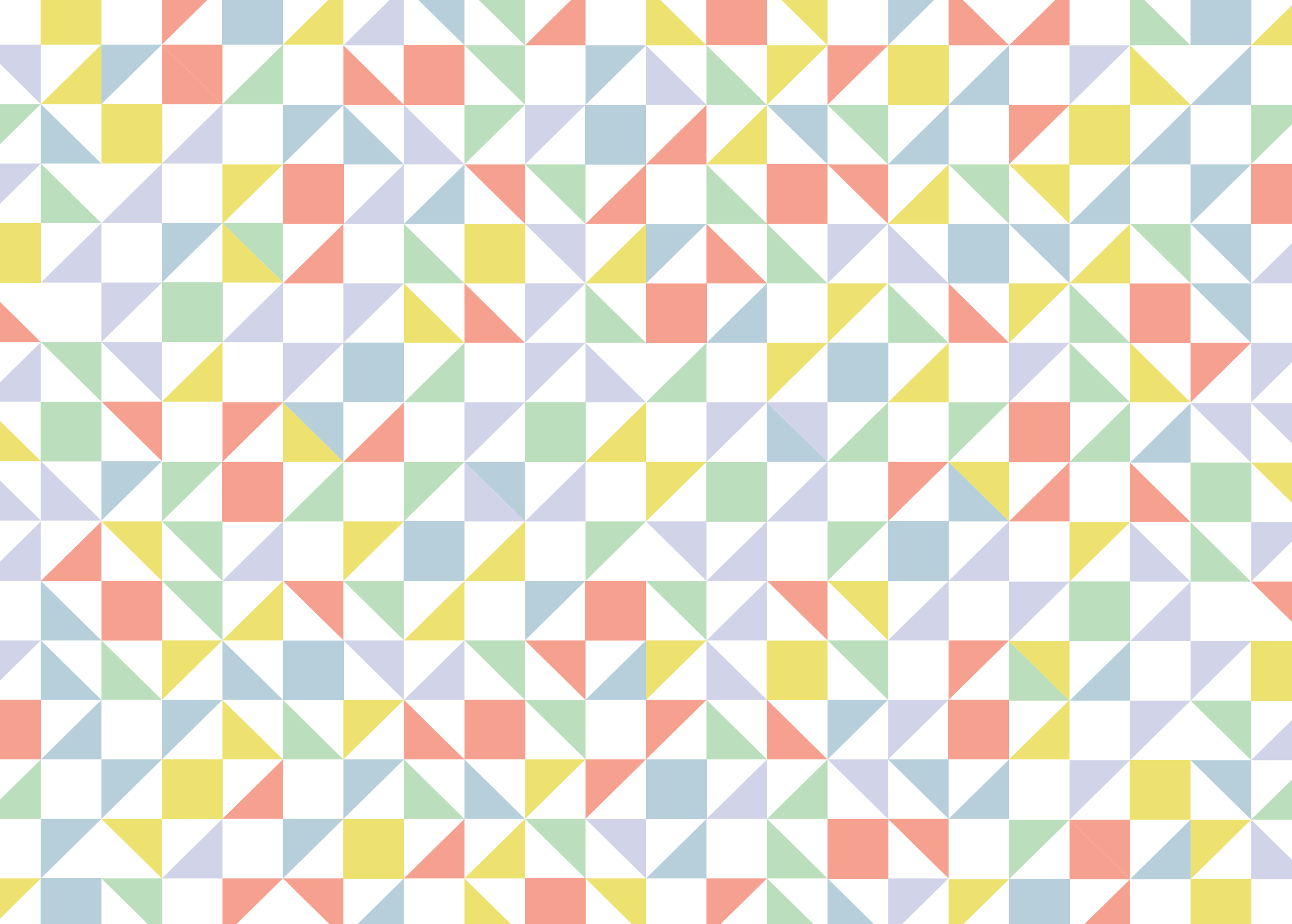
intentional futures

Designing Effective Courseware

10 Lessons Learned for Mapping the Experiences of Instructors and Students



About This Project

The Next Generation Courseware Challenge (NGCC) has been a 3-year Bill & Melinda Gates Foundation effort to support seven providers in creating digital courseware to help low-income and disadvantaged learners succeed in high-enrollment undergraduate college courses. The goal of this workbook is to share some user experience lessons learned from Intentional Futures' work with these providers.

Based on student and instructor interviews, user experience design principles, learning science, and instructional design best practices, we have identified ten key design lessons in developing effective courseware. The pages that follow include explanations of each lesson, along with best practices and questions to advance your understanding or implementation.

Are you a courseware provider? Use this workbook to assess yourself and improve your product.

Are you an educator? Use this workbook to build understanding and assess current and future products.

We see this workbook as a complement to the Courseware in Context (CWiC) Framework, a tool that helps postsecondary decision-makers select a courseware solution that meets their functionality and implementation needs. We have included connections to CWiC throughout this workbook. We hope the combination of these two tools will result in students and instructors having increased access to courseware that better meets their needs.

About Digital Courseware

Digital courseware, as defined by Tyton Partners, is instructional content that is scoped and sequenced to support delivery of an entire course through purpose-built software.

It includes assessment to inform personalization of instruction and is equipped for adoption across a range of institutional types and learning environments.[1]

How to Use These Materials

We created this document in workbook form to best help you learn and apply its contents. It can be used in multiple ways. If you already know which challenge you need to work on first, then feel free to dive right into its pages.

If not, then turn to the appendix for some activities using the included cards to help you prioritize where to start.

Enjoy!

— Intentional Futures

The Courseware Journey

We interviewed over 100 instructors and students and had them map their emotional states, on a scale of frustration to excitement, as they went through the stages of new courseware implementation. Looking at the full journey, beginning with instructors first becoming aware of the courseware through the end of the course, we observed a common pattern for both instructor and student emotional experiences.

This map is a generalized representation of the emotional journey users take with the product. Looking at these ups and downs, we narrowed in on the areas where frustration was occurring and where users were lost or confused about how the product was supposed to work. From these pain points, we identified ten design lessons, which are outlined in detail in the following pages.

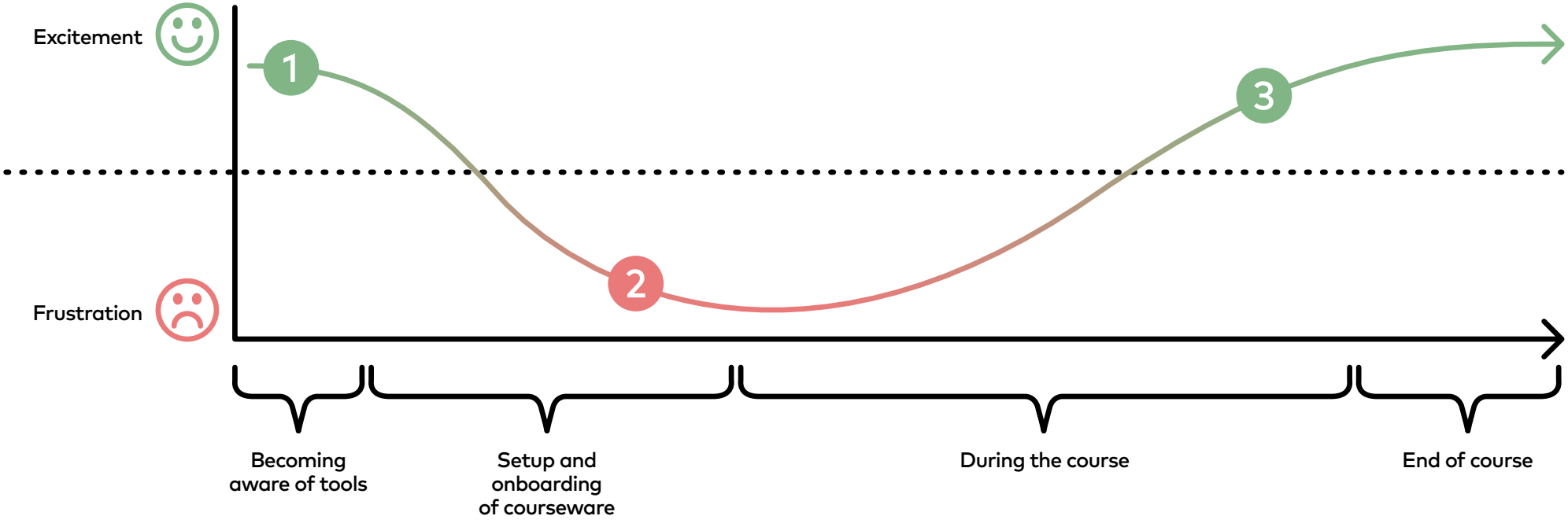
1. **Instructor** Optimistic about potential of a new tool

   Student Enthusiastic about an affordable and easily accessible resource

2. **Instructor** Concerned about how much work is required, how it fits into their plans, and how to provide technical support to students

   Student Worried about grades, and discouraged by unclear expectations

3. **Instructor and Student** Getting the hang of the tool, and starting to see the value it offers



10 Design Lessons

Each of these lessons can influence user emotional states at various points throughout the courseware experience and are particularly prevalent in the 'Setup and Onboarding' (S) and 'During the Course' phases. (D)

Since the user journey for each product is different, this workbook will help you find moments where your courseware is creating excitement for users and identify areas where your users might be frustrated. Each lesson includes an overview, student and instructor quotes to show the challenges faced, best practices, and an activity to help you design a better user experience.

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Learning to Use a New Tool

Learning to Use a New Tool

OVERVIEW

Imagine if at age 16 you were handed a driver's manual to read, and then were expected to get behind the wheel and drive by yourself. There's no way you could remember all of the nuances of how to operate the car as well as the rules of the road. Instead, you would have someone guiding you through your first time driving, supporting you with only information that is relevant in the situation. At first, you need to know basic things like how to start the car, put it into drive, and press the gas pedal. Learning how to merge onto the highway is not needed until much later, and hearing it up front would simply overwhelm you as a new driver.

Similarly, instructors and students need guided and targeted first-time experiences when learning how to use any new tool in the classroom, digital or not. Instructors feel the weight of new responsibilities on their very full schedules and may shy away from adopting a new tool because it is hard to get started and see how it provides value in their instructional practice. Students are generally more tech-savvy, but they don't necessarily have experience with the ways learning happens through courseware. Both students and instructors feel unprepared and without proper onboarding may turn away from using the product or not use it as intended.

