EAB

Student-Centered Classroom Design and Technology

District Leadership Forum

District Leadership Forum

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1) Executive Summary

Key Observations

Research suggests that effective learning space design improves student achievement and engagement. Administrators at all profiled districts developed learning space redesign initiatives to improve teacher efficacy and student achievement. Contacts at **District C** note that redesign efforts galvanize teachers to improve their pedagogy, and contacts at **District A** report classroom redesign improves the quality of student work. Research suggests that administrators can greatly improve a student's progress by moving them from an ineffective learning space to a highly effective learning space.[1] Important factors include naturalness (i.e., natural light, air quality), individualization (i.e., ownership, flexibility), and stimulation (i.e., complexity level).[2]

Organize classrooms into learning zones and/or distinct stations that support varied pedagogical strategies. Research on learning space design recommends that teachers segment their classrooms into defined learning zones that promote different types of learning, including individual learning and group work.[3] At **District A**, administrators ask teachers to create group-centric collaborative spaces, focused individual spaces, open presentation spaces, and interactive makerspaces based on the work of Rosan Bosch.[4] At **District D**, teachers rotate students through blended and traditional learning tasks via defined individual and group stations.

Provide multiple types of flexible, moveable furniture to ease classroom transitions and promote student choice. Contacts at all profiled districts recommend that districts purchase flexible, moveable furniture to help teachers and students quickly assemble and disassemble stations and learning zones. Contacts at **District A** note that moveable furniture greatly eases classroom transition across learning zones. Furniture should be foldable and modular, comfortable, varied, safety-tested, and protected by warranty. Contacts at **District E** report that when administrators give students choice among varied furniture, they increase student engagement and learning.

Purchase moveable televisions and projectors instead of interactive whiteboards to facilitate station rotation and classroom flexibility. Contacts from **District E** report that even in student-centered classrooms, teachers need access to visual displays to deliver content to students. That said, contacts from most profiled districts recommend that administrators avoid relying on interactive whiteboards and fixed teaching walls, as they limit teacher flexibility and thus lead to teacher-centric instruction. Instead, administrators should purchase moveable projectors and televisions that allow teachers to create stations, facilitate small-group presentations, and redirect student focus.

Develop application-based funding models to incentivize teachers to conduct research and participate in training related to classroom redesign. At **District A**, **District C**, and **District D**, administrators ask teachers to submit applications that clearly outline how they will use redesign funds to create student-centered instruction in their classrooms. Through these applications, administrators can target limited funds to those teachers that will use them most effectively and ensure that teachers adequately research and test potential classroom designs prior to implementation.

1) Peter Barrett, Yufan Zhang, Fay Davies, and Lucinda Barrett, "Clever Classrooms: Summary Report of the HEAD Project," *University of Salford Manchester*, February 2015, 14. https://www.salford.ac.uk/cleverclassrooms/1503-Salford-Uni-Report-DIGITAL.pdf
2) Ibid.
3) Ibid., 28.
4) Rosan Bosch, *Designing For a Better School Starts at School: No More Classrooms* (Copenhagen, Denmark: Rosan Bosch Studio, 2018).

2) Redesign Motivations

Learning Space Impacts

Research Suggests That Effective Learning Space Design Improves Student Achievement

Educators are increasingly focused on how classroom design affects learning. The crowdfunding site **DonorsChoose** saw requests for funding for flexible furniture increase from 110 to 21,163 from 2015 to 2016.[5] Recently, districts and cities—including all profiled districts—have begun to undergo school upgrade and classroom design initiatives. In major cases (i.e., cases that incorporate building renovations), initiative costs can reach prices from $42.5 million dollars to 1.2 billion dollars.[6]

192x

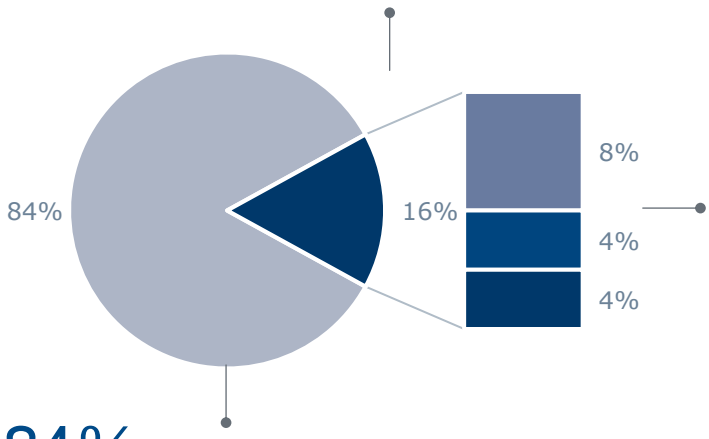
Increase in funding requests for flexible furniture

Contacts and research studies suggest that learning space design measurably contributes to student academic achievement. Teachers at **District A** report that the quality and creativity of student work improved following learning space redesign. Further, a study of 153 U.K. classrooms asserts that administrators can greatly improve a student's progress by moving that student from an ineffective learning space to a highly effective learning space.[7] Importantly, the study found that whole-school factors (e.g., size, play facilities, navigation routes) are less impactful on student outcomes than the design of individual classrooms.

Components of Learning Spaces That Significantly Impact Student Achievement[8]

16%

of variation in yearly student academic progress is explained by qualities of the learning space (e.g., amount of natural light)



Three qualities of learning spaces have the greatest approximate impact on student progress:

- **8% - Naturalness**
- **4% - Individualization**
- **4% - Stimulation**

84%

of variation in yearly student academic progress is explained by factors outside of learning space design (e.g., parental involvement, teacher effectiveness)

5) Brenda Iasevoli, "Schools are Rethinking Classroom Design to Encourage Collaboration, Creativity," *The Hechinger Report*, June 22, 2019. https://hechingerreport.org/schools-are-rethinking-classroom-design-to-encourage-collaboration-creativity/
6) Ibid.
7) Peter Barrett, Yufan Zhang, Fay Davies, and Lucinda Barrett, "Clever Classrooms: Summary Report of the HEAD Project," *University of Salford Manchester*, February 2015, 14. https://www.salford.ac.uk/cleverclassrooms/1503-Salford-Uni-Report-DIGITAL.pdf
8) Ibid., 15

Most Important Qualities of Learning Spaces[9]

Though teachers and administrators may have limited control over "naturalness," teachers can modify classroom layouts (individualization) and decorations (stimulation) to improve student achievement at minimal cost.

Naturalness

Light, temperature, and air quality:

- High levels of natural and artificial light
- High air quality through natural and mechanical ventilation
- Reasonable temperatures through central heating and shade control

Individualization

Ownership and flexibility:

- Breakout spaces
- Defined learning zones
- Efficient storage
- Large, accessible wall areas
- Student-created displays
- Personalized elements

Stimulation

Appropriate level of complexity and color:

- Minimal decoration and distraction
- Varied wall colors to stimulate student attention (light walls, one bright feature wall)
- 20-50 percent clear wall space
- Interesting, colored furniture

Secondary Factors

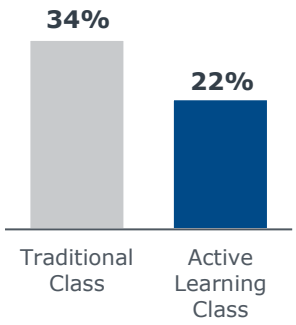
- **Sound**: Minimize sound distractions with sound-absorbing treatment, including soft furnishings, posters, and carpeted areas.
- **Links to Nature**: Provide access to nature with plants and wooden furniture elements.

In addition, prior EAB research in the higher education space suggests that learning spaces that promote individualized instruction (e.g., student interactions, collaborative group projects and activities) over teacher-centric instruction (e.g., lectures) improve student achievement. At universities, these active learning spaces demonstrate clear advantages over traditional classrooms, including improvements in year-to-year student retention.

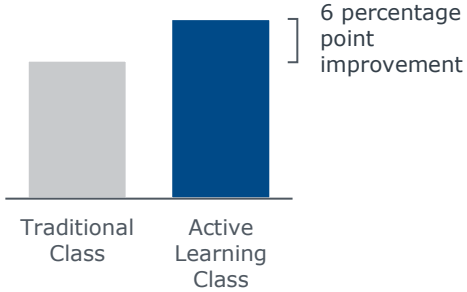
Impact of Student-Centered Active Learning Spaces on Student Achievement

For more information on the impact of active learning, see **page 9** of EAB's **Active Learning Spaces**.

Average Course Failure Rate at Multiple Institutions



Average Student Scores on Identical Tests at Multiple Institutions



Source: S Freeman, S Eddy, M McDonough, M Smith, N Okoroafor, H Jordt, and M Wenderoth, "Active Learning Increases Student Performance in Science, Engineering, and Mathematics." Proceedings of the National Academy of Sciences 111.23 (2014) 8410-8415; Facilities Forum interviews and analysis. Cited in Rowe Stephen, "Active Learning Spaces," *EAB Facilities Forum*, 2016.

9) Peter Barrett, Yufan Zhang, Fay Davies, and Lucinda Barrett, "Clever Classrooms: Summary Report of the HEAD Project," *University of Salford Manchester*, February 2015, 14. https://www.salford.ac.uk/cleverclassrooms/1503-Salford-Uni-Report-DIGITAL.pdf

In response to these effects, administrators at all profiled districts implemented transformative classroom redesign initiatives to encourage teachers to deliver student-centered instruction. Many profiled districts received recognition for their efforts, including awards from the International Society for Technology in Education (ISTE) and the Consortium for School Networking (CoSN).

