Preparing to Introduce Design Thinking in Middle Schools
Critically Examining Planning Processes Involving School Officials and Design Educators

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This case study critically analyses and describes knowledge gained by a team of university-based design educators and researchers who engaged in the planning necessary to introduce specific aspects of design thinking in middle school classrooms in Denton, Texas, USA, a city of about 140,000. (Middle schools in the U.S. typically educate students aged 11 to 14.) This piece articulates key insights about how and why the introduction of design thinking should be collaboratively and strategically planned if it is to function as an effective augmentation of a college preparatory curricula, and the learning experiences that constitute this, at this educational level. The authors are university-level art and design educators at the University of North Texas, and they share what they learned during a three-years-plus collaboration with key school district administrators and advisors, middle school instructors, and more than 90 middle school students. The intent of this discourse is to provide readers with actionable means to effectively prepare the groundwork for introducing design thinking in middle school classrooms.

Keywords: teaching design thinking; habits-of-mind; S.T.E.A.M.; strategic planning; critical thinking

Introducing the ‘Why and How’ of Our Project
The primary reasons why our university-based art and design education team sought to establish and maintain a relationship with a mid-sized American middle school system in Denton, Texas—albeit temporarily hampered by a pandemically induced suspension of in-school learning in the school district within which we have been working—are framed within Chris Argyris’ ideas regarding the need to utilize, or create and utilize, actionable knowledge (1996). In our case, the actionable knowledge we began seeking almost three years ago in mid-2018, and are still seeking, is two-fold: 1.) if the approaches and methods common to the process of design(ing) (e.g., open-ended problem-based framing, iterative thinking and prototyping, recursive exploration and reflection, failure as a learning heuristic) could be reconciled with and enrich middle-school pedagogical approaches that typically favour single ‘right’ answers arrived at by engaging in a linear, expeditious manner; and 2.) whether this hybrid approach to learning could engender habits of mind that could transcend subject matter to become meta-level skills upon which students could rely as they take on increasingly complex learning and life challenges.

In order to describe how our investigation would work in a way that was understandable to our educational partners, and to dispel or attenuate widely-held misconceptions about what the professional practice of design entails (i.e., untethered creative expression, technological facility as an end rather than a means, visual selling and consumer demand creation), we employed ‘design thinking’ — a term now in common usage that has come to mean the codification and use of design practices by non-designers seeking a system of user-centric problem understanding and solution seeking—as an encapsulating descriptor for our efforts. More broadly, we situated our efforts within the educational realm as the “A” in the acronym “S.T.E.A.M.” This is the letter that represents the (A)rts and is a recent addition to the longstanding acronym “S.T.E.M.” that has come to denote core subject matter areas that, at least in the United States, have come to be seen as vital and necessary for pre-university-level students to acquire and master — (S)cience, (T)echnology, (E)ngineering, and (M)athematics. In so doing, we positioned our investigation within a contemporary movement gaining
purchase in western education that, somewhat ironically, has returned to the belief that the arts and humanities remain a vital way of interpreting, understanding and shaping action in the world. This positioning also serves as an antidote to the belief that technology is the sole arbiter of and catalyst for human progress, and also a response to the uneasy feeling that the uber-networked, hyper-globalized online creations of our ‘silicon saviours’ have somehow distorted the diverse and socially rich ways people can construct identity, build community, and relate to their lived environments and cultures.

Armed with a belief in the efficacy of design thinking as an educational catalyst, and a conceptual framework that we believed would be acceptable to existing sensibilities and priorities in K-12 education, we entered into a conversation with a local school district (one that was near the university where our art and design education team was based) that had shown an interest in new ways of enriching education in its visual arts classrooms and beyond.