WHAT INSTRUCTORS ARE SAYING

"It kind of felt a little bit like, here's a new system and here's a giant book to go with how to use the new system. It was a little bit overwhelming to try to learn it that way."

"[Students] know how to download music and go on different social media, but actually navigating a learning environment software is not as simple as it might be."

WHAT STUDENTS ARE SAYING

"This is my first time ever having an online textbook... I haven't mastered it yet since I'm still getting the hang of it."

This workbook page contains a checklist of things you should do in order to apply the design lesson.

To help instructors and students learn new courseware:

- [ ] **Be user-centric**

  Use encouraging language to describe your product features in terms of what tasks they will enable users to do.

- [ ] **Teach by doing**

  Allow users to guide their own tour of the interface with clear navigation so they can always find their way back. Offer just-in-time tips with relevant onboarding information in the moment to prompt users to try new features.

- [ ] **Foster trust**

  Provide value before making requests. Avoid upfront tutorials and make them optional and always available.

- [ ] **Create and celebrate early wins**

  Provide a setup wizard for instructors that encourages them to take a few key steps to prepare to optimize student success. Offer students opportunities for low-stakes, easy wins at the beginning to allow them to explore without fear of negatively impacting their grades.

- [ ] **Set reasonable expectations**

  Onboarding takes time. Instructors feel like they get oversold on the idea that tech will save them time. Ideal onboarding time is 1-2 weeks, and this period can make or break the overall experience.

- [ ] **Offer responsive support**

  Ensure users know where to go and who to contact if they run into any issues.

Related CWiC Framework Capabilities and Attributes:

Usability: Are there design features or assets to help users orient themselves with the interface and software in general?

This workbook page contains prompts and activities to help you further understand and apply this design lesson to your work.

SEEK EXTERNAL INSPIRATION

Go through the first-time user experience for these websites: mint.com, slack.com, and turbotax.com.

What do these websites do really well for first-timers? What is striking about what their sites get you to do, think about, or feel in their onboarding experience?

Based on what you've seen on those sites, what are 3 things you can change or add to make the first-time experience with your courseware better?

1.

2.

3.

Stuck? Check out these websites for inspiration:

firsttimeux.tumblr.com
useronboard.com

Grab some blank paper and sketch your improved first-time user experience. Here are some tips to get you started:

- Pay attention to how you break up the steps for what users need to know and do to get started with your courseware.
- Consider building on the early excitement that users have when trying a new tool.
- First time experiences don't need to show all the capabilities at once. Take a look at Managing Cognitive Overload on page 59 and think about how you can gradually introduce features or fixes to acclimate users without overwhelming them.

Customizing for Course Alignment

Customizing for Course Alignment

OVERVIEW

Envision playing a game of Tetris where there is just no way to get all the pieces to line up. The pressure of limited time makes the experience even more stressful. You have different pieces —lots of them—and every piece you play has different rules for how to line them up correctly.

Instructors feel like they are facing a similar challenge as they attempt to align new courseware modules with state and/or department standards, a textbook, and lecture presentations they have developed and honed for years. When courseware is not easily customizable to match instructional context, it can be difficult for instructors to integrate it with the rest of their course and deliver a cohesive experience to students. This leads to unclear expectations, confusion, and frustration.

WHAT INSTRUCTORS ARE SAYING

"There is no source where I can pull [questions] from and adjust them to the way I teach."

"I don't teach everything that's in that book. Some parts are more important to me and my students than it would be to someone that goes to a more rural college... we focus differently. So you're asking questions that just don't matter to me... that is a little problematic."

WHAT STUDENTS ARE SAYING

"I thought I would fail because lessons weren't being taught in class."

"We don't learn what we take quizzes on in class. We never talk about it."

Courseware may be more easily aligned to instructor practice if:

- ☐ Instructors have control over what students are working on.
- ☐ Instructors can integrate it as a teaching tool for in-class work, beyond just assignments and assessments.
- ☐ It matches instructor's existing behaviors, processes, and languages (e.g., grading, lesson prep).
- ☐ It is flexible to match the instructor's pedagogical approaches, like project-based or competency-based learning.
- ☐ The content is searchable and presented visibly in the form of a map or list.
- ☐ The content map is presented exactly the same for both instructors and students.
- ☐ Instructors can earn the ability to use features for customization by completing training.

Related CWiC Framework Capabilities and Attributes: Customization and Configuration

Can educators or course designers create and edit learning objectives or outcomes?

Can educators or course designers create and edit learning content and assessments?

Is there a repository of additional assessments/assessment items that can be accessed and incorporated by educators or course designers?

CUSTOMIZATION AUDIT

Which components of your courseware are fixed? How might that inflexibility make it difficult to use your courseware as a teaching tool? How could you help instructors in these areas?

In which ways can your courseware be customized to match instructional context?

How difficult or time-consuming is it to make those modifications? What might make it easier?

Organizing Skills and Objectives

Organizing Skills and Objectives

OVERVIEW

Picture trying to prepare a five-course meal with just a list of ingredients for the entire dinner. You know what all of the components are, but without recipes or an understanding of what you're making for each course, it's incredibly difficult to know how the ingredients fit together and what the larger goal is.

Similarly, students need to be able to build a model of how the content they encounter relates to the ultimate learning outcomes of the course. Students lose motivation when it's not clear to them what skill they are developing or what they're working toward.

WHAT INSTRUCTORS ARE SAYING

"It would have been great to have an outline to the course."

WHAT STUDENTS ARE SAYING

"[Two learning sections were] a great way to show that we were paying attention. They also had an objective which made it easy to know what to look for."

"I remembered some basic concepts but since the questions were recycled, I inevitably started memorizing the answers themselves rather than thinking about each question."

Help users understand how skills and objectives are organized by:

☐ Activating prior knowledge

Learners store information in sparse knowledge structures and need help weaving it into coherent structures. Students learn new ideas by calling upon things they already know, which helps them interpret new information and store it appropriately.[2]

☐ Providing outlines and tables of contents

This helps instructors and students see how everything in the course fits together. Make it clear to instructors which standards content is mapped to.

☐ Clearly communicating learning outcomes

Students want to know what concrete skills they are mastering. Use short videos to introduce what a student is about to learn, pose a question, and give them objectives that connect to the larger skills or goals. Close content sections with short videos of what skill(s) was just learned and how the objectives were met, and answer the question that was posed at the beginning.

☐ Explaining to students how they are learning

Help students understand how learning science is being applied to what they are doing (e.g., *"You might see a lot of questions repeated. That's because it takes multiple exposures to the same content before it becomes part of your long-term memory"*).

Best Practices in Action

"If all the courses build upon each other so that by the time you reach mastery in your particular degree program, all of your knowledge maps are connected and you see that pathway from your earliest learning of exposure all the way to the point where you've really mastered the skills." — Administrator

Related CWiC Framework Capabilities and Attributes:

Measurement and Structure: Have learning outcomes been mapped to learning objectives?

Depth of Interaction: Are learners prompted to recall or apply prior learning?

Scaffolding: Are there narrative structures that act as guidelines or organizers of learning activities?

MAPPING YOUR COURSEWARE STRUCTURE

How do objectives and their required skills align with overarching learning outcomes of your courseware?

Are these skills and objectives visible to instructors? Y / N

Is it transparent to students what they need to master to achieve proficiency? Y / N

How could you draw or visually represent these connections?

Expectations of Adaptivity

Expectations of Adaptivity

OVERVIEW

Imagine paying a premium for a personal trainer at your gym who promises to adapt a fitness program to your specific goals, strengths, and weaknesses. After a few sessions, you see your trainer leading a group workout class through the same exact exercises she's been teaching you. You confront her about why you're paying a premium for a workout that's not actually adapted for you. She explains that though the exercises look the same, the repetitions, weights used, and ordering are personalized to your fitness plan.

Instructors and students face similar concerns with adaptive courseware, because 'adaptive' as a word is loaded and confusing. People's expectations don't match reality because they don't understand it.

WHAT INSTRUCTORS ARE SAYING

"My idea of an adaptive software would be... it's able to assess where the student is at and be able to predict or know from previous encounters where the hiccup is and be able to move with it."

"My assumption—and this is purely an assumption—is that all of the students are seeing the same questions every time which would not fit with my idea of what adaptive was supposed to be."

WHAT STUDENTS ARE SAYING

"I thought things were going to adapt to my pace/brain."

"I was told that the software was supposed to adapt to my learning style."

To alleviate confusion around adaptivity:

☐ Set expectations

Set clear expectations about how your courseware defines adaptivity and which components are adaptive.

☐ Show changes

Show students and instructors how the system is tailoring their learning and feedback to their level of comprehension.

☐ Provide training

Build a module to train instructors and students about how adaptivity works.

☐ Add personality

Give your adaptive learning (AL) a name and personality. Encourage students to "teach the AL" to learn more about them.

Related CWiC Framework Capabilities and Attributes: Adaptivity

Does the courseware adapt the goals or standards for learner completion based on more inputs than a single correct response to the previous item or activity?

Does the courseware adapt the presentation of content based on learner-declared goals?

Does the courseware adapt the complexity or presentation of content based on a learner pre-test?

Does the courseware adapt the complexity or presentation of content based on a learner's affective state?

Does the courseware adapt the scope of instruction (breadth and depth of content) based on more inputs than a single correct response to the previous item or activity?

Can educators or course designers override or change the parameters of adaptive protocols?

ADAPTIVITY ASSESSMENT

Using the definition of adaptivity as "the adjustment of presentations of content in relation to knowledge of learners," consider the following questions.[3]

Which components of the courseware are adaptive (e.g., an upfront diagnostic is used to adjust complexity or presentation; based on student performance, content may be shown as video, text, or audio)?

Which student inputs (e.g., multiple choice, short-answer, long form) are used to determine future content presentation? Which are not?

How does the courseware currently explain which components are adaptive to instructors? To students?

How could you provide more clarity about how adaptivity is applied and used in the courseware?

Creating a Supportive Environment

Creating a Supportive Environment

OVERVIEW

Envision starting a new job as a remote member of a team when you're used to working in an office. As you go through the onboarding documents, you have trouble setting up your calendar and are unfamiliar with the project management tool the company uses. Who do you go to for help—your manager, the operations manager, or IT? Do these people prefer email, a phone call, or another form of communication? You feel isolated but don't want to bother anyone.

Students and faculty adjusting to an online learning environment face similar struggles. They are used to being able to raise their hand or turn to a neighbor, but now have to figure out the equivalent action digitally.

WHAT INSTRUCTORS ARE SAYING

"Right now I'm just on an island hoping that it works."

