ENHANCING DIVERSITY THROUGH DESIGN EDUCATION WITH MOLD
MINORITIES' OPPORTUNITY TO LEARN DESIGN

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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 of access to design education and resources within racially minoritized communities. Grounded in the notion that teaching design thinking aids individuals in building skills that translate to situations beyond design, expanding the reach of design education would be beneficial to racial minorities' personal development. This paper explores the development and application of a design toolkit to facilitate design education in focal communities. Minorities' Opportunity to Learn Design (MOLD) is an equity-driven platform that delivers a unique experience to design thinking and learning. Using an exploratory sequential approach, this study examines the impacts and values of MOLD in real-world settings.

Keywords: Design Education, Diversity in Design, MOLD, Minorities in Design, Design Thinking.

1. INTRODUCTION

Most individuals from minority backgrounds already deal with various personal, social, and economic obstacles that can drastically impact their career goals and opportunities. Many educational institutions in the United States are brimming with inequality issues that leave many minority students at a disadvantage relative to their majority counterparts. Problems like inadequate educational funding, lack of career awareness, and systemic abandonment of predominantly minority school systems can severely affect what these minority students decide to do with their life. This phenomenon of not providing design-based education opportunities to minority students has contributed to the visible lack of professional designers. It also has hidden a powerful tool from a community of people that could directly benefit from design.

This study examines the issues surrounding the lack of diversity in the design professions by focusing on the obstacles minorities face pursuing design education and careers. It will also attempt to provide students, educators, and under-resourced communities, with a tool to help close equity gaps in design and deliver a fun design learning experience targeted to minority youth. The hypothesis is that doing so will ultimately yield more awareness and increase the perceived value of design. This study employs a qualitative case-study methodology that seeks to serve as an example of how design and design-thinking can be introduced to minority students.

2. LITERATURE REVIEW
2.1 LACK OF MINORITIES IN DESIGN PROFESSION

The racial and ethnic demographics of the United States are ever-changing, as projected by the U.S. Census Bureau (2015) which estimates 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 burdened by a legacy of demographic homogeneity concerning racial identity. Professional designers spend their lives creating for society and listening for feedback. 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 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 creating accessible services and products that serve the needs of all humanity. Data collected from a 2018 U.S. Department of Labor report of 983,000 designers shows the 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. Mitchell-Powell and Miller (1991) published an AIGA essay titled, Why is graphic design 93% White? Which postures the specific barriers which kept minorities out of the graphic design industry. Mitchell-Powell and Miller argued that the most robust obstacles impacting minority students are a lack of access to resources. Nearly 30 years later, this research remains relevant as many of these barriers still prevent underserved minorities from studying design.

Throughout the country's history, underserved minority communities are burdened by a lack of access, resources, and opportunities to higher education and creative industries. These barriers to entry and resources have denied minority students career opportunities, creative development opportunities, and the ownership of their ideas. Data from Adobe's Creativity's Diversity Disconnect (2017) survey indicated that "young creatives of color are twice as likely to perceive a lack of access to tools and training as a significant barrier." Other obstacles remain additional social factors outside of access that serve as barriers to design education, such as bias and systemic exclusion.

2.2 DESIGN-BASED PEDAGOGY

According to Royalty (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). Royal posits that DBP has five main attributes: audience, challenges, teamwork, problem-solving, and creativity. In classrooms that use a design-based pedagogy, students are expected to exhibit the behaviors of designers to solve problems. When compared to other well-known educational frameworks, DBP proves to be "robust" and provides a "learning environment that invites students to practice design to explore and expand the boundaries of their creativity" (Royalty, 2017. p.2)

Carroll et al. (2010) claim 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). 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 language as a tool, and developing a bias toward adaptivity.

2.3 EDUCATION NEEDS OF MINORITY STUDENTS

Throughout the last few decades, various researchers have documented many of the unique learning characteristics of minority students. McKinsey & Company (2009) addressed that "the persistence of the educational achievement gap imposes on the United States the economic equivalent of a permanent national recession" (p 6). In 1987, William B. Johnston investigated and 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 design field remain significant. In *Key Issues in Minority Education*, Ward & Cross. (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. In recent years the study of culturally responsive teaching pedagogy 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 primary way to educate minority students.