Figure 1. Texas-based, university-level design educators and researchers Michael Gibson and Keith Owens (both are shown standing) facilitate an initial meeting with school district administrators, advisors and middle- and high-school educators in Denton, Texas, USA to explain how and why design thinking might be an effective addition to the learning experiences of students enrolled in these classrooms. Source: ©Peter Hyland 2019

This school district had a long, 30-plus year history of affording research teams from outside of our College of Visual Arts and Design opportunities to work with their administrators, advisors and consultants, instructors and students to pursue a variety of research initiatives. Previous efforts by various members of our university’s research community led our team to believe that our endeavour stood a reasonable chance of yielding some understandings about how and how not introduce design thinking into middle school classrooms. While this did indeed occur to a degree, it did not occur at all in ways that we could have (or should have) anticipated. What this case study will reveal is what our team learned from what failed to evolve as we had hoped it would with our attempts to interject a new pedagogical approach into middle school classrooms. In what follows, we offer what we discovered when we considered “what didn’t work” with our preparatory efforts for this project. We believe these revelations could be useful to others who are considering or beginning similar types of investigations into the roles that the habits of mind common to engaging in the process of design might play in the classroom.
Examining How Early Compromises and Misunderstandings Led to Eventual Problems

We had hoped our attempts to introduce design thinking in middle school classrooms would help students learning in those settings construct new knowledge for themselves by engaging in the following four “steps” inherent in this approach.

- Build empathy for the needs of people unlike themselves — their users — through research.
- Suggest new ideas — lots of them — that could help their users improve a given, undesirable situation in their daily lives.
- Develop a selection of their new ideas into various prototypes that they could then test.
- By engaging in this testing process, assess which prototypes were the most and least effective at meeting their particular users’ needs.

An Investigation Regarding What Our Initial Interactions with School District Personnel Entailed

An overarching catchphrase we developed early on as we attempted to explain design thinking to the array of stakeholders in the school district that we would be working within was that “design thinking is an iterative process to help students develop LOTS of ideas, and then eliminate all but the strongest among them based on their assessments of which of these ideas worked best as prototypes on behalf of specific users.” We felt it was important to use this catchphrase as a way to remind ourselves and our collaborators that design thinking was an effective means to: 1.) develop critical thinking skills, such as being able to perceive a given issue from multiple points of view, 2.) reason from logical rather than passionate perspectives, 3.) use evidence to support statements and courses of action (even if this evidence disconfirms your personal ideas), and, 4.) avoid “falling in love and then staying married to” the first idea you develop (Willingham, 2008). We also felt it was important to remind our collaborators that the decision-making processes that guide design thinking are more important to student learning than whatever artifacts they produce as a result of engaging in these processes.

The initial response to our articulation of these ideas, and to our further articulation that they could be used to frame a qualitative research platform that would operate as a case study, was met positively by our school district-based collaborators. We also initially presented a plan to support our qualitatively based foundation with a limited set of quantitative data sets that would be gathered from observing the evolution of classroom projects we had co-developed with middle school classroom educators. These would be developed by students who would engage in design thinking processes as the schedule of these projects progressed. What we did not realize as we began to formulate methods for operating and assessing particular, project-based approaches for introducing design thinking in two to four of the school district’s middle school classrooms was that their administrators’ and instructors’ conceptions of what constituted viable and acceptable approaches and methods for engaging in qualitative or quantitative case study-based research were not well-aligned with ours.

For example, based on our previous experiences as design educators and researchers of planning and operating design projects in other types of classrooms, we were accustomed to being able to compare and contrast the operation of a specific type of design learning experience in one classroom against the operation of another in another classroom. Assessing what types of project descriptions, parameters, and strategies and tactics for facilitating critical, in-classroom discussions against each other usually allowed us to gather evidence-based data that could be used to construct the types of knowledge necessary to guide future project planning. As the course of our early interactions with school district officials progressed, they changed from initially supporting the idea that design thinking could be introduced differently, or not at all, in some of the classrooms within which we were being allowed to introduce it, to insisting that all classrooms we would be allowed to work within have design thinking be introduced into them.