"[Faculty] don't get a chance to talk to each other, so whatever you can do to facilitate that conversation, everybody's going to be better off in the long run."

WHAT ADMINISTRATORS ARE SAYING

"Building a sense of community and, particularly, enhancing instructor presence is an ongoing challenge online."

WHAT STUDENTS ARE SAYING

"You feel intimidated to 'bug the teacher' versus in class you can raise your hand."

"It's not valuable for me to know all of [my classmates], but for me it's really important to know one person really well."

Frame messages to create a supportive environment[4]:

☐ Create social awareness of others

People are heavily influenced by the behaviors of their peers.[5] In an online environment where students can't see their classmates and instructors don't know who else is using the same product, use messages about best practices to incentivize productive behavior.

- ✓ *"95% of students study for at least 30 minutes before attempting a quiz. Try reviewing the last chapter before your next quiz attempt."*
- ✓ *"80% of instructors set up their assignments in this way. Try it and see if it works for your context."*

☐ Emphasize that challenges are common and improvable

Early struggles can be perceived as a lack of belonging or potential, making learners feel alone.[6]

- ✓ *"I see you are struggling with this concept, but you are not alone. Everyone experiences moments of struggle. These are challenging topics and can take time to really grasp."*
- ✓ *"Instructors often feel overwhelmed at this point in the setup process."*

☐ Highlight interdependence

Promoting independence can make academic tasks seem more difficult.[7]

- ✓ *"Is there a concept that you just grasped that you could help other students with? Helping each other with our gaps in understanding helps both their and your own understanding of concepts."*

☐ Establish communication channels

Faculty members may not have dedicated time for working together on courseware implementation; leverage training opportunities to foster local collaboration. Students who are used to in-person classes may struggle to know where to go for help in an online environment.

- ✓ *Create Facebook communities for instructors and students from which they can opt out. Promote users as peer mentors of your courseware and make them moderators in the communities. This way you can monitor feedback and interaction, but not have to moderate.*

Related CWiC Framework Capabilities and Attributes: Collaboration

Are learners prompted to act as a tutor or mentor?

Can learners interact with peers during learning activities?

Are learners prompted to provide or receive feedback on or from peers?

QUESTIONS TO CONSIDER

What opportunities currently exist for instructors on the same campus to collaborate around using courseware?

How do students know if their peers are struggling on similar content?

What types of support are available to students online as they use your courseware? What barriers might exist to accessing these resources?

What is the tone and language used in the messages that students see throughout your courseware (e.g. when they fail a test)? Does it promote persistence?

Availability and Usability

Availability and Usability

OVERVIEW

Imagine the frustration of an important text message that won't send because of limited service, or filling out a long form on your mobile device, but being unable to scroll down far enough to click "submit." These usability issues can be a huge barrier for instructors and students when using courseware.

Consider the following technology statistics and how they may impact how users experience your courseware.

COLLEGE STUDENT DEVICE USE

- 85% own a smartphone
- 52% own a tablet
- 87% use a laptop, notebook, or Chromebook computer weekly for school work
- 42% use two or more devices on a typical school day[8]

INTERNET ACCESS FOR US ADULTS

- 73% of US adults have broadband internet service at home (the percentage is lower for racial minorities and those with lower levels of education and income)
- 17% of adults age 18-29 are smartphone-only internet users at home[9]
- 42% of public libraries reported insufficient connection speeds to meet demands of patrons[10]

WHAT INSTRUCTORS ARE SAYING

"I think all professors will tell you they hate coming to class and the students don't have their books for two or three weeks because they're waiting on financial aid... They're already behind. So the chance of them going back and reading the chapters... or even being able to do the lessons... or the worksheets you've given them become harder if they do it at all. This way, day one they have a book."

WHAT STUDENTS ARE SAYING

"[A textbook is] more simple to use online... because you're not carrying an extra 20 pounds of weight in your backpack."

To design for availability and usability:

☐ Provide continued access

Allow students to access content before, during, and after the course is over.

☐ Make material mobile friendly

Design mobile-friendly courseware and test it with novice mobile users on various devices.

☐ Get feedback

Get feedback from a diverse set of user experience reviewers to ensure maximum usability.

☐ Test often

Test the courseware experience at various bandwidth speeds.

☐ Universal compatibility

Test compatibility across browsers as students may not have control over which browser they use at a library.

Related CWiC Framework Capability: Procurement Capabilities

Browser/OS compatibility, interoperability, accessibility, and scalability

DISCUSSION QUESTIONS

If a student accesses your courseware on a tablet in class and wants to finish an assignment from her mobile device, what issues might she run into?

Take a screenshot of an assignment as viewed on a laptop and on a mobile phone. How is the student experience different on a smaller screen?

Choose a lesson or experience in the courseware that involves a video. If a student's internet access is too slow to load the video, what resources are available to help her complete the assignment?

Framing Messages to Motivate Students

Framing Messages to Motivate Students

D

OVERVIEW

Picture going to the doctor with an ailment, and your doctor recommends a medicine to treat it. How willing would you be to try the medicine if the doctor said, "There is a 90% chance that you will not experience any negative side effects"? What if she said, "There is a 10% change that you will experience negative side effects"?

Though these statements mean the same thing, if you are like most people, you'd be more willing to try the medicine if presented to you in the first way.[11] In courseware, the way in which messages are framed impacts the subsequent actions that students will take. Thoughtful framing can motivate students to practice good study habits and focus on skill acquisition and not just getting the grade.

WHAT INSTRUCTORS ARE SAYING

"Students wait until the due date so they don't have time to retake quizzes, even when the teacher reminds them."

"Sometimes students will go out of their way to do something that is extra credit when they won't lift a finger to do something that is actually required."

"[I] don't think [the courseware provider has] hit the sweet spot between pushing students and frustrating them."

Frame decisions in courseware to incentivize the behavior students should take[12]

☐ Loss aversion

Losses hurt about twice as much as gains help.[13] Framing choices as avoiding a loss can motivate students to stick to their goals.

✗ *"You could improve your score by attempting the quiz before the due date. Do you want to try?"*

✓ *"95% of students attempt the quiz at least 3 days before it's due so they have time to retake it. You risk getting a lower quiz and course grade if you don't. Do you want to attempt the quiz now?"*

☐ Gain and loss framing

When a decision is presented in terms of gains, people take the sure thing. When framed in terms of losses, people are more likely to take a gamble.[14]

✗ *"Students who don't study in between quiz attempts are 5% likely to do better on the second quiz."*

✓ *"Students who study for at least 30 minutes between quiz attempts do on average 22% better on the quiz. Do you want to spend more time studying?"*

☐ Self-efficacy

Students often attempt only tasks they believe they will be successful in.[15] Authentic, confidence-boosting messages can motivate them to take on more challenging content.

✗ *"The next topic is hard for most students. Plan to spend lots of time on it."*

✓ *"Students in the past have found this upcoming topic challenging, so you will need to take more time on this. You have the background knowledge and skills that you need. Let me know if you have questions."*

Related CWiC Framework Capabilities and Attributes: Scaffolding

Does the courseware incorporate social/emotional interventions designed to improve learner study skills, work habits, and attitudes?

MESSAGING AUDIT

What factors motivate students using your courseware (e.g., course completion, grades, job skill acquisition, time efficiency, cost)?

Find examples of three places where students receive a message to prompt a certain recommended behavior.

1. _____

2. _____

3. _____

Follow-up questions on these messages

- How well does it align to student motivations?
- Does it incentivize the action you want students to take?
- Could it be reframed to be more motivating?

What additional messages could you include to motivate students to practice good study habits?

Visible Progress Monitoring

Visible Progress Monitoring

D

OVERVIEW

When you're on a bus ride, you likely look for signs of time and distance passing as you make your way to a specific destination. Whether checking your clock or stops remaining, watching the exit numbers or mile markers, or following a GPS, you're regularly able to reflect on how far you've gone and how much you have left to go to meet your objective. Imagine if these indicators of progress did not exist, like if you were in a dark, isolated space the entire trip. You would likely feel lost and restless, as you sat wondering how close your destination was.

Students are accustomed to physical worksheets and books, where it is easy to gauge progress toward completion. They can use chapters, units, pages, and physical markers to see where they are in the content sequence. In the transition to online learning, students seek similar indicators of their progress within content (across chapters or modules), but also across all assessments, assignments, and contents for the course.

WHAT INSTRUCTORS ARE SAYING

"[There is] no straightforward way to say where they are [in the course]"

WHAT STUDENTS ARE SAYING

"[I] wish there was a better way to track progress while doing a lesson."

"Sometimes I forget. I just click continue and I forget to click on [the help module] so I just continue reading, and I'm like 'oh shoot. I have to go back and do my questions'."

Help students monitor progress by:

- [ ] **Providing context**

  Give them a clear sense of where they are in the book as they read.

- [ ] **Being clear**

  Distinguish between percentage completion and performance.

- [ ] **Showing achievement towards a goal**

  Display time or questions left in each assignment and assessment.

- [ ] **Showing checklists**

  Provide a map or checklist so that students and instructors know what content has been completed and what is to come.

Related CWiC Framework Capabilities and Attributes: Feedback

Can a learner track their progress and remaining tasks in the same interface?

PROGRESS MONITORING AUDIT

Take screenshots of three different experiences in your courseware—an assignment, an assessment, and your home screen or dashboard.

Can students answer these questions in each experience?

	1. *"Where am I?"*	2. *"What am I supposed to do?"*	3. *"How much do I have left to do?"*
Assignment	**Yes / No**	**Yes / No**	**Yes / No**
Assessment	**Yes / No**	**Yes / No**	**Yes / No**
Home screen or Dashboard	**Yes / No**	**Yes / No**	**Yes / No**

Where are there opportunities to offer more clarity on student progress in these moments?

Take a look at the Organizing Skills and Objectives on page 23. Consider how your progress monitoring is aligned to learning goals to help students focus on the value of the content.

Managing Cognitive Load

Managing Cognitive Load

OVERVIEW

Imagine landing at an airport you've never been to for a layover. Your flight attendant reads off which gate your connection is, but then proceeds to read a list of ten other connection gates. When you step off the plane, you are met with tons of information presented in a variety of forms: directories, loudspeaker announcements, arrivals and departures screens, and wayfinding signs. Furthermore, there are people talking, and restaurants and shops distracting you. As hard as you try to focus on remembering your gate, there are so many other stimuli competing for your attention that it's easy to forget.

