The Lesson Design Toolkit:
Lesson Planning As Experience Design
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Abstract

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This thesis work asks how design can be helpful in the context of education, better facilitating the lesson design process for early-career educators.

Because most college educators aren't formally taught how to teach, they often lack the processes and methods to effectively design classroom experiences. Designers face similar problems, but have well developed processes and methods for moving forward while building intuition. Lesson planning is a form of experience design, but it's not approached as such. This situation calls for a toolkit to help early-career college educators effectively design lessons without the benefit of extensive experience.

The Lesson Design Toolkit is a series of workbooks that help early-career college educators navigate the process of creating a lesson. As each workbook guides the way, it introduces teaching theory and design methods that are helpful in an aspect of lesson design. This approach shows how design methods can be applied to the design of designed experiences.

THE
LESSON
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TOOLKIT

The Lesson Design Toolkit: Lesson Planning As Experience Design

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Introduction

In higher education, we don't teach how to teach. Most college educators aren't taught how to plan for a class. They have to figure it out themselves, following an individual, intuitive process. Seasoned educators have that intuitive sense of what works based on their personal experience, but early-career educators don't have the benefit of experience. They often lack the processes and methods to effectively design classroom experiences and build their intuition.

The classroom is a curated experience, one created through planning goals, assessments, content, and teaching activities. Educators are asked to create these experiences as they plan their lessons, yet they often do not have the background skills to succeed in these messy, ambiguous design situations (Kolko 2017). As their experience grows, educators eventually find effective lesson design methods of their own. But until this experience is gained, early-career educators struggle to plan lessons without the requisite design skills.

Designers face similar problems, but have well developed processes and methods for building intuition. This project explores how the processes and methods used in design can also be used in education to achieve similar outcomes.

This project takes two approaches in addressing this situation. First, it acknowledges that lesson design is a design problem. The design of classroom experiences can benefit from the methods used by designers. Designers have an effective set of methods for framing problems, making sense of ambiguous challenges, and planning effective interventions. By applying these methods to a teaching context, this toolkit provides educators with the tools to effectively plan lessons.

The project also provides a process to usher early-career educators through creating lessons. It provides a structured experience scaffold for new educators creating classroom experiences. A toolkit provides a process to follow and get to a viable lesson plan. Each aspect of the toolkit is intended to be used as the educator sees fit, adapted to their individual context, values, and experience.

This toolkit helps early-career educators plan lessons using a combination of design methods and pedagogical theory. It provides a loose process to follow alongside targeted skills for each stage of planning. The process can be followed linearly, used in parts, or adapted to the individual educator's needs and preferences.

The toolkit begins by exploring the context of the lesson and considering how the components relate to one another. From this base of understanding, four workbooks focus on objectives, assessment, content, and activities. Critique and reflection activities iteratively improve the lesson plan and incorporate learnings into future planning.

The result shows how design methods can be applied to disciplines not traditionally considered design. It shows how the design of experiences can be informed by designerly frameworks and toolkits. I argue for the use of contextually situated methods to help non-Designers use their expertise to design experiences.

Background

Lesson Design in Education Today

Design is a common word in education, though a limited one. The traditional approach to teaching is to begin with selecting teaching activities (lecture, group discussion, etc.) and then connect them back to the course's learning goals. Wiggins and McTighe (1998) flip this order in their backwards design approach. The overall emphasis is on determining, in linear order, the outcomes, assessment criteria, and teaching activities of a lesson.

This illustrates one current explicit, strategic design process within the educational community. As in product design, beginning with a statement of desired objectives yields both superior outcomes and provides structure in an open, ambiguous, and ill defined design situation.

What is insufficient about backwards design is that it still requires knowing the desired outcomes-something that is often not known until later in the design process. There's a need to support discovery and exploration of desired outcomes to a greater degree than is available in the authors' approach.

Drawing from Wiggins and McTighe, Fink (2003) shows another design process that is common in the education community. Integration of the activities is encouraged (but not named) as an iterative approach to improving a plan. The author's thesis is simple: Figure out what you want to accomplish with the lesson, then find a way of knowing if you've succeeded. If you can do that, the rest will work out.

Analyzing situational factors is Fink's suggested first step in designing a lesson. He suggests that educators have a tendency to dive into the details and make a collection of barely related lectures, implementing tactics before considering strategy.

Fink's focus on student learning is similar to a focus on user experience found in the design discipline. Both approaches shift familiar activities into the perspective of those being served and their objectives. This is a somewhat new paradigm to both fields, each having previously been centered around experts who rely primarily on experience. Both disciplines benefit from explicit consideration of outcomes, rather than from making assumptions about tactical methods. As a lesson often defaults to lecture, a website or logo is often an assumed solution because "it's what we do." Fink's approach takes focus off of the activities/tactics and onto the strategy of what it to be accomplished.

Both of these authors illustrate design approaches currently used in mainstream education. These methods are helpful, but limited in their current form. They suggest broad processes to follow and concerns to be aware of, but stop short of explaining specifically how to practice the component methods. They provide a lesson design process in broad strokes, but do not provide direction on how to proceed. The discipline of design can not only provide detailed, specific, and proven methods for use in these situations, but can provide a stronger framework to integrate them in an accessible toolkit.

The Widening of Design

If we consider many design agency portfolios, they're not only sharing the products they create, but the way in which they have designed them. The process, methodology, and methods of design are themselves a deliverable. There's also more systems-level thinking. For example, in service design, design is working behind the scenes, not only the visible touchpoints.

In his book Frame Innovation, Kees Dorst discusses design's roles. The author contends that conventional problem solving is failing at addressing certain kinds of contemporary problems. The methods practiced by designers are proposed as an alternative to conventional problem solving, beginning with the problem setting process of frame innovation.

The author identifies stubborn contemporary problems as having four attributes, each making these problems difficult and lending themselves to a frame innovation approach.

The author's main argument is that "our society is implicitly organized by type of solution, rather than by type of problem." (Dorst 2015 p.134) The solution is in asking "What if this was a different kind of problem?" By stepping back from the problem and looking at is holistically, rather than applying familiar solutions, alternative approaches can be attempted.

One of the author's main insights is that the way we perceive problems is as important as the solution. There is an opportunity for a tool to support educators in problem setting.

The nature of contemporary problems, Dorst 2015, p.11

The Case For Design Methods In Education

There's a clear need for lesson planning support for early-career educators. This requires a framework for considering all of the critical aspects of lesson design so that the work serves learning outcomes. As complex classroom planning challenges are encountered, specific design methods are necessary to facilitate lesson development. Because so much of what works in teaching is rediscovered individually rather than learned from a peer, collaboration must be facilitated.

Support for early-career educators would make them happier and more effective, and on a faster timescale than what experience alone can provide.

Design is the right approach because lesson planning is a form of design. Lesson planning is often solved with intuition, but intuition requires process and experience to develop. An explicit process that structures and highlights unintuitive processes like objective setting and exploration could see these activities practiced at a higher level.

Early career educators would benefit from an approach using design processes and methods. These processes first consider outcomes, then introduce contextually situated design methods to assist in the individual aspects of lesson planning.

As an example of a design method, lesson planning requires organizing and curating interconnected content, exploring different combinations of content and activities. Designerly methods like card sorting could help organize and focus the lesson.

Educators are already iterating on their plans, but doing so on a quarterly or yearly basis, a slow rate that could be accelerated. Design methods could show how to test small parts of a plan and make iterations without setting foot in a classroom.

Data Collection

A two part data collection process consisted of expert interviews coupled with prototype processes using design methods. The primary research sought to answer the questions, “How do educators approach and work through problems in the course of lesson planning?” and “How might designerly methods might be helpful?” Research was continued during the prototyping and testing phase in the form of expert reviews and user tests.

Interviews

September-December, 2018

Primary interviews have been conducted with 6 expert educators across diverse disciplines. A loose set of questions was followed through interviews of approximately 45 minutes. This has revealed how teaching works in practice and has helped to identify opportunities for design interventions. Primary research will continue with prototype testing.

Interview Summaries

KM, Instructor, College of Education (expert)

This experienced educator has a clear, considered process beginning with objectives and working toward smaller details. She’s a major proponent of active learning and reflection. In describing her preparation, she worked from an outline of the overall structure, with special emphasis placed on setting and writing objectives.

BW, Instructor, Biology, (expert)

BW’s teaching is focused on active learning techniques in large (400+ person) classrooms. He is enthusiastic about trying new things and has found success in evangelizing the new methods in his own research, active learning being the foremost among them. He has great interest in classroom equity and inclusiveness. He suggested ways to try new methods and test prototypes with a limited audience.

LK, Nurse Educator at a major regional hospital, (intermediate)

LK teaches professionally in a hospital setting in a hybrid manager and continuing educator role. Though her approach is the most structured and rigorous of all participants, she doesn’t follow a formal lesson plan. Her preparation follows the pattern of first setting objectives, then determining how to evaluate achievement of that objective, and finally planning lessons to best prepare students for those evaluations. Since she’s so close to tangible outcomes in the hospital, there’s more focus on evaluations and quantitatively measuring performance. The professional setting prioritizes practice over theory.

CO, Graduate student and instructor, (beginner)

CO is teaching her first solo course. She has low confidence in any given method she uses, but high interest in discovering better ways to work in the future. She engages in “total preparation,” with minute-by-minute class plans. She likes to visually sketch her plans, including some simple diagrams showing how people would divide into groups. In the initial stages of planning, she put off some lesson planning decisions for later revision. There was no evidence of a concrete method for making plans, with plans being created intuitively. Preparation was noted as the primary means of building confidence.

DA, Instructor, Writing and Literature Survey, (expert)

As both an instructor and a musician, DA describes his process as improvisational. The general structure of the course is determined early in his process, but specifics are rarely planned more than a day in advance - a “raw curriculum”. His schedule is based on how skills build upon each other. He prefers to move on from a topic only once students have demonstrated skills in their work. DA’s main struggles are in breaking existing bad habits in students’ writing. His students tend to adhere to a rigid 5 paragraph structure, but he encourages allowing the structure to emerge only after working with the material. For new course preparation, he puts himself through the class first, observing his own learning process. Though he tends to overplan the first iteration, on the second version it’s easier to wing it, “jam with students.”

EC, Instructor, Queer Studies, Video Games, English Literature, (expert)

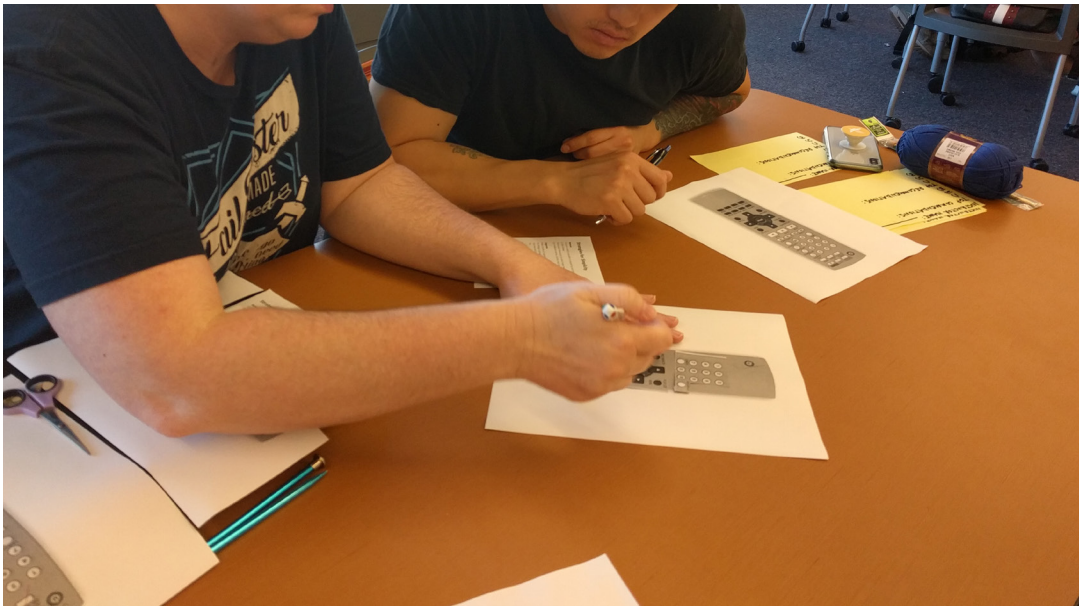
EC is interested in gamification as an approach to learning, but finds it problematic because it abstracts the real learning goals. Of the studied participants, the extent of EC’s planning falls in the middle of the spectrum. He believes that “The best instruction is extemporaneous.” He determines objectives, then improvises. EC made a comparison between teaching and dungeons and dragons, where students don’t do what you expect, so you have to improvise based on their needs. He describes the course plan as a structure with modular parts. Compared to the other teachers he observes, his emphasis is more on performance than planning. He adapts performance techniques from elsewhere in his life, like dungeons and dragons and improv comedy. Sometimes he creates notes for students with accessibility issues. When made into a collaborative activity, note taking can be helpful. He saves time by writing a list of common issues, finding patterns and themes.