Based on the literature review, a list of minority educational needs must be reviewed by educators who work primarily with minority student populations. 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. Furthermore, diversity is essential within the design industry because of the way the design process works. Homogeneity often fails to breed new ideas, while the convergence of diverse experiences and knowledge often does. The philosophical tone in this study was influenced by the transformative worldview that emphasizes "advocating for an action agenda to help marginalized people" (Creswell, 2014). It is illogical and unfair that the diversity gap within the field of design is stagnant, yet there are still very few studies investigated with an emphasis on minority students' design education.

3. METHODS & DESIGN PROCESS
3.1 RESEARCH METHODOLOGY

To facilitate the exploratory sequential approach, this research was executed in four phases, beginning with a qualitative step to determine the educational needs of minority students and the benefits of a design-based education. The subsequent four stages of research are explained in Figure 1.
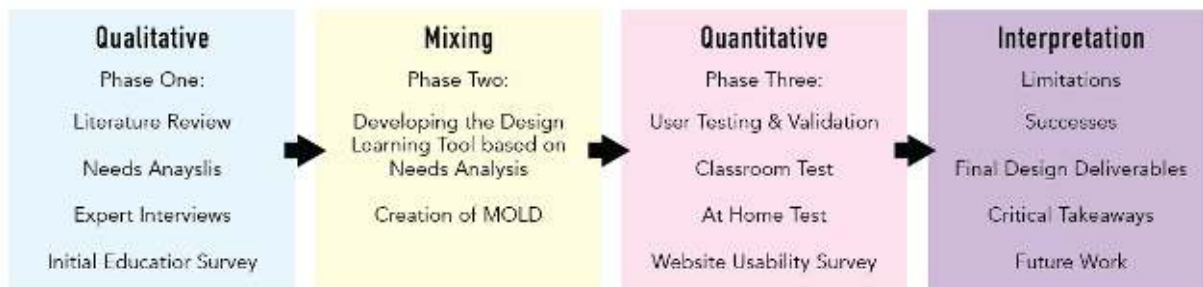

Qualitative	Mixing	Quantitative	Interpretation
Phase One:	Phase Two:	Phase Three:	Limitations
Literature Review	Developing the Design Learning Tool based on Needs Analysis	User Testing & Validation	Successes
Needs Anayslis		Classroom Test	Final Design Deliverables
Expert Interviews	Creation of MOLD	At Home Test	Critical Takeaways
Initial Educator Survey		Website Usability Survey	Future Work

Figure 1 *Research Study Methodology*

In phase one, qualitative data was gathered through minimally structured expert interviews. Online surveys with educators that work primarily with minoritized student groups were also conducted. Relying on the list of needs identified through prior research, the online educator surveys were used to gain further knowledge of students' educational needs as observed by active classroom educators. Following the needs analysis, a prototype design tool was made in phase two based on the design themes developed from phase one.

In phase three of the study, the final prototype design tool was tested with minority students and educators at the Hall Center for Education in Aldine during a design workshop guided by the researcher. The racial and ethnic demographic make-up of student participants of the Hall Center for Education fit the demographics of this study's focus, which were Black and Hispanic students between the ages 13-17. 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 COVID-19's 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 design learning tool was tested by a 13-year-old participant under the supervision of a parent. 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.

3.2. MOLD DEVELOPMENT AND DESIGN APPROACH

This case study aimed to develop a design learning tool and platform that would provide design awareness and value to underserved minority youth. These prototypes must provide access to a profound learning experience and force the student to think critically and with empathy. Therefore, the primary approach we explored was to incorporate the educational needs of minority students into a design workshop. This workshop was designed to integrate minority youth's culture into a learning system that embodies a human-centered design framework.

The newly developed design learning tool for this study was branded as MOLD, an acronym for minorities' opportunity to learn design. MOLD provides design learning access, resources, opportunities, and value to minority students. These four pillars will serve as the foundation for the MOLD experience. The focus was to design the experience to suit the educational needs of minority students using a problem-centered learning curriculum. The design learning experience must be adaptable enough to be implemented in different settings. To include aspects of cultural relevancy to the workshop, MOLD's initial challenge focused on footwear design. Sneakers and urban minority culture have been integrated for over 40 years, and launching the initial challenge as a sneaker will help explain design with products that many target participants are familiar with.