Students who are learning new material are trying to do much more than just remember a gate number. It is critical to manage how much information they are receiving and are expected to keep in mind to help them focus and avoid overload.

WHAT INSTRUCTORS ARE SAYING

"I actually hide lots of [courseware product] things because... it's information overload."

WHAT STUDENTS ARE SAYING

"I felt bombarded with text and quizzes."

"Videos with real people and real stuff are really informative and provide a break from reading [so you're] not just swamping your mind with a bunch of words."

"[The content is] very dry, very long, [and] so much information not broken up in a digestible way."

Tips for managing cognitive load:

☐ Minimize extraneous processing

Students learn by transferring information from their working memory, where they can hold about four things they're actively thinking about, to their long-term memory, where it's stored for later use.[16] Cluttered or chaotic interfaces with too much, too complex, or irrelevant content overwhelm working memory and distract students from the learning objective.[17,18]

☐ Vary content format

Too much content in the same format is difficult for students to digest. Use a mix of text, images, videos, and infographics. People perceive things that are close to one another to be more related than things that are farther apart.[19] Look for opportunities to group content for more clarity.

☐ Chunk information

Break up skills into small chunks and provide students with explicit instruction, clear explanation of concepts and skills, and worked examples. This removes the guesswork for those that may not have relevant concepts in their long-term memory. Sequence content and test how long it takes users to go through a section. If it's more than 15-20 minutes, consider ways to further break up the sequence (e.g., mini-quizzes, games, etc.).

☐ Monitor understanding

Embed assessment questions in content. Let students re-answer the questions as many times as they need. Ask Level 1 or 2 Blooms Taxonomy questions in these moments.

☐ Gradually increase difficulty

Keep learners within their zone of proximal development by removing scaffolds as they build mastery. Students should alternate between intentional confusion and engaged concentration, avoiding boredom and frustration.[20]

Related CWiC Framework Capabilities and Attributes: Depth of Interation

Does the courseware offer varying means of learner action and expression (e.g., physical actions, use of multimedia, interactive objects, and executive functions)?

Do learners have the option to select from different representations of the same content in learning modules?

COGNITIVE LOAD AUDIT

Take three screenshots of different features in your courseware and answer the following questions for each.

What did you take screenshots of?

1. _____ 2. _____ 3. _____

How many things are on the screen at once that a student needs to pay attention to?
If students access your courseware through an existing LMS, don't forget to count those components as well.

1. _____ 2. _____ 3. _____

How many decisions does a student need to make on this screen?

1. _____ 2. _____ 3. _____

Does everything on the screen support the learning objective? Is there anything that might divert student focus?

1. _____ 2. _____ 3. _____

Should any of the information be divided into another screen? Multiple screen experiences are better than cognitive overload experiences.

1. _____ 2. _____ 3. _____

List every step a student must take to complete the experience. Are there redundancies? Is anything extraneous?

1. _____

2. _____

3. _____

Delivering Useful Feedback

Delivering Useful Feedback

OVERVIEW

Imagine you are in a country where you do not speak the language, but you looked up a few key phrases before your trip. You approach a store owner and ask for the restroom (you think). She shakes her head no. Now what? Did you use the right word? Was your accent incorrect? Do they not have a public restroom? Is it currently occupied? The feedback you received, in the form of a shaking head, does not give you enough information to figure out what to do next. You feel frustrated and confused.

The same happens to students when learning new concepts and working to develop independent mastery. Without clear, concise, and actionable feedback, they repeat mistakes and can't figure out why they got something wrong. Was it an error in their content understanding? Did they submit their answer incorrectly? Is the LMS being buggy? Factor in the time pressure that students are often under, and this situation becomes even more stressful and high-stakes. Feedback in an online environment has to connect to the relevant content and allow for revisions of work product, so that resubmissions can occur.

WHAT STUDENTS ARE SAYING

"For me, say you're doing a problem and you have an answer and it says it's wrong. I'd like there to be an explanation. Like a path on how it got there rather than how you would have gotten to a different answer."

"When you get questions wrong on a quiz, it tells you what you got wrong. Most of the time it's too vague."

"When you get a question wrong, it should suggest which sections I need to re-read."

Quality feedback is:

☐ Clear

Explain where the student is now and be specific in identifying an aspect of their performance that needs improvement. A letter grade or generic comment does not offer a clear path for growth.

✗ *"Keep up the good work!" "Not quite there yet."*

✓ *"You answered questions about X correctly but seem to be struggling with Y. Go back and reread section Z and try again."*

☐ Concise

Focus on the top priority issue in that moment. Too much feedback at once can be demotivating. Stick with short sentences and avoid unnecessary words.

✗ *"Go back and read chapters 1-3. Pay attention to X, Y, Z, and Q."*

✓ *"You seem to be having trouble with X, which a lot of the skills in this section build upon. Focus on mastering X before attempting the rest of the problems."*

☐ Timely and actionable

Show students the effect of their actions right away and allow them to reflect on their thinking and adjust their approach as needed. Feedback provided early and often prevents learners from developing misconceptions.

✗ *Have a student answer 20 questions in a row and then show them all the questions they got wrong at the end of an assignment they cannot retake.*

✓ *After an incorrect answer, show students a worked example of a similar problem or direct them to specific moments for review and allow them to try again.*

☐ Focused on student actions

Feedback about the process or strategy the learner used is most effective. Avoid giving feedback about the learner as a person.[21]

✗ *"Great answer. You're so smart!"*

✓ *"Incorrect. You may have selected this answer because you are thinking in X way. Consider Y instead."*

Related CWiC Framework Capabilities and Attributes: Feedback

Does the learner receive diagnoses of likely missing skills or knowledge components?

Do learners receive gradation (or multiple-try) feedback within a single activity?

FEEDBACK AUDIT

What data can you pull that would give indications of how students are persisting after they receive feedback (e.g., after answering a question correctly or incorrectly, completing an assignment with a passing or failing grade, submitting work, logging in)?

Identify three areas in your courseware where student feedback or persistence could be improved. What improvements might you make?

1. _____

2. _____

3. _____

Guiding Questions

Does the feedback students receive in each situation meet the criteria of quality feedback?

Are there areas where additional feedback could help guide students to progress?

At what level is the feedback given? Is the level appropriate in the situation?

- Right or wrong
- Supports thinking to discover the right answer, but not explicitly directive
- Directive to a specific area to review

What is the ratio of student inputs to feedback?

What impact do you think the feedback is having on the student experience?

Consider ways that social norms and positive peer pressure can nudge students to optimal behaviors. What types of information can you include with feedback to nudge students to take action?

Card Activities

This workbook and card set can be used in multiple ways depending on who you are and what you hope to accomplish. Here are some activities to get you started on prioritizing the lessons. Once you have identified a lesson to work on, dive into the workbook for more information about how to better meet user needs in that area.

Prioritizing Using the Kano Model

Objective

To assess your product and prioritize which lessons to act on based on potential user emotional response

Players

Product managers, designers, and engineers

The ten design lessons fall into three categories:

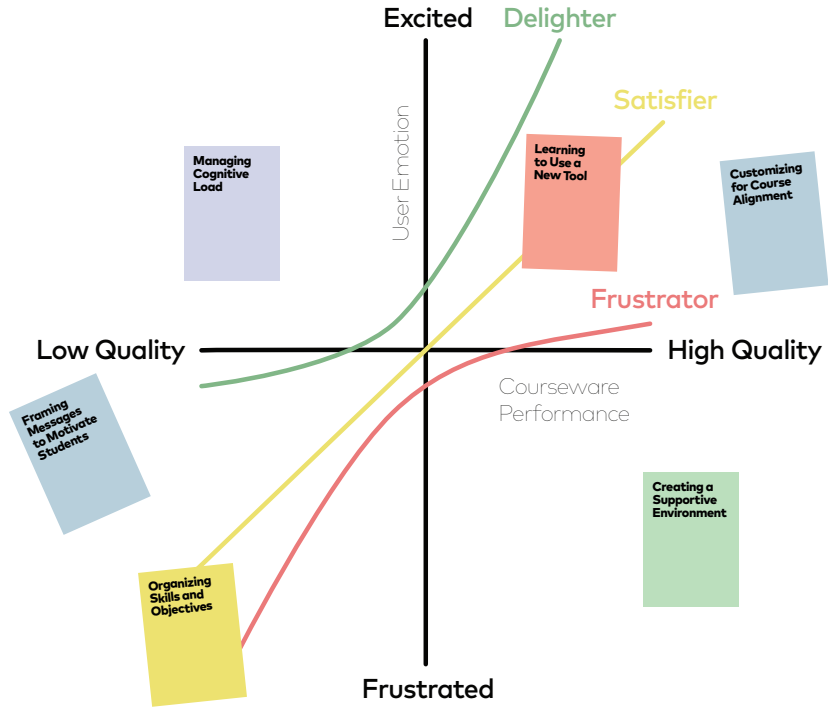
Delighters: Trigger excitement and delight when done really well and cause minimal frustration if they are absent. They are unexpected and thus have more potential to excite than frustrate.

Satisfiers: Expected, and yet can result in excitement when done well; will cause frustration when not done well. They have equal potential to excite and frustrate.