Instructional Methods Prototype

June 2018

As a test of how design methods might be helpful in education, I created a lesson that taught designerly methods to educational psychology students. The lesson included four designerly strategies for simplifying complex experiences. The students were asked to apply the strategies to the basic organizational task of rearranging buttons on a remote control.

The prototype showed great interest in and willingness to try new tools, even if unfamiliar. The available time for the session did not allow for evaluation of effectiveness, but in the activities we completed together, students successfully applied each of the four strategies.



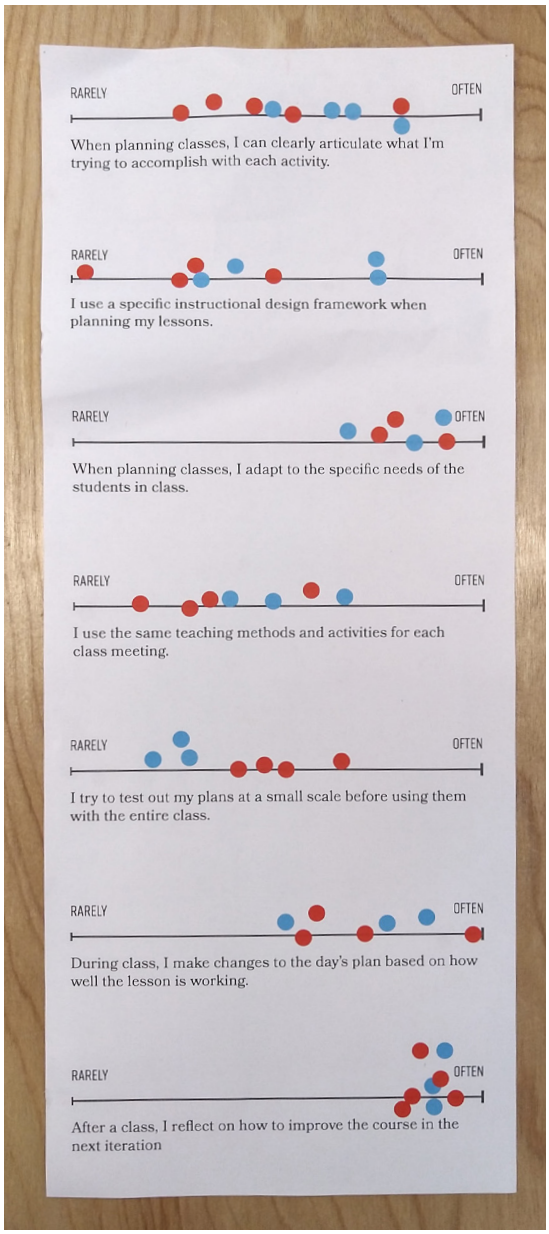
Students participating in the organizational methods workshop.

Informal Survey

December 2018

As an accompanying element in a thesis poster show, A survey was made available to attendees. Using either blue for faculty or red for graduate students, respondents placed a small dot along a spectrum as an answer to several prompts.

The responses showed how reflection and adapting to students are universal features in the practice of those surveyed. Faculty are less likely than graduate teachers to try out new methods on a small scale.



Informal survey results.

Research Synthesis and Findings

Patterns

Preparation flows from objectives, to evaluation, to individual lessons. This resembles backwards design. (KM, BW, DA, EC)

Understanding the big picture comes first, with details filling in a rough plan. (ALL)

New teachers enthusiastically adapt past work from self or colleagues and rely heavily on this. (CO, EC)

New teachers report “making it up” as they go, with little planning structure and low confidence in their methods. (Fink, Wieringa, CO)

Classroom activities are chosen intuitively from familiar activities. (KM, BW, Fink)

There is little oversight or approval process in day to day decisions.

Teachers are open to new methods, especially if supported by data. (KM, CO, Wieringa)

Objectives are often known, but may change throughout the lesson design process. (Wierenga)

New teachers often over prepare and stick to a script, which does not perform well. (KM, EC)

Teaching is described as a kind of performance. (EC)

Themes

Teaching requires improvisation. Plans change while in the classroom, in content, timing, and activities. The best moments in the classroom are extemporaneous, improvised in collaboration with the students. One educator described these lessons as “A jam session with students.” Preparation levels fall on a spectrum, with moderate preparation being most effective.

Educators practice in different ways. Effective practices can vary depending on instructor, discipline, setting, and student. Each practice reflects personal preferences, which requires freedom and autonomy. Lesson and course design is generally not a collaborative process.

Experience helps build patterns and rules of thumb that save time. Preparation builds confidence and saves time by providing a framework for the creation of other lesson aspects.

Curriculum is always a work in progress, iterating with each presentation. There’s little pre-classroom prototyping and testing in expert practice, with plans instead being made from classroom experience.

Educators rarely feel good about the first iteration of their course because they know it will be better in the next version. They practice reflection and look for ways to improve because they want to do the job well. New teaching methods to improve outcomes are desired and sought after.

Insights

Because classroom contexts can vary greatly, there are a wide variety of ways to teach and no single way is always right. An educator's choice in teaching methods reflects their own values and personality. From both personal experience and observation, educators occasionally try teaching methods that they do not believe in. This is often met with limited success and a regression to previous methods. Due to individual preferences, diverse subject matter, and variations among student groups, there is no single set of best practices in teaching methods.

Given that lesson planning is an intuitive process based on experience, new educators struggle because they don't have experience to fall back on. Because selection of teaching methods depends upon an individual's preferences, it takes time to learn and determine those practices. Without established rules of thumb, many decisions must be made from first principles. This adds to the workload of early-career educators.

Because educators want to do the job well, there already exists a strong culture of iteration in practice. Because there are few opportunities for iteration on any given lesson, the pace is slow, changing only as often as the course is offered. Insights from one lesson may be applied to the next, but this process is informal. Longer term activities like multi-week assignments cannot be as easily adjusted and remain on a slower iteration cycle.

Because they don't have the experience to be quick at planning and evaluation tasks, saving time is important for new teachers. With experience, rules of thumb are created to save time (Wieringa). Planning and evaluation activities take up more of early-career educator's time than their more experienced counterparts. With limited time and decision making capacity, efficiencies must be found in process and scope.

Because extemporaneous interactions with students are effective, understanding the big picture of a lesson is more important than planning the fine details. The fine details take time to plan and often stand in the way of extemporaneous interaction. Creating "structured experience scaffolds" (Kolko) is an effective frame for lesson planning activities.

Previous course materials are a proxy for experience. Early-career educators report these materials as valuable in the planning process. The materials both structure the content and suggest teaching activities. Existing course materials are not necessarily followed verbatim, especially when created by another educator, but are instead adapted based on personal values. When an educator has insufficient experience to fully understand and evaluate a plan, aspects of the plan such as overall course structure or assignments may be followed more closely.

Design Principles

Any intervention must support an intuitive, iterative, and nonlinear process. In practice, planning is nonlinear and is completed across multiple sittings. Efforts tend to be broadly spread, as opposed to narrowly focused on a single aspect. To avoid changing common existing practice, these qualities must be sustained and supported. Autonomy and personal discretion enable this process and should be preserved.

Intuition and experience create a self reinforcing cycle. Given that instructional design is an intuitive process based on experience, an intervention can either increase experience or improve intuitive design skills. Though experience and intuition are closely linked, the latter is more readily improved. Opportunities to support the development of intuition should be provided by an intervention.

An effective planning process will consider and adjust for the specific students and what works for them. Because each group of students is different, there must be an opportunity to observe the lesson, reflect on its effectiveness, and make adjustments both in the immediate and long term.

Preparation tools should provide a scaffold upon which to attach extemporaneous interactions. Not every aspect of a lesson can be planned for. Students will not do what is expected. Any effective plan must accommodate the unforeseen. The most effective educators create an outline as an experience, then through a combination of improvisation and adaptation of prepared content, deliver a lesson.

Educators want to improve and are interested in trying new methods. In each of the interviews and in many more informal interactions, there was a sense that educators found their work important and wanted to perform it well. I never encountered a sense that an educator knew everything they needed to know, or any defensiveness about not knowing. This suggests that introducing new teaching tools in a design intervention will be valued and accepted.

Problem Definition

Imagine being a new graduate student, 24 years old and just admitted into a prestigious program. You've even received funding, but it requires teaching a basic writing course to 60 students. This a new and daunting challenge—How do you stand in front of people and teach? How do you interact with students? How do you prepare for class? What content will be covered? How does grading work? What do you do if someone is upset? How is this all balanced with your own graduate classes and research?

This is overwhelming on many levels. It's a novel kind of challenge that requires unfamiliar ways of working and solving new problems. You have no experience to draw upon and no opportunity for training. There's no time for reflection or iteration.

In this impossible situation, you teach by copying the way you were taught. Class is mostly lectures and reading, which don't engage the students well. Many lectures don't have a clear objective, instead covering a set of predetermined content in an unfocused way. Your lesson plans are a patchwork list of topics, all presented with the same familiar methods. As your experience builds, the task of preparation slowly becomes a little easier, a little more automatic. Absent explicit methods for designing classroom experiences, it's easy to get stuck when a plan doesn't come together easily. Even the small victories are tinged with doubt. Today went well, but why? Without a framework for consciously planning and evaluating the day's class, the process is guesswork.

Your teaching isn't very effective and the quarter is a stressful, lonely, demoralizing experience. Your student evaluations are OK, but not good enough given the amount of effort put into the course. This is not at all unusual. In higher education, we generally don't teach how to teach. Early career educators don't receive the kinds of frameworks and methods that prepare them with effective teaching practices.

In conducting primary research with college educators, one thing became clear: most people have their own unique way of preparing for their classroom. These methods are developed with experience, but experience takes time to accumulate. Many eventually admitted that they never developed a formal, deliberate process, but intuitively figured it out as they went and eventually found what worked for them. One author even compared planning to alchemy – leave enough books on your desk and eventually they turn into a plan. (Kolko 2019)

Seasoned educators have an intuitive sense of what works based on their personal experience. But early-career educators don't have the benefit of experience. They're overwhelmed and unprepared, pressed for time, and struggling. They often lack the processes and methods to effectively design classroom experiences and build their intuition. They have no formal training in how to teach, only what they've figured out on their own. With little collaboration or support, they must discover how to teach on their own. They are so overwhelmed that little planning is practiced, instead improvising as they go. They're finding one viable plan and going with it without exploring

alternatives. The overwhelmed educator is certainly not going to read hundreds of pages from the above authors.