MOLD IT Design Thinking 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. The experience flow and design thinking process represented in Figure 2 served as a foundation for developing the content of the design tool.
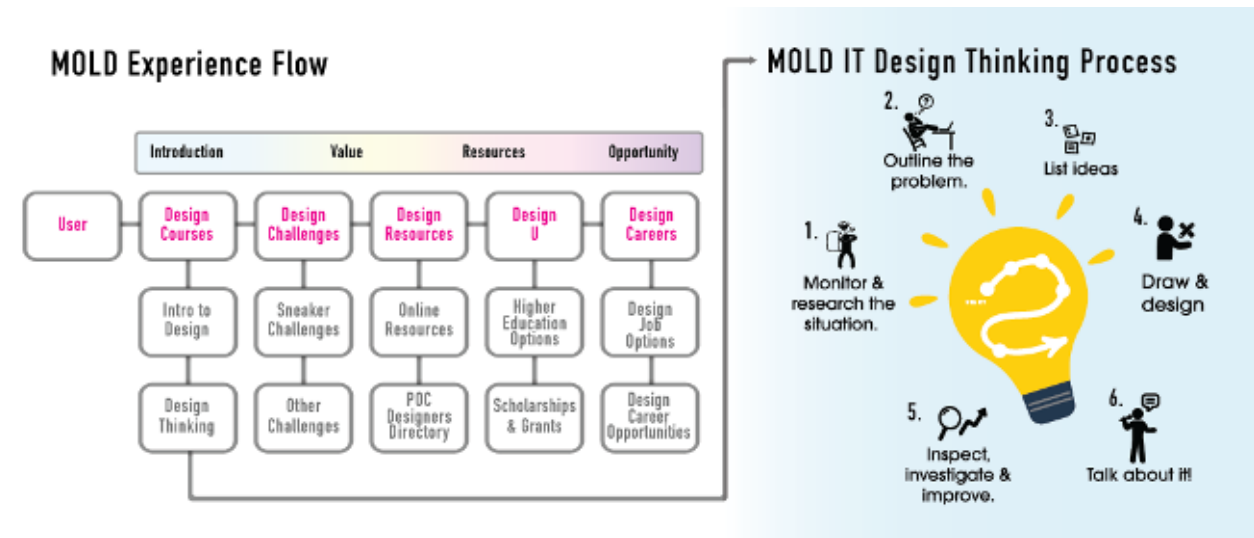

Figure 2 *MOLD Experience Flow & MOLD IT Design Thinking Process*

Design Courses

MOLD's design thinking courses give participants access to a design thinking approach for innovation and developing ideas. Introductory courses focused on "What is Design?" and "MOLDIT Design Thinking Process." The design courses featured a series of videos to help MOLD realize its goal of reaching student participants ages 13-17. MOLD's design courses emphasize the power of design and the value of a tangible process to take ideas from paper to prototype.

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. Handbooks that serve as lesson plans and guides were created to model the MOLD IT process. The MOLD sneaker design challenge offered three options to provide the participant 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 participant to create a shoe for someone looking to start a shoe company inspired by animals. The last challenge option allowed the participant to freestyle their prototype.

Student & Facilitator Handbook

The student handbooks were designed with the MOLD IT framework in mind. This handbook takes the participant through the entire MOLD IT process and sets the foundation for building the shoe prototype. The facilitator handbooks were designed as a guide for the workshop facilitator. This handbook takes the participant through the objectives of the lesson and the State of Texas Assessment goals for students ages 13-17 that are achieved through completing the workshop.

MOLD 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 physical prototype for MOLD utilized recycled products that 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 instructor's control over the workshop.

The next part of the process focused on more of a structured approach to the MOLD experience. The structured approach allows more control and direction in the process. It allows for anyone to participate, even with specific disabilities, and it ensures the participant has the needed tools to complete all tasks.