This insistence made it impossible for us to compare and contrast how the same type of project-based parameters would affect students’ and instructors’ responses to our project-based prompts, as well as students’ abilities to engage in iterative design decision-making processes, and also students’ willingness to learn from having some of their prototypes fail while others succeeded. (An example of the type of middle school-level design prompts we operated was, “use design thinking to guide the development and construction of a hat that visually communicates your feelings about a social, cultural, environmental or political issue that is important to you.”)
What had been planned and initially agreed upon as a way to learn from what could happen in middle school classrooms that were given virtually the same set of project parameters — except that one set would evolve as a project guided by design thinking and the other would evolve without it — did not occur. Instead, the same set of project parameters was mandated to operate across all of the middle school classrooms we were allowed to operate in. This decision was taken by school district officials out of a concern about feelings of disparity among teachers, students, and parents, as not all classrooms in the district were being afforded an opportunity to engage in an activity available to other students in other classrooms, or schools. This concern prevented us from being able to engage in a comparison between the outcomes of project-based learning guided by design thinking and project-based learning that was not.
Figure 3. The project parameters that were operated within the middle school classrooms our team of design educators and researchers were allowed to observe were not primarily guided by the empathetically informed, iteratively developed prototyping methods that form the basis of design thinking. This resulted in the outcomes of student projects resembling traditional visual arts artifacts rather than the final iterations of design processes. Source: ©Peter Hyland 2019.

These aspects of our preparation processes revealed a fundamental misunderstanding about how (and why) we framed “research” as we did and how (and why) school district administrators, advisors and instructors...hhref=https://doi.org/10.21606/drs_lxd2021. It also highlighted the fact that educational approaches are shaped by socio-cultural imperatives as much as they are by any desire for discovering and implementing effective pedagogy.

Examining the Challenges of Situating Design Thinking in Visual Arts Classrooms

We had proposed that design thinking be thought of as a synthetic set of activities that could be used by students and the instructors who taught them to bring together multiple types of knowledge from diverse disciplines. We also proposed it as a complex phenomenon that could be studied in-depth for a specified period of time within a set context (Muratovski, 2016, p. 49), like a middle school classroom. The district, however, constrained by a subject-oriented approach driven by a strict testing culture, believed that the project should situate in visual arts classrooms, as state standards related to that subject area offered more flexibility in developing curriculum, with the possibility of engaging with other disciplines at a later date. While design and the arts, per se, share common visual language and exploratory methods, the two endeavors part company at the level of intent — creative self-expression versus evidence-based problem-solving on behalf of others. Our initial observation sessions conducted prior to our actual co-teaching revealed that the visual arts classrooms in which we would operate were widely believed by students and teachers alike to be sites for personal expression and a redoubt from the stultifying “skill-and-drill’ learning approaches so commonly deployed in other middle-school classrooms. The mere act of creation, apart from any systematic approach or reflection, was celebrated as a successful learning outcome in and of itself. Thus, we worried (rightly so) that our design thinking exercises and their underlying philosophy would be at odds with the accepted culture animating these classrooms. Moreover, because the finished prototypes would visually resemble typical results of student visual arts projects, it would become too easy to conflate our design thinking-based
outcomes with the creation of more traditionally and intuitively guided visual arts artifacts. The result of this would be to lose sight of the methodological underpinnings we were attempting to instill and demonstrate on behalf of both students and instructors.

Figure 4. The group of student projects depicted here reveals one of the principal challenges for students who weren’t effectively introduced to design thinking during the facilitation of this project: that of not engaging in the iterative development and testing of lots of ideas early on in a development process to avoid ‘falling in love with your first idea.’