Effective Learning Space Design Increases Student and Teacher Engagement

Contacts at **District A** and **District C** report that learning space redesign efforts galvanize teachers to reassess their pedagogical approach. At both districts, teachers voluntarily attend learning space redesign trainings even without receiving funding for furniture/design elements. At District A, contacts reference teaching practice changes recorded on blogs to demonstrate the impact of redesign on teaching effectiveness.

52.5%

of learning space redesign survey respondents at **District C** implemented effective design principles even without additional funding.

Teachers at District A, District C, and **District D** also report evidence of improved student engagement due to learning space redesign. At both districts, contacts report that students participate more in discussions and contribute more actively to classroom activities. Contacts at District A report that learning space redesign can re-engage even previously withdrawn or disengaged students, and contacts from District C cite student survey data related to improved engagement.

Student Survey Results from *District C*[10]

87%
of students agreed that it is easy to work on projects in redesigned classrooms.

84%
of students report easy access to technology in redesigned classrooms.

97%
of students report ease of mobility in redesigned classrooms.

87%
of students report easier collaboration in redesigned classrooms.

90.5%
of students found classroom furniture comfortable.

10) Independent Evaluator, "Evaluation of District C Program," *District C*, provided July 18, 2019.

Classroom Technology Also Plays an Important Role in Increased Student Achievement

A review of 219 studies that assess the impact of technology on student achievement found that across all ages and major subject areas, students in technology-rich environments experienced increased achievement.[11]

Influences of Space on Pedagogy

Non-Traditional Learning Spaces Encourage Teachers to Implement Student-Centered Pedagogy

At **District B**, administrators discourage traditional classroom layouts (i.e., rows of desk facing a large teaching wall) because they believe teachers are less likely to implement new pedagogical techniques (e.g., collaborative work, blended learning) in traditional environments. When administrators design classroom layouts specifically for teacher-centered, stand-and-deliver pedagogy, teachers do not feel pressure to deliver student-centered instruction. Experts in school design argue that simplistic classroom designs emphasize the philosophy that knowledge flows only from the teacher to the students and that all students learn in the same way.[12] In response, when administrators at District B observe traditional classroom layouts during teacher observations, they explicitly comment on classroom design in written feedback and suggest new layouts.

For more information, see **page 11** of **Implementation and Assessment of Personalized Learning**.

While traditional learning spaces can encourage traditional pedagogy, non-traditional learning spaces support innovative teaching strategies. Prior EAB research describes how districts that implemented personalized learning developed learning environments with mobile seating, independent workspaces, collaborative tables, and comfortable furniture. These design elements allow teams of teachers to deliver differentiated instruction based on student preferences. At one district, administrators removed walls between classrooms to encourage teachers to design lessons that allow for varied groups and additional collaboration.

11) J. Sivin-Kachala, *Report on the Effectiveness of Technology in Schools, 1990-1997* (Software Publisher's Association: 1998). Cited in John Schacter, "The Impact of Education Technology on Student Achievement," *Milken Exchange on Education Technology*, 1999. http://www2.gsu.edu/~wwwche/Milken%20report.pdf

12) Prakash Nair, Randall Fielding, and Jeffrey A. Lackney, *The Language of School Design: Design Patterns for 21st Century Schools* (DesignShare, 2009), in Chris Johnson, "Small Tweaks to the Learning Space can Make a Big Difference," *ISTE*, October 15, 2015. https://www.iste.org/explore/In-the-classroom/Small-tweaks-to-the-learning-space-can-make-a-big-difference

3) Classroom Design

Layout

Organize Classrooms into Learning Zones That Support Different Pedagogical Strategies

Research on learning space design recommends that teachers segment their classroom into defined learning zones that promote different types of learning, including individual learning, group work, and content presentation. Administrators at **District A** and **District C** base classroom learning zones on the work on Rosan Bosch and David Thornburg.[13] These learning zones support different learning styles, encourage new teaching methods, and increase student mobility.

Six Types of Learning Zones at *District A*[14]

Mountaintop

A space in which one individual or a group of individuals addresses a large audience and communicates information one way. Suitable for lectures and student presentations.

Example: Stage with semi-circle of chairs

Cave

A space that supports individual concentration and focus. Caves are small spaces for one to two students that are slightly separated from the central learning space.

Example: Desk behind moveable partition

Campfire

A space for group-centric, collaborative learning situations. Campfires should be somewhat secluded to allow groups to share ideas and discuss concepts without interruption.

Example: Booth with bench seating

Watering Hole

An open space through which many students pass that encourages informal interaction with students from other groups or areas in the classroom.

Example: Central materials station

Hands-on

A space that supports application of knowledge and sensory learning experiences.

Example: Classroom makerspace

Movement

Open spaces in which students can engage in physical, movement-centric learning activities (e.g., stations).

Example: Carpeted, open floor space

These learning zones may be present in individual classrooms or throughout a school building. For example, school buildings may feature hands-on makerspaces, movement-centric gyms, and central watering hole cafes, while individual classrooms within the building each have their own mountaintops, campfires, and caves.

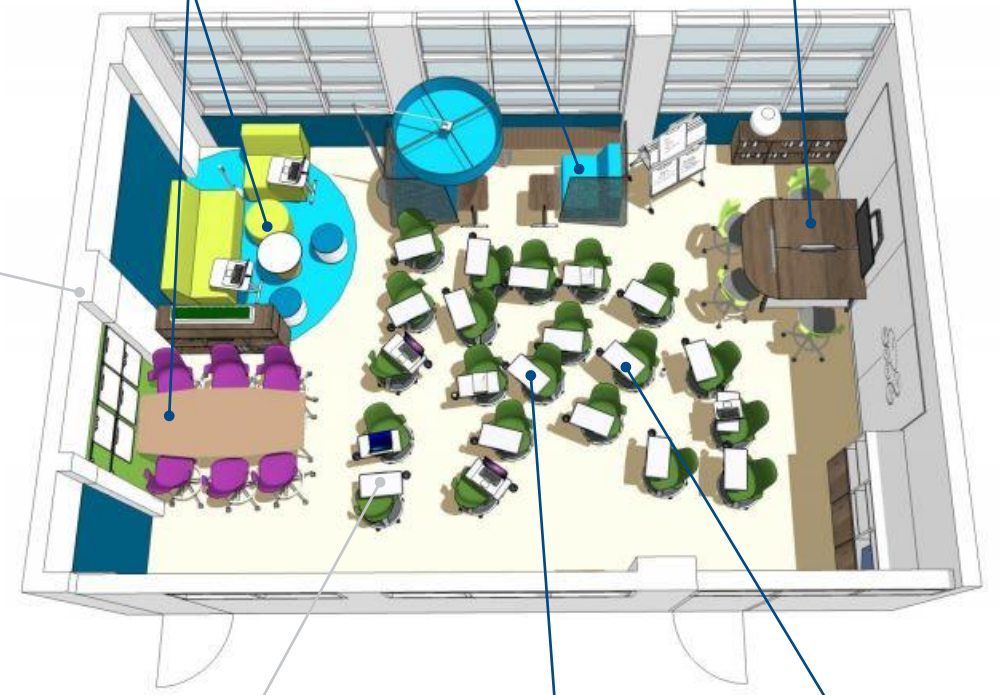
13) Rosan Bosch, *Designing For a Better School Starts at School: No More Classrooms* (Copenhagen, Denmark: Rosan Bosch Studio, 2018); Diana Rendina, "Read this Book: From the Campfire to the Holodeck," *Renovated Learning*, January 16, 2017. http://www.renovatedlearning.com/2017/01/16/campfire-holodeck/
14) Ibid.

Sample Zoned Classroom

Campfire
Collaborative spaces that support groupwork.

Cave
Sheltered, individual workspace for one to two students.

Hands-On
Makerspace with storage for materials, whiteboards, and collaborative technology.



Classrooms do not need to contain all learning zones. For example, this school building may include a cafe/cafeteria that serves as a **watering hole** for students' free periods.

With flexible furniture, classroom areas can **alternate** between learning zone types depending on the needs of the class.

Mountaintop
Desks can orient to face the front of the room to create a stage for teacher lectures and student presentations.

Movement
Students can move desks to the side of the room to create an open space for activities that require physical movement.