MOLD Online Experience

The online design approach centered around the inquiry: How can MOLD deliver design learning content in a fun, coherent, and interactive way? User research was conducted by first targeting people who educate minority students to develop the content requirements. Then, user personas were created through this interview process. Next, a competitive analysis was completed on different online educational platforms that target a similar age demographic. Before the website layout was constructed, MOLD's content was inventoried and audited. The content was evaluated in terms of value that it provides for users who helped create a hierarchy of information for the website. Next, the content was grouped and labeled to investigate any potential relationships between the content. The grouping of content gave insight into what to begin marking and how to prioritize navigating the content delivery. From there, wire-framing was done based on that content navigation insight. This part of the process's goal is to create a visual representation of a layout for the online experience of MOLD.
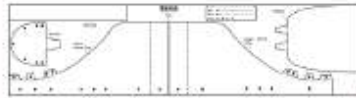
Figure 3 *MOLD Sneaker Design Challenge Kit & Website Design*

4. MOLD WORKSHOP SUMMARY & DISCUSSION

4.1. MOLD LEARNING OUTCOMES FROM CLASSROOM WORKSHOP

The MOLD classroom workshop consisted of presenting the design learning content in part one, and part two focused on the sneaker design challenge. Before and after surveys of the participants' knowledge and awareness of design, demographics, and workshop experience were collected. Every participant stated they found the MOLD IT process to be helpful in bringing their ideas to life. This confidence is key to developing critical thinking skills. After being asked if their definition of design changed after taking the workshop, one of the participants stated, "yes, design is everything." Another participant said the workshop "really opened my mind to how I could create different things, in different ways." One participant explained the most memorable part of the workshop was "making a sneaker for someone with missing toes," showing high levels of empathy. When asked about MOLD's overall experience, the educator of the participants "I think it was awesome; my kids were extremely receptive to everything. It was something completely different than what they are used to. You can see that they were challenging themselves creatively and mentally throughout the process."

Figure 4 *MOLD Workshop in Classroom*

4.2 MOLD AT-HOME LEARNING OUTCOMES

      The participant shared learning this process could help them bring their ideas to life, and the most challenging 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 how to put something together off of reading instructions, 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.

Figure 5 *MOLD Workshop at Home*

4.3 MOLD ONLINE USABILITY RESPONSES

Student Responses

      The responses from the student usability surveys 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 said they would like to learn more about design.

Professional Designer Responses

      The professional designers surveyed work in eight different design fields, including industrial design, UX design, and graphic design. The designer participants were identified from five other races or ethnicities. The responses from the designer usability survey showed that all participants understood the purpose of MOLD. Adverse reactions and design critiques were collected through the designer participants when asked what they would change about the MOLD website. One of the participants stated, "Stronger home page & navigation." Positive responses from the designer participants included, "MOLD is practical, doable, realistic, and I can see this included in a school project within a class or curriculum." Another participant stated, "I love the idea of this! I think early exposure is key in developing design talent."

Educator Responses

      A majority of the educators surveyed 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 more creative with its education, while still challenging students' creativity and thinking. It's giving students a new experience in education." That educator 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."

5. CONCLUSION

A diversity-focused design tool, MOLD, was created, tested, and branded as Minorities' Opportunity to Learn Design. MOLD was developed based on the hypothesis that providing design access and resources to racially minoritized students will increase their awareness of design, the perceived value of design, and knowledge of the design thinking process. Minority students, educators, and designers participated in this study by providing feedback on the physical, digital, and overall learning experience of MOLD. After testing, a majority of the student participants expressed their excitement for the new learning experience and the results of pre and post-surveys revealed 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. 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.

Plans for the project could include having MOLD established as a 501c3 non-profit organization. With that status, apply for grants to allow continued research and testing with more student participants to develop the design tool experience further and expand design courses and challenge offerings. Since the original launch, a new design challenge has been created, and it focuses on teaching the participant how to make face masks from materials found at home. There has also been a partnership with a STEM organization to implement MOLD in their summer camp 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.

This study suggests that students enjoy having a design-based learning experience, and educators believe learning design skills can significantly impact the students. Further, this case study serves as an example of a way to introduce minority students to the benefits of design and design-thinking and 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 can elevate the creative thinking skills of all students.

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Appendix A
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

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 solution 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 creation, it's a shoe but other solutions might involve digital work or, a week 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.