Siloed subject orientation, incommensurate classroom learning culture and likely misperceptions about what should constitute the final work product were not the only possible barriers to success. Underlying and amplifying all of these dynamics was the requirement that we align our approaches with the Texas Essential Knowledge and Skills (TEKS) framework as mandated by the Texas Education Agency (TEA), the governmental organization that oversees primary and secondary public education in the state of Texas. (The TEKS framework was adopted in 1997 to outline what students enrolled in Texas public schools at particular grade levels must learn in each subject matter area before being allowed to matriculate into the next grade level.) To ensure that this stipulation could be met, we were invited to participate in curriculum development training, along with some of the middle school educators and administrators with whom we were partnering to introduce design thinking into this school district’s middle school classrooms.

The central goal of this training was to help us better align the design thinking approaches we were seeking to introduce with the per-grade-level learning outcomes specified within the TEKS framework to guide curricular planning and day-to-day instruction in the visual arts. This work had to be completed and approved before the design thinking-based projects we had co-developed with our middle school partners could be introduced into specific middle school classrooms. The learning outcomes stipulated by the TEKS framework were not necessarily onerous or inimical to our agenda, but aligning them with how we felt design thinking should be introduced as an approach and as a set of working methods proved ineffective. Processes for productively integrating what we were proposing into their curricular planning efforts were not realized, as this was not articulated clearly enough early on as an essential goal. This was particularly true with regard to meeting the objective of introducing design thinking as a means to improve student learning experiences across several, middle-school-level subject areas outside of the visual arts, such as social studies, language arts and technology applications.
This failure to broadly introduce design thinking occurred despite the fact that we were afforded the opportunity to work early in this process with our middle school partners in two, day-and-a-half-long workshops that afforded us an opportunity to co-develop curricular templates based on approaches rooted in *Understanding By Design* (UBD; Bowen, 2017). The essential premise of *Understanding By Design* is to guide the planning of curricula and learning experiences in ways that emphasize the outcomes that a student should achieve from engaging in a given lesson or activity rather than the lesson or activity itself. The intent is to foster and facilitate planning processes that are rooted in learning rather than teaching. While utilizing *Understanding By Design* as a means to guide curriculum and lesson planning did allow us to begin to envision how design thinking could have been synthesized across subject areas outside of the visual arts, we were ultimately unable to introduce it outside of this subject area. This occurred as a result of our inability to reconcile what we could envision conceptually with the day-to-day, TEKS-framework-imposed realities of having to ensure that subject-area-specific learning objectives would still be met in the particular types of classrooms — social studies, language arts and technology applications — within which any learning experiences informed by design thinking would be taught. Ultimately, attempting to satisfy the per-subject-area stipulations articulated within the TEKS framework curtailed most of our efforts to connect learning across rather than within them.

**Not Allocating Sufficient Time for University-Based and Middle-School Instructors to Work Collaboratively**

The difficulties posed by having to closely align lessons guided by design thinking with institutionally imposed curricular frameworks such as *Understanding By Design* and the TEKS were not the only barriers that affected the success of our efforts. Another was the fact that the school district had limited funds available to pay for substitute teachers. This became problematic because it prevented the full-time, middle school instructors we were attempting to partner with sufficient time to plan lessons guided by design thinking from leaving their classrooms long enough to effectively work with us to plan them. (We had originally planned to work with them for between five and eight days during an approximately 18-week semester.) Specifically, it prevented these full-time instructors from working with us closely enough to develop these lessons in ways that they believed would actually work on behalf of their respective groups of middle school students in their particular classroom settings.

As a result, our full-time, middle school faculty partners were not able to be absent from their respective classrooms to work with us to plan lessons and projects rooted in design thinking for more than one to three days — non-consecutively — per semester. Their limited classroom release time significantly curtailed our ability to effectively work with them to co-develop learning units rooted in design thinking. As a result of this, key opportunities were lost to:

1. **seamlessly integrate student learning outcomes with the planned execution of lesson or project plans guided by design thinking;**
2. **work realistically within or in light of non-fungible classroom realities, such as timing, sequencing and student expectations, and;**
3. **develop project-based learning opportunities that had resulted from a collaboration which allowed all parties to bring to bear their unique perspectives as the design thinking lesson plans were conceived, shaped, and assessed.**

