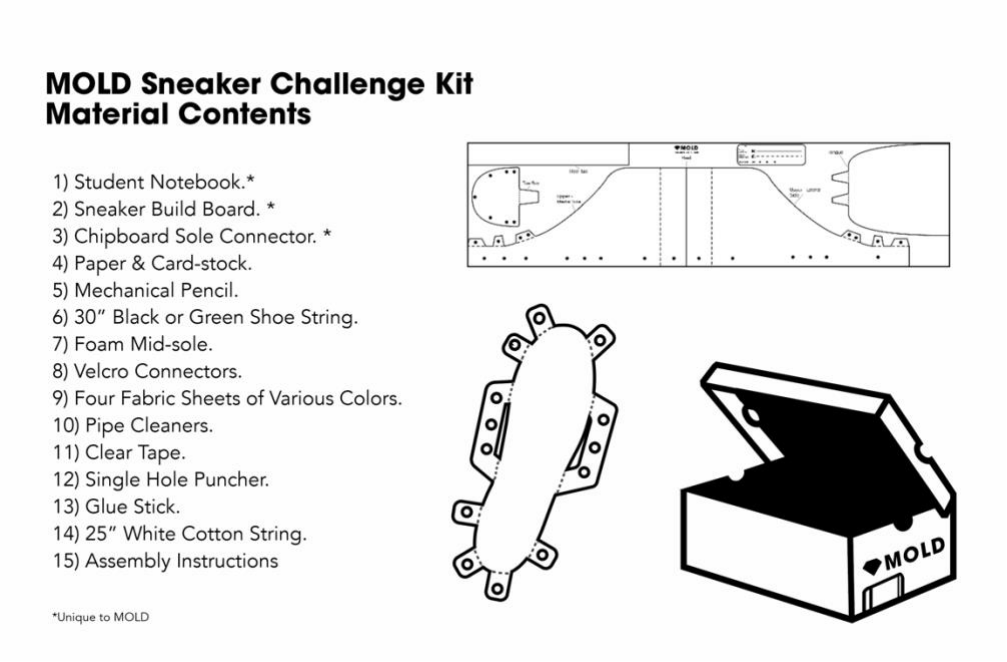


Figure 22 *Final Contents of MOLD Sneaker Design Challenge Kit*

MOLD Online Experience

After several iterations, the MOLD online experience was tailored to initially target minority students because they are the main users. The secondary target for the online experience are the educators, administrators, and parents who have the buying power. MOLD's website offers feasible access to the power of design and design thinking. MOLD's website is displayed in Figure 23. Figure 24 is an illustration of MOLD's online design guidelines.