Source: Modified from Steelcase Education, "6-12 Classrooms," *Steelcase*, accessed July 30, 2019. https://www.k12blueprint.com/sites/default/files/6-12-Classrooms.pdf

Account for Differences in Learning Zones Between Primary and Secondary Levels

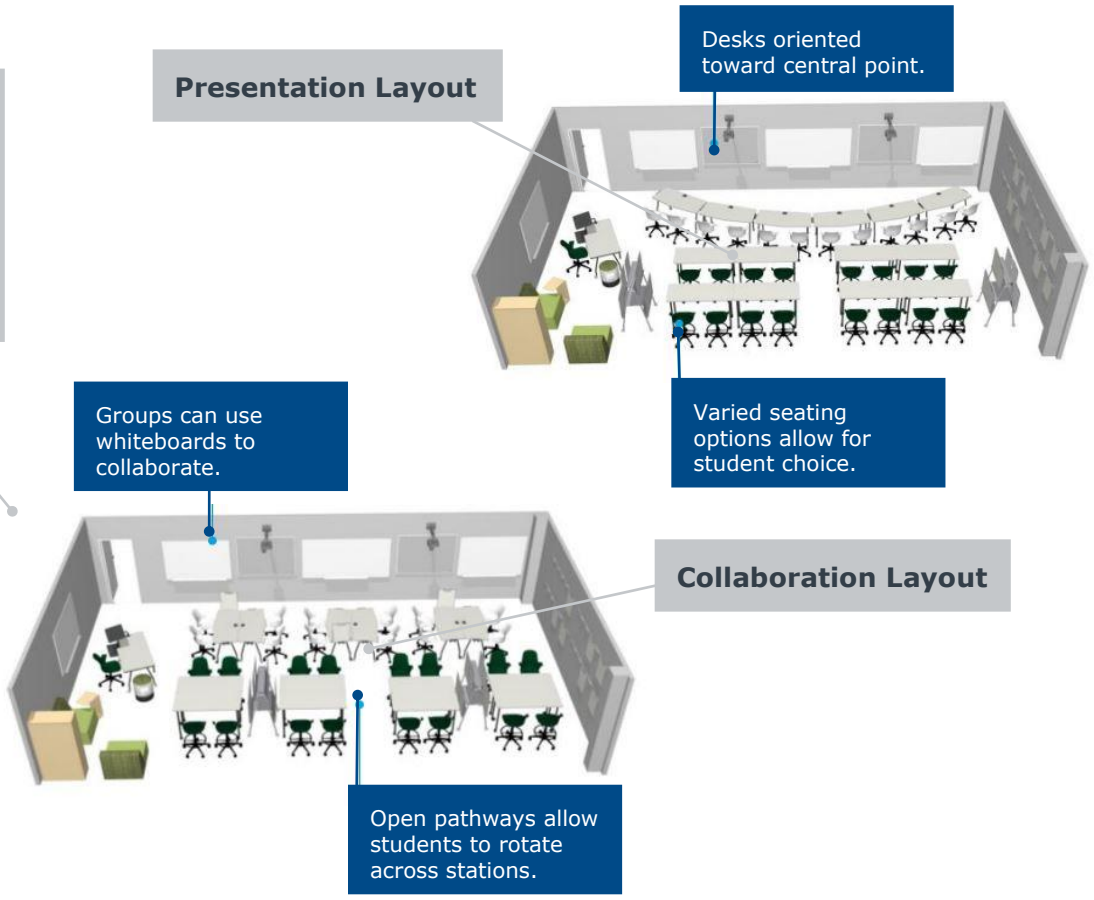
Contacts at **District C** report that because primary teachers support multiple content areas and tasks, primary classrooms should incorporate more learning zones. Because secondary teachers are content-area experts, secondary classrooms can incorporate fewer learning zones (e.g., no watering hole, no hands-on zone). Secondary classroom learning zones should have a greater instructional focus, as students can access socialization and individual retreats outside of the classroom. Similarly, contacts from **District E** report that secondary classrooms typically contain fewer, more focused learning zones and stations.

Rather than maintain separate zones throughout every class period, administrators at District A and **District E** encourage teachers to transition the entire classroom from zone to zone as needed. This approach saves classroom space, as all students can participate in the same zone. Contacts from District A report that teachers should transition from a mountaintop layout to separate campfires to individualized cave zones within a single class period.

At District E, administrators give teachers the freedom to design two-to-three specialized class layouts based on specific learning tasks (e.g., discussion, collaborative group work). Contacts report that teachers switch between these layouts within class periods or from day to day, depending on their needs.

Sample Classroom Layouts Based on Specific Learning Tasks

Contacts from **District E** recommend classroom layouts designed by **Steelcase**, as the company conducts research on classroom design.

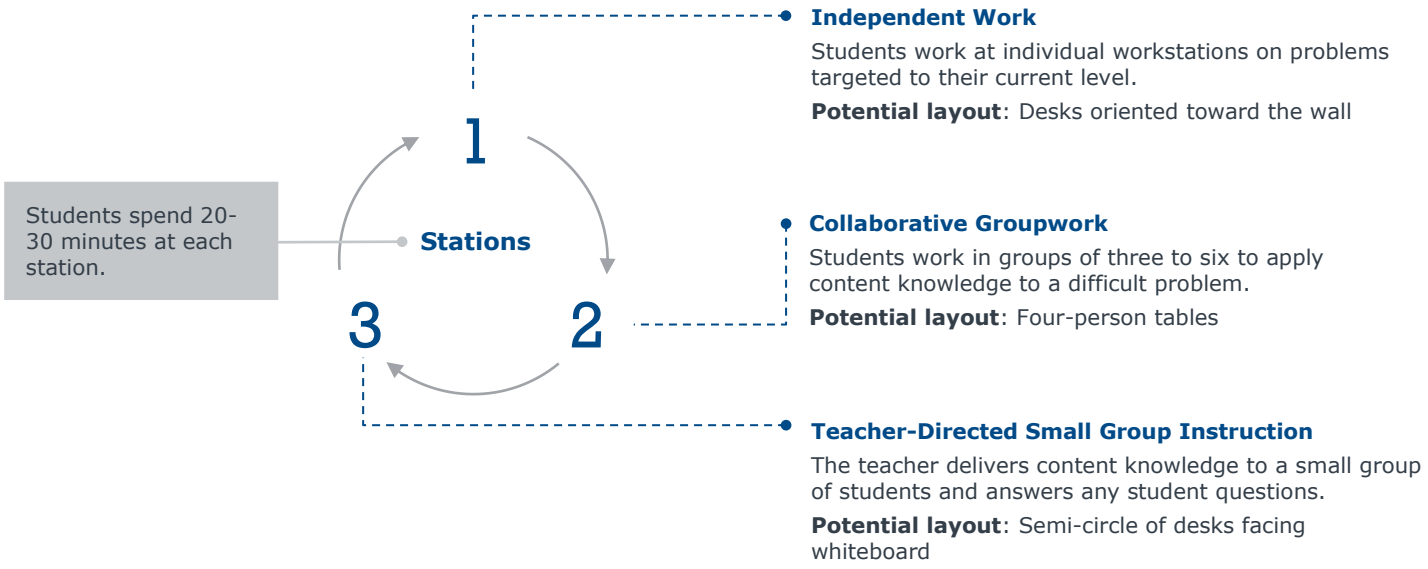


Source: Modified from Steelcase Education, "K-12 Blueprint: Thought Starters," *Steelcase*, accessed July 30, 2019.
https://www.k12blueprint.com/sites/default/files/K-12%20Blueprint%20Thought%20Starters.pdf

To Ensure Personalized, Student-Centered Instruction, Consider a Station-Rotation Classroom Model

At **District B** and **District D**, administrators encourage teachers to develop multiple stations within the classroom that align with different learning zones/types of learning. For example, teachers at District B ask teachers to implement a three-station rotation process. In this way, all students can access multiple types of learning within the same class period.

Station Rotation Model at *District B*



At District D, teachers in grades K-12 adopt a standardized station-rotation model that incorporates blended, personalized instruction. To ensure that teachers master this model, administrators ask teachers to follow a step-by-step station implementation process. Importantly, administrators ask teachers to use furniture or layouts in each station that align with the instructional strategies in use at that station (e.g., large, round tables for teacher-led, small group instruction).

Year-Long, Station-Rotation Implementation Process at *District D*

Step 1: Blended Learning

- Teachers separate the class into two groups, one teacher-led and the other computer-led through adaptive programs.
- Teachers practice blended learning techniques and stations in a low complexity environment.

Step 2: Collaborative Work

- Teachers separate the class into three groups: one teacher-led, one computer-led, and one collaborative station.
- At the collaborative station, students work on projects in groups of two to six.

Step 3: Individualized and Creative Practice

- Teachers add two additional stations—a 21st century skills station and an independent practice station—for a total of five.
- At the 21st century skills station, students complete projects that focus on communication, critical thinking, and workplace skills (e.g., students prepare a three minute speech and share in small groups).

Teachers undergo these steps over the course of one year to ensure they have time to master necessary strategies.

Step 4: Personalized Instruction

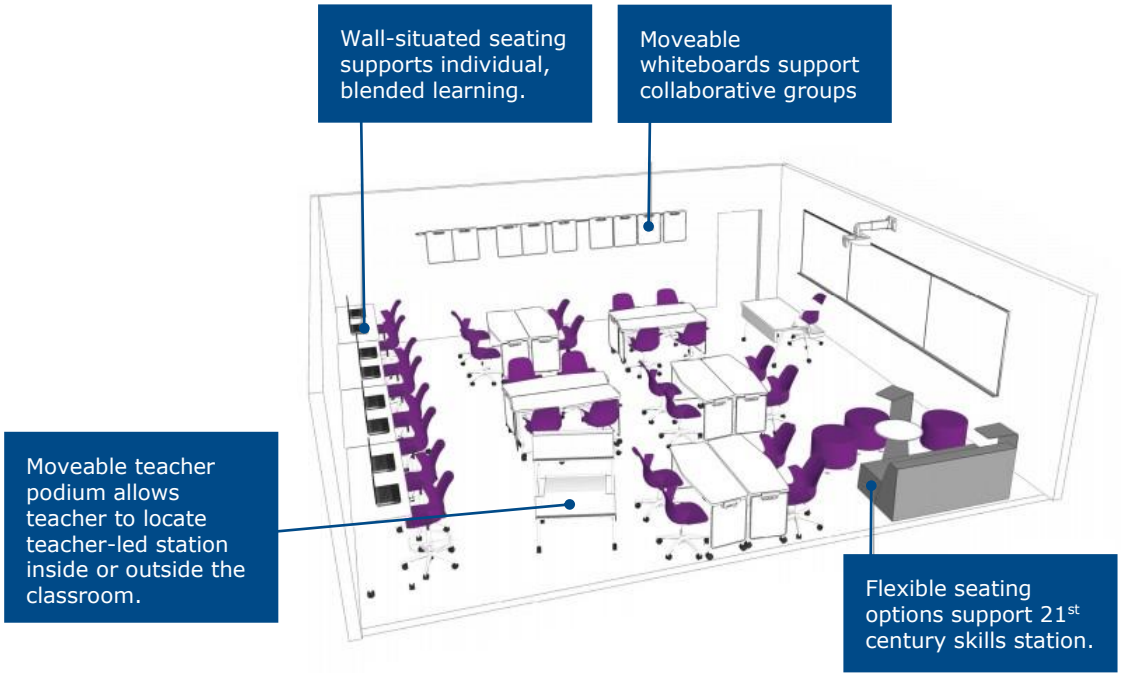
- After a year of experience with station rotations, administrators ask teachers to divide students into high/middle mastery, low/middle mastery, and low mastery.
- Teachers use a pre-assessment to identify skill-gaps and assign students to groups.
- Groups complete different tasks at each station that target their specific needs.