Because discovering what works takes each person years to develop, early-career college educators find themselves unprepared. There's so much to do, so much to learn, and not enough time to deeply consider one's own teaching practice. Without experience and an explicit process, planning a lesson is a difficult task to even complete, let alone execute well. Planning is not necessarily an intuitive skill to learn, but these early-career educators are nonetheless asked to intuitively develop their teaching methods in isolation, reinventing what is already known by their more senior peers.

Lesson planning isn't alchemy and it doesn't need to be reinvented by every new educator. Lesson planning is a design problem, but it isn't approached as one. Designers face similar problems as educators, but have well developed processes and methods for moving forward while building intuition. This situation calls for a toolkit to help early-career college educators effectively design lessons without the benefit of extensive experience.

The following prototypes build toward a toolkit to help educators create lesson plans. It helps people get started and build their intuition by providing designerly methods and structure to the lesson design process.

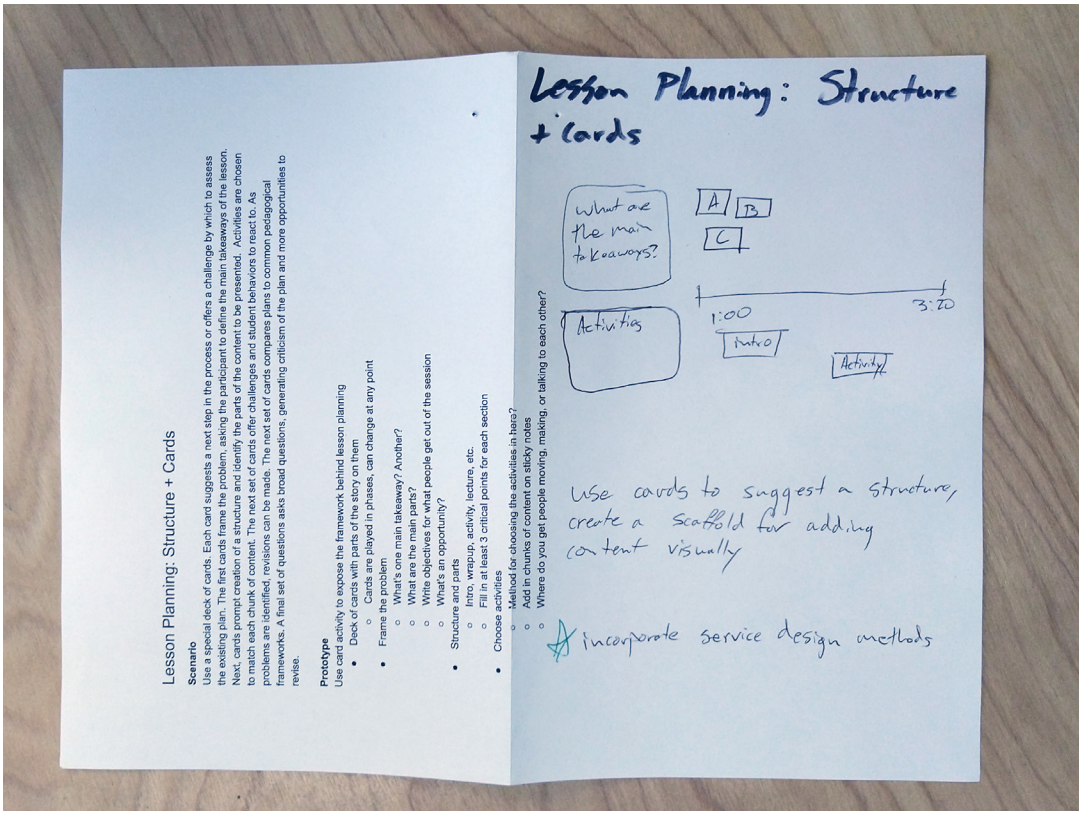
Determining exactly how to help educators in this process requires finding the most helpful format and methods for a group of people. The following prototypes try multiple approaches, learning from each experiment and using the insight to narrow the overall approach.

Process, Prototyping, Testing

During this phase of the project, I prototyped and tested interventions that can provide a framework for early-career educators as they plan lessons. These interventions introduce design methods as helpful tools for taking on design problems in education.

Written Prototypes

At the conclusion of the research phase, there were many ideas and opportunities to pursue, but there wasn't a clear way to consolidate them into a tangible intervention. The related ideas were typed on a half sheet, then prototype descriptions and diagrams were sketched onto each sheet. Each written prototype began with a scenario of someone planning or teaching, followed by a story of how a possible intervention would create a preferable future. Five interventions were proposed, each one containing an idea that was eventually used in the final product.



Initial written prototypes

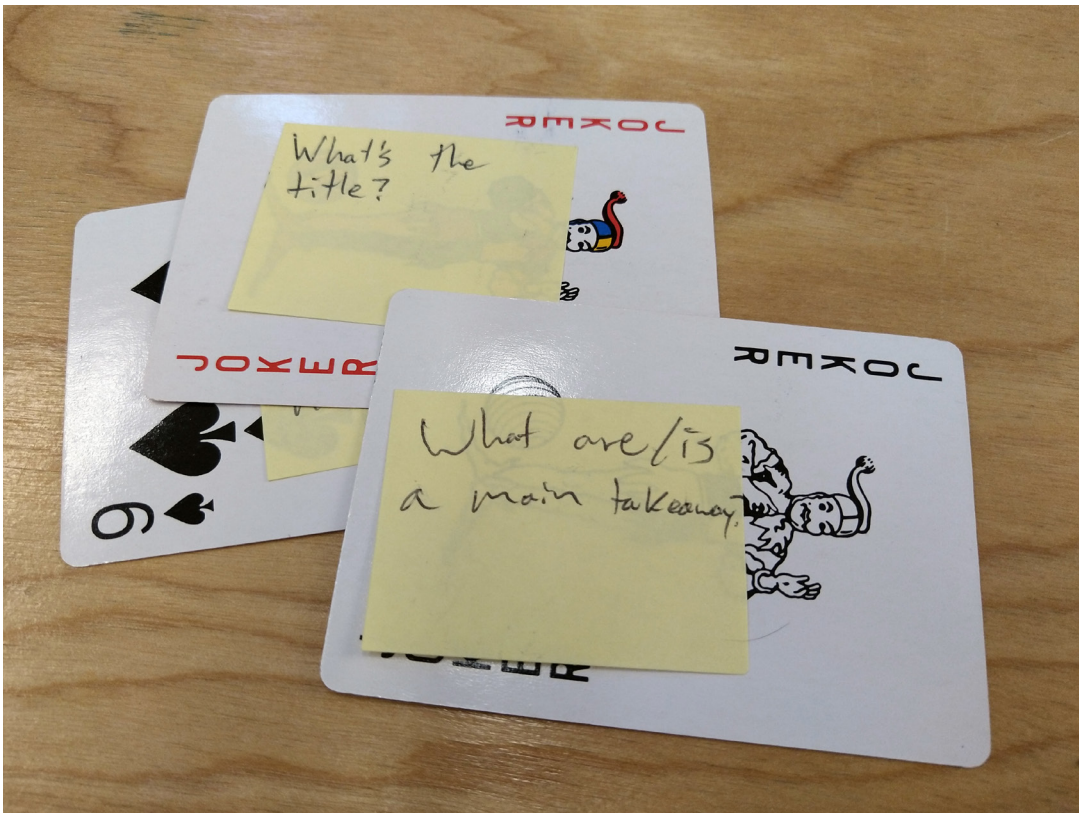
The interventions themselves were usually a sentence or two with a title, always nonspecific. In one case, the intervention referred to "a chart with some basic questions about the classroom." The lack of specificity made it possible to discover preferable outcomes and follow my own intuition without concern for how it might be achieved.

Each intervention included a rudimentary visual to lend it some tangible form from which to respond. One diagram included a timeline and activities on sticky notes, a feature that was later incorporated into the final product design.

Functional Prototypes

Question Cards

A recurring theme in the written prototypes was a protocol, a series of questions or considerations that would help frame the creative process in lesson planning. The first functional prototype began as a set of playing cards with prompts attached. Each prompt helped the reader consider an aspect of their planning and teaching.



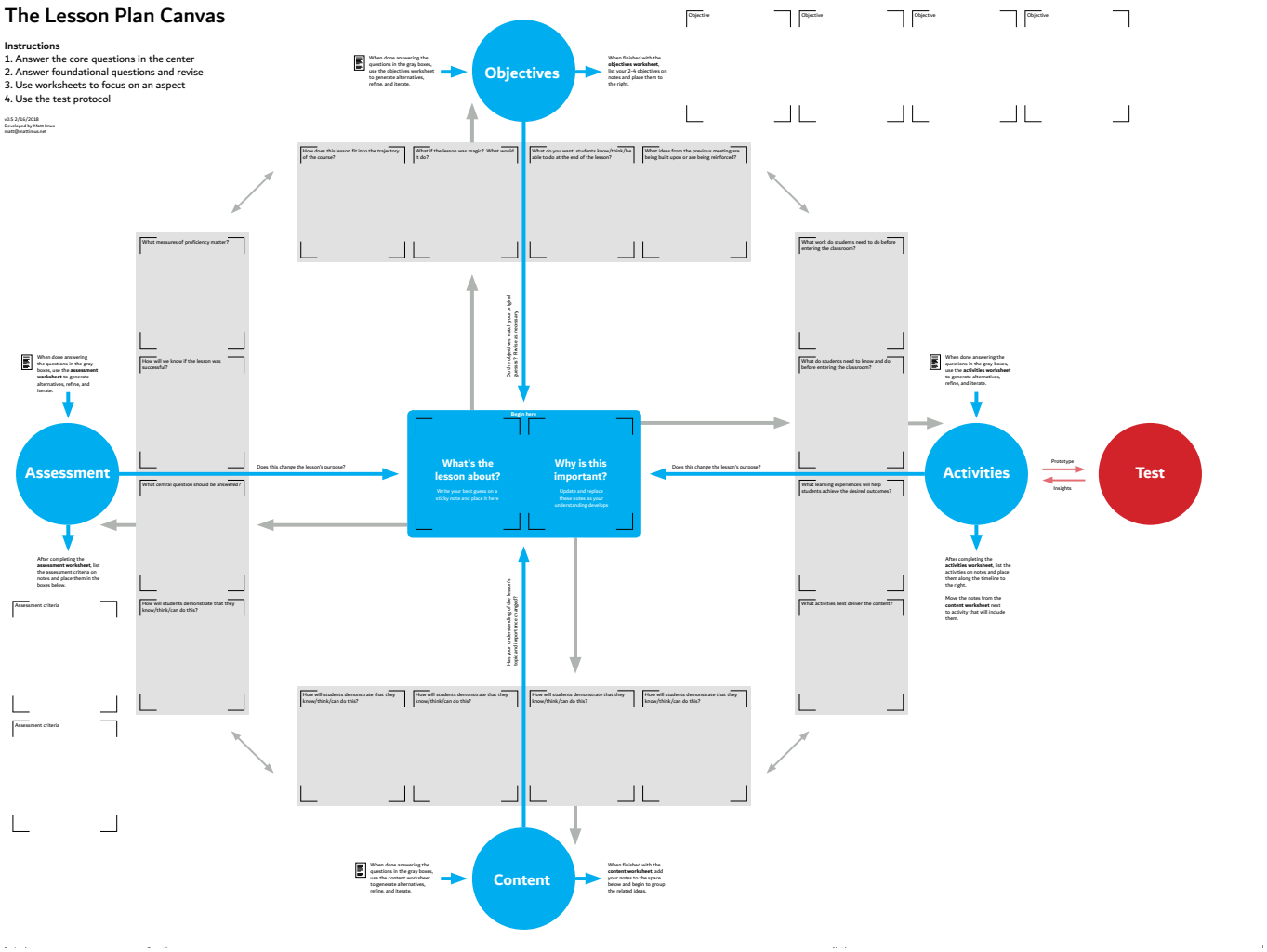
The first functional prototype asked helpful questions, but didn't provide enough structure to guide a user through a design process.