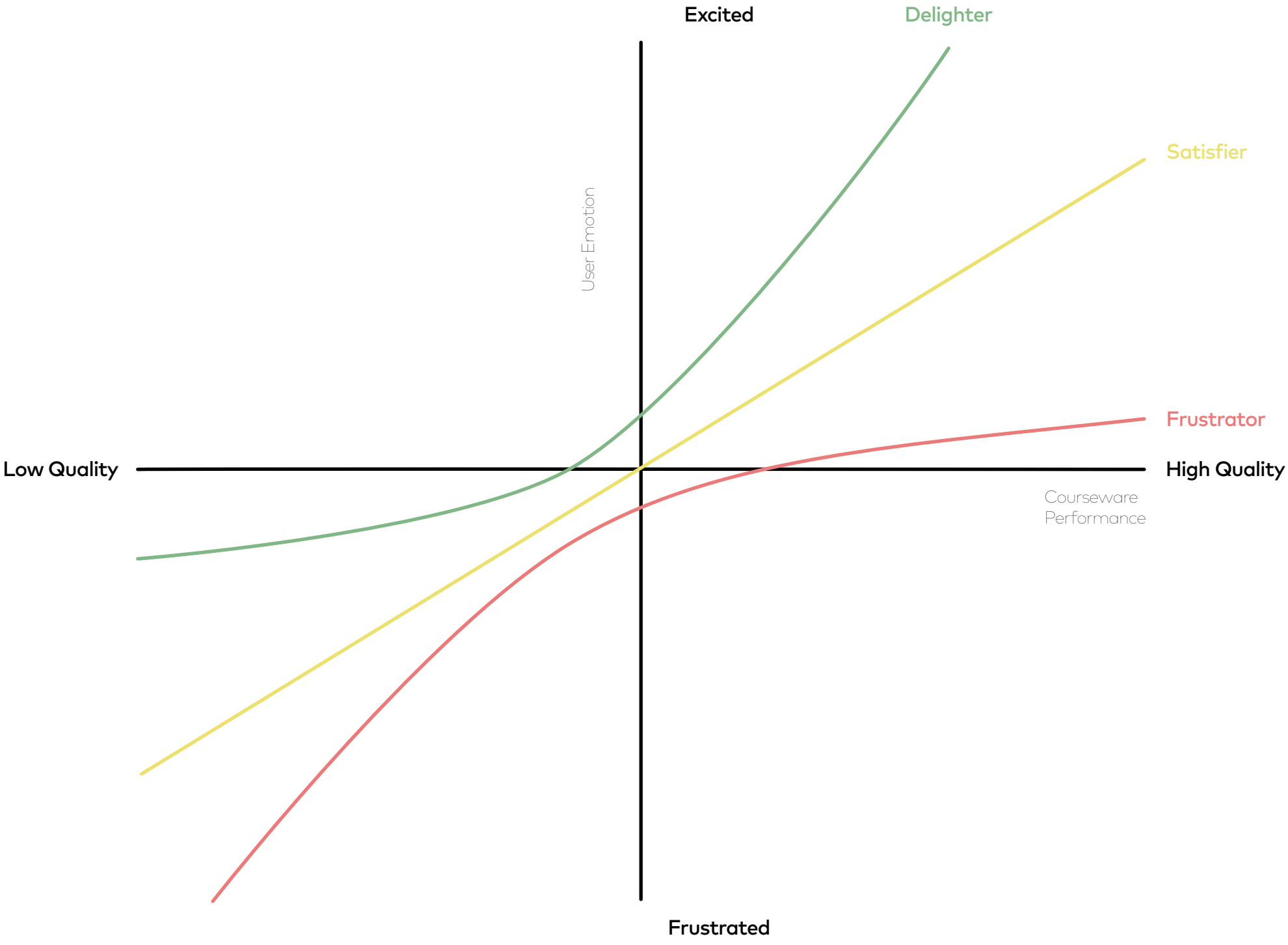
Frustrators: Basic must-have features that cause frustration when not done well; have limited potential to excite when done well. The return on investment of improving these tapers off once they meet basic requirements.

Instructions

1. Using the checklist on the back of one card, assess your courseware performance on a spectrum from addressing the lesson really well (all items checked) to not addressing it (no items checked).
2. Place the card on the curve that is associated with that lesson (delighter, satisfier, frustrator), aligned with your performance assessment on the horizontal axis.
3. Repeat with all of the cards.
4. Prioritize the frustrators that you are not doing well, then the satisfiers, then the delighters.



Challenge	Type	Challenge	Type
Learning to Use a New Tool	Satisfier	Creating a Supportive Environment	Delighter
Customizing for Course Alignment	Satisfier	Framing Messages to Motivate Students	Delighter
Organizing Skills and Objectives	Satisfier	Availability and Usability	Frustrator
Visible Progress Monitoring	Satisfier	Expectations of Adaptivity	Frustrator
Delivering Useful Feedback	Satisfier	Managing Cognitive Load	Frustrator


Excited
Delighter
Satisfier
Frustrator
User Emotion
Low Quality
High Quality
Courseware
Performance
Frustrated

Prioritizing Using Superlatives

Objective

To prioritize which lessons to act on based on desired outcomes

Players

Product managers, marketing, and sales

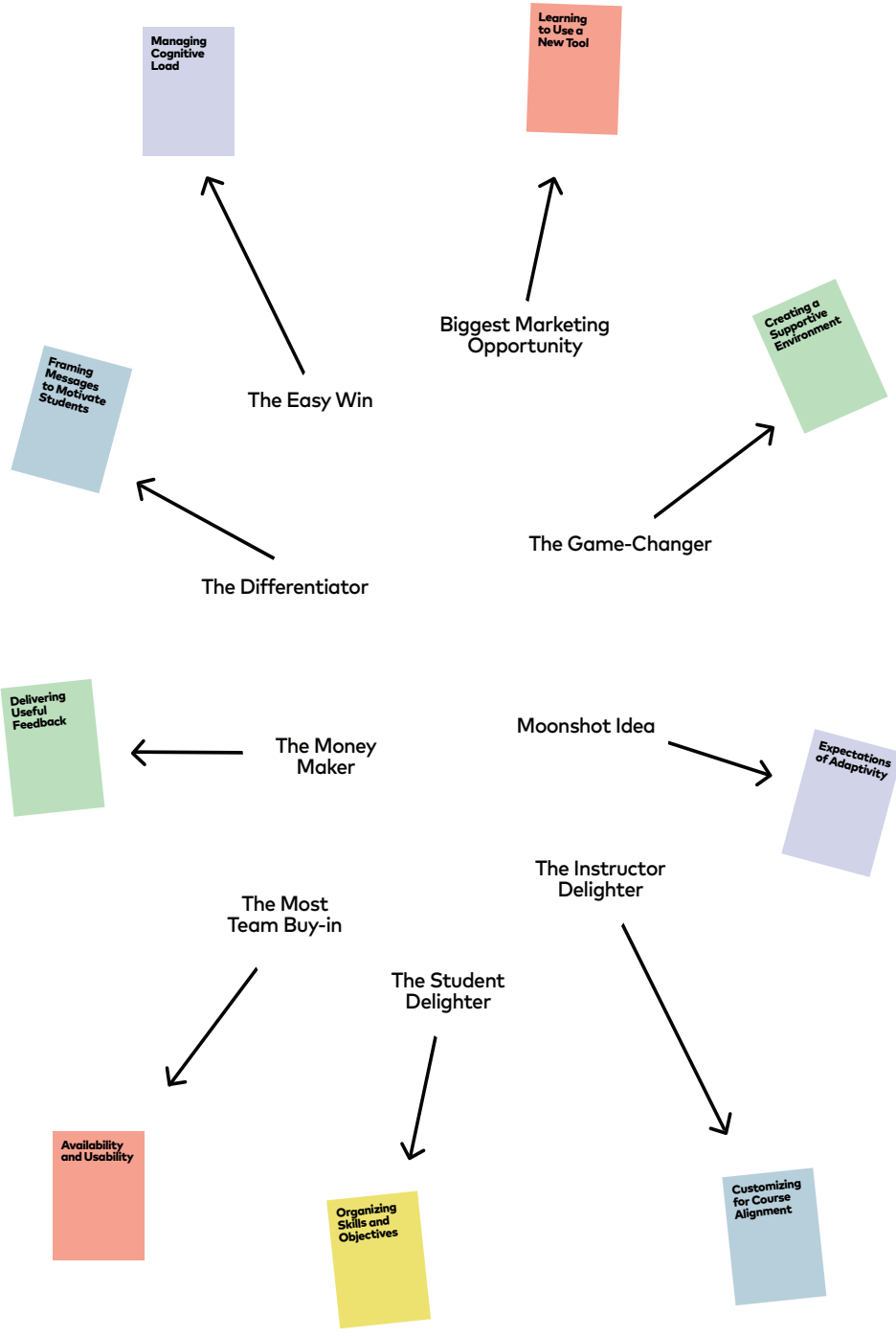
Instructions

1. Divide up the deck of cards and have each player place his/her cards next to the arrow of the superlative that most relates to that lesson.

2. Have each person explain why they placed their cards where they did. Do others agree?

3. Discuss as a team which superlatives are top priorities and which lessons to focus on.

4. Prioritize the frustrators that you are not doing well, then the satisfiers, then the delighters.



The Differentiator

The Easy Win

Biggest Marketing Opportunity

The Game-Changer

The Money Maker

Moonshot Idea

The Most Team Buy-in

The Student Delighter

The Instructor Delighter

Identifying Important, Not Urgent Lessons

Objective

To identify lessons that are important but not urgent and to think about how to integrate them in your product roadmap