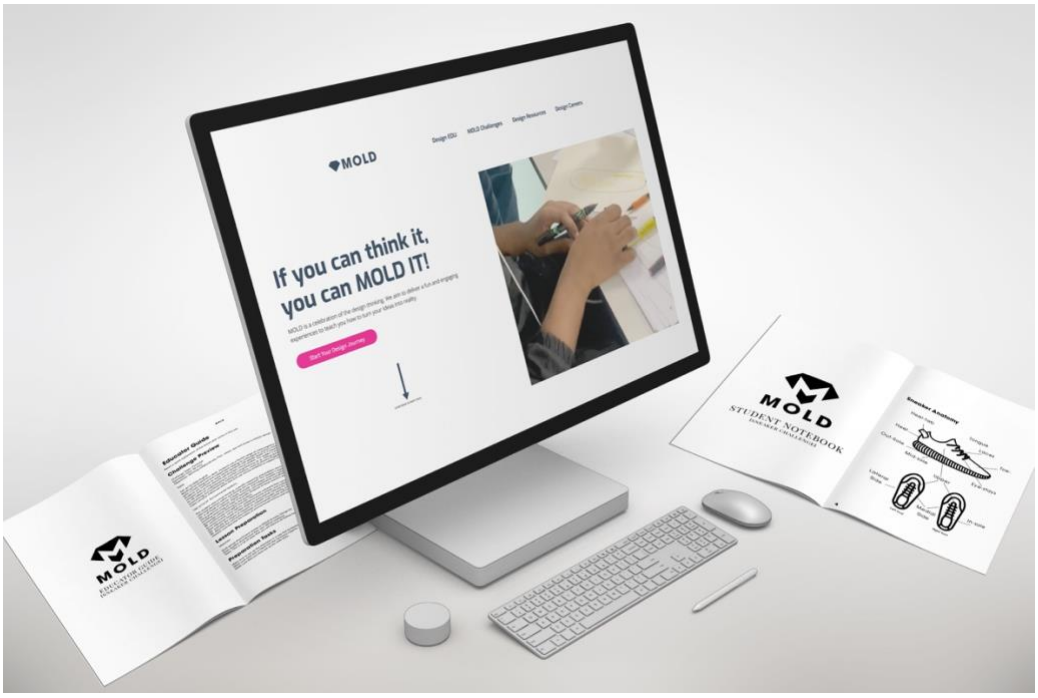


Figure 23 *MOLD Online Experience*

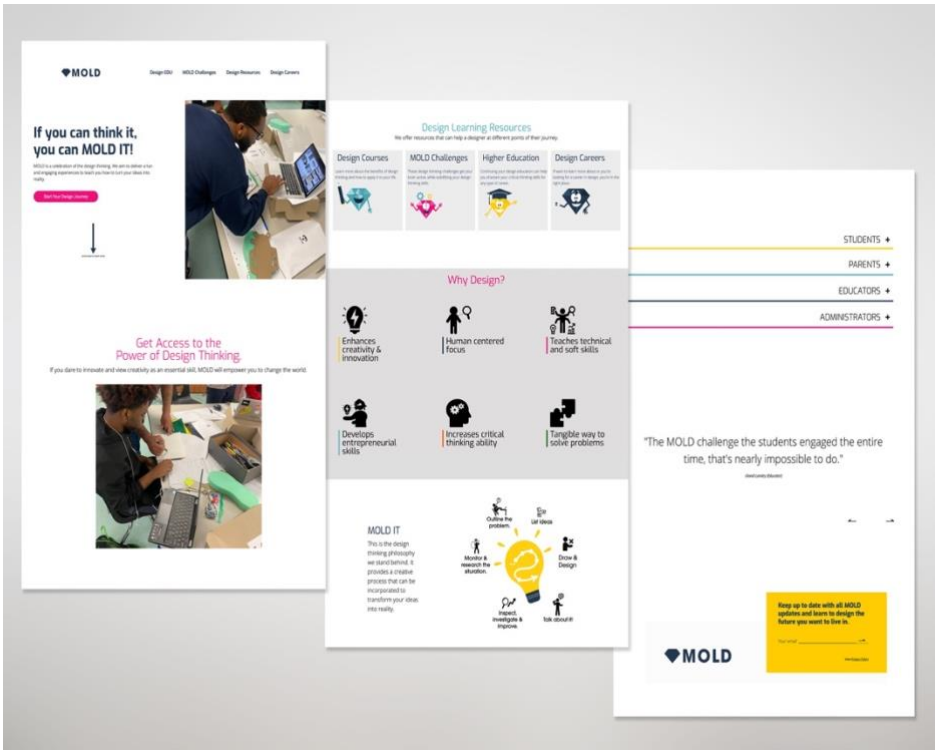


Figure 23 (Continued) *MOLD Online Experience*

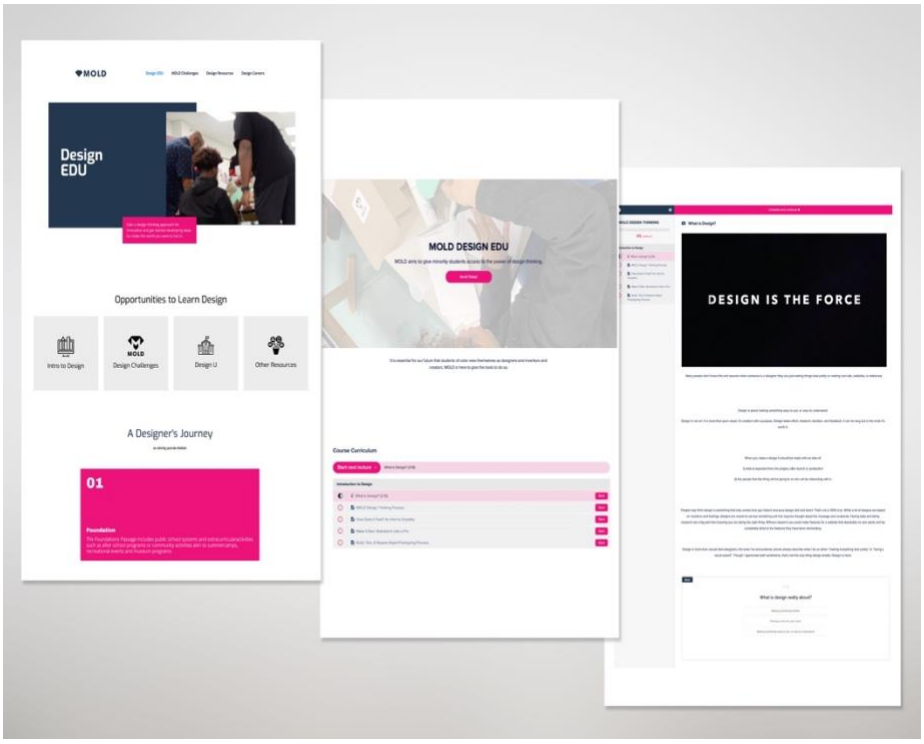


Figure 23 (Continued) *MOLD Online Experience*

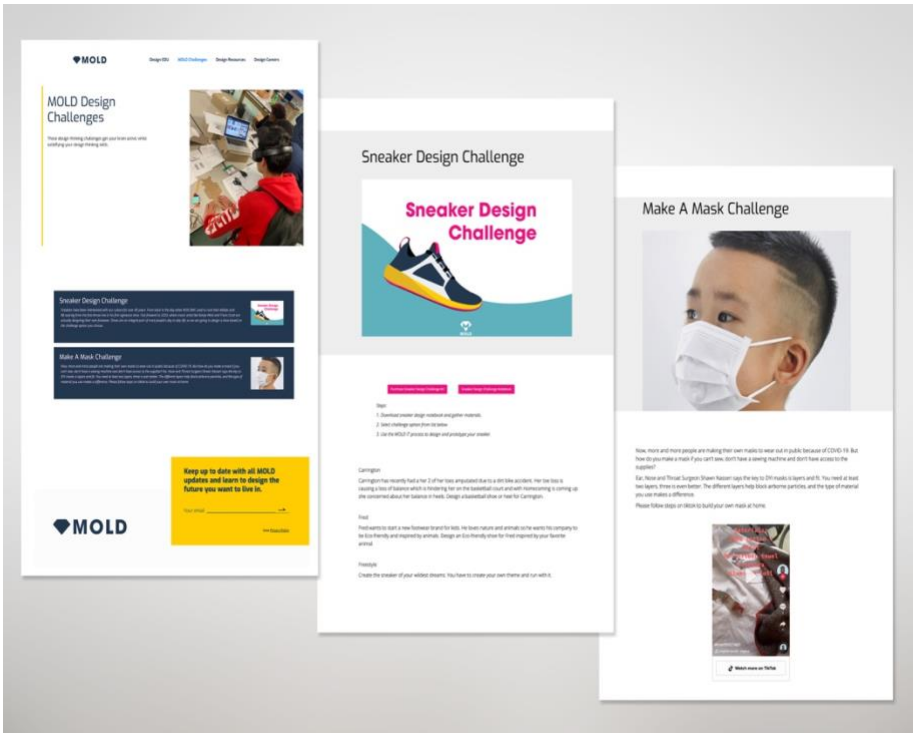


Figure 23 (Continued) *MOLD Online Experience*

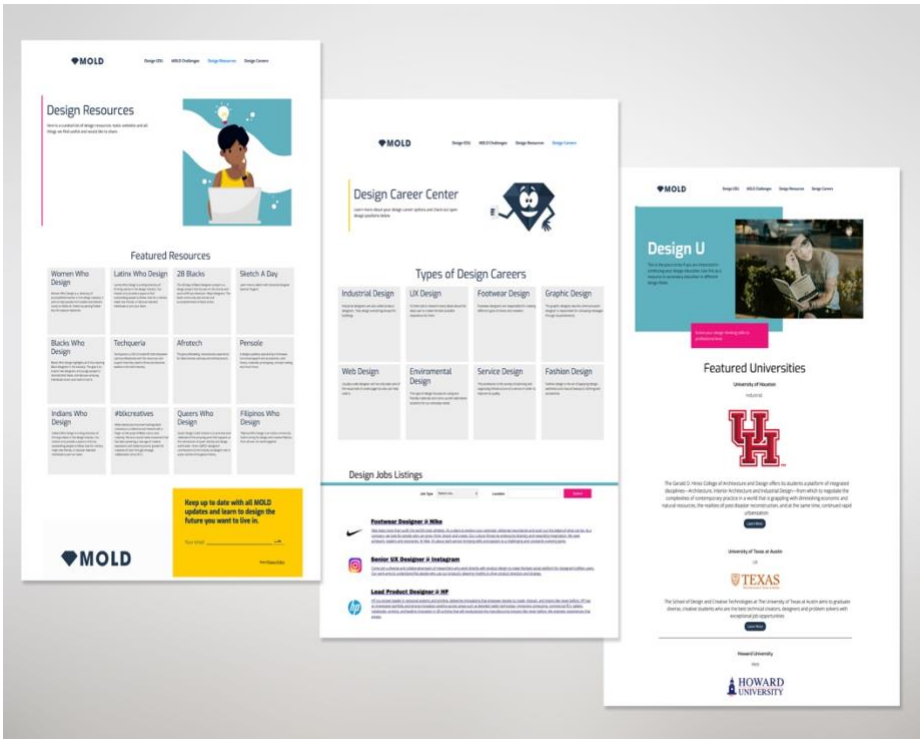


Figure 23 (Continued) *MOLD Online Experience*

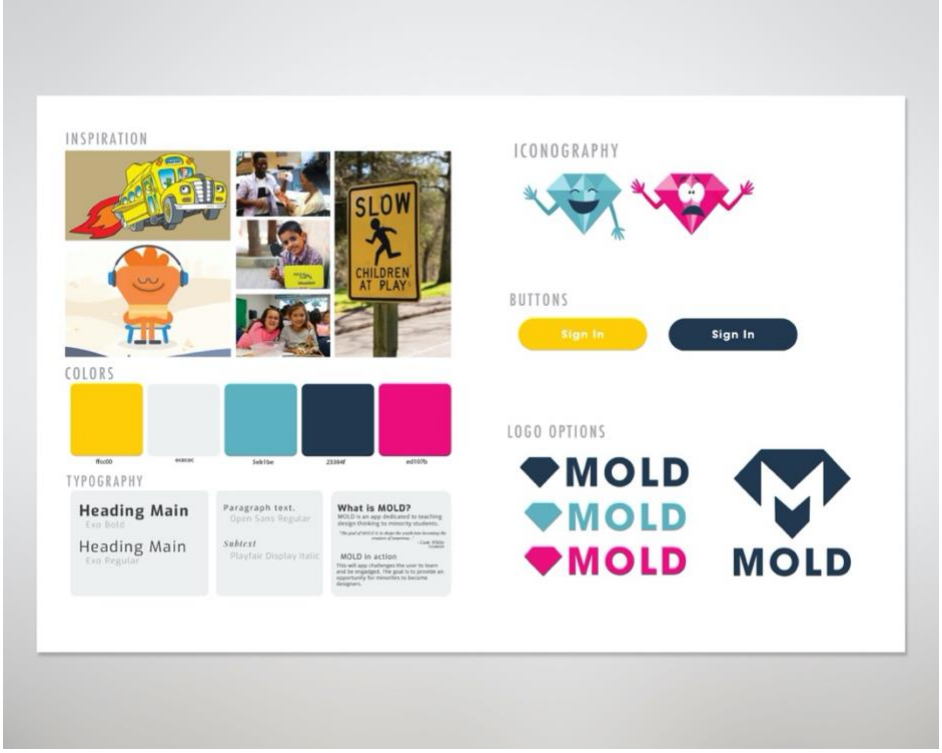


Figure 24 *MOLD Online Experience Design Guidelines*

CHAPTER 8: CONCLUSION

8,1 Critical Takeaways

The lack of diversity in the design industry has existed for years, but is growing in prevalence in recent years as our world becomes more diverse. It is important to ensure that the design industry represents the society that it is responsible for creating products for. Unfortunately, not enough access to design resources exists and minority students remain less aware of design. This lack of access will continue to lead the design profession down a path of homogeneity and products that do not serve the needs of all its users. Thus demonstrating the imperative need for change in this area, with specific regard to how we educate minority students. Offering minority students a design-based education option will give them direct access to developing skills that are desperately needed.

The current study hypothesized that creating a design tool to provide underserved minority students access to design resources would increase their awareness and value of design. This increase in design awareness and value can one day help combat the lack of diversity in the design profession. Learning about design and design thinking is mutually beneficial for the student as well. It instills a creative framework that can lead to self-empowerment and future innovation.

A diversity-focused design tool was developed and branded as a minorities' opportunity to learn design or *MOLD*. MOLD was used as a case-study to test the hypothesis that providing design access and resources to racially minoritized students will increase their awareness of design, perceived value of design, and knowledge of the design thinking process. Minority students, educators, and designers participated in this study by providing feedback on physical, digital and overall learning experience of MOLD. After testing, a majority of the student participants enjoyed the experience, and the results of pre and post-surveys demonstrate that their awareness and value of design grew as well. This outcome supports the hypothesis since

engaging underserved minority students with an equity-driven design tool led to higher awareness and perceived value for design.

The participants involved in this study shared crucial insight in both phases of the research. There are essential educational skills that many minority students lack and giving them access to design thinking skills help them develop those skills to increase the chance of success. This study makes a major contribution to design-focused research by offering empirical evidence of how an intervention aimed to increase minority students' access to design can be beneficial toward generating enhanced awareness and perceived value of design. By offering interventions such as MOLD to minority youth and educators, we might one day have a field of designers that represents our diverse world.