To encourage movement and activity throughout the class period, students spend 15 minutes per station.

Use the Hallway to Maximize Classroom Space

Contacts at **District C** report that teachers can improve station function by creating a station in the hallway (e.g., delivering small-group instruction through a projector situated in the hallway).

Sample Station-Rotation, Blended Learning Classroom



Source: Modified from "K-12 Blueprint: Thought Starters," Steelcase Education, *Steelcase*, accessed July 30, 2019.
https://www.k12blueprint.com/sites/default/files/K-12%20Blueprint%20Thought%20Starters.pdf

Implement Research-Backed Classroom Layouts to Facilitate Effective Discussions and Collaboration

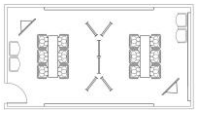
At **District C** and **District E**, administrators encourage teachers to implement research-backed learning zone layouts that promote student collaboration and personalization of learning. Contacts at District E recommend that teachers find inspiration from multiple sources, including mock-ups developed by the flexible furniture vendor Steelcase.

Administrators ask teachers to identify 20-40 core actions (e.g., problem solving) that take place in their classroom and identify elements of their layout that specifically contribute to those actions.

At District C, contacts recommend layouts based on the research of Lennie Scott Webber, a specialist in the design and planning of environments. Webber identifies layouts suited for presentation of knowledge, collaboration, communication, and critical thinking, among other tasks.[15]

Sample Research-Backed Classroom Layouts

Two separated group stations with writeable space.



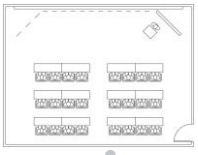
Make Decisions

- Distributed leadership
- Visible learning and materials
- Protection between groups

Circular small group setting where all students are face to face.

Communicate Knowledge

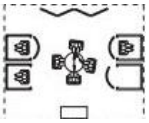
- All participants can contribute knowledge
- Informal, causal setting
- Quick exchange



Deliver/Apply Knowledge

- Changeable focus from instructor to learner

Flexible presentation space that can be rearranged into group spaces.



Create Knowledge

- Private spaces
- Spaces for groups
- Separate zones

Combination of writeable space, individual space, and group space.

Source: Laurie Scott Webber, "In Sync: Environmental Behavior Research and the Design of Learning Spaces," *Society for College and University Planning*, 2009. https://www.academia.edu/24124687/Environmental_Behavior_Research_and_the_Design_of_Learning_Spaces

Prioritize Classroom Layouts That Eliminate Barriers Between Teachers and Students

To create student-centered classrooms, administrators at **District A** and **District D** remove aspects of traditional classrooms (e.g., fixed teaching desks) that separate teachers from their students and instead rely on shared space and flexible teaching podiums.

Ask Teachers to Develop Classroom Transition Protocols

Researchers recommend that teachers develop specific classroom routines, rules, and protocols related to transitions and instructional tasks, and then ask students to practice those rules.[16] Teachers should ask students to practice transitions with flexible furniture to minimize potential disruptions.

15) Laurie Scott Webber, "In Sync: Environmental Behavior Research and the Design of Learning Spaces," *Society for College and University Planning*, 2009. https://www.academia.edu/24124687/Environmental_Behavior_Research_and_the_Design_of_Learning_Spaces
16) Todd Finley and Blake Wiggs, *Rethinking Classroom Design: Create Student-Centered Learning Spaces for 6-12th Graders* (London, England: Rowman and Littlefield, 2016).

Strategies to Foster Connection Between Teachers and Students

Shared Space	Flexible Teaching Podiums
• At **District A**, teachers create open, carpeted spaces in their classrooms so that students can choose to sit and work on the floor. • Teachers sit down on the carpet with students to participate in discussions and watch presentations. • This egalitarian, shared space fosters connections between teachers and students.	• At **District A** and **District D**, teachers use moveable, adjustable podiums and projects in place of static teacher's desks. • Teachers can thus easily deliver small-group instruction or move away from the center of the classroom, as they are not tied to a focal point.

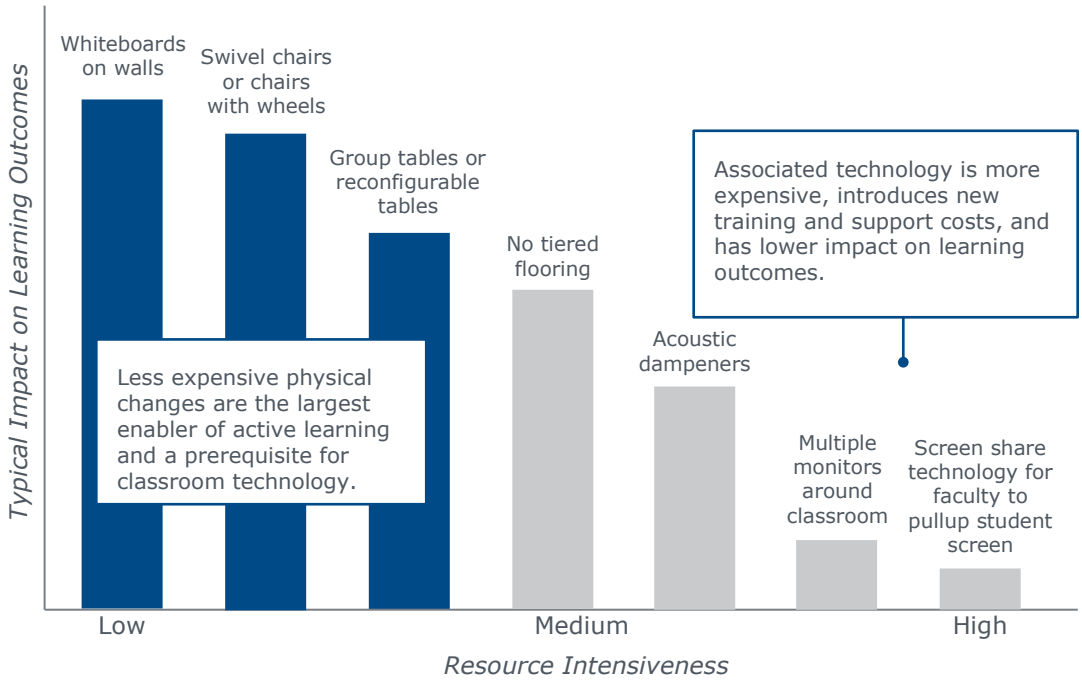
Key Components

Provide Multiple Types of Flexible, Moveable Furniture to Ease Classroom Transitions and Promote Student Choice

Contacts at all profiled districts recommend that districts purchase flexible, moveable furniture to help teachers and students quickly assemble and disassemble stations and learning zones. Though contacts at **District A** report that teachers can create effective learning zones with traditional furniture, they emphasize that moveable furniture greatly eases the transition process. Contacts at all profiled districts recommend furniture with casters or wheels. Prior EAB research on active learning spaces in higher education supports this conclusion.

For more information, see **page 12** of **Active Learning Spaces**.

Impactful Features of Higher Education Active-Learning Spaces



Source: Facilities Forum interviews and analysis, cited in Rowe Stephen, "Active Learning Spaces," *EAB Facilities Forum*, 2016 (Modified).

Characteristics of Effective Flexible Furniture

Contacts highlight miniature **Muzo** tables, which form the shape of crescent moons for modularity and fold up for easy movement.

Foldable and Modular

Contacts from **District C** note that foldable tables allow students to more easily move tables around each other to create open spaces and stations. Contacts also prioritize tables that fit together easily to form circles/groups.

Soft and Comfortable

Contacts from **District B** report that soft, comfortable furniture is particularly conducive for small group settings and discussions.

A study from Texas A&M found that student use of standing desks improves executive function and working memory.[17]

Varied

Contacts from **District E** note that when students can choose between varied seating options, it increases their agency and productivity.

Safe and Warranty-Protected

Contacts from **District C** report that because moveable furniture can sustain damage from frequent use, warranty-protected, safety-evaluated furniture is critical.

Contacts from **District C** recommend specific reliable vendors, including **Herman Miller**, **Steelcase**, and **VS**.

Use Flexible, Rolling Whiteboards to Segment Learning Zones, Foster Collaboration, and Improve Teacher Efficacy

Administrators at **District A** and **District E** purchase rolling, flexible whiteboards for student-centered classrooms. Contacts at both districts report that this additional interactive space fosters collaboration among students. If students can sketch out their ideas visibly, they can more easily converse with peers about different ways to approach problems. Contacts at District A refer to this ability as visible learning. They highlight that as students complete groupwork on flexible whiteboards, the teacher can quickly assess and resolve potential misconceptions. In addition, students can look at the work of other groups and approach them for help, which further increases collaboration and movement among students.