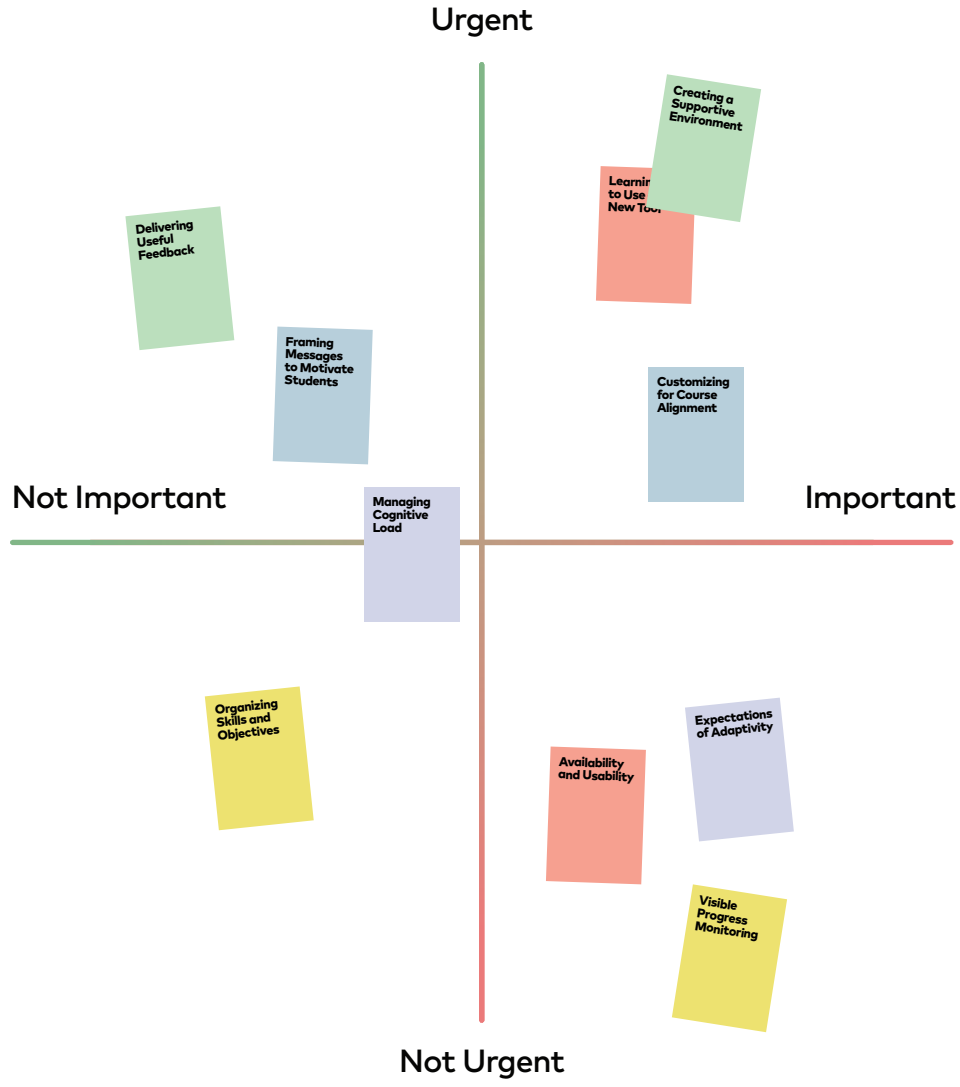
Players

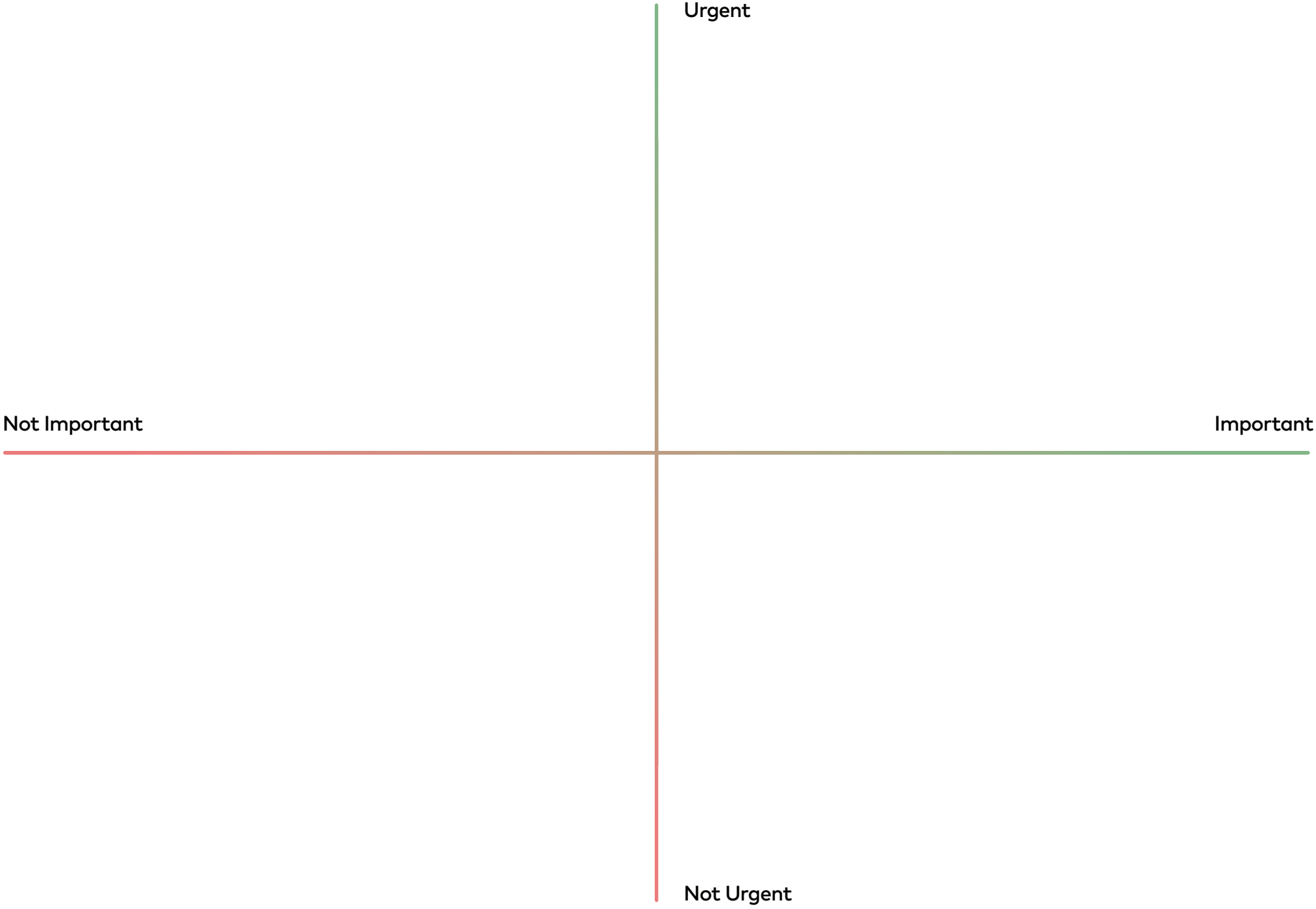
Product managers, designers, and engineers

Instructions

1. Place each lesson card on the grid according to its urgency and importance for your courseware.

2. It is natural to prioritize things in the urgent and important quadrant. Discuss how you might prioritize items in the important but not urgent quadrant.




Urgent
Not Important
Important
Not Urgent

Assessing a Product with SWOT

Objective

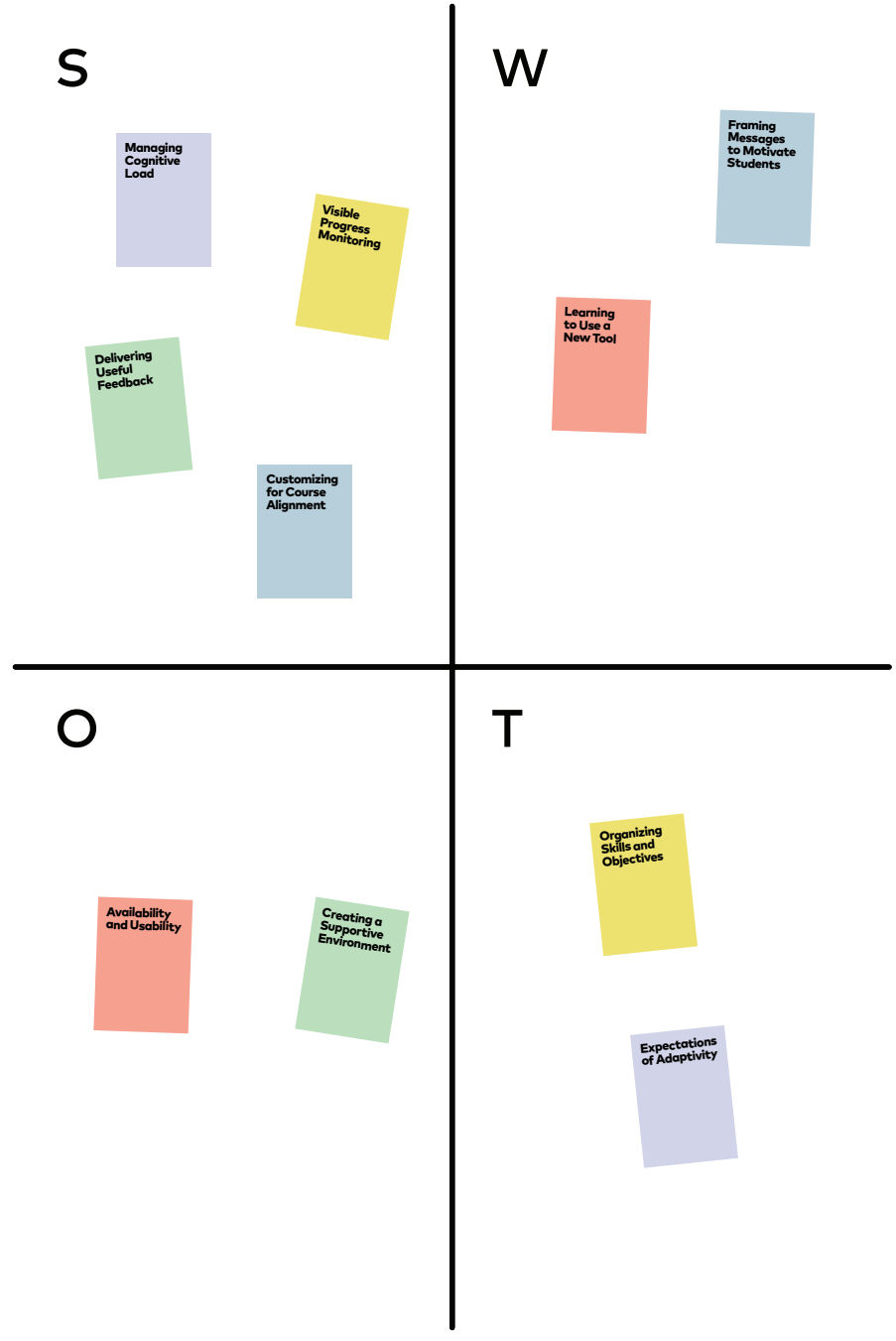
To introduce courseware, demo how your product meets lessons, and prioritize areas for improvement