Further, this case study serves as an example of a way to introduce minority students to the benefits of design and design-thinking, as well as a way to increase the diversity efforts within the design industry. The impact of this study could be seen outside the targeted demographic as well, as the benefits of a design-based education not only serve minority students, but it can elevate creative thinking skills of all students. The results of this study suggest that students enjoy having a design-based learning experience and educators believe learning design skills can have a tremendous impact on the students.

8.2 Future Work

Future plans for the project could include having MOLD established as a 501c3 non-profit organization. With that status, apply for grants that will allow continued research and testing with more student users to further develop the design tool experience and expand design courses and challenge offerings. There are also plans to upgrade MOLD's physical deliverables to offer more sustainable products to users. The concept for a new design challenge has been created and it focuses on teaching the user how to make face masks from materials found at home. Plans for the future also include partnerships with STEM organizations

to implement MOLD in summer camps and school programs to incorporate the MOLD IT process into their curriculum. The further development of this project could provide access to a powerful way of thinking for countless minority students and add a splash of color to the design industry.

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Appendix A

Phase One Research Tools and Responses

Expert Interview Questions

Interview A

- What are key issues that you believe minority students face in their educational journey?
- Describe the daily activities of your program?
- Do you feel like the students are enjoying themselves?
- Could you describe the demographic of the kids in your program?
- What areas or parts of the process do the minority students need the most help on?
- What would you say, if anything, minority students are lacking?
- Do you believe minorities require a different way of teaching than their counterparts?
- If so, what would be the most effective way to teach most minority students?

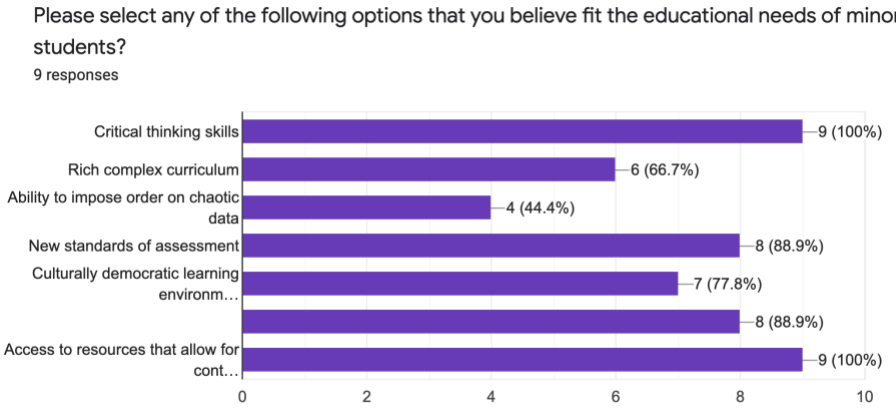
Interview B

- What are key issues that you believe minority students face in their educational journey?
- Do you feel like design based learning can be incorporated into the school system?
- So as far as kind of a design based pedagogy going forward in the design education. Is that something that you feel like you will push for as your potential educator working between Administration and teachers?
- What have you seen design thinking skills do for students?
- Do you feel like there are any specific skills that minority students are lacking that could be improved upon for either career or life or professional development?