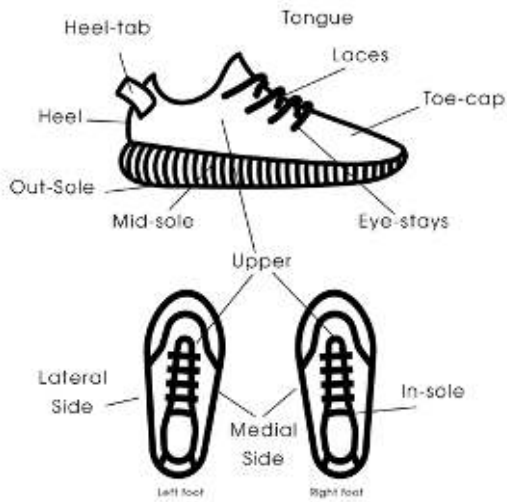#### Talk About It

Then, when it's done, it's ready to be talked about. In this 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.

Sneaker Anatomy

Heel-tab

Tongue

Laces

Toe-cap

Heel

Out-Sole

Mid-sole

Eye-stays

Upper

Lateral Side

In-sole

Medial Side

Left foot   Right foot

MOLD

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 lot 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 her upcoming u 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 as he wants his company to be Eco-friendly and inspired be 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.

MOLD

CONTROL YOUR JOURNEY

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:

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HOLD

MONITOR & RESEARCH

OBSERVATIONS	QUESTIONS

OUTLINE & UNDERSTAND THE PROBLEM

FRED'S CHALLENGE

11

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:

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HOLD

MONITOR & RESEARCH

OBSERVATIONS	QUESTIONS

OUTLINE & UNDERSTAND THE PROBLEM

FREESTYLE CHALLENGE

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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.
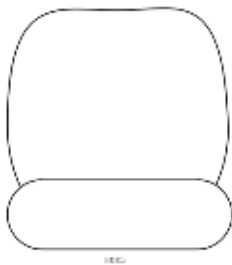
DRAW & DESIGN

SKETCH OUT YOUR SNEAKER IDEAS

LATERAL SIDE

MEDIAL SIDE

14

15

HEEL

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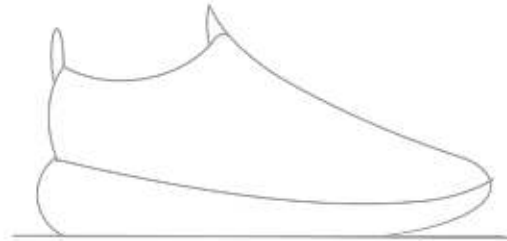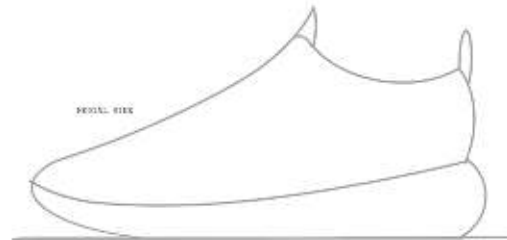
1. TAKE SOME TIME TO EXPLORE THE MATERIALS IN THE MOLD IT KIT!

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

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17

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.

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Congratulations
CELEBRATE WHAT YOU MADE!

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Appendix B
Facilitator Handbook

Design Review

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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, it's 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 this 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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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 exploration of what your students will be doing during this part of the lesson.	This is a short exploration 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 with in 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 material 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.
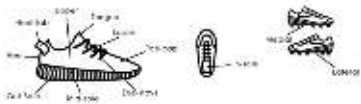Make sure that you have set up the slide-show.

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	I read "Design In" 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 yourself 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 come up 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 powerful ties 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.
11	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 utilize 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

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Education Needs of Minority Students   vs   Activities in this MOLD Challenge

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Appendix C
MOLD's Physical Design Learning 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**

