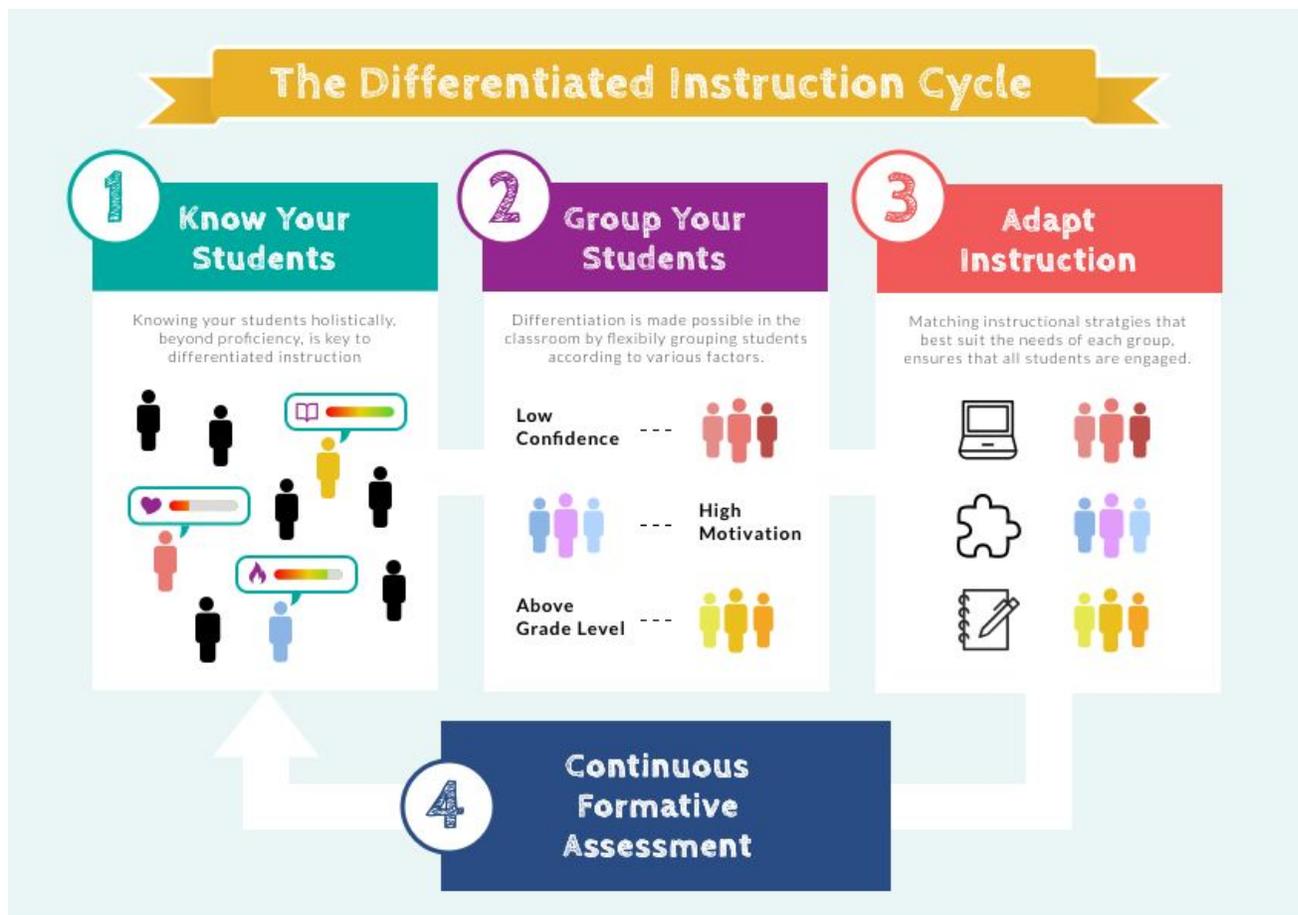


Tailor-ED Design Research

Tailor-ED helps teachers create differentiated lesson plans that are tailored to the needs of students. Teachers send short assessments to understand both the social-emotional and proficiency needs of students. Based on the student's answers Tailor-ED groups the students by their needs for every lesson and recommends the most effective resources for each learner group. This results in a complete differentiated lesson plan that can be shared in just one click with the entire class.

From its inception, Tailor-ED has been premised upon deep-seated learning science, continuously using research to fuel design thinking and decisions. Below is Tailor-ED's Differentiated Instruction Cycle, which is the pedagogical basis of the product that was built in order to help teachers reach every student through creating differentiated lessons. The annotated bibliography (found under each stage) will explain the correlation between the research and design decisions regarding each stage of the differentiated cycle and how it is reflected in the design of the product.

The Differentiated Instruction Cycle



Know Your Students

To differentiate instruction effectively, teachers first need to understand their students' needs - needs that go beyond just proficiency. Within this framework, six student factors have been distilled in order to understand students' needs: motivation, self-confidence, social aptitude, working memory, focus, and proficiency (per topic). By looking beyond proficiency, teachers are able to comprehend underlying factors that drive student learning (Jones, McGarrah, & Khan, 2019). These learning factors are consistently assessed within Tailor-ED, and the results are utilized in order to help the teacher guide instruction as well as to allow the grouping algorithm to consistently adapt to student needs and create the most effective groups possible.