Contacts at **District E** also note that teachers can use flexible whiteboards to create defined segments for learning zones and stations and thus help guide students. In this setup, whiteboards help minimize sound in collaborative stations from interfering with the work of students in quiet stations. Contacts recommend that schools purchase flexible whiteboards that are approximately six feet tall and three feet wide for this purpose.

Maximize Writeable Space on Classroom Walls

Contacts at **District E** report that rather than cover walls with distracting decorations, teachers should instead prioritize whiteboards and examples of student work.

17) Ranjana K. Mehta, Ashley E. Shortz, and Mark E. Benden, "Standing Up for Learning: A Pilot Investigation on the Neurocognitive Benefits of Stand-Biased School Desks," *International Journal of Environmental Research and Public Health*, vol. 12, no. 1, (2016). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4730450/

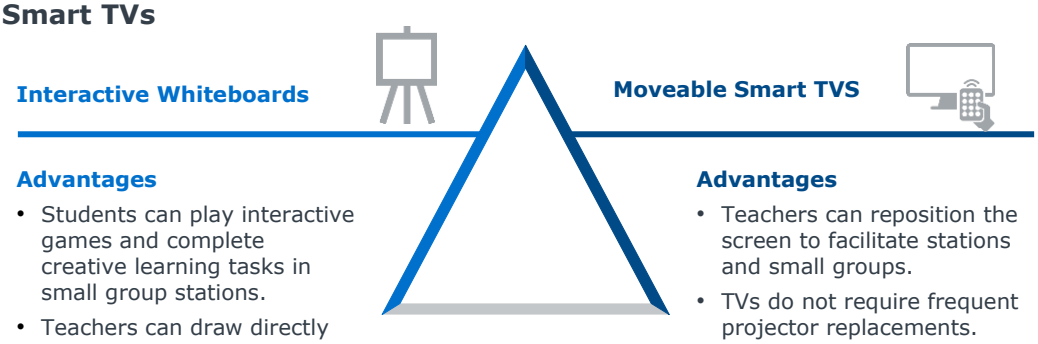
4) Classroom Technology

Presenting Content

Purchase Moveable Televisions and Projectors to Facilitate Station Rotation and Vary Student Focus

Contacts from **District E** report that even in student-centered classrooms, teachers need access to large visual displays to deliver content to both large and small groups of students. Contacts report that images and video are important to cement concepts. That said, contacts from **District C** and **District D** recommend that districts not rely on interactive whiteboards and fixed teaching walls, as they limit teacher flexibility and thus encourage teacher-centric instruction. Instead, administrators purchase moveable projectors and smart televisions on carts that allow teachers to create stations, facilitate small-group presentations, and vary the center of student attention.

Advantages and Disadvantages of Interactive Whiteboards and Smart TVs



Interactive Whiteboards

Advantages

- Students can play interactive games and complete creative learning tasks in small group stations.
- Teachers can draw directly on digital content.
- Interactivity engages primary students.

Disadvantages

- Fixed to one location in the classroom.
- Teachers often do not take advantage of interactive features.
- Expensive and requires frequent projector replacements.

Moveable Smart TVS

Advantages

- Teachers can reposition the screen to facilitate stations and small groups.
- TVs do not require frequent projector replacements.
- Teachers and students can wirelessly connect to TVs to share work through casting technology.

Disadvantages

- Students and teachers cannot directly interact with TVs but must connect their own devices.
- Buying large televisions for larger classes is expensive.

Contacts at **District E** report that primary students use interactive whiteboards much more often than secondary students.

Contacts at **District D** report that teachers often use interactive whiteboards as glorified whiteboards. Contacts report that interactive whiteboards are becoming outdated and no longer featured at educational technology conferences.

For this reason, contacts at **District C** also purchase moveable projectors.

To Maximize the Effectiveness of Existing Interactive Whiteboards, Use Them in Small Group Instruction

Contacts at **District D** report that when teachers take advantage of interactive whiteboards, they typically call one student to the board at a time. Contacts recommend that instead, teachers should encourage students to interact with the boards in small groups through a station-rotation model. At **District B**, students work in groups of four to complete a drag-and-drop matching activity with interactive whiteboards.

Provide Access to 1:1 Devices to Allow Students to Access and Edit Content During and After Presentations

For a comprehensive guide to 1:1 implementation, see EAB's report **1:1 Computing Programs**.

Contacts at most profiled districts report that administrators underwent or are currently undergoing 1:1 implementation to provide laptops and/or tablets to students. At **District B**, administrators also created a bring-your-own device policy that allows students to use their phones, tablets, and laptops for instructional purposes. Contacts at District B report that 1:1 devices allow students to follow along during teacher presentations on their device even if not in a good position to see the screen. At **District A**, administrators purchased digital pens that allow students to take notes on their screen during presentations to facilitate effective 1:1 device use during presentations.

Contacts at **District E** highlight multiple casting technology vendors, including **AppleTV**, **Chromecast**, and **ScreenBeam**.

Students can also use 1:1 devices to participate more effectively in classroom presentations. At District A and District E, teachers use TVs and projectors with casting technology (i.e., technology that allows teachers and students to easily share content on their device's screen for the entire class to view). During presentations, teachers can use this technology to quickly showcase student work, understand and respond to student questions, and even conduct classroom polls.

Recommendations to Increase the Effectiveness of 1:1 Devices

Allow Students to Keep Devices After School and During Breaks

Contacts at **District E** report that 24-hour access to 1:1 devices permits students to explore classroom content and their own interests outside of the classroom. At **District B**, administrators allow students to keep devices on breaks so that they can continue to access coursework.

Use 1:1 Devices to Support Implementation of Blended Learning

At **District D**, students use 1:1 devices to complete adaptive, personalized assignments and learn content at blended learning stations. Administrators purchase digital curricula designed specifically for this purpose. At **District E**, some teachers ask students to review five-to-seven minutes of content online at home prior to lessons for application the next day.

Pair 1:1 Devices with LMSs to Assign and Collect Student Work More Efficiently and Improve Collaboration

For more information on how to use LMSs to improve instruction, see EAB's report **LMS Selection and Implementation**.

At **District A**, contacts emphasize the importance of their learning management system (LMS), Schoology, in the effectiveness of their 1:1 program. Contacts at **District B** note that 1:1 devices allow students to upload work to Google Classroom, which eases work collection and grading and allows students and teachers to collaborate and deliver feedback.

Train Teachers on Effective Classroom Management Strategies Regarding 1:1 Devices

At **District E**, contacts report that cellphones and technology can distract students. Contacts recommend that teachers clearly differentiate between technology-based activities and technology-free activities and ask students to put away technology when it is not necessary for instruction.

Use Technology Resources to Promote Student Choice in How to Understand Content and Demonstrate Mastery

At **District E**, contacts report that in student-centered classrooms, teachers should provide students with choice in three areas: what they learn, how they learn, and how they showcase their learning. Contacts note that well-designed classrooms and well-selected technology resources allow teachers to effectively provide these choices to students.

To provide students with choice, administrators at **District B** and **District D** purchase digital programs to present content to students. At District D, administrators prioritize adaptive and interactive programs that support personalized instruction. Using these programs, teachers ensure that students access content targeted at their specific level and aligned with district standards. Contacts report that these adaptive programs encourage teachers to deliver student-centered instruction more than traditional textbooks. Administrators aim to purchase one program per grade-level, per subject area. Example programs include **i-Ready**, **STMath**, **Aplusmath**, and **Gizmos**. At **District B**, teachers also allow students to choose their own sources for learning, including YouTube videos.

Contacts at District E report that to provide students with choice in how they demonstrate mastery, administrators should also select technology that supports creative projects. For example, students can use 1:1 tablets and laptops to create digital advertisements and publish articles online. At District D, administrators purchase specific technology resources to facilitate creativity, including film cameras, portable green screens, and video-editing/creative applications (e.g., **WeVideo**, **Pear Deck**). At District B, teachers help students create their own podcasts.

Teachers at **District B** differentiate opportunities for student choice based on student grade-level. Primary students often cannot handle the responsibility of project management. Thus, rather than allow primary students to develop their own projects, teachers provide primary students with lists of "can do" tasks that they can choose from once they have completed their mandatory work.

To help prepare students to take control of their own learning, teachers at District B develop formal support structures:

Project-Based Learning Support Structures for Secondary Students at *District B*

1 Early-Stage Projects

- Teachers provide students with a guided choice between two projects only.
- Teachers develop clear, detailed rubrics and preset deadlines for each project component.

2 Advanced Projects

- Students have greater flexibility over the types of projects they complete to demonstrate mastery.
- Teachers adapt rubrics and checkpoints to student projects when possible.

Both

- Students work collaboratively to complete projects.
- Teachers set clear deadlines and track student progress in Excel.
- Teachers do not allow students to complete similar projects twice in a row.
- Teachers provide intensive support to students who fall behind deadlines.

Sample Projects


Community Interviews


Music Videos


Scripted Movies

Consider Virtual Reality Headsets to Allow Teachers to Create Immersive, Authentic Experiences

Contacts from **District D** report that teachers can engage students by providing authentic, unexpected experiences. Contacts cite virtual reality as an effective way to deliver these experiences. At **District A**, **District B**, and District D, teachers can access virtual and—at District D—augmented reality headsets.