In sharing the prototype with others, the questions received the most attention, showing the value of asking questions about the context of the problem. This continued to be incorporated in each subsequent prototype, even as the overall changed.

Tests showed that the format was too open and didn't suggest how the interventions might be used. This was the first encounter with a persistent issue: Freedom is desired, yet some degree of direction is required to help people understand the activity's process. Each ensuing prototype increased the level of structure and guidance in the activity.

Concept Diagram

At this point, there were still many unorganized ideas to work with. Cards clearly weren't going to be the final form, but context questions had been validated as helpful in the planning process. I wanted to communicate to others in a tangible form so that experts could review these ideas and direct development.



An early diagram showing the process of exploring the context through inquiry, then gathering and organizing the objectives, assessment, content, and activities. Every activity comes back to the central question: What's the lesson about?

From this grew a conceptual diagram containing the earlier questions, placed in the context of each of the core components of planning: Objectives, Assessment, Content, and Activities. The diagram better integrated the questions with a structure, but was still not well understood by audiences.

Expert reviews proved most helpful in this formative stage of prototype development. Critique from a member of the College of Education revealed general soundness in concept and the educational theories used. Being an

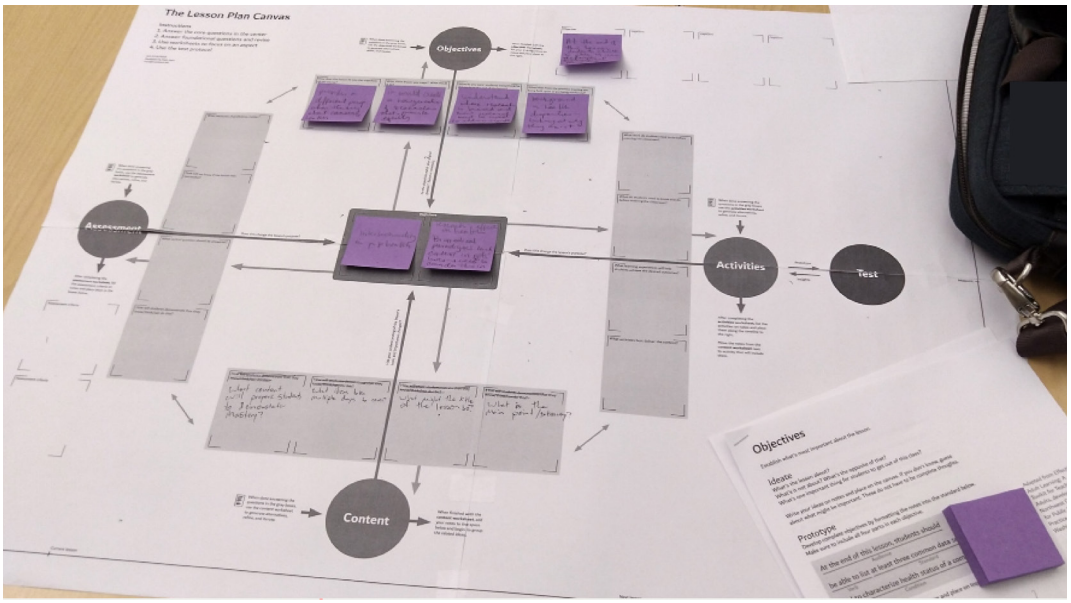
outsider to the academic education community, experts made sure that their discipline's core values and techniques were well represented in the process. This was an effective balance to my background, not only as creator of the prototypes, but as a professional designer interested in disseminating design methods.

This prototype showed that a conceptual diagram could be a viable format to discuss the creative process. It provided some structure and helped to understand the relationships between the core components of lesson planning. In communicating how the core components of lesson planning related to each other, expert reviews became more productive.

Concept Diagram As A Canvas

The next iteration of this diagram focused on making the diagram into an activity. I wanted something that could be tested, not just talked about.

As the diagram was refined, it was adapted into a worksheet with places to answer each question by attaching sticky notes. This was paired with the first iterations of the workbooks, a set of printouts which contained specialized content too detailed to fit on the worksheet. Explicit prompts and more refined visuals helped give direction to the activities, but the process remained confusing and difficult for testers to follow.



The diagram worksheet. This was intended as a hub where educators would fill in the elements of a lesson plan.

This was the first version of the prototype to be extensively tested with the target audience. Test participants were students in a UW Center for Teaching and Learning course on teaching basics. All were graduate students looking to improve their teaching skills, most pursuing teaching careers. Three students provided a critique of the process and two planned a partial lesson using the tool.

The directed but open nature of the toolkit was uncomfortable to one subject who was used to clear steps in a linear process. Exploring and answering the questions didn't provide enough feedback to her to indicate whether she was doing the activity correctly. Ambiguity in freeform process is uncomfortable for some and must be mitigated.

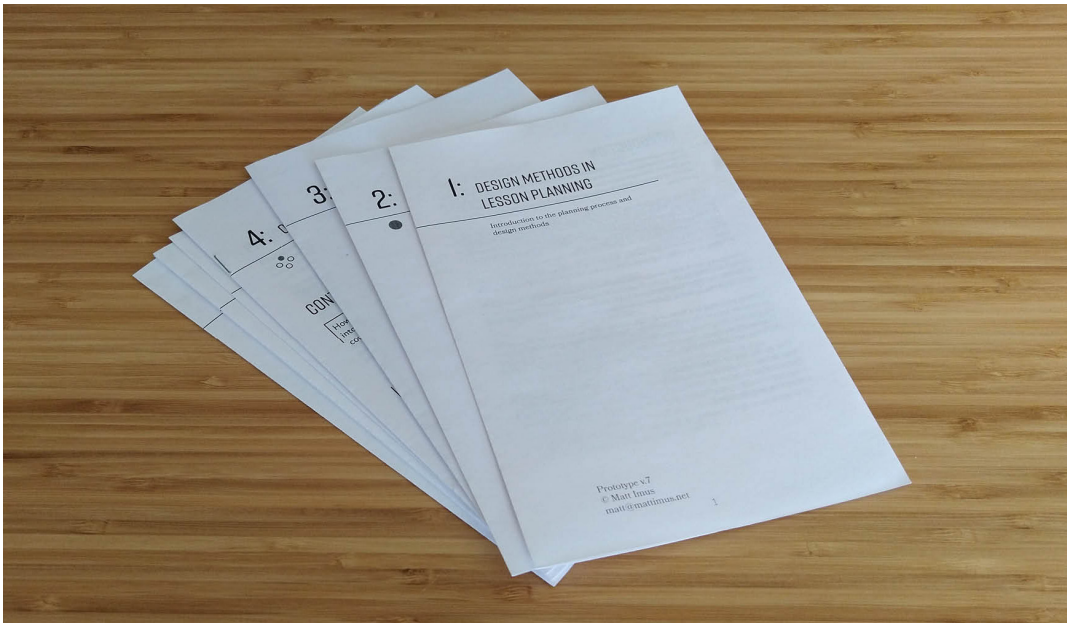
The other tester began with similar feelings before finding a helpful metaphor: the lesson planning activity wasn't like her main discipline of nursing, with its certainty and definitiveness. It was more like her experience playing music, which required a willingness to begin tasks with uncertain outcomes and to move forward in ambiguity. While delightful, this skill should not be required in a lesson planning tool, but rather supported and encouraged. This was another indication to provide additional structure in the activities.

The main point of positive feedback was that the tool helped them consider things that they wouldn't have on their own. The open, externalized nature of the tool was perceived as helpful in collaboration with other educators. Like the previous conceptual diagram, people making a lesson plan in a visual form find it easier to share and discuss ideas.

Workbooks And a Linear Process

Given participants' struggles with a freeform process, a fully linear version of the toolkit was built in the form of several workbooks. I was concerned that this would be overly restrictive, limiting the value of autonomy prioritized in the research findings.

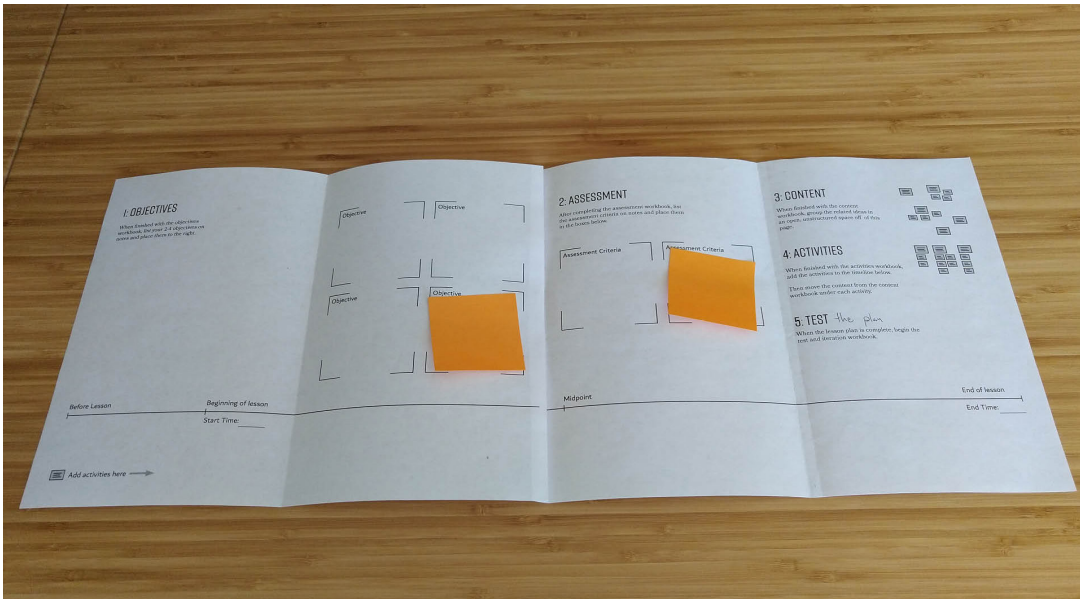
The next iteration of the tool deprecated the diagram as a hub for the process and instead put the entire toolkit into numbered workbooks. These workbooks became folded pamphlets, a small change that made the content within feel more substantial.



The workbook format.

The suggestion of order within the workbooks clarified the expectations and made them easier to use. The more structured process was welcomed and not resented as being too burdensome, validating the interaction model and solidifying the overall format of the intervention. From this point, the focus turned to refining and expanding the content of the workbooks.

The testing process continued with participants from the Center for Teaching and Learning and others in the campus educational community. Critiques and walkthroughs revealed opportunities to integrate more educational theory and tools. There were several “but what about…” statements encouraging additions of subjects like active learning and time management. This led to excerpts in the workbooks, each adapting existing educational theory in a discrete section that could be referenced elsewhere in the workbook.



A late stage version of the Lesson Plan Canvas. Results from the other workbooks are gathered here to create a lesson plan.

Refined Prototypes

Prototype development continued in the same format and overall approach. Given the large amount of content at 48 pages in total, refining the details and making adjustments for comprehension became a large task.

Testing the mature prototype in realistic use was a reminder of how overwhelming and anxiety-ridden lesson planning can be. There was a strong response to the introduction and getting started materials that showed how important the framing of the toolkit was. This renewed my efforts to communicate the function and need for the toolkit to people who have just picked it up.