Appendix C
MOLD's Online Design Learning Tool
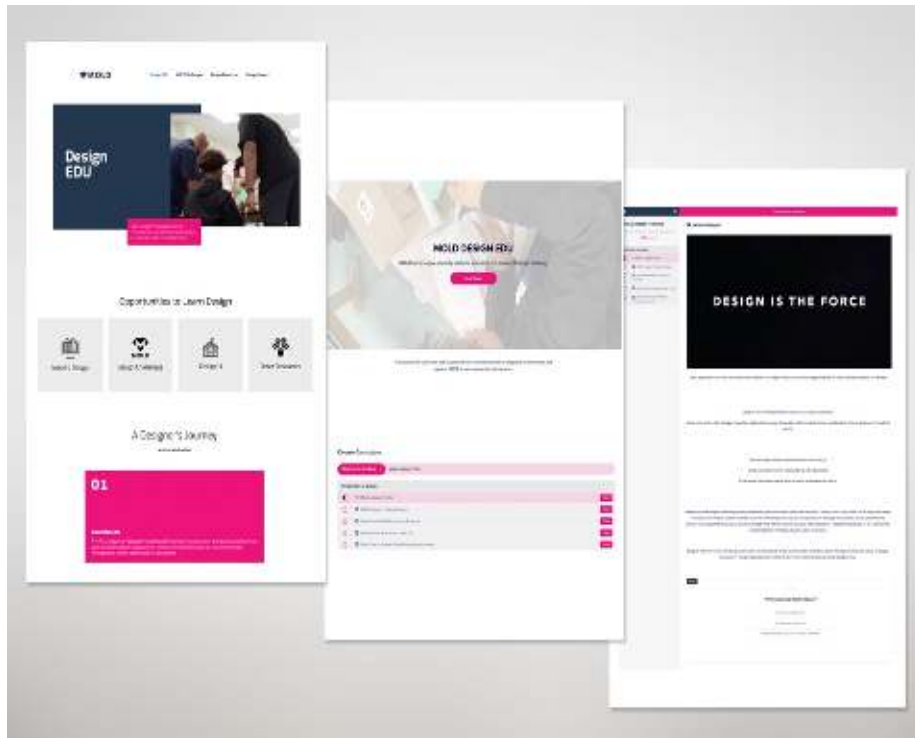

Figure 23 (Continued) *MOLD Online Experience*
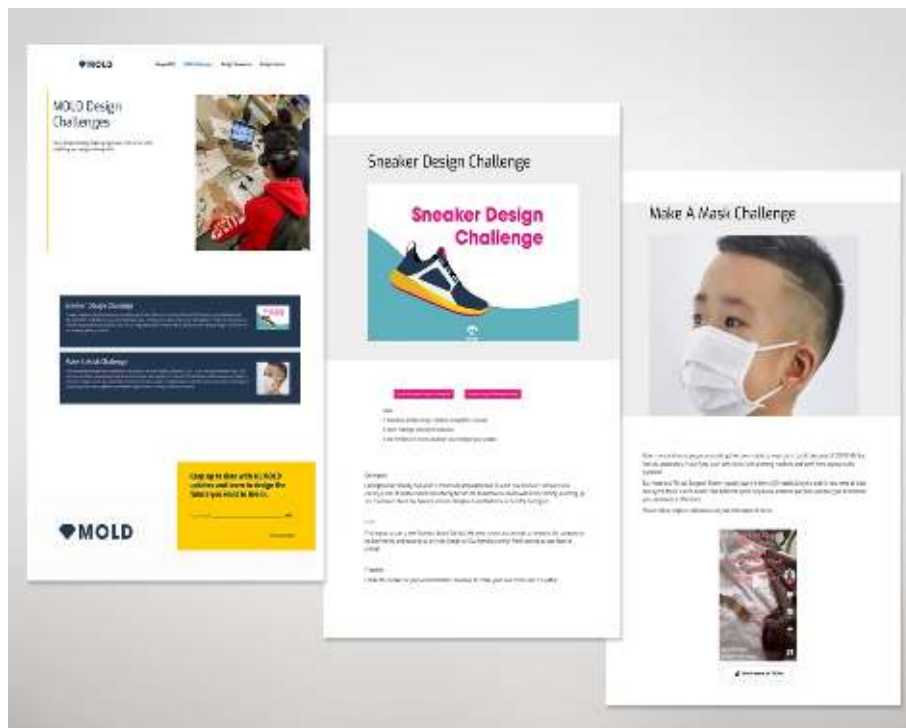
Figure 23 (Continued) *MOLD Online Experience*