Please select any of the following options that you believe fit the educational needs:

- [ ] Students Working Together.
- [ ] Critical Thinking.
- [ ] Rich Complex Curriculum.
- [ ] Engagement and Competitiveness.
- [ ] Ability to Impose Order to Chaotic Data.
- [ ] New Standards on Assessment.

Please describe in detail what you believe are the educational needs of some of the minority students you work with?



Initial Educator Survey

Please describe in detail what you believe are the educational needs of some of the minority students you work with?

"A lot of my students have their short comings because they don't know what is out there for them. They have grown up in the same streets, in the same neighborhood, around the same people. They don't have access to a lot resources which limit their abilities to see their future that is different from their parents or siblings. I think this is the biggest downfall for our students."

"I think one of the most important things is to give the students access to resources that allows them to fully develop in the school environment."

"I'm currently designing STEM curriculum for high school students through a virtual platform called Nearpod. There is an educational need for access to technology, financial resources to fund post-secondary education, and representation of their communities in subject interests. This curriculum will introduce students to systems thinking concepts, include systems dynamics modeling, and give exposure to STEM careers and jobs."

"Minority students need better access to technology, actual enrichment programs, more time to digest material, added support in school and after school."

"It really depends on the area you are teaching in that serves black and brown children. From my experience, I work in a low-income neighborhood that is exposed to crime and drugs. The first need I tried to provide was a structured learning environment. It was hard because I believe in choice—a democratic classroom. But that takes awhile to build. Next I would say language support & realia; the growing numbers of English language learners steadily increases. Educators also should realize every student is always learning English! More time spent on word studying is needed. More resources to expand learning & to support their learning."

"A lot of the minorities that I work with need social/emotional learning. They cone from traumatic backgrounds and don't know how to deal with emotions or conflict. When they aren't equipped with coping skills then it's hard for them to learn things such as critical thinking skills or how to work in groups.
They also need more diverse ways of being assessed. In science class, they are assessed by hands on lab practicums and students tend to do well, but when it comes to standardized benchmark tests, some students don't do as well. These students need more real world, hands on experiences because when they are able to relate, they are able to remember."

"The educational gap and resources that our students have in comparison to other students in higher income neighborhoods. This has been very clear with COVID 19, where many high income communities already had students with devices, whether that be laptops or iPads, we are currently still trying to get 100% of our students devices or hotspots. This has already put them behind when comparing them with other students with resources. Many of our students have to work and now may be the only providers for their household, so trying to learn a new way of school online is not a priority."

Initial Educator Survey

Please describe in detail what you believe are the educational needs of some of the minority students you work with?

"There is so much. The recent pandemic and distance learning has highlighted so much more. The technological gap is very real. But outside of our current state, representation has always been a strong need for minority students. The need to learn, read and see their own culture."

"I believe majority of the students' I worked with lacked support and access to resource. Let alone the school I taught at itself lack accessible resources. So a lot of our students' were behind in every aspect of education. Our students needed to see and receive a new experience. They needed to experience a education that they would not receive at any other surrounding schools. Students' should be given more choices when selecting extra curriculum activities. I believe there should be programs that help students gain certifications. Curriculum should be geared more towards a career path of the students' choice. More access to tutors was definitely needed. Our students needed more time working with computers. Also, more involvement from the community."

Appendix B

Phase Three Research Tools and Responses

Participant Pre & Post Workshop Survey Questions

Pre Workshop

Name, Age, Gender and Zip Code?

What is your favorite item you own? And why?

Would you rather read or watch a video to learn something new?

Have you ever designed anything on your own?

Would you rather work individually or in groups?

Do you know what design means?

On a scale from 1-10, how valuable is design to you?

On a scale from 1-10, how well do you currently know the design thinking process?

Do you believe design is useful?

How many design careers do you know about?

Are you interested in learning more about design?

Post Workshop

Has your definition of design after participating in the MOLD workshop? If so, please write your new definition?

On a scale from 1-10, how valuable is design to you?

On a scale from 1-10, how well do you currently know the design thinking process?

How many design careers do you know about?

Are you interested in learning more about design?

How well do you understand the MOLD IT design thinking process on a scale of 1-10?

Can you list the MOLD IT design thinking steps?

Do you believe the MOLD IT process is useful to bring your ideas to life?

How much did you enjoy the MOLD sneaker workshop on a scale 1-10?

What was your favorite thing you learned about during the MOLD sneaker workshop workshop?

Would you do the workshop again for a different product?

Is there anything you would change about the workshop?

"At Home" Physcial Test Interview Questions

Participant Interview

What did you learn during the workshop?

Do you feel like the toolkit had everything you needed to complete the workshop?

Would you do the workshop again?

What did you think about the MOLD IT design thinking process? Were you able to follow that process easily?

Do you think learning that process could help you bring your ideas to life?

Is there anything that you would change about the workshop?

Were the workshop instructions easy to use? Was the shoe easy to put together?

Parent/Facilitator Interview

How was the design workshop workshop a quality learning experience for your son (participant)?

What type of things do you feel like he learned?

How much would you say you helped him during the workshop?

Did the MOLD tool have all the necessary items needed to complete the workshop?

Would you recommend this program?

Anything that you would like to add about the MOLD design tool or workshop experience?

"At Home" Physcial Test Interview Response

Student Participant Interview

What did you learn during the workshop?

"I learn how to design my own shoe and make the shoe."

Do you feel like the toolkit had everything you needed to complete the workshop?

"Yes."

Would you do the workshop again?

"Yes."

What did you think about the MOLD IT design thinking process? Were you able to follow that process easily?

"Yes."

Do you think learning that process could help you bring your ideas to life?

"Yes."

Is there anything that you would change about the workshop?

"No."

Were the workshop instructions easy to use? Was the shoe easy to put together?

"Yes, but with shoe building was a little hard."

Parent Particpant Interview

How was the design workshop workshop a quality learning experience for your son (participant)?

"Yes."

What type of things do you feel like he learned?

"He learned how to put something together off of reading it, and build it own his own."

How much would you say you helped him during the workshop?

"He did mostly on his own but he needed help adjusting the green part (midsole)."

Did the MOLD tool have all the necessary items needed to complete the workshop?

"Yes."

Would you recommend this program?

"Yes, of course."

Anything that you would like to add about the MOLD design tool or workshop experience?

"It was a great idea and I think it's a great experience for kids learning how to do their own things and come up with their own things and how to put them together."

Hall Center of Education Educator Interview

How do you feel the MOLD sneaker challenge went?

Do you feel like the students were more engaged during the challenge compared to a normal class day?

Do you believe this MOLD sneaker challenge could be incorporated into a school's curriculum?

The principal of your school stopped by during the workshop, did she say anything about it after it was over?

Would you consider doing another type of design challenge in your classroom?

Do you feel like learning the design thinking process will have an impact on your students' life?

How do you feel the MOLD sneaker challenge went?

"I think it was awesome, my kids were extremely receptive to everything that you were instructing them to do It was something completing different than what they are used to. You can see that they were challenging themselves creatively and mentally throughout the process."

Do you feel like the students were more engaged during the challenge compared to a normal class day?