At these profiled districts, teachers use virtual reality headsets to take students on virtual field trips. Students can visit national and international historical sites, explore museums, and even view natural environments like the Great Barrier Reef. For example, students at District A use virtual reality headsets to visit Egypt and Greece in social studies classes. At District D, teachers can request instructional-coach support to design effective virtual reality lessons.

5) Testing and Implementation

Purchasing

Create Concrete Protocols to Ensure Technology and Furniture Purchases Align with District Strategic Plans

Both **District B** and **District D** developed standardized processes to evaluate technology and/or furniture that incorporate student and teacher feedback, pilot testing, and request for proposal/demo processes. District B uses a consistent process for furniture and technology purchases, and District D developed a specific protocol to approve adaptive technology programs for blended learning.

Contacts from District D emphasize that at the core of their evaluation, they determine whether a technology product aligns with their five- to ten-year district technology and strategic plans. In this way, the district can ensure that new technology purchases will remain relevant to their district in the future, even as the district purchases new, more advanced technology. To ensure that purchases align with district and teacher needs, administrators at both districts also incorporate teacher and school administrator feedback into the process.

Technology/Furniture Purchase Process at *District B*

For more information about vendor requests for proposals, you can consult EAB's **Comprehensive Vendor RFI Toolkit**.

1. **Vendor Request for Proposals Process**
   Administrators ask multiple vendors to submit proposals through the district's request for proposal process. This process allows administrators to compare multiple products and ensure vendors provide all necessary information.
2. **Curriculum Alignment Assessment**
   Instructional coaches and curriculum content-area supervisors collaborate with teachers to assess if potential products align with the district's core curriculum, technology plan, and privacy requirements.
3. **Pilot Program**
   If a product meets requirements, administrators run a pilot program that incorporates teachers from multiple schools and grade levels. Administrators collect feedback through onsite visits and district-level meetings with representatives from each school.

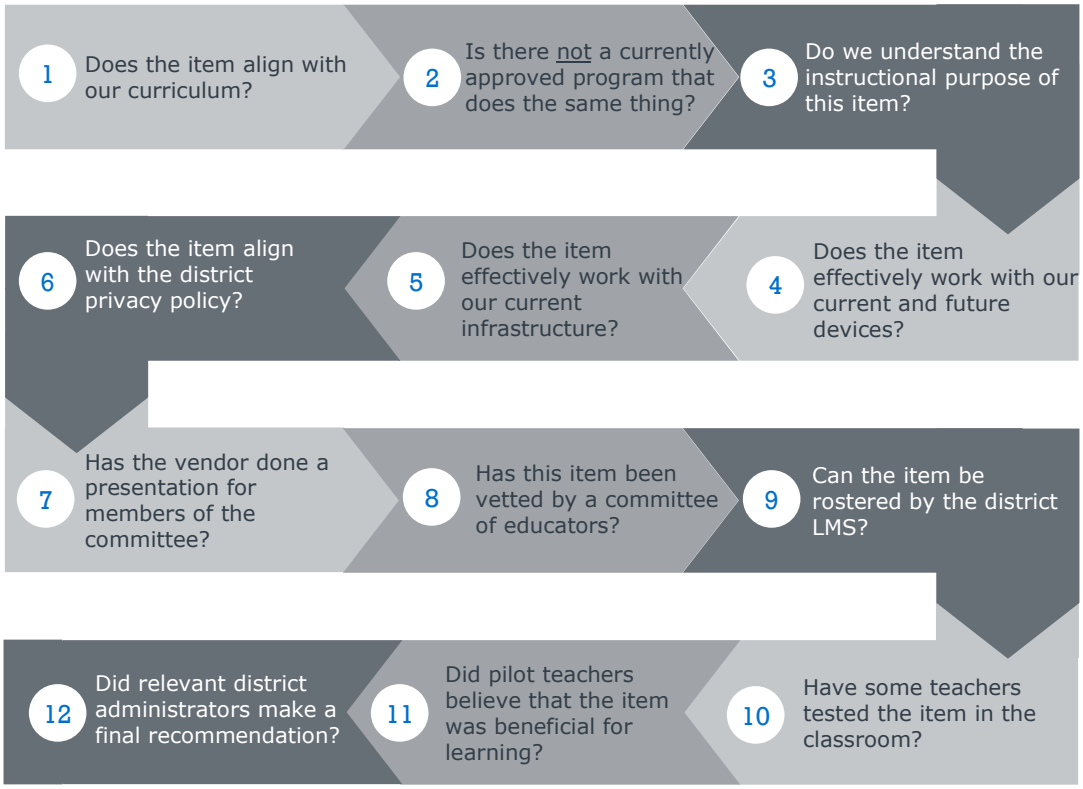
> If we're bringing in a new software program, we [our instructional coaches and content-area supervisors] look at our Tier 1 curriculum for that content area and ask, "how does this program help us close the gap so that more students are successful?"
>
> Administrator at profiled district

Ask Experienced Teachers to Test New Technology Resources to Improve Evaluations

At **District B**, teachers can apply for recognition (i.e., membership in an honor society) based on their ability to integrate technology and student-centered pedagogy. Administrators ask these teachers to test new digital programs because of their experience with technology.

At District D, administrators designed an explicit, checklist-based process for all new curriculum-focused software. New products must meet all criteria established by the checklist. Evaluators also must fill out detailed rubrics and questionnaires, including an EdTech Software and Application Rubric and a Digital Content Questionnaire.

New Digital Content Checklist at *District D*[18]



Purchase Technology on Short Contracts to Increase Ability to Upgrade as Technology Advances

Because technology advances quickly, contacts at **District E** recommend that rather than purchase technology on a ten-year purchasing cycle, districts design technology budgets to accommodate two, five-year purchasing cycles. In this way, administrators can preserve budgetary flexibility to respond to changes in the educational technology landscape. At **District D**, administrators limit their contracts for digital content to one year. If new, better, or more affordable digital content emerges, the district can quickly pivot to this new content without breaking contracts with existing vendors.

Use Surveys to Assess Technology Pilot Programs

At **District D**, administrators use surveys to assess technology and classroom design implementation, including the **Lead and Transform Tool** from ISTE, teacher-specific technology surveys, and an internal student technology survey based on ISTE standards.

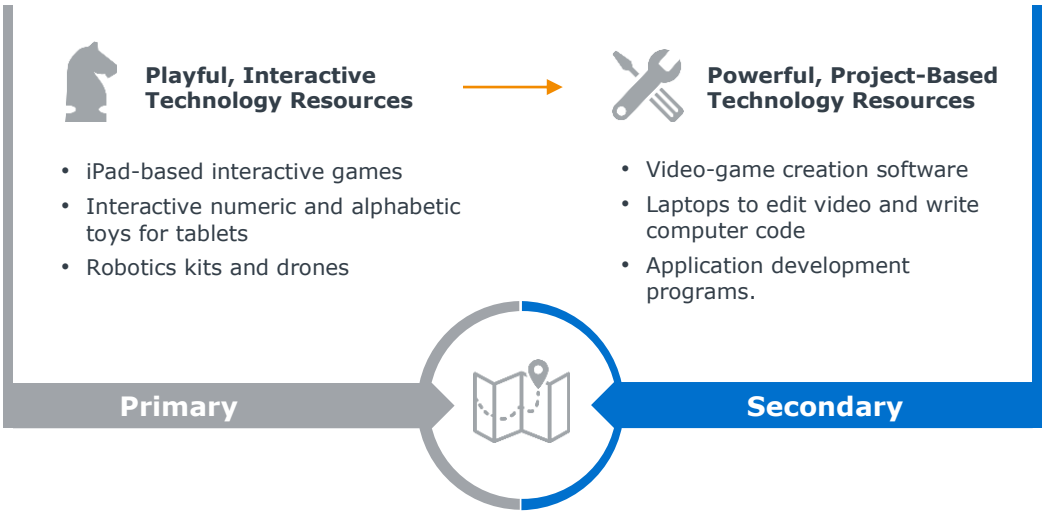
18)"Digital Content Evaluation and Selection Process," *District D*, provided June 28, 2019.

In Technology Purchases, Account for Capability Differences Among Primary and Secondary Students

At **District D**, administrators purchase different technology resources for primary and secondary grade levels based on student interests and abilities. In primary school, administrators provide resources that students can manipulate and use in games, puzzles, and other playful activities. Contacts at District D and **District E** report that primary students rely on interactive resources and content more than secondary students.

For secondary students, administrators at District D focus on tools and software that allow students to apply concepts creatively to solve problems and develop products.

Primary and Secondary Technology Resources at *District D*



Allow Content-Area Teachers to Select Resources That Align with Needs of Their Subject

At **District E**, contacts report that classroom design and necessary technology resources can vary greatly from content area to content area, particularly among unrelated subjects (e.g., science versus English). Rather than rely on recommendations from vendors, contacts recommend that administrators hold group meetings of content area instructors to identify the core instructional needs of each content area and select furniture and technology resources accordingly. Contacts also suggest that administrators survey teachers to collect recommendations from all stakeholders associated with each content area. Administrators at **District A** and **District C** also allow content-area teachers to provide feedback on necessary furniture and resources.

At District A and District C, administrators created a catalog of approved furniture options from which teachers can select their own furniture. District A's catalog includes estimated costs, dimensions, and colors for various furniture items. Teachers with access to classroom redesign budgets can select furniture items that most align with the needs of their students and content area. Contacts report that teachers specialize their classrooms based on their content area. For example, English teachers select moveable sofas to support an English-specific pedagogical technique that requires comfortable, individual workspaces. At **District D**, contacts also purchase specific technology resources designed to facilitate learning in each content area.