As the prototype was refined and adjusted, a better defined target audience was established. This is a toolkit for early career college educators. This includes assistant professors, but could also help graduate students teaching their first courses. While the audience is necessarily focused, the usefulness of

this product in fact will extend beyond novice teachers and into other levels of education and training.

The introduction in the tested prototype began by describing the difficulties of the lesson planning process. This was received as a powerful validation and permission to struggle.

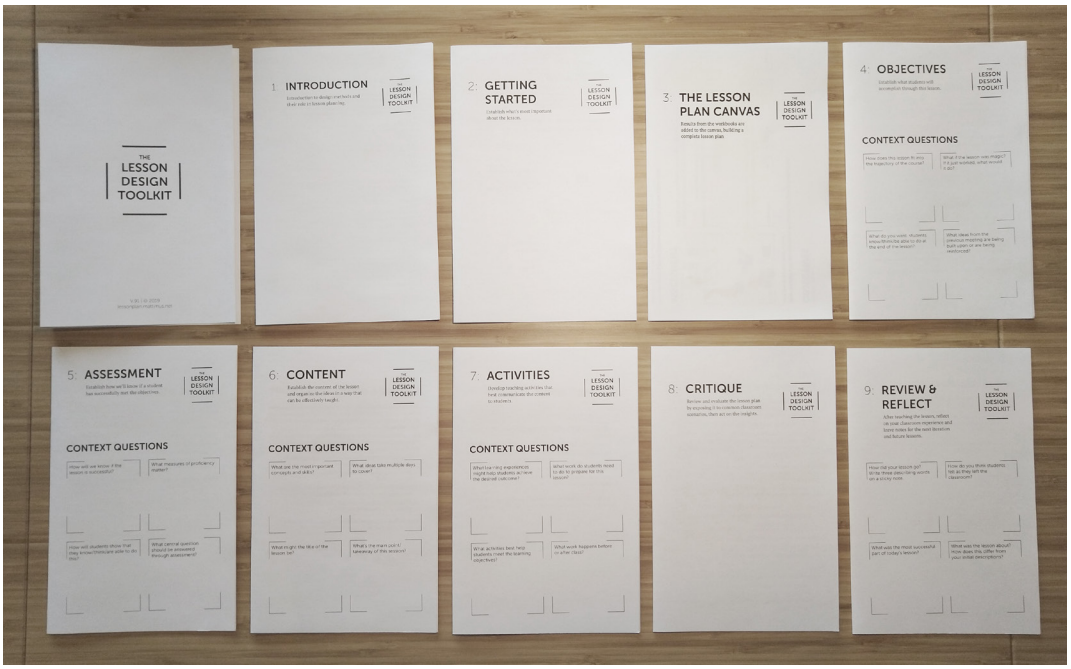
The getting started workbook was described as inspiring for someone versed in design but too entrenched in the day to day work to consider goals and strategy. It was described as a "creative icebreaker," a reminder to apply this person's intuition to their teaching. Increasingly, the value of this toolkit lies not only in the design methods, but in providing a structured format for developing lessons. This structure provides a path forward and some reassurance that the educator is not "doing it all wrong."

The test participant did report that the nine workbooks comprising 48 pages felt like too much to do. They only completed the first three workbooks despite finding them valuable. While I had anticipated fewer portions of the toolkit being used as the educator gained experience, the limited initial use was disappointing. A suggested remedy was to combine all of the workbooks into a single bound book. Given the anxiety about only using some of the workbooks, there should also be messaging in the introduction that acknowledges using only portions of the toolkit as being OK.

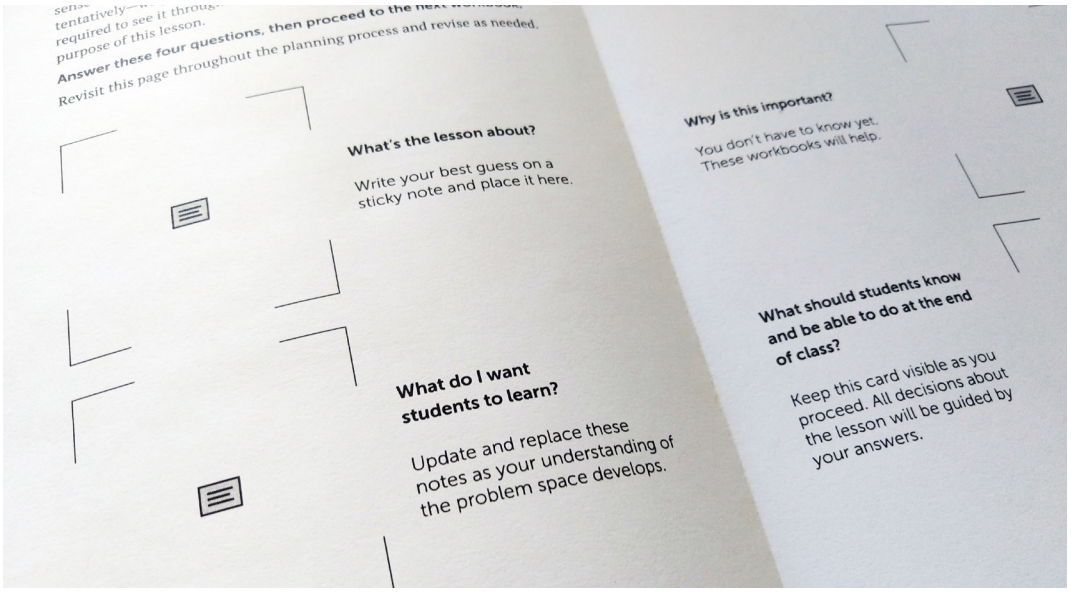
The final design refinements included several minor changes based on this testing and review process. More diagrams were added to illustrate the process within each workbook, especially in showing how to arrange the sticky notes. I refined the visuals and built out the presentation layer, which improved the impression of quality and finality. This occasionally became a minor distraction, as the visuals took center stage, rather than quietly supporting the lesson design activity. The canvas in workbook 3 became a centerpiece that could stand alone if needed. Additional educational theories were introduced and integrated into the planning process.

Final Design

The toolkit is a series of workbooks that help early-career college educators navigate the process of creating a lesson. Next, a series of workbooks go through the core teaching practices of setting objectives, defining assessment criteria, organizing content, and planning teaching activities. They provide a suggested process to build the most important parts of the classroom experience. Further workbooks critique the plan to avoid common issues, then prompt reflection and revision for the next lesson. Critique readies the lesson for a classroom and a reflection process makes adjustments for next time. As each workbook guides the way, it introduces design methods that are helpful in the specific context, as well as established, evidence based teaching theory.



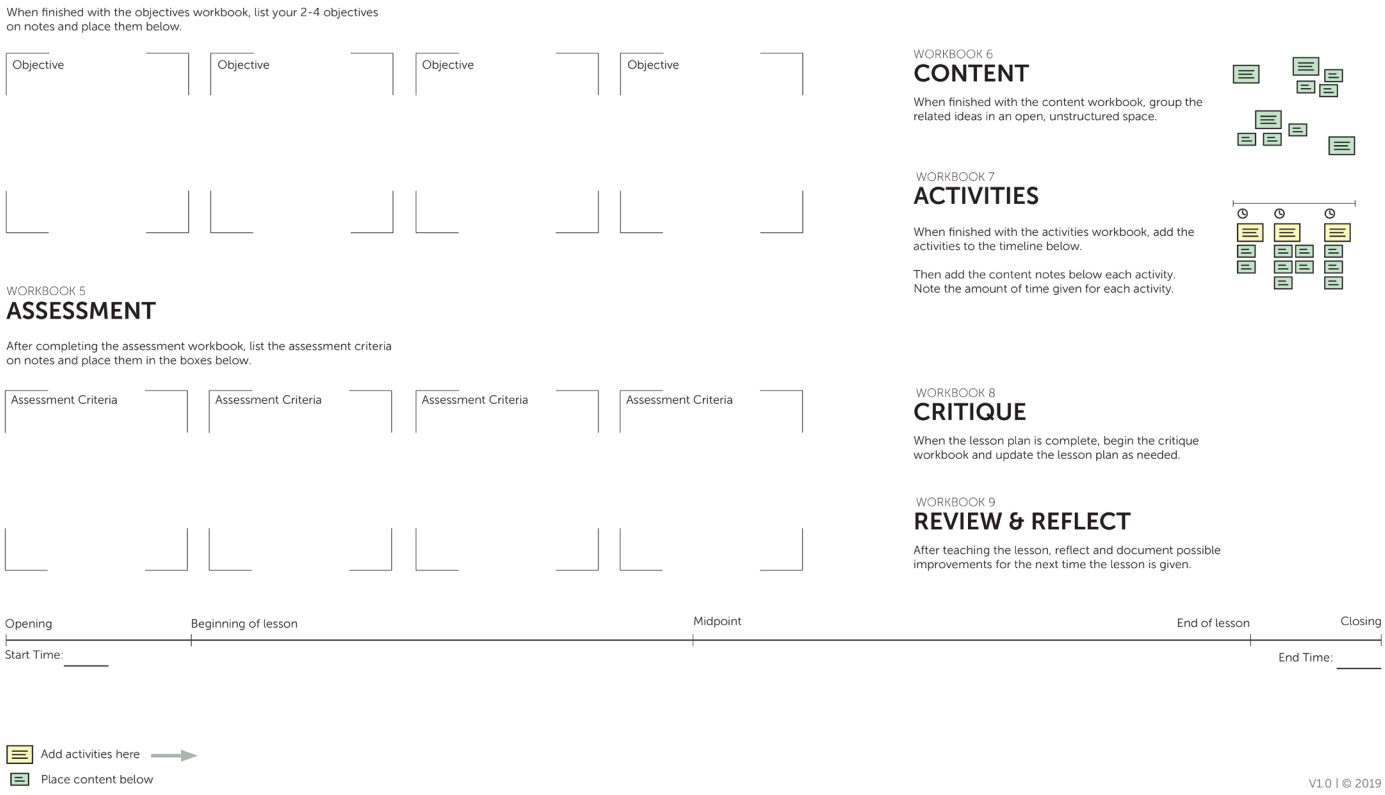
The Lesson Design Toolkit Workbooks



The Getting Started Workbook asks basic questions about the lesson.

Guiding Ideas

To start the workbooks, four questions are asked about the lesson: What's the lesson about?, Why is this important?, What do I want students to learn?, and What should students know and be able to do at the end of class? These questions identify what's most important, which guides the lesson planning process.