"Oh yeah for sure, definitely. I even had kids in my classroom that aren't normally in my class. The students were texting their friends to invite them over because they could already see how cool it would be to them to do."

Do you believe this MOLD sneaker challenge could be incorporated into a school's curriculum?

"Yeah, I would love for it to be, especially for our school because we don't have as many electives. So it was definitely better to be able to do something completely different and their engagement kind of showed me that this might be something that they actually need in their day-to-day curriculum."

The principal of your school stopped by during the workshop, did she say anything about it after it was over?

"She was extremely proud of how the kids were and that is not always the case. That they are receptive to something new. Actually engaging and doing something outside the box. She was also extremely proud of how you (researcher) handle it. She brought up an instance about the one participant who was hesitant to work within groups and how you still made sure there were included into the activity."

Would you consider doing another type of design challenge in your classroom?

"Yeah, totally."

Do you feel like learning the design thinking process will have an impact on your students' life?

"I think it will have an impact on their lives. This was a great activity for them to really identify all the steps that go into creating anything, and that will be useful. "

Online Usabiltiy Test

Test for Students

Section 1
Name, Age, Gender and Zip Code?

Do you know what design is?

Section 2
What's the purpose of MOLD?

What do you think about the interface? Is it easy to use?

Have you ever heard of design thinking before visiting the MOLD website?

Does the landing page make you want to continue looking through the website?

Do you like how the website looks?

Do you like the colors used on the website?

What is the purpose of the "MOLD IT" process?

If you were looking for a design thinking activity to do what would you do on the website?

Are interested in learning more about design?

Would you like to try the sneaker design challenge at school or at home?

What other products would you be interested in learning how to design?

Test for Educators

Section 1
Name?

Type of Eduactor?

Education Experience?

Section 2
What do you think about the interface? Is it easy to use?

Have you ever heard of design thinking before visiting the MOLD website?

Does the landing page make you want to continue looking through the website?

Do you feel learning design thinking can help fill some of the educational gaps that minority students need?

If you were looking for a design thinking activity to do what would you do on the website?

What do you think about how information and features are laid out?

Does the landing page make you want to continue looking through the website?
If you could change or add a feature to the website what would it be?

Do you believe the content on the site is suitable for minority students between the ages of 10-16?

What other products would you be interested in learning how to design?

Do you believe MOLD offers a credible learning experience? Why or why not?

Test for Designers

Section 1
Name, Race/Ethnicity, Gender?

Type of Designer?

Design Experience?

Section 2
What's the purpose of MOLD?

What do you think about the interface? Is it easy to use?

If you were looking for a design thinking activity to do what would you do on the website?

What do you think about how information and features are laid out?

Does the landing page make you want to continue looking through the website?

If you could change or add a feature to the website what would it be?

What are your thoughts on the MOLD design thinking process?

Do you wish you had a design resource like this to begin your journey to being a designer?

MOLD Online Usability Test - Student

Age

11-16

Gender

1 Male
5 Female

Race/Ethnicity

3 Black
2 Latinx
1 Biracial

Location

77489
75154
77073
77034
96828
77521

Does the landing page make you want to continue looking through the website?

6 of 6 said yes

Do you like how the website looks?

6 of 6 said yes

What do you think about the interface? Is it easy to use?

6 of 6 said yes

Have you ever heard of design thinking before visiting the MOLD website?

4 of 6 said no

Do you like the colors used on the website?

5 of 6 said yes

Are interested in learning more about design?

4 of 6 said yes

Would you like to try the sneaker design challenge at school or at home?

5 of 6 said yes

What is the purpose of the "MOLD IT" process?

"A t-shirt maybe"

"micheal jackson shirts"

"Shirts, Had fans , phone cases"

"Mostly pieces of clothing"

"Web pages"

"Football gear"

What's the purpose of MOLD?

"MOLD is an initiative focused on providing design thinking to under-served populations."

"Give minority students an opportunity to learn about design."

"Design courses" "power of design thinking"

What is the purpose of the "MOLD IT" process?

"It provides a creative process that can be incorporated to transform your ideas into reality."

"A creative process to help transform ideas into reality."

"Develop design thinking"

"To transform ideas into a reality through a creative process"

"Providing design"

"Design in motion"

If you were looking for a design thinking activity to do what would you do on the website?

"Design learning resources"

"click on MOLD challenge" "The challenges"

"I would browse through all the categories of the website that catch my attention the most."

"Look through Everything and decide."

MOLD Online Usability Test - Designers

What are your thoughts on the MOLD design thinking process?

"It's very informative and it gives you step by step instructions."

"It definitely opened my mind to a different way of approaching the mold process."

"easily understandable"

"It's clean and user friendly."

"Practical, doable, realistic, and I can see this included in a school project within in a class or curriculum."

"I love the idea of this! I think early exposure is key in developing design talent."

"I like what you want to accomplish - we do need to hear more about minority thought leadership in design."

"The idea of design thinking is implicit in the challenges and this process is part of the evolution from the routine Design, involving creativity mini-C to allow users to turn in creativity Pro-C or creative Design, which I think would be one of the goals of this project."

"I find it easy to understand, maybe you can have pop ups when you roll over the icons giving an example. Or an example of a design that followed the philosophy."

"Good process but I would pinpoint exactly where the beginning of the process is on that graphic (the lightbulb)."

Do you wish you had a design resource like this to begin your journey to being a designer?

10 of 10 said yes

MOLD Online Usability Test - Educators

What do you think about how information and features are laid out?

"I like the features and the separation of tabs. I wish you could show the information in pictures to give it more detail. Like examples of students design projects."

"It's very user friendly."

"The features are easy to use and the information is direct."

"Very user friendly."

"Easy to access and learn about MOD"

"The information is concise and still gives enough information to make you want to learn more. The graphics are colorful and to the point. I learned a lot About the program in just 3 minutes."

"Change the way students think about solving a problem, thinking of a project based situation that students are interested in."

"Easy to access and understand"

"I'm on a cell phone, therefore the scrolling interface was a little confusing at first."

"Not overwhelming or filled with a lot of information. I like for the fact I did not have to read a long drag out mission statement. I really like the information giving on ways students' could use design to elevate their career or creativity."

What do you think about how information and features are laid out?

"On the landing page I would give multiple examples and pictures of the possible designs that the students could make to get them hooked into designing. Instead of one picture I would have multiples that flip through the top to see the different kinds of designs thinking projects and challenges.

"Add more photographs related to the content so the user can envision the target audience for MOLD. Representation matters. If this is a local or global experience, I think that should be highlighted with careers and more activities. The addition of universities was a great thing to do because students might begin their academic journey at Parsons because of MOLD. What about adding companies that are in the design industry? I think also highlighted the approach of including the outcomes, method, and resources for student/parent engagement would be nice too."

"A section for lower elementary students. Same concept but at their level."

"I can't think of anything."

"Not sure."

"Maybe may add more visuals of what actually takes place. There are a lot of people the like to see pictures and videos."

MOLD Online Usability Test - Educators

What's the purpose of MOLD?

"To get students involved in designing program. Mainly minorities that have not been introduced to such a topic."

"Provide students the opportunity to develop using their creativity."