Content-Area Aligned Resources at *District D*

Science

Administrators purchase probeware that students can connect to 1:1 devices and use to conduct science experiments.

Social Studies

Administrators encourage teachers to use virtual reality headsets to provide field trips to museums and historical sights.

English

Administrators purchase an extensive library of e-books to enable students to access reading material.

Art

Administrators provide iPad Pros and digital pencils to allow students to create digital artworks.

Funding

Use District, Grant, State, and Parent Organization Funding to Support Classroom Redesign Efforts

Profiled districts rely on a combination of grant funds, district general funds, parent organization support, and fundraising to support classroom redesign efforts, with most from district and state funds.

Sources of Funding at Profiled Districts

1

District General Funds

Teachers at **District C** apply for classroom redesign funding through a dedicated program, which the district funds through general funds assigned to innovation funding. Similarly, **District B** funds hardware and furniture purchases through district general funds. Lastly, **District D** uses media center funds and leftover departmental funding to redesign classrooms.

2

State Funds

Both District B and District D received state grants related to redesign efforts. Specifically, District B received state funding to renovate school buildings.

3

Grant and Philanthropic Funding

District B secured grants to support professional learning for teachers and also partnered with the Nellie Mae Education Foundation. In addition, District C secured funding from the district philanthropic foundation and from the district parent-teacher association. Districts source philanthropic funding from a variety of sources—District D also received grants from companies such as Steelcase.

Consider Using Donated Furniture in Classrooms

Administrators at **District C** sourced flexible furniture for a pilot program through a donation from a local furniture store. The store owner's children attend school in the district.

Test Classroom Redesign Implementation with Pilot Programs to Assess Effectiveness and Ease Full Implementation

At **District C**, administrators hired external designers to recommend effective classroom layouts after interviewing pilot program teachers.

Administrators at **District A**, **District C**, **District D**, and **District E** use pilot programs to test the effectiveness of furniture, technology products, and classroom layouts. Contacts also leverage pilot programs to train participating teachers in classroom design best practices, explore research related to learning spaces, and assess the impact of design on teacher and student efficacy. Specifically, contacts at District E ask pilot program teachers to iterate potential classroom designs until they identify the most effective solutions. Pilot program lengths range from a few weeks at District D (for technology programs) to a year at District C.

Pilot Program Structures at Profiled Districts

Application-Based

At **District A** and **District D**, interested teachers apply to join pilot programs. Administrators require teachers to undergo professional development, conduct research, and develop clear plans for how they will use the space as part of the application process.

Grade-Level/School Specific

At **District C** and **District E**, administrators piloted new classroom design within a specific grade-level. At District C, administrators launched an initial pilot with all fifth-grade students, while administrators at District E piloted classroom redesign in six ninth-grade classrooms. In these pilot programs, teaches can easily collaborate with their peers.

Use Student Surveys and Classroom Observation to Assess Pilot Programs

At **District C**, administrators pre-surveyed all fifth-grade students to diagnose problems with classroom design. Administrators also observed students for one month to assess how students use and do not use current classroom furniture. After redesigning classrooms to address diagnosed needs, administrators used post-surveys and interviews to assess the impact of the changes.

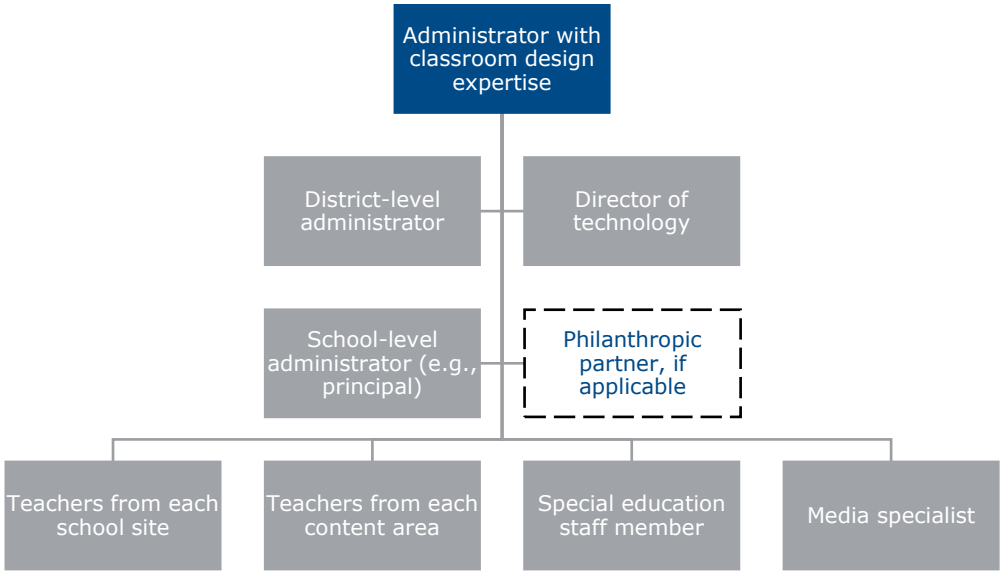
Create Design Teams of Teachers and Administrators to Coordinate the Classroom Redesign Process

At **District C** and **District E** and, administrators created collaborative teams of teachers and administrators responsible for identifying tenets of effective classroom design, designing and selecting teachers for pilot programs, and evaluating district-wide classroom redesign efforts. At District E, administrators created a design team prior to piloting classroom redesign. Teachers affiliated with the design team tested research-backed layouts provided by the lead administrator, collected feedback, and adjusted layouts before a formal pilot in the district's ninth-grade center.

At District C, district administrators created an advisory board to coordinate pilot program expansion. Advisory board members designed a comprehensive application process for teachers who wished to redesign their classrooms and continue to conduct

yearly surveys and interviews with participating teachers. The design team at District E meets as needed, while District C's advisory board meets quarterly.

Sample Design Team Membership Structure



Develop Application-Based Funding Distribution Models to Incentivize Teachers to Conduct Research and Participate in Training

At **District A**, **District C**, and **District D**, administrators ask teachers to submit applications that clearly outline how they will use redesign funds to create student-centered instruction in their classrooms. Through these applications, administrators can target limited funds to those teachers that will use them most effectively. By completing each step, teachers prove to administrators that they have thought carefully about how classroom design impacts learning and pedagogy. Administrators also use applications to ensure teachers complete thorough preparatory work, including attending trainings, interviewing stakeholders, and researching design.

For example, at District D, teachers must read the book **The Space** and answer a series of questions related to classroom redesign. Similarly, at District A, teachers selected by application must attend a three-day, immersive summer training about how to adjust pedagogy to align with advanced learning spaces.

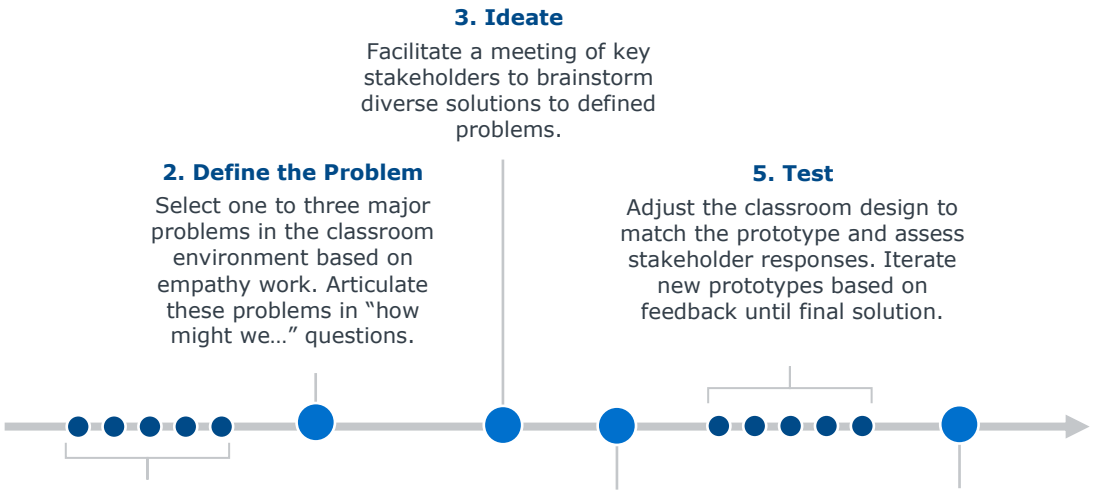
Contacts at District A report that this training is even more important than providing new furniture. If teachers do not receive guidance on how to adapt pedagogy to the spaces, students will not receive the benefits. Teachers create to-scale paper cutouts of their classrooms, receive instruction on learning zones, and then redesign their classrooms to incorporate zones. Teachers also learn pedagogical strategies taken from Harvard's **Visible Thinking** project designed to introduce, synthesize, and explore concepts.

Human-Centered Application Process at *District C*[19]

Necessary Tasks

1. Teachers must complete each step of the empathy-based **human-centered design process.**
2. Teachers must attend a **classroom redesign professional development** session, either with a district cohort, school cohort, or one-on-one meeting with an experienced administrator.
3. Teachers must identify the **impact and scope** of their redesign effort, including anticipated start and end dates, number of students impacted, and grant funds requested/earned from outside sources.
4. Teachers must participate in the **evaluation** portion of the initiative, including a pre- and post-initiative survey.

Human-Centered Design Process



1. Empathize
Identify problems of key stakeholders through multiple student surveys; student interviews; parent, paraprofessional, and instructional coach feedback; and classroom observations.