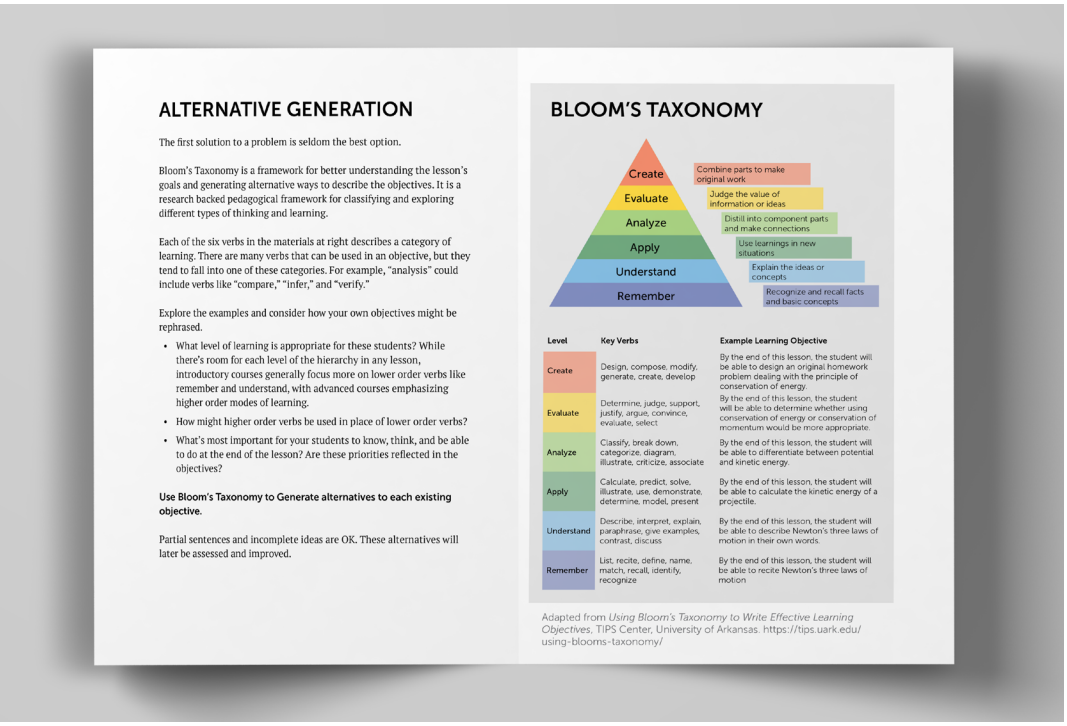
The Lesson Plan Canvas is the hub of the planning process.

The Lesson Plan Canvas

A canvas is provided as a place to build a complete lesson plan. As the subsequent workbooks are completed, their results are assembled here, rearranged, and revised.

Core Aspects

The next four workbooks develop specific aspects of a lesson plan.



ALTERNATIVE GENERATION

The first solution to a problem is seldom the best option.

Bloom's Taxonomy is a framework for better understanding the lesson's goals and generating alternative ways to describe the objectives. It is a research backed pedagogical framework for classifying and exploring different types of thinking and learning.

Each of the six verbs in the materials at right describes a category of learning. There are many verbs that can be used in an objective, but they tend to fall into one of these categories. For example, "analysis" could include verbs like "compare," "infer," and "verify."

Explore the examples and consider how your own objectives might be rephrased.

- What level of learning is appropriate for these students? While there's room for each level of the hierarchy in any lesson, introductory courses generally focus more on lower order verbs like remember and understand, with advanced courses emphasizing higher order modes of learning.
- How might higher order verbs be used in place of lower order verbs?
- What's most important for your students to know, think, and be able to do at the end of the lesson? Are these priorities reflected in the objectives?

Use Bloom's Taxonomy to Generate alternatives to each existing objective.

Partial sentences and incomplete ideas are OK. These alternatives will later be assessed and improved.

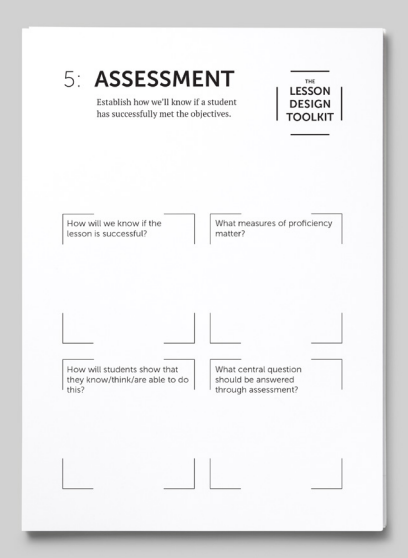
BLOOM'S TAXONOMY

Level	Key Verbs	Example Learning Objective
Create	Design, compose, modify, generate, create, develop	By the end of this lesson, the student will be able to design an original homework problem dealing with the principle of conservation of energy.
Evaluate	Determine, judge, support, justify, argue, convince, evaluate, select	By the end of this lesson, the student will be able to determine whether using conservation of energy or conservation of momentum would be more appropriate.
Analyze	Classify, break down, categorize, diagram, illustrate, criticize, associate	By the end of this lesson, the student will be able to differentiate between potential and kinetic energy.
Apply	Calculate, predict, solve, illustrate, use, demonstrate, determine, model, present	By the end of this lesson, the student will be able to calculate the kinetic energy of a projectile.
Understand	Describe, interpret, explain, paraphrase, give examples, contrast, discuss	By the end of this lesson, the student will be able to describe Newton's three laws of motion in their own words.
Remember	List, recite, define, name, match, recall, identify, recognize	By the end of this lesson, the student will be able to recite Newton's three laws of motion

Adapted from *Using Bloom's Taxonomy to Write Effective Learning Objectives*. TIPS Center, University of Arkansas. https://tips.uark.edu/using-blooms-taxonomy/

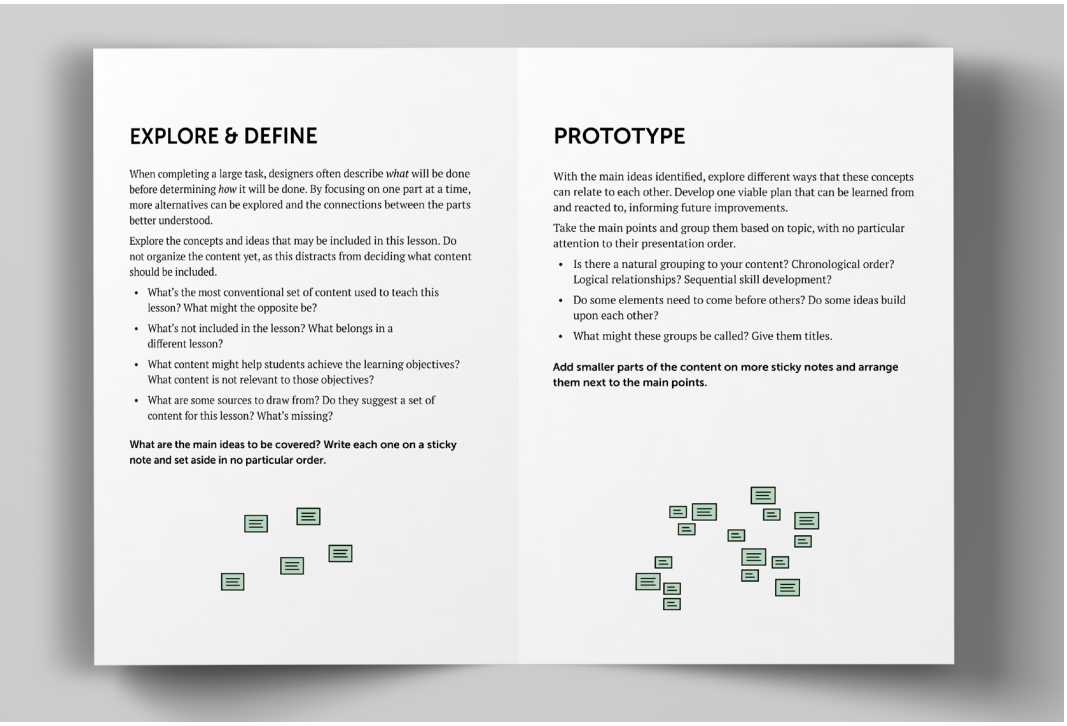
The Objectives Workbook defines outcomes and identifies ways to know if we've succeeded.

The Objectives workbook helps explore, define, focus, and iterate on the lesson objectives and outcomes. Pedagogical mainstays like Bloom's Taxonomy are introduced to ensure appropriate expectations. By establishing objectives early in the process, the other aspects are better focused on what matters most.



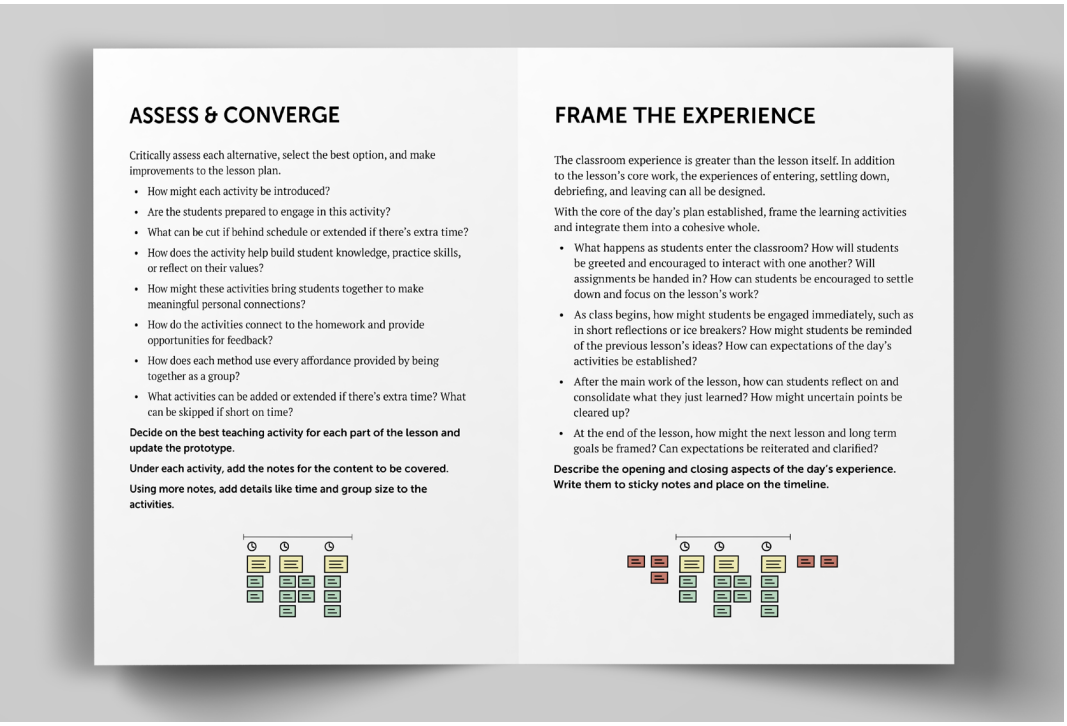
Drawing from the backward design method, the Assessment workbook guides educators as they create student assessments that align with the objectives and match the material being taught. The workbook helps educators to articulate what they want to accomplish, then have a way of knowing if they've succeeded.

The Assessment Workbook.



The Content Workbook helps determine what's included in the lesson and how it is organized.

The Content workbook helps generate ideas and organize the material to be covered. Using design methods like card sorting and concept mapping, a daunting amount of potential content can be organized into a prototype lesson plan.



ASSESS & CONVERGE

Critically assess each alternative, select the best option, and make improvements to the lesson plan.

- How might each activity be introduced?
- Are the students prepared to engage in this activity?
- What can be cut if behind schedule or extended if there's extra time?
- How does the activity help build student knowledge, practice skills, or reflect on their values?
- How might these activities bring students together to make meaningful personal connections?
- How do the activities connect to the homework and provide opportunities for feedback?
- How does each method use every affordance provided by being together as a group?
- What activities can be added or extended if there's extra time? What can be skipped if short on time?

Decide on the best teaching activity for each part of the lesson and update the prototype.

Under each activity, add the notes for the content to be covered.

Using more notes, add details like time and group size to the activities.

FRAME THE EXPERIENCE

The classroom experience is greater than the lesson itself. In addition to the lesson's core work, the experiences of entering, settling down, debriefing, and leaving can all be designed.

With the core of the day's plan established, frame the learning activities and integrate them into a cohesive whole.

- What happens as students enter the classroom? How will students be greeted and encouraged to interact with one another? Will assignments be handed in? How can students be encouraged to settle down and focus on the lesson's work?
- As class begins, how might students be engaged immediately, such as in short reflections or ice breakers? How might students be reminded of the previous lesson's ideas? How can expectations of the day's activities be established?
- After the main work of the lesson, how can students reflect on and consolidate what they just learned? How might uncertain points be cleared up?
- At the end of the lesson, how might the next lesson and long term goals be framed? Can expectations be reiterated and clarified?