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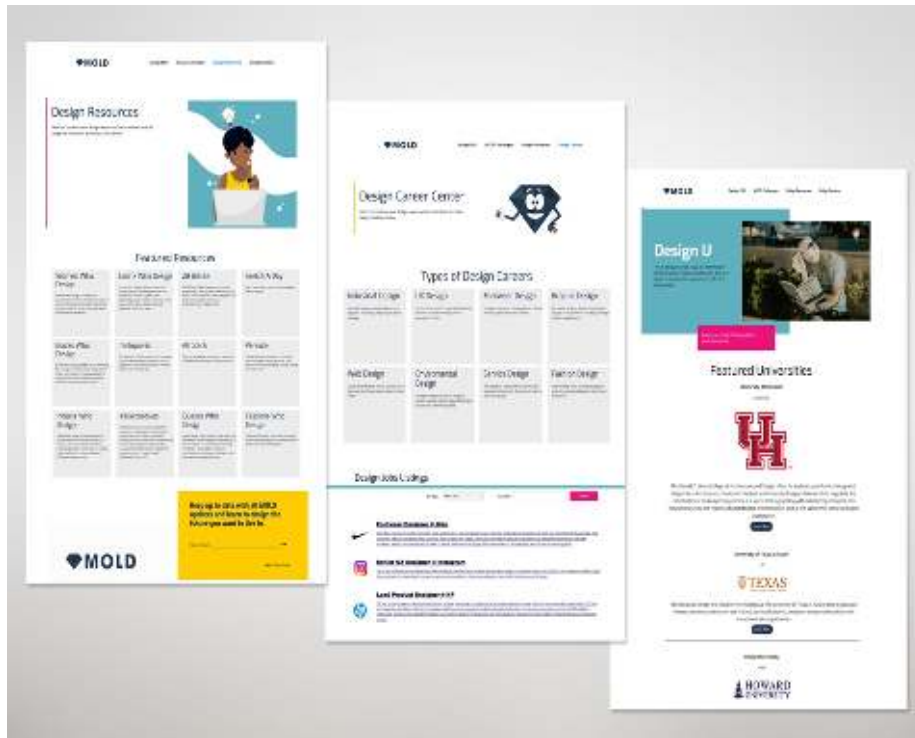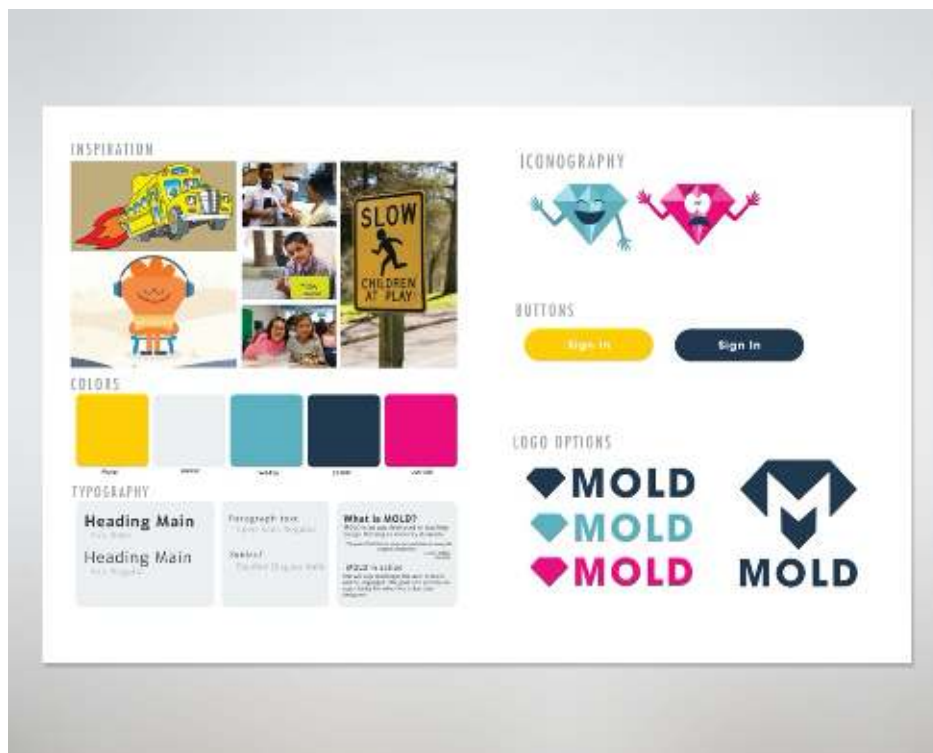

Figure 24 *MOLD Online Experience Design Guidelines*