2. Define the Problem
Select one to three major problems in the classroom environment based on empathy work. Articulate these problems in "how might we…" questions.

3. Ideate
Facilitate a meeting of key stakeholders to brainstorm diverse solutions to defined problems.

4. Prototype
Select top ideas from ideation and develop a prototype through scale drawings, models, and furniture rearrangement.

5. Test
Adjust the classroom design to match the prototype and assess stakeholder responses. Iterate new prototypes based on feedback until final solution.

6. Identify Solution
Create a final plan with furniture, lighting, paint, and resources. Select items from the district's menu of approved options. Highlight any low or no-cost changes.

Contacts at **District E** highlight research that suggests that when teachers provide students with choice, student engagement and achievement increases. Through the "empathize" process, teachers can identify student learning space and seating preferences and provide varied options so that students can choose what works best for them.

Develop Implementation Timelines That Incorporate Checkpoints for Teacher Reflection and Adjustment

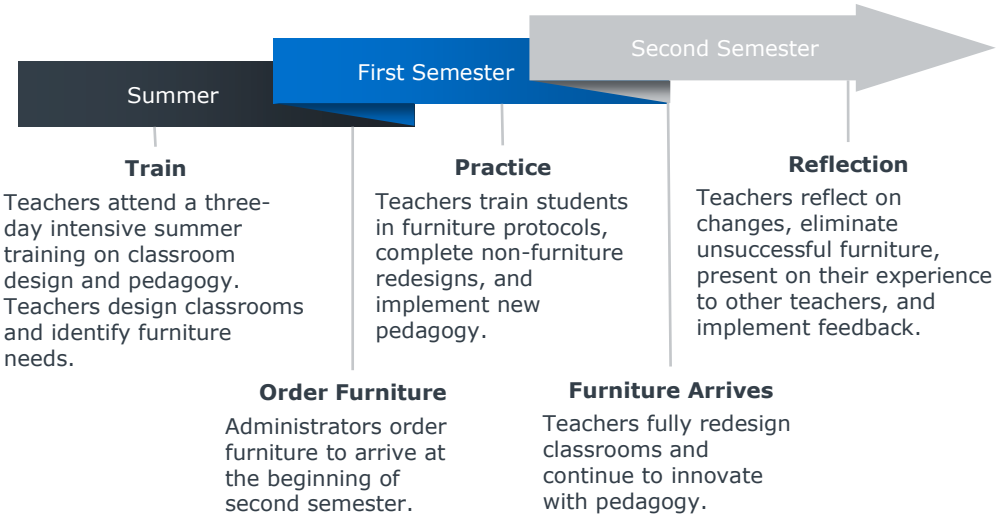
At **District A**, administrators implement classroom redesign processes on a year-long timeline so that teachers have time to master pedagogical changes and flexible furniture protocols. In this timeline, teachers must spend one semester preparing students for the new design before any new materials or furniture arrives. During this time, administrators schedule regular meetings with teachers to assess their progress and address any difficulties they may face. At the end of the process, administrators

19) "Classroom Design Grant Application," District C, provided July 18, 2019.

ask teachers to reflect on the effectiveness of their new space and make changes as necessary.

Classroom Redesign Implementation Timeline at *District A*

During this process, administrators at **District A** schedule regular meetings with participating teachers. Administrators also encourage teachers to participate in district online forums.



Encourage Teachers to Maintain Online Blogs to Increase Collaboration and Assess Redesign Efforts

At **District A**, administrators created an online forum where teachers can post pictures of their classrooms, crowdsource solutions to common problems, and share pedagogical and design insights. To encourage teachers to participate, administrators post questions in the forum related to district priorities. District administrators also use the forum to collect value stories and evidence of impact.

Teacher Training

Offer Tiered, Differentiated Professional Development That Reflects Desired Student-Centered Strategies

Contacts at most profiled districts report that teacher training is critical to ensure that classroom redesign efforts meaningfully impact pedagogy, school culture, and student achievement. For example, contacts at **District A** describe a speech from an administrator at Harvard School of Education, in which the administrator described a classroom redesign effort within the school. This administrator purchased brand new, flexible, rolling furniture for all classrooms, but during a classroom walkthrough, they found that each professor had organized their new furniture into traditional rows. Contacts report that teachers and students both need training to create and participate in collaborative, student-centered learning spaces.

> It comes down to instructional design. Sometimes we get caught in the trap of, hey, let's modernize what the space looks like and add flexibility and furniture, but ultimately we haven't changed the idea that our job might be to talk half the time that we normally do … if professional development and classroom redesign aren't in sync, you're not doing it right.
>
> Administrator at profiled district

At **District B**, administrators provided tiered professional learning to help teachers integrate 1:1 technology into classrooms. Administrators intentionally structure sessions to reflect the differentiated instructional practices they encourage teachers to adopt with their students. In these sessions, teachers indicate their level of mastery over classroom technology as beginner, intermediate, or advanced. Based on their level of mastery, teachers attend separate sessions that cover the same content, but differ in their pace and intensity. For example, beginner teachers may learn two digital assessment tools, whereas advanced teachers may learn five to seven tools in the same amount of time. Contacts report that initial sessions were highly successful and planned an upcoming professional development day with the same structure.

Use Instructional Coaches to Provide One-on-One Instruction in Student-Centered Classroom Pedagogy

Though district-wide or school-wide professional development sessions can disseminate information to multiple teachers efficiently, teachers often lack the time to follow through on professional development topics. To encourage implementation of student-centered pedagogical strategies after sessions, administrators at **District B** used grant funding to establish four student-centered coaches in each district high school. Administrators also asked the district's technology integration coaches to support teachers as they adjust their pedagogy.

Administrators and coaches create concrete pedagogical guides that teachers can refer to, including a document that highlights the main components of student-centered instruction.

Pedagogy	Technology
Student-Centered Coaches	**Technology Integration Coaches**
• District teachers that teach two periods a day and coach three periods per day. • Specialized by content area. • Assist with student-centered lesson plan development, observe lessons, and host post-observation check-ins and feedback sessions.	• Technology staff that support teachers full-time. • Assist with lesson development, support teachers during lessons, and provide technology support. • Share expertise related to specific resources (e.g., podcasts, virtual reality) so that teachers can support students.

- Coaching is non-evaluative to encourage participation and focuses on strengthening skills.
- Teachers sign up for appointments to meet with coaches.
- Teachers can request unlimited time with coaches if they desire.
- Coaches track district-wide participation in spreadsheets.
- Coaches reach out to department heads with poor participation to identify teachers that may need support.

Contacts at District B report that student-centered and instructional coaching greatly shifted teaching culture in the district toward student-centered instruction. Initially, the district used grant and district funding to fund four student-centered coaches in each high school and three technology integration coaches for the district. As teachers gained experience and grant funding expired, administrators reduced coaching staff to two student-centered coaches per high school and one technology integration coach for the district.

Ask Innovative, Dedicated Teachers to Lead Trainings for More Inexperienced Teachers

Funding full-time-equivalent positions for instructional coaching can be prohibitive for many districts. To help increase access to coaching, administrators at **District B** and **District D** ask experienced teachers to train their peers. For example, at District D, administrators host a yearly conference on a dedicated teacher professional development day. Administrators book a keynote speaker with experience in instructional technology or design, but district teachers lead between 100 and 120 breakout sessions for their peers in the district.

At District B, administrators identify innovative teachers via an application-based teacher recognition system. Teachers submit an application that proves they meet each of the 11 criteria for the program, including seeking ongoing professional development, implementing multiple grouping strategies, creating flexible classroom arrangements, and using technology to promote student choice, collaboration, and differentiated instruction.[20] Successful teachers receive a plaque recognizing their achievement outside their door, specific acknowledgement at the beginning and end-of-year assemblies, conference access, and priority access to flexible furniture and technology resources. In exchange, administrators ask selected teachers to use prep periods and substitute coverage to train other teachers.

20) "Teacher Recognition Initiative Criteria," District B, accessed August 9, 2019.

6) Research Methodology

Project Challenge

Leadership at a member district approached the Forum with the following questions.

1. What technology resources do contact districts incorporate in classrooms?
    a. What technology do teachers at contact districts use to present content to students?
    b. Do classrooms at contacts districts incorporate teaching walls with singular displays?
    c. Why did contact districts select specific technology resources?
2. How do contact districts select technology that will remain useful and relevant in future years?
3. How do teachers at contact districts use technology resources to promote student engagement and learning?
4. How do contact districts arrange classrooms to promote student learning, engagement, and creativity?
    a. How do contact districts arrange classrooms to encourage teachers to deliver personalized, student-centered instruction?
    b. How do contact districts arrange classrooms to promote student collaboration?
5. How do contact districts test effective technology resources and classroom layouts pre-implementation?
6. How do contact districts fund classroom technology upgrades and classroom re-designs?
7. How do contact districts differentiate technology resources and classroom layouts across content areas?
8. How are secondary classroom layouts and technology resources different from primary classroom layouts and technology resources at contact districts?
9. How do contact districts train teachers to adjust their pedagogy to new technology resources and classroom layouts?

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Research Parameters

The Forum interviewed administrators at districts that recently underwent student-centered classroom redesign initiatives. The Forum prioritized districts recognized for their successful redesign initiatives/technology integration efforts.

A Guide to Programs/Districts Profiled in this Report

District	Location	Approximate Enrollment
District A	Northeast	3,500
District B	Northeast	8,000
District C	Midwest	10,500
District D	Midwest	10,000
District E	Midwest	3,000