Describe the opening and closing aspects of the day's experience. Write them to sticky notes and place on the timeline.

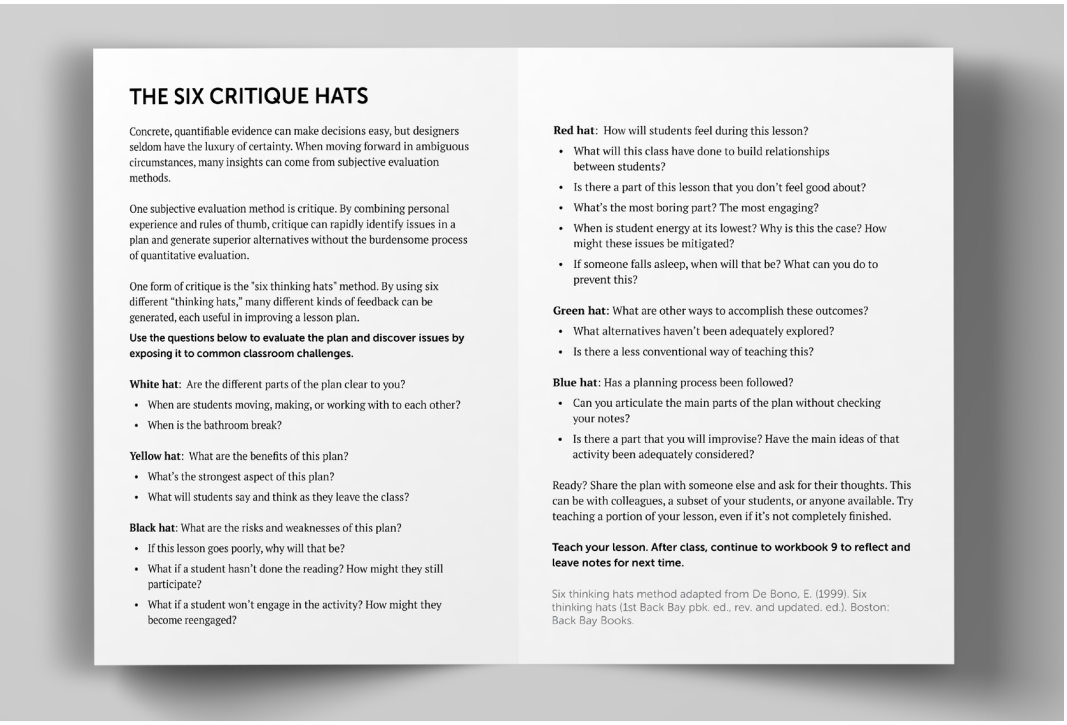
The Activities Workbook helps plan the teaching activities that will communicate the content.

The Activities workbook develops teaching activities that best engage students with the lesson content. This helps avoid ineffective lectures by exploring alternative teaching methods and classroom activities through a structured process.

With exploration and alternative generation methods found throughout these workbooks, educators are encouraged to make basic prototypes and then react to them, iterating and improving over time. Collectively, these workbooks define the core aspects of a lesson plan and help assemble it into a coherent whole.

Critique

With a prototype lesson plan ready, a Critique workbook exposes the plan to reality and informs improvement and helps avoid common mistakes. By testing and iterating, educators avoid bringing a flawed first draft of a lesson into the classroom.



THE SIX CRITIQUE HATS

Concrete, quantifiable evidence can make decisions easy, but designers seldom have the luxury of certainty. When moving forward in ambiguous circumstances, many insights can come from subjective evaluation methods.

One subjective evaluation method is critique. By combining personal experience and rules of thumb, critique can rapidly identify issues in a plan and generate superior alternatives without the burdensome process of quantitative evaluation.

One form of critique is the "six thinking hats" method. By using six different "thinking hats," many different kinds of feedback can be generated, each useful in improving a lesson plan.

Use the questions below to evaluate the plan and discover issues by exposing it to common classroom challenges.

White hat: Are the different parts of the plan clear to you?

- When are students moving, making, or working with to each other?
- When is the bathroom break?

Yellow hat: What are the benefits of this plan?

- What's the strongest aspect of this plan?
- What will students say and think as they leave the class?

Black hat: What are the risks and weaknesses of this plan?

- If this lesson goes poorly, why will that be?
- What if a student hasn't done the reading? How might they still participate?
- What if a student won't engage in the activity? How might they become reengaged?

Red hat: How will students feel during this lesson?

- What will this class have done to build relationships between students?
- Is there a part of this lesson that you don't feel good about?
- What's the most boring part? The most engaging?
- When is student energy at its lowest? Why is this the case? How might these issues be mitigated?
- If someone falls asleep, when will that be? What can you do to prevent this?

Green hat: What are other ways to accomplish these outcomes?

- What alternatives haven't been adequately explored?
- Is there a less conventional way of teaching this?

Blue hat: Has a planning process been followed?

- Can you articulate the main parts of the plan without checking your notes?
- Is there a part that you will improvise? Have the main ideas of that activity been adequately considered?

Ready? Share the plan with someone else and ask for their thoughts. This can be with colleagues, a subset of your students, or anyone available. Try teaching a portion of your lesson, even if it's not completely finished.

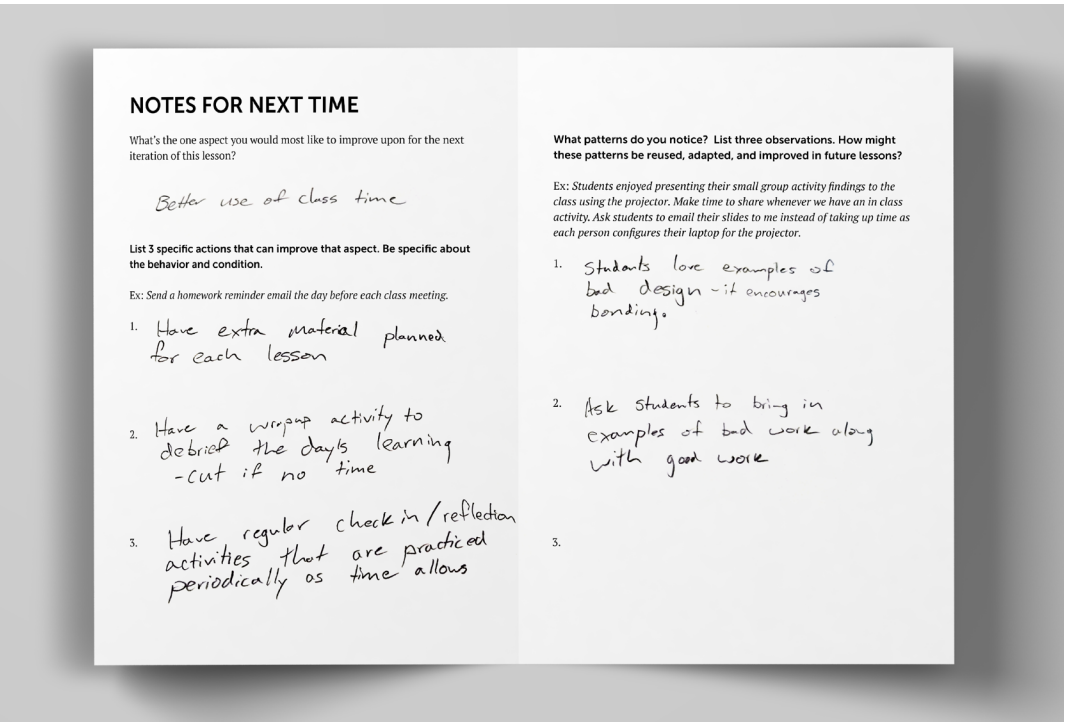
Teach your lesson. After class, continue to workbook 9 to reflect and leave notes for next time.

Six thinking hats method adapted from De Bono, E. (1999). Six thinking hats (1st Back Bay pbk. ed., rev. and updated. ed.). Boston: Back Bay Books.

Designerly evaluation methods are adapted to an education context in the Critique Workbook.

Review & Reflect

After teaching the lesson, the Review & Reflect workbook identifies issues to fix in the next lesson and helps establish a reflective practice. By identifying and responding to these insights, both helpful patterns are decomposed into generalized heuristics that can be reused later.



NOTES FOR NEXT TIME

What's the one aspect you would most like to improve upon for the next iteration of this lesson?

Better use of class time

List 3 specific actions that can improve that aspect. Be specific about the behavior and condition.

Ex: *Send a homework reminder email the day before each class meeting.*

1. Have extra material planned for each lesson
2. Have a wrapup activity to debrief the days learning - cut if no time
3. Have regular check in / reflection activities that are practiced periodically as time allows

What patterns do you notice? List three observations. How might these patterns be reused, adapted, and improved in future lessons?

Ex: *Students enjoyed presenting their small group activity findings to the class using the projector. Make time to share whenever we have an in class activity. Ask students to email their slides to me instead of taking up time as each person configures their laptop for the projector.*

1. Students love examples of bad design - it encourages bonding.
2. Ask students to bring in examples of bad work along with good work
3.

Prompts help establish a reflective practice and provide direction for the next iteration of the lesson.

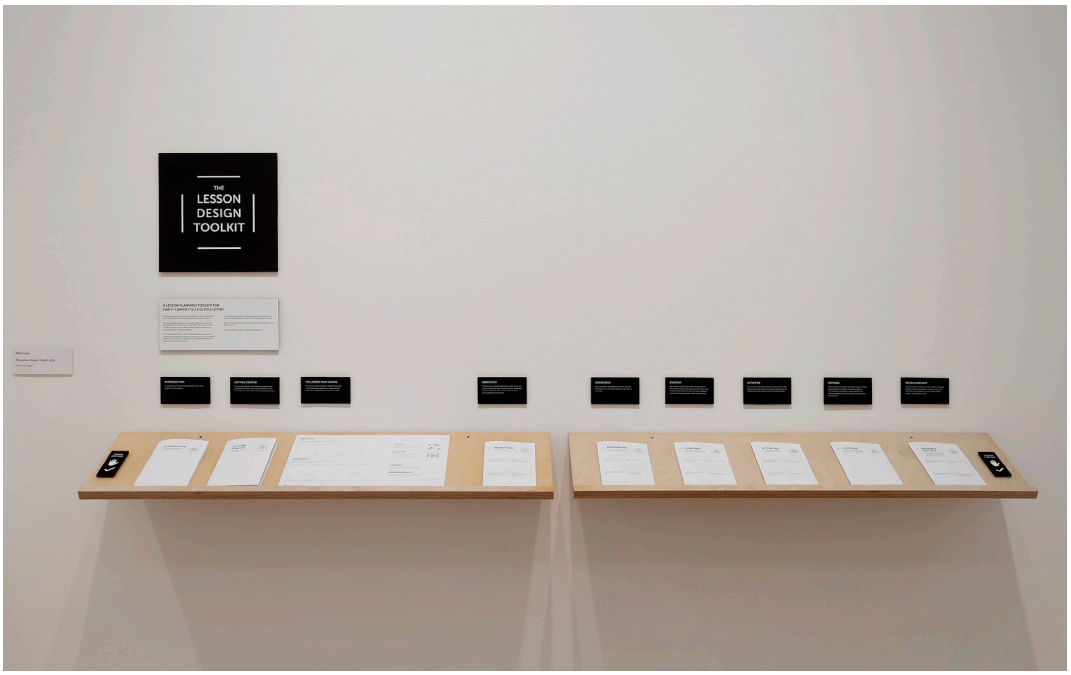
Approach

This toolkit supports educators as they establish their practice, yet preserves autonomy and flexibility. Rather than imposing a strict structure, the workbooks suggest a design process that can then be adapted as the individual educator sees fit. The Lesson Plan Canvas functions as a standalone framework. After internalizing these design methods, educators may choose to shorten the process and make this as the only part of the toolkit regularly used.