"The purpose of MOLD is to provide design thinking to under-served populations."

"To provide design programs to minority students."

"A way to support critical thinking through learning a new skill like designing."

"To give minorities the opportunity to learn and think critically through design methods."

"Change the way students think about solving a problem, thinking of a project based situation that students are interested in."

"To teach minority students how to design."

"To provide a different way of educating students', that challenges their creativity and critical thinking skills."

"Good process but I would pinpoint exactly where the beginning of the process is on that graphic (the lightbulb)."

Have you ever heard of design thinking before visiting the MOLD website?

8 of 9 said no

Do you feel learning design thinking can help fill some of the educational gaps that minority students need?

6 of 9 said yes

MOLD Online Usability Test - Educators

Do you believe the content on the site is suitable for minority students between the ages of 10-16?

9 of 9 said yes

Do you believe MOLD offers a credible learning experience? Why or why not?

"I think it could be a great experience for students especially those students that don't know what their future holds, or the different types of learning paths that can lead them to a career."

"Yes, it offers a variety of activities that are hands on."

"Yes because I see the intentionality in the experience."

"I believe it can. The more exposure you give to minority students the better."

"Yes, it seems like a great way to show how you can apply your learning in a different way. Also shows the realia of a career choice that promotes active thinking and problem solving."

"Yes because it's an interactive program that focuses on what minorities need the most."

"Yes, I believe many students struggle finding their way of learning. Teaching them different ways of learning or solving a problem is always beneficial so that students figure out what way works best for them."

"I'm unsure. Who is the target audience for the website. Are you pitching a program for educators and administrators to bring to their school? Are you pitching to parents to bring something extra-curricular to their child? Are you pitching to students to take initiative in their own learning?"

"Yes I do. I believe so because MOLD is aligning its education to today's world. It's being more creative with its educating. While still challenging students' creativity and thinking. It's giving students' a new experience in education. We all know it has been way overdue for education to make changes, and MOLD is stepping in and doing just that."

Appendix C
Student Handbook

MOLD

STUDENT NOTEBOOK
[SNEAKER CHALLENGE]

Design Review

What is Design?

Design is everywhere and in everything. Design is problem solving and communication in various forms. Design, from physical products to mobile apps should make the world a little easier through which to navigate. By learning more about design, you are getting a glimpse into art, creativity, problem solving, business and branding.

Design Thinking?

Design thinking is a flexible process for getting the most out of the creative process. It is used in the arts, in engineering, in the corporate world, at universities, and in social and civic spaces. It works when creating digital content or when building things with duct tape and cardboard. It can even be used in planning events or in designing services.

MOLD IT Design Thinking Process:

This process was designed to help you get your ideas out of your head and into the world. If you can think it, you can MOLD IT.

Monitor & Understand the Situation

In the first phase, you should look over the situation or challenge, and learn as much as you can about it. The goal here is awareness. It might be a sense of wonder at a process or an awareness of a problem or a sense of empathy toward an audience. This is also where you begin asking a ton of questions.

Outline the Problem

This second phase is where you demonstrate you've identified a problem and begin to breakdown the process or problem through an authentic research experience. This is where you might conduct interviews or needs assessments, research articles, watch videos, or analyze data.

List Ideas

This is where you apply newly acquired knowledge to potential solutions. In this phase, you will list your ideas. We will not only brainstorm, but also analyze ideas, combine ideas, and generate a concept for what sneakers you will create.

Draw & Design

In this next phase, you are sketching out your ideas on paper then start creating a prototype using the materials provided. In this situation, its a shoe but other solutions might involve digital work or, a work of art or something you engineer. It might even be an action or an event or a system.

Inspect, Investigate & Improve

During this step, you begin to inspect and investigate what's working and improve what's failing. The goal here is to view this revision process as an experiment full of iterations, where every mistake takes you closer to success.

Talk About It

Then, when it's done, it's ready to be talked about. In the phase, you will talk about your idea and prototype in front of whoever is around. Talking about your ideas out-loud will help you improve your creative confidence and you never know who could provide you with design insight.

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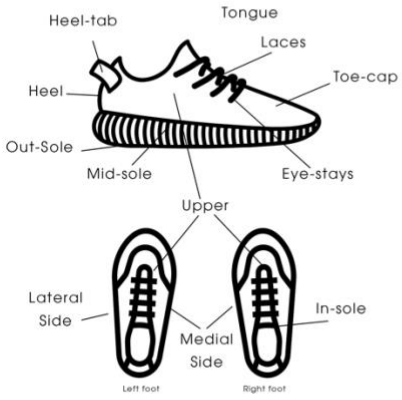
Sneaker Anatomy



Sneaker Glossary

Eye-stays - The part of the shoe that hold the laces in place.

Heel-tab - Can be used to help put on and take a sneaker.

Heel - Like the back of the human foot, the back of a sneaker is called the heel. Between the upper and inner liner of the heel is the heel counter, which is often a curved insert made from firm material such as plastic, to cup the heel and prevent excessive movement. Some shoes have the heel counter on the outside, or none at all.

In-sole - Above the mid-sole and inside the shoe is the insole, also known as the sock-liner. It's the part that the sole of your foot contacts directly. Usually made from foam, rubber or leather, insoles can immensely change the feel and fit of a sneaker. For example, if you have high arches, you may need a different insole with arch support. Some insoles are removable, while others are glued down.

Laces - The part of the shoe used to tighten to fit wearers foot.

Lateral Side - Standing up straight and looking down at your feet, you can see the top of the shoe. The side facing the outside of your body is the lateral side.

Medial Side - Standing up straight and looking down at your feet, you can see the top of the shoe. The side facing the middle of your body is the medial side.

Mid-sole - The material that sits inside the shoe that creates a layer between the sole and the wearer's foot. A la The insole adds comfort for the wearer, while hiding the join between the upper.

Out-sole - The out-sole is the layer of sole that is exposed to the ground. Due to the amount of wear and stress this part of the shoe receives it is usually made of a very durable material.

Toe-cap - Shoes may have a toe-cap in the front upper of the shoe. Toe-caps can take various forms, but the distinct types are: complete replacements for the front upper of the shoe; stitched over toe-caps that add an extra layer to the upper.

Tongue - A shoe tongue is a strip of leather or other material located under the laces of a shoe. The tongue sits on the top center part of the shoe on top of the bridge of the foot.

Upper - The entire part of the shoe that covers the foot.

CHOOSE YOUR CHALLENGE

1. CARRINGTON
Carrington has recently had a her 2 of her toes amputated due to a dirt bike accident. Her toe loss is causing a loss of balance which is hindering her on the basketball court and with Homecoming is coming up she concerned about her balance in heels. Design a basketball shoe or heel for Carrington.

2. FRED
Fred wants to start a new footwear brand for kids. He loves nature and animals so he wants his company to be Eco-friendly and inspired by animals. Design an Eco-friendly shoe for Fred inspired by your favorite animal.