The result of this siloed development process could be seen each time learning units rooted in design thinking were deployed in the classrooms of our middle school faculty partners. They freely interpreted the delivery and classroom expectations for each of these units, which resulted in them being facilitated primarily as art-making projects that yielded visual arts artifacts rather than opportunities for students to utilize design thinking as a means to empathize with people different from themselves and then develop and design a product, service or experience on their behalf. Additionally, as these art-making scenarios unfolded, university faculty came to operate less as co-teachers and more as outside observers or classroom visitors for the duration of each learning experience that had become only rudimentarily informed by design thinking. Little if any integration occurred to coordinate new understandings that could have been gained by comparing existing and new learning experiences. Similarly, there were no comparative analyses performed during segues from ‘teaching into’ or ‘teaching out of’ learning units that were rooted in visual arts approaches versus their design thinking counterparts.
Summary/Key Takeaways

The following excerpt from Jessica Lahey, an English teacher and contributing writer for *The Atlantic*, succinctly and accurately summarizes the most essential understanding our team gleaned from engaging in the preparation processes of necessary to introduce design thinking in middle school classrooms in a mid-sized, American city in Texas (2017):

> When executed with a clear understanding of its purpose as a method for fostering empathy, creativity, and innovation, design thinking can be a powerful tool for learning and change. If it is hastily and inexpertly implemented by educators with a weak or incomplete understanding of its principles, however, it is likely to be a waste of energy and precious classroom time.

Our now three-plus years of interactions with a diversely populated group of school district administrators, subject matter coordinators, curricular advisors and consultants, and middle school classroom educators — our “non-university-based research project partners” — have clearly revealed the need for us to have more concise and purposeful dialogue around three key issues. The elemental makeup of this threesome as they affected our attempts to introduce design thinking into middle school classrooms is interrelated, and we learned that each one of them directly and indirectly affects the other two. They are described as follows.

- In order for middle school-level learning experiences rooted in design thinking to be adequately operationalized in actual classroom settings, we as art and design educators and researchers needed to **frame and manage the expectations of our non-university-based research partners more effectively than we did** about the knowledge and insights among students and teachers that these kinds of learning experiences could and could not yield.

- In order for the groups of middle school students we worked with on a per-project basis to utilize design thinking to 1) empathize with the rational and emotional needs of others, 2) organize what they learned from this into a design strategy, and then 3) generate lots of ideas that could have been tested and assessed as prototypes, we needed to work much more closely and collaboratively with the instructors of these students to ensure that the lesson plans being created to guide specific “design thinking projects” **were actually feasible as such** in those instructors’ classrooms.

- In order for our university-based team of design educators and researchers to effectively introduce **and study** design thinking in this school district’s middle school classrooms, a clearly understood definition of what actually constitutes research in this area needed to have been agreed upon early on by our university-based team and the school district’s administrators, curricular advisors and consultants, and the middle school educators who were involved with this endeavour.

Our university-based team’s failure to engage early on in more deeply plumbed and broadly informed critical discussions with key, middle school-based personnel from our partner school district severely limited the knowledge that introducing design thinking into our chosen school district’s actual middle school classroom settings could have yielded. With that stated, we emerged from our engagement in this partnership with what we feel are crucial understandings about how to prepare to engage in the planning processes necessary to effectively introduce project-based learning experiences in middle school classrooms that are guided by design thinking. Equally as important, we emerged with crucial understandings about how not to engage in these types of planning processes, including knowledge that we believe could help others in the design education and design research communities avoid making some of the mistakes we made. Learning ‘what not to do’ and ‘what to avoid’ have been essential aspects of engaging in design processes since these were introduced as distinct means for guiding decision-making in the 1960s. What we have introduced in this case study are some guidelines for operationalizing these within the realm of public education settings — particularly at the middle school level — that wish to incorporate design thinking into their curricula in ways that realistically and meaningfully affect student learning in positive ways.

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