Henry Art Gallery Exhibition

The Lesson Design Toolkit was placed on exhibit at the Henry Art Gallery from May-June of 2019. The exhibition materials focused on the toolkit as an artifact, rather than displaying process or implications. Visitors were encouraged to read through the workbooks. A copy of the toolkit was shown in use on the adjacent table. This section of the exhibit showed what the toolkit looks like when used, including sticky notes with text. This content was generated as I prepared a guest lecture for a class of design sophomores.

The Lesson Design Toolkit as presented at the Henry Art Gallery, May 2019. Photo credit: Mark Woods

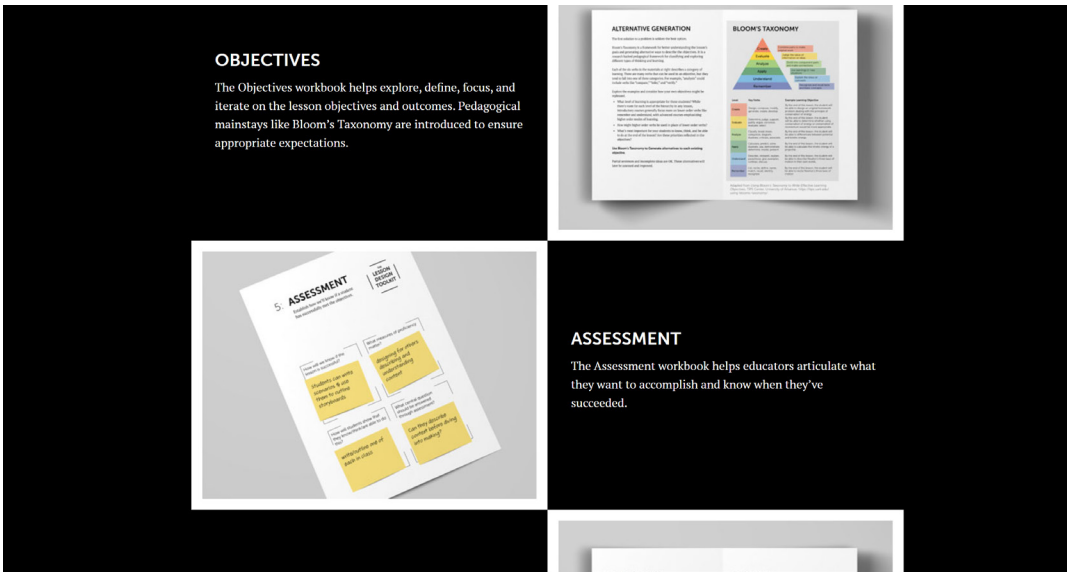


The Lesson Design Toolkit as presented at the Henry Art Gallery, May 2019.
Photo credit: Mark Woods

The Lesson Design Toolkit as presented at the Henry Art Gallery, May 2019.
Photo credit: Mark Woods

Website

A website was created to promote the toolkit and encourage others to use it. The intent is to continue testing the toolkit in use to develop it further. The toolkit is available to download in full at lessonplan.mattimus.net.



Toolkit website at lessonplan.mattimus.net

Discussion

The Toolkit's Impact

There's an unmet need in the lesson design process that this toolkit addresses. Among many early-career college instructors, there's a pervasive feeling of being unqualified and unprepared in the practical aspects of instruction. For most, planning a lesson is an intuitive process. Given time and experience, many develop the skills and methods necessary to plan and teach well. But without an introduction to educational theory, there's too much left to the individual to discover and reinvent on their own.

This toolkit is intended for early-career educators, but has generated broader interest. As noted in interviews and in personal conversations, many teach by "doing to others what was done to them." Even experienced educators often feel they lack a strong sense of the process behind their work. They have adapted their own methods from what they experienced as students, finding what works over time. A tool for beginners also helps seasoned educators improve their practice through examination of what works in their classroom.

This prototype serves basic emotional needs as much as instructional needs. At its most basic, it provides a way forward that leads to a viable lesson plan. In both personal experience and anecdotes, this lessens the fear and sense of being overwhelmed, allowing lessons to be taught and experience gained. The toolkit introduces design methods that can help in specific tasks, also building general habits like iteration and reflection that will gradually improve an educator's abilities over time.

This process can be used as a scaffold from which to attach experience. There is comfort in having a viable path forward that can be improved with time and experience. By providing methods that can be helpful in the design aspects of lesson planning, the toolkit helps fill in that scaffold.

This toolkit illustrates a need for this unique kind of approach. It is a design tool adapted to education and customizable by the educator to their unique situation and preferences. It suggests a linear process for lesson planning, but is not so rigid that a linear process must be followed precisely. Educators are free to use the parts of the toolkit that they find valuable and relevant, while ignoring other aspects. Participants in the prototype tests found the toolkit flexible, as it is used in different ways by different people. Some workbooks were used while others ignored.

This provides actionable guidance in the context of designing a lesson. Critique and reflection methods allow educators to generate more of their own guidance, building agency and autonomy in teaching environments that often do not provide either logistical or emotional support.

This toolkit also aides in collaboration. The process of externalizing thought in a physical, visual medium makes it easier for educators to share, discuss, and collaborate with more experienced peers. This externalization is helpful for individual understanding and also beneficial in explaining to others and working on the same ideas together. Traditionally, this has been far less feasible with traditional tools like word processors and notebooks.

The Future of The Toolkit

This is hardly a complete account of how to teach. There are many more skills and methods required to teach a course. This toolkit is only complete in that it provides a process to follow and methods to help complete each step toward a viable lesson plan. There are opportunities for others to develop these ideas, both in education and in other fields.

Long term validation of these methods in a teaching context could direct future iterations. I would like to test this intervention on a long term basis to discover what educators integrate into their own practice. It will be insightful to see what's used long term vs what's tried a few times and forgotten. As these design methods are practiced, remembered, and integrated into one's practice, I suspect that the Lesson Plan Canvas workbook will be used as a standalone framework. After several uses, the practices within the other workbooks will become intuitive and will serve only as a reminder and as reference material for the most difficult lessons.

There is also a need for the educational community to validate the effectiveness of toolkits taking this approach. My work improves upon on previously validated teaching methods by combining and augmenting them in novel ways. This particular toolkit has been shown to be effective in limited use, but there's room to examine the value of design methods in general as an effective educational intervention. This work is better completed by the educational community than by a professional designer.

The approach of applying design methods to nontraditional design problems can be applied more broadly than what is demonstrated in this toolkit.

This toolkit could easily adapt to course level planning as well. Compared to lesson planning, course planning uses similar methods, but with a different emphasis. This may contain more tools for assessing what students already know and believe. Understanding students, their needs, and what they already know is a user experience research problem. It could complement this toolkit's emphasis on generative design methods with design research methods. This is an important part of education that didn't fit into the scope of designing individual lessons, but is critical in planning for an entire course.

There remains a gap between works of theory and prescriptive how-to guides. Freeform, adaptable methods in the context of a guide can be a helpful format for future works. It can help educators go from consumers of vague design methodologies (or narrowly applicable tools) to active designers of the tools. This won't make anyone an excellent designer, but it allows more agency and freedom than following a worksheet that only includes a narrow, inflexible protocol.

This work not only treats education as a design problem, but designs an intervention that helps educators become better designers of their own classroom experiences. Designing designed experiences, both in and outside of education, is an opportunity to further the impact of design. In the same format of this case study in education, one may apply and adapt design methods to new problems.

Conclusion

Beyond The Toolkit

Many situations contain an aspect of design problems, with open, complex, dynamic, and networked qualities (Dorst 2015). The traditional value of design when applied to other disciplines is in shaping how we approach problems, explore the space around them, and make plans to proceed. This is not the only way that Designers can contribute to design in other domains.

Through this prototype, I've shown that the classroom is one example of a designed experience that is well served by design methods. This toolkit provides design methods for a focused audience of early career educators, but provides enough flexibility to be adapted and applied to new situations. The toolkit is designed for the context of education, allowing it to provide specific, tailored methods that are immediately and apparently helpful to educators. These contextually situated methods not only help shape the approach to problems as in traditional design, but extend to implementation and execution.

Contextually Situated Methods

Design problems are present in many disciplines, but are often less central to their practice and are underemphasized. When design skills are treated only as an adjunct to traditional core competencies in a discipline, practitioners find themselves without the kinds of tools and methods that would be helpful.

This toolkit shows how patterns of thinking that are helpful in design problems can be learned and applied to problems with similar attributes. The emphasis of this toolkit remains in the methods, integrated into the practice of lesson planning in a way that is immediately and apparently useful. Though often helpful, these aims do not necessarily require theory and a deep understanding of design methodologies to be effective. As new challenges are encountered, design situations need not even be recognized as such. Ultimately, helping an audience design experiences doesn't require extensive theory. People using design methods don't have to understand what design is to find it useful. They require tools and methods specific to their situation. Designers can create and situate these tools and methods.

As design is applied to areas outside of traditional design, the frameworks have largely been abstract and theoretical. This is useful in helping design practitioners adapt to novel situations and expand the reach of design. Many existing frameworks fall short in that they help determine what to do, but not how to do it. This leaves practitioners able to strategize but unable to execute. To effectively adapt design to new fields requires contextually situated design that adapts design methods to their new context.

A major shortcoming of Design Thinking is that it primarily a methodology, emphasizing strategy and theory over tactical methods. It is so broad and general that it is unhelpful until a practitioner adapts it to their immediate context. By emphasizing contextually relevant design methods over broad methodologies, this toolkit provides tailored help for a specific audience.

Design has traditionally been applied to other disciplines as a strategy tool at the beginning of a problem solving process. Design can also be helpful as a method of execution, embedded in later stages of problem solving. Though most effective when used together, either approach can stand on its own as a helpful tool.

To be most effective, design toolkits must be situated in context and connected to execution. They must help practitioners recognize relevant parts of their situations as design situations and apply design methods where useful. Lastly, they must contain methods relevant to the problems of their situation so that problems can not only be understood, but solutions can be designed and implemented.

This Is Meta-Design

There's long been a dichotomy between designing for people versus designing with people. This is a third way. We can share our methods so that others may use them independently.

As we support non-designers in their work, the role of Designer is to design the design of experiences. By contextualizing design methods, we can prepare others to independently practice design while enhancing their own expertise.

To succeed in creating contextually situated methods that help others in the design aspects of their work requires special priorities. Even more so than usual, this practice requires a sensitive and knowledgeable understanding of the people using the methods and the challenges they're addressing. Methods need to remain flexible in use so that practitioners can make better use of their expertise. They must suggest specific solutions, but make them optional components of a larger whole that can be adapted.

Designers must be willing to assist with the design aspects of other domains, contributing where their strengths allow in creating contextually situated methods and processes. Where a Designer's expertise ends, they must be willing to get out of the way. Having empowered others to better take on design challenges, Designers must allow experts in other domains to put their own knowledge to work most effectively and without interference.

The classroom is a designed experience. This toolkit demonstrates one singular approach to designing the design of those experiences. This meta-design (Fischer & Scharff 2000) is an opportunity to create broadly valuable frameworks that can be applied to the creation of experiences. By sharing design methods with a broader audience, I hope to help others recognize the experience design aspects of their specific situations and respond with appropriate design methods. When non-Designers are better empowered to design, they may create the greatest impact.

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