3. FREESTYLE
Freestyle! Create the sneaker of your wildest dreams. You have to create your own theme and run with it.

FOLD

CONTROL YOUR JOURNEY

To start the Carrington Sneaker Challenge, please turn to page:
8

To start the Fred Sneaker Challenge, please turn to page:
10

To start the Freestyle Sneaker Challenge, please turn to page:
12

CARRINGTON

Carrington has recently had two of her toes amputated due to a car accident. Her toe loss is causing a loss of balance which is hindering her on the basketball court and with Homecoming is coming up she concerned about her balance in heels. Design a basketball shoe or heel for Carrington.

THINGS TO CONSIDER

So, think about this shoe for Carrington.

1. Consider her and other people who live with amputated toes as your target audience. How will do you design a shoe for to help her with her balance? What will her experience be putting on the shoe?

2. How will it look? What kind of materials do you want to use? Colors?

3. Think of how you can make your shoe design interchangeable for people who have different amputated toes.

Jot down anything that comes to mind:

FOLD

MONITOR & RESEARCH

OBSERVATIONS	QUESTIONS

OUTLINE & UNDERSTAND THE PROBLEM

CARRINGTON'S CHALLENGE

Once completed please turn to page 14 of your notebook.

FRED

Fred wants to start a new footwear brand for kids. He loves nature and animals so he wants his company to be Eco-friendly and inspired by animals. Design an Eco-friendly shoe for Fred inspired by your favorite animal.

THINGS TO CONSIDER

Let's help Fred save the world through kids shoes!

1. What's your favorite animal? What's 5 unique attributes about that animal?

2. What does it mean to be Eco-Friendly?

3. How can you put a few of those attributes in a shoe? What kind of materials do you want to use? Colors?

Jot down anything that comes to mind:

FRED'S CHALLENGE

MONITOR & RESEARCH

OBSERVATIONS	QUESTIONS

OUTLINE & UNDERSTAND THE PROBLEM

Once completed please turn to page 14 of your notebook.

FREESTYLE

Don't want to make a shoe for Carrington or Fred? That's cool, then the freestyle challenge is for you. You have free range to create what ever you want but it must have a theme and you must explain why you made the design decisions you made.

THINGS TO CONSIDER

Let's take a moment to dream about your perfect sneaker...

1. Consider your ideal audience

2. What kind of theme will it have? A ton of shoes shoe has a theme. It might be a mountain theme or a space theme or pop culture theme. So, create a theme for your shoe.

3. What kind of features does your sneaker have that makes it different?

Jot down anything that comes to mind:

FREESTYLE CHALLENGE

MONITOR & RESEARCH

OBSERVATIONS	QUESTIONS

OUTLINE & UNDERSTAND THE PROBLEM

Once completed please turn to page 14 of your notebook.

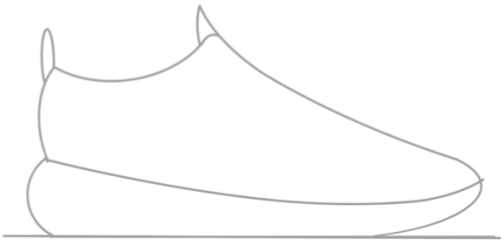
LIST YOUR IDEAS

Brainstorming time! Break out those sticky notes and jot down as many ideas as you can. Try to fill this whole page with your ideas.

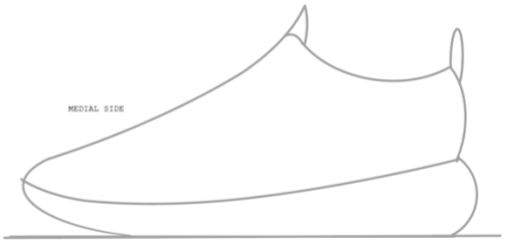
DRAW & DESIGN

SKETCH OUT YOUR SNEAKER IDEAS

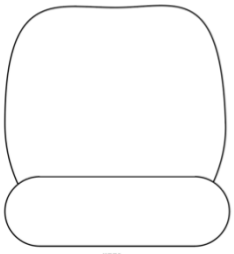
TEMPLATES ARE ONLY HERE IF YOU NEED THEM.
PLEASE LET YOUR MIND WONDER.



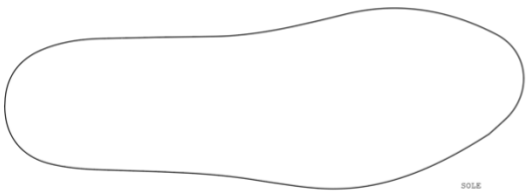
LATERAL SIDE



MEDIAL SIDE



HEEL



SOLE

1. TAKE SOME TIME TO EXPLORE THE MATERIALS IN THE MOLD IT KIT!

2. USE THE TOOLS AND INSTRUCTIONS PROVIDED IN THE TO BRING YOUR SNEAKER TO LIFE!

INSPECT, INVESTIGATE & IMPROVE

Spend some time testing out your sneaker ideas. Write down what's working and not working:

Stages	What's working?	What needs to be improved?
Example:	*Heel tab fits perfectly*	*Lace system needs adjusting*

TALK ABOUT IT!

Presentation Matters.

Make a quick plan on how you want to present your concept to the class. Role playing as the client is a great way to learn and develop empathy for others.

Congratulations

CELEBRATE WHAT YOU MADE!

Appendix D
Educator Handbook

MOLD

EDUCATOR GUIDE
[SNEAKER CHALLENGE]

Design Review

What is Design?

Design is everywhere and in everything. Design is problem solving and communication in various forms. Design, from physical products to mobile apps should make the world a little easier through which to navigate. By learning more about design, you are getting a glimpse into art, creativity, problem solving, business and branding.

Design Thinking?

Design thinking is a flexible process for getting the most out of the creative process. It is used in the arts, in engineering, in the corporate world, at universities, and in social and civic spaces. It works when creating digital content or when building things with duct tape and cardboard. It can even be used in planning events or in designing services.

MOLD IT Design Thinking Process:

This process was designed to help you get your ideas out of your head and into the world. If you can think it, you can MOLD IT.

Monitor & Understand what's going on

In the first phase, you should look over the situation or challenge, and learn as much as you can about it. The goal here is awareness. It might be a sense of wonder at a process or an awareness of a problem or a sense of empathy toward an audience. This is also where you begin asking a ton of questions.

Outline the Problem

This second phase is where you demonstrate you've identified a problem and begin to breakdown the process or problem through an authentic research experience. This is where you might conduct interviews or needs assessments, research articles, watch videos, or analyze data.

List Ideas

This is where you apply newly acquired knowledge to potential solutions. In this phase, you will list your ideas. We will not only brainstorm, but also analyze ideas, combine ideas, and generate a concept for what sneakers you will create.

Draw & Design

In this next phase, you are sketching out your ideas on paper then start creating a prototype using the materials provided. In this situation, its a shoe but other solutions might involve digital work or, a work of art or something you engineer. It might even be an action or an event or a system.

Inspect & Improve

During this step, you begin to inspect and investigate what's working and improve what's failing. The goal here is to view this revision process as an experiment full of iterations, where every mistake takes you closer to success.

Talk About It

Then, when it's done, it's ready to be talked about. In the phase, you will talk about your idea and prototype in front of whoever is around. Talking about your ideas out-loud will help you improve your creative confidence and you never know who could provide you with design insight.

Educator Guide Glossary

Here's a quick explanation of the lesson plan terms in this unit.