Group Your Students

Grouping students by their needs serves a two-fold function within differentiated instruction. First, the grouping is what allows personalization to be feasible in a 20+ student classroom, both with or without technology. Grouping students additionally breaks the misconception that a teacher needs 30 different lesson plans for 30 students in order to personalize instruction. Student groups also fundamentally remove the isolation in personalization. By working in student groups, a teacher doesn't have to compromise on the student to student and student-teacher interaction.

Tailor-ED's grouping algorithm uses collected and inputted data about each student, as well as learned knowledge regarding instructional strategies and learning factors in order to recommend the most effective groups possible for each lesson. Students' are constantly assessed in the algorithm, ensuring that students do not feel tagged in a specific group, but rather allows their strengths to shine, and their challenges to be faced in the most effective environment (Bernard, Borkhovski, Schmid, Waddington & Pickup, 2019).

Adapt Instruction

There are many entry points to help student learning once the students are grouped by their needs. Teachers are now able to leverage instructional strategies to target the needs of each group (Bernard et al., 2019).

The basis of the recommendation algorithm behind Tailor-ED rests conceptually on the LVP model, connecting instructional strategies to learning factors. Once the main learning factors of each learning group are identified, the recommendation algorithm searches for the curated activity that

both meets the learning standards requested by the teacher and implements the learning strategies which are tied to the relevant learning factors for each group. This recommendation both allows for effective differentiation whilst also ensuring that students are consistently exposed to a wide variety of instructional strategies in their studies.

Continuous Formative Assessment

Leveraging formative assessment promotes a greater understanding of the efficacy of their instruction and each of their students' needs. Throughout the research process and from user research, it was evident that formative assessment was the key to transforming a linear process into a cycle, that continuously improves over time.

Formative assessment in Tailor-ED is realized in the form of a uniquely generated exit ticket, which is incorporated into every differentiated lesson a teacher creates. The exit ticket consists of two proficiency questions, five SEL questions, and two open-ended questions. This complete exit ticket consistently assesses students' proficiency as well as their SEL needs, allowing teachers to constantly maintain a holistic view of each student and therefore be able to guide instruction and feedback accordingly (Torrance, 2012). The results are instantly presented through the lesson insights page, where teachers can view results on both a classroom and individual student level. These results then guide teacher instruction and feedback and inform student grouping, allowing for dynamic differentiation; constantly adapted to students' needs.

Annotated Bibliography

Bernard, Robert M., Borkhovski, Eugene., Schmid, Richard F., Waddington, David I., & Pickup, David I. (2019). Twenty-first century adaptive teaching and individualized learning operationalized as specific blends of student-centered instructional events: A systematic review and meta-analysis. *Campbell Systematic Review*, 15(1-2), DOI:10.1002/cl2.1017

This study explores the effect on student achievement when using small group instruction, whilst also analyzing the teacher's role in adapting instruction. The review utilizes evidence from 299 studies, resulting in 365 estimates of the impact of teaching and learning methods and practices. It was understood that adapting instruction for K-12 learners according to abilities, needs, and interests directly correlate to improved learning achievement. Additionally, it was made clear that

the role of the teacher in terms of adapting instructional resources and activities was extremely significant. This study firstly influenced the design of the grouping mechanism, emphasizing that groups should be created according to both abilities and needs. Further, the review helped strengthen the use of learning strategies within the platform in order to help teachers best adapt instruction.

Jones, Stephanie M., McGarrah, Michael W. & Kahn, Jennifer. (2019). Social and Emotional Learning: A Principled Science of Human Development in Context. *Educational Psychologist*, 54(3), 129-143, DOI: 10.1080/00461520.2019.1625776

The authors, from the Harvard University Graduate School of Education, purport a key framework for both research and practical development regarding social and emotional learning. They highlight significant studies that have progressed understanding and further demonstrate core principles that should become the premise for future educational improvement. The emphasis and practical nature of this study, determining the centrality and essential connection between social-emotional learning and cognitive development for learners, directly influenced Tailor-ED's product design. It framed social-emotional learning as one of the core competencies of the platform that needs to be manifested in a practical way, thereby helping form the basis for the machine learning algorithm.

Torrance, H. (2012). Formative assessment at the crossroads: Conformative, deformative and transformative assessment. *Oxford Review of Education*, 38(3), 323-342, DOI: 10.1080/03054985.2012.689693

This article stipulates that the theory and method of formative assessment are at a standstill and need to be disrupted. It acknowledges the significance and effectiveness of the widespread practice of formative assessment, however, the issue lies with the limited scope of the assessments. Torrance claims that there is a much greater range of options that can be exercised within formative assessment. As such, this inspired Tailor-ED's formative assessment design, in the form of an online exit ticket, to include a broad range of questions covering both proficiency and social-emotional learning factors, as well as inputting a direct channel for students to voice their opinion.