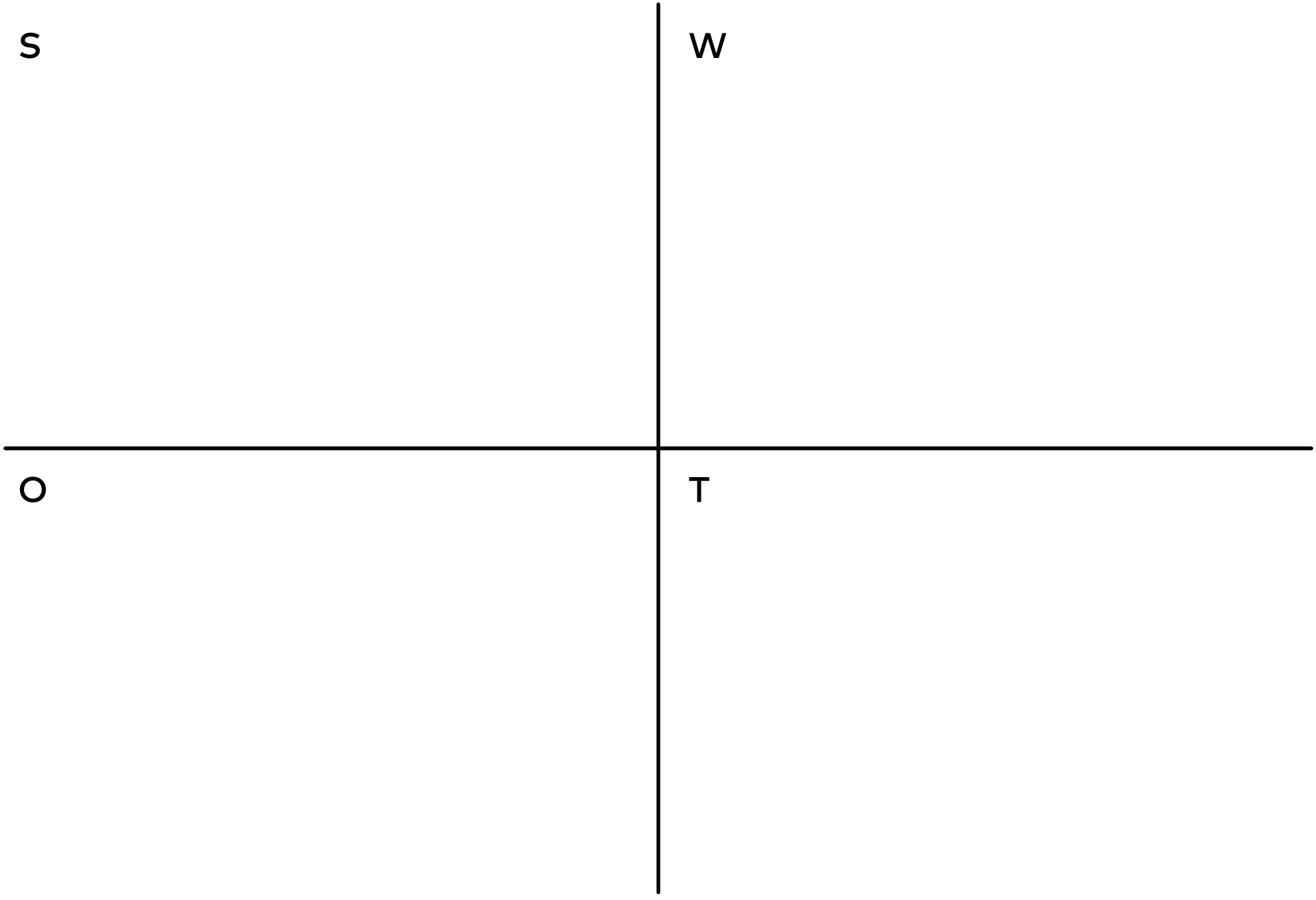
Players

Product managers, marketing, and sales

Instructions

1. Identify each lesson as one of the following:
   - **S** Strength: your courseware does this really well
   - **W** Weakness: your courseware does not do this well
   - **O** Opportunity: areas your courseware can capitalize on or use to your advantage
   - **T** Threat: competing products are advancing in this area
2. Use the cards in the strength category to market your courseware.
3. Discuss how to prioritize improvements in the other categories as a team.




S
W
O
T

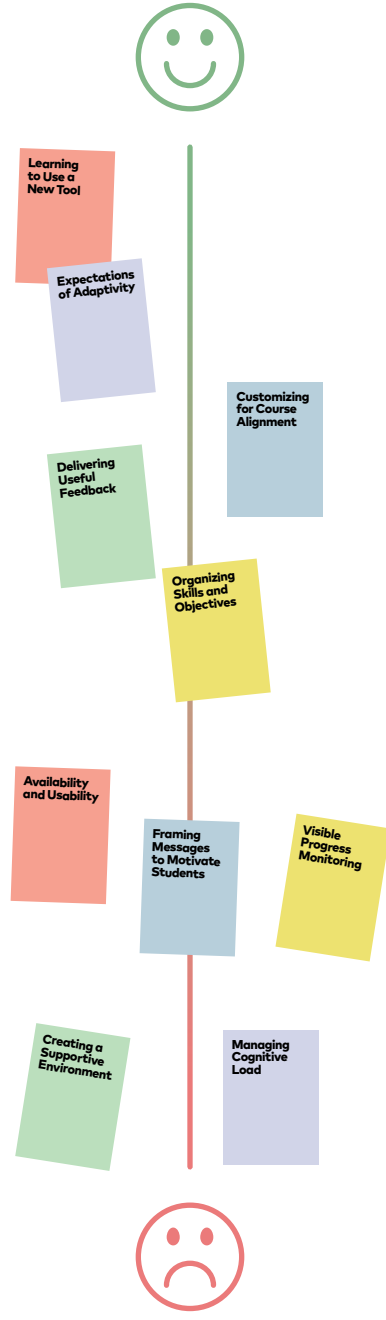
Gathering User Feedback

Objective

To do user evaluations about frustration and delight

Players

Product managers, instructors, and students



Instructions

1. Set up interviews with users of your courseware (note: if you are not able to speak directly with users, you may do this activity by categorizing feedback you've received most recently by which lesson it pertains to based on the checklist on each card).

2. Ask users about their experience with each lesson, focusing on the following areas:
   - What were you trying to do when you experienced this lesson?
   - What steps did you take?
   - How did you feel?
   - What could have made the experience better for you?

3. Based on user responses, place each card on the spectrum to the right, from delightful feedback to feedback that shows frustration with your courseware pertaining to the lessons.

4. Prioritize lessons that cause the most frustration.

Journey Map

Objective

To prioritize the lessons based on when the user experiences them in your courseware

Players

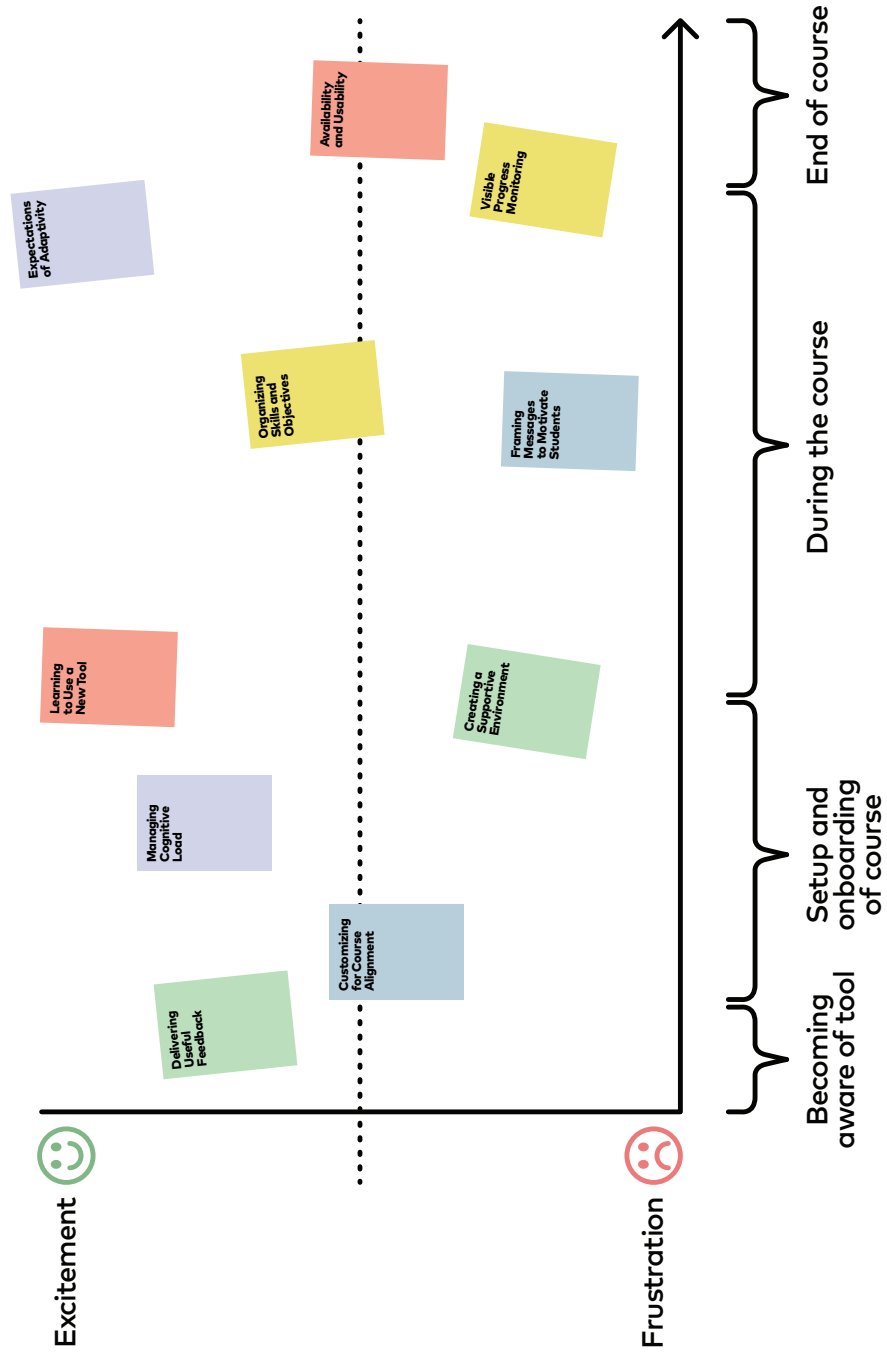
Product managers, designers, and engineers