Lesson Preview

Lesson Topic: This is the main idea for the lesson

Estimated Time: This is merely an estimation. Times will vary according to your specific students.

Objectives: These objectives are designed to be clear, concise, and student-friendly while also connecting to depths of knowledge and Bloom's Taxonomy

Common Core Standards: We each lesson to the Common Core Standards.

Lesson Preparation

Materials: This is a list of any materials you will need for that specific lesson.

Tasks: This is a list of tasks that you will need to do before beginning the lesson.

Lesson Outline

Materials: This is a list of any materials you will need for that specific lesson.

Tasks: This is a list of tasks that you will need to do before beginning the lesson.

Slide #	Student Tasks	Teacher Tasks
Each slide has a number at the bottom right-hand corner. This section explains where you should be in the slide-show.	This is a short explanation of what your students will be doing during this part of the lesson.	This is a short explanation of what you, as a teacher, will be doing during this part of the lesson.

Educator Guide

Here's a quick explanation of the lesson plan terms in this unit.

Challenge Preview

Challenge Topic: Footwear
Estimated Time: 90 mins
Objectives: Working collaboratively. Plan, create, test and revise a sneaker design.

TEKS:

TAC §110.30(b) English
Reading/Comprehension Skills. Students use a flexible range of meta-cognitive reading skills in both assigned and independent reading to understand an author's message. Students will continue to apply earlier standards with greater depth in increasingly more complex texts as they become self-directed, critical readers. The student is expected to: (A) reflect on understanding to monitor comprehension (e. g., Asking questions, summarizing and synthesizing, making connections, creating sensory images); and (B) make complex inferences about text and use textual evidence to support understanding.

TAC §112.37. Environmental Systems,

The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:
(A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;
(B) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials; (C) draw inferences based on data related to promotional materials for products and services; (D) evaluate the impact of research on scientific thought, society, and the environment; (E) describe the connection between environmental science and future careers; and (F) research and describe the history of environmental science and contributions of scientists.

Lesson Preparation

Materials:

Each group should have access to MOLD Sneaker Design Kit
Each student should have their own MOLD notebook
Tasks: This is a list of tasks that you will need to do before beginning the lesson.

Preparation Tasks

Make sure to set up the classroom in a way that facilitates collaboration.
Make sure each box is filled with the necessary supplies.
Make sure that you have set up the slide-show.

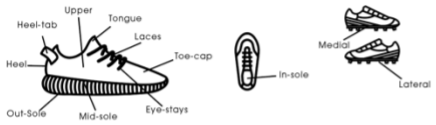
Educator Guide Design Introduction

Slide #	Student Tasks	Eductor Tasks
1	Watch presentation	Navigate slideshow through the duration of the workshop.
2	Watch presentation	Explain what MOLD is and what the students will be learning.
3	Watch presentation	Read slide to students
4	Watch presentation	Load "Design Is" video from MOLD youtube or MOLD Website
5	Watch presentation	Read slide to students
6	Watch presentation	Read slide to students
7	Answer questions	Facilitate discussion with students based on questions provide on slide

Educator Guide Sneaker Challenge

Slide #	Student Tasks	Educator Tasks
8	Review anatomy of the sneaker and glossary. Choose challenge and jot down any questions you have in your MOLD Notebook	Pass out the MOLD Notebooks and instruct students to go to page one.
9-10	Go to your assigned group. Image your self inside the situation you are trying to solve to really understand the problem.	Break the students up into groups based on the challenge the student chose. Have them research the challenge.
11-12	This is the stage where you try to develop an key insight based on the research and questions you've asked. List any ideas that might help you solve the problem.	Walk around and guide students who might be struggling with creating ideas. Ask them to think about exciting moments someone might experience their shoes.
13	Individually: Sketch out some ideas for your shoe design. Take some time to explore your items. What are some of the possibilities that you see? What are some design ideas that you might want to test out as you build the sneaker?	Use this time to have fun with your students. As they play around with the supplies, you might want to join them.
13	Create an initial plan for your shoe design. Brainstorm ideas and then create a sketch of what it will look like.	Focus on whether or not the groups are working collaboratively in a way that values every member.
13	Start building!	Use this time to meet with each group and monitor their progress.
14	Begin testing the shoe prototype to see where it fails and try to fix it.	This revision phase should come naturally to groups. This might be a time when you have to provide a lot of encouragement to groups that are getting frustrated.
15	Individually: Complete the self-reflection.	This last reflection can be done at the end of the class period or at a later time.

Sneaker Anatomy and Glossary



Eye-stays - The part of the shoe that hold the laces in place.

Heel-tab - Can be used to help put on and take a sneaker.

Heel - Like the back of the human foot, the back of a sneaker is called the heel. Between the upper and inner liner of the heel is the heel counter, which is often a curved insert made from firm material such as plastic, to cup the heel and prevent excessive movement. Some shoes have the heel counter on the outside, or none at all.

In-sole - Above the mid-sole and inside the shoe is the insole, also known as the sock-liner. It's the part that the sole of your foot contacts directly. Usually made from foam, rubber or leather, insoles can immensely change the feel and fit of a sneaker. For example, if you have high arches, you may need a different insole with arch support. Some insoles are removable, while others are glued down.

Laces - The part of the shoe used to tighten to fit wearers foot.

Lateral - Standing up straight and looking down at your feet, you can see the top of the shoe. The side facing the outside of your body is the lateral side.

Medial - Standing up straight and looking down at your feet, you can see the top of the shoe. The side facing the middle of your body is the medial side.

Mid-sole - The material that sits inside the shoe that creates a layer between the sole and the wearer's foot. A la The insole adds comfort for the wearer, while hiding the join between the upper.

Out-sole - The out-sole is the layer of sole that is exposed to the ground. Due to the amount of wear and stress this part of the shoe receives it is usually made of a very durable material.

Toe-cap - Shoes may have a toe-cap in the front upper of the shoe. Toe-caps can take various forms, but the distinct types are: complete replacements for the front upper of the shoe; stitched over toe-caps that add an extra layer to the upper.

Tongue - A shoe tongue is a strip of leather or other material located under the laces of a shoe. The tongue sits on the top center part of the shoe on top of the bridge of the foot.

Upper - The entire part of the shoe that covers the foot.

Education Needs of Minority Students	VS	Activities in this MOLD Challenge
Students working together.		Working in groups is recommended for this design challenge.
Critical Thinking.		Having the students figure out a certain problem or developing a theme for the sneaker design helps them build critical thinking and problem solving skills.
Rich complex curriculum.		The students attempts to solve real world problems provides them a rich complex curriculum.
Engagement and Competitiveness.		The entire design process is presented as a source of competition. The innate desire to want your ideas heard would blossom. The process forces the students to be engaged by forming and communicating their ideas. The prototyping phase allows the students to engaged through working with their hands.
Ability to impose order to chaotic data.		The students develop their ability impose order on chaotic data by asking questions, doing the research and turn that research into insights for a tangible prototype.
New standards on assessment.		Monitoring engagement and presenting can help provide a new means assessing students.
Culturally democratic learning environment.		The students ability to choose their challenge option represents a culturally democratic learning environment where students are allowed to pursue things of their interest.