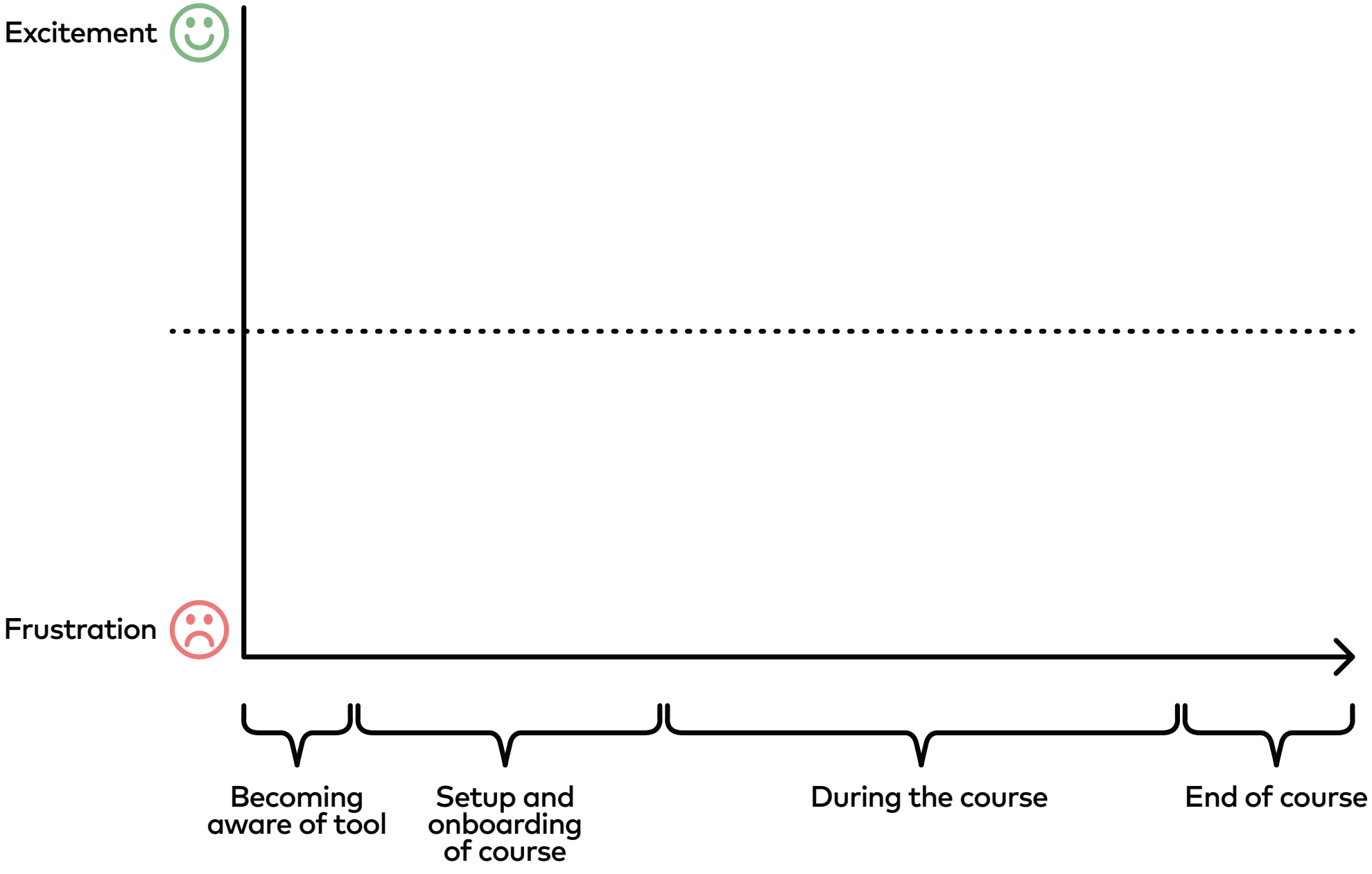
Instructions

1. Place each card on the journey map according to which phase users experience the lesson in your courseware and the level of excitement or frustration you believe it elicits from them.

2. Draw the corresponding emotional curve of your user experience.

3. Prioritize the lessons that cause frustration earliest.




Excitement
Frustration
Becoming aware of tool
Setup and onboarding of course
During the course
End of course

Rose Bud Thorn

Objective

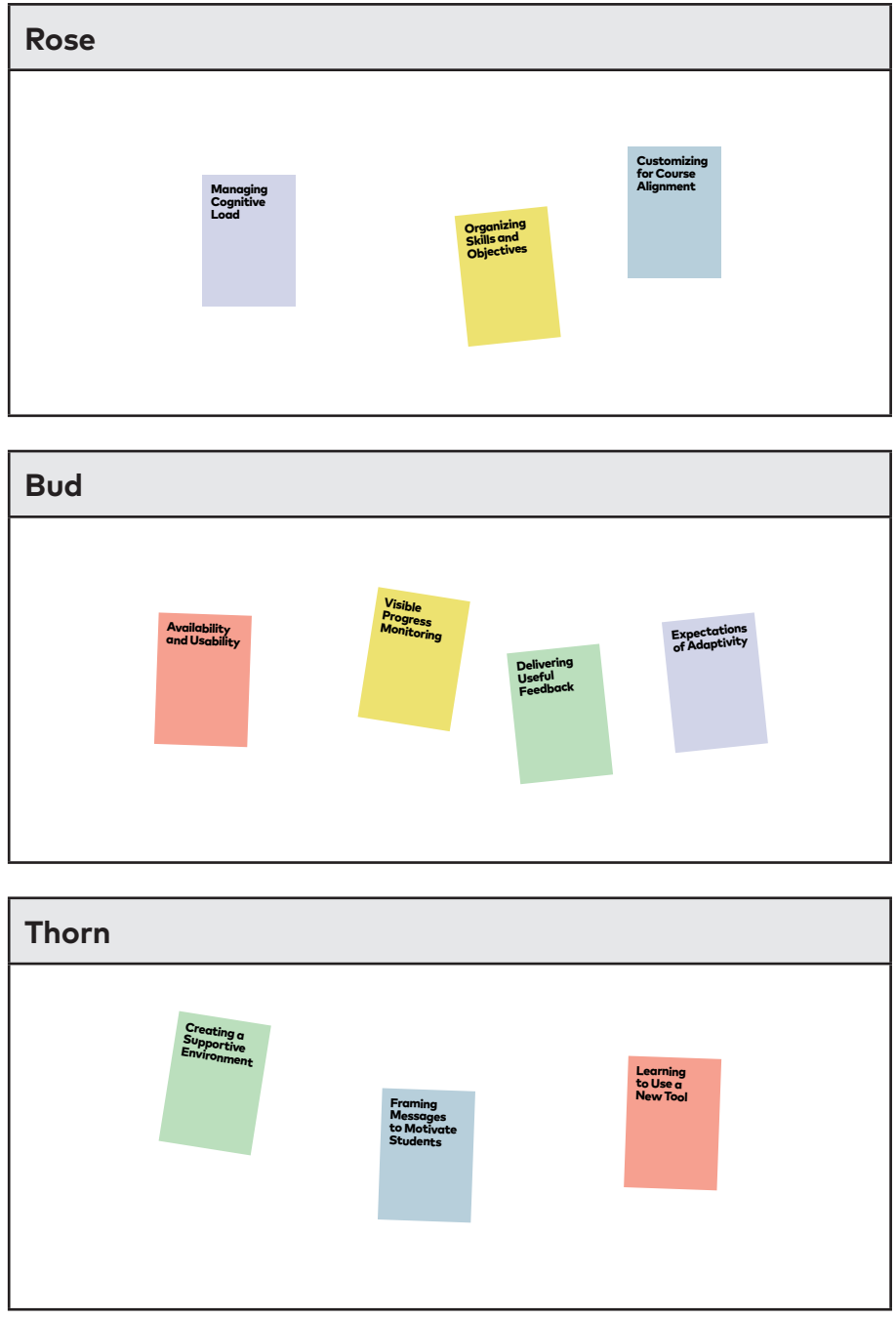
To help instructors gather feedback from students to pass on to courseware providers

Players

Instructors and students

Instructions

1. Have your students read through the lessons and identify them as follows:
   - **Rose:** Something the courseware product does well
   - **Bud:** Something that has potential
   - **Thorn:** Something that is not done well or is a source of frustration
2. Ask students follow up questions for each category:
   - **Rose:** What are specific examples or moments where this went well for you? What made the experience positive (e.g., content, messages, visual layout, etc.)?
   - **Bud:** What would you like to see built on what already exists to turn the bud into a rose?
   - **Thorn:** What were you trying to do when you experienced this lesson? How did you feel? What made it frustrating?



Rose	Bud	Thorn

Cataloging the Challenges

Objective

To react to the content from each lesson

Players

Product managers and designers

Instructions

1. For each card, read through the content and note the following:
    - **Surprises:** What information is new or something you hadn't considered before?
    - **Knowns:** What are things you've heard from users already?
    - **Desires:** What do you want to be able to do to better help users through this challenge?
    - **Visions:** In three years, what does an improved user experience look like in this area?
2. Star line items that you especially want to remember.

Surprises	Knowns

Desires	Visions

Appendix

The following list highlights areas of alignment between the ten design lessons and the attributes for institutional decision-making in the CWiC Framework.

Courseware providers can complete the CWiC Framework to communicate to the market which features their products include here: *cwic.learnplatform.com*

RELATED CWiC FRAMEWORK ATTRIBUTES AND CAPABILITIES

Customizing for Course Alignment

Customization and Configuration

Can educators or course designers change learning content and assessments?

Can educators or course designers change learning objectives or outcomes?

Is there a collection of supplemental content or assessments for educators or course designers to use?

Expectations of Adaptivity

Adaptivity

Does the courseware adapt to the goals or standards for learner completion based on more inputs than a single correct response to the previous item or activity?

Does the courseware adapt the presentation of content based on learner-declared goals?

Does the courseware adapt the complexity or presentation of content based on a learner pre-test?

Does the courseware adapt the complexity or presentation of content based on a learner's affective state?

Does the courseware adapt the scope of instruction (breadth and depth of content) based on more inputs than a single correct response to the previous item or activity?

Can educators or course designers override or change the parameters of adaptive protocols?

Organizing Skills and Objectives

Measurement and Structure

Have learning outcomes been mapped to learning objectives?

Depth of Interaction

Are learners prompted to recall or apply prior learning?

Scaffolding

Are there narrative structures that act as guidelines or organizers of learning activities?

Creating a Supportive Environment

Collaboration

Are learners prompted to act as a tutor or mentor?

Can learners interact with peers during learning activities?

Are learners prompted to provide or receive feedback on or from peers?

Can educators or mentors and learners initiate contact with one another within the courseware interface?

Availability and Usability

Procurement Capabilities

Browser/OS compatibility, interoperability, accessibility, and scalability

Framing Messages to Motivate Students

Scaffolding

Does the courseware incorporate social/emotional interventions designed to improve learner study skills, work habits, and attitudes?

Visible Progress Monitoring

Feedback

Can a learner track their progress and remaining tasks in the same interface?

Delivering Useful Feedback

Feedback

Does the learner receive diagnoses of likely missing skills or knowledge components?

Do learners receive gradation (or multiple-try) feedback within a single activity?

Managing Cognitive Load

Depth of Interaction

Does the courseware offer varying means of learner action and expression (e.g., physical actions, use of multiple media, interactive objects, and executive functions)?

Do learners have the option to select from different representations of the same content in learning modules?

Learning to Use a New Tool

N/A

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