# Why are we still using 19th century furniture in 21st century learning?

**Problem Proposal**

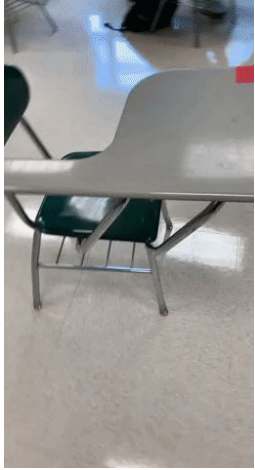By 3 students

11/10/21

# Table of Contents

# Potential problems?

We first came up this this list of general problems, and decided to expand more on the comfort of chairs in school, which is what brought us to the idea of school desks and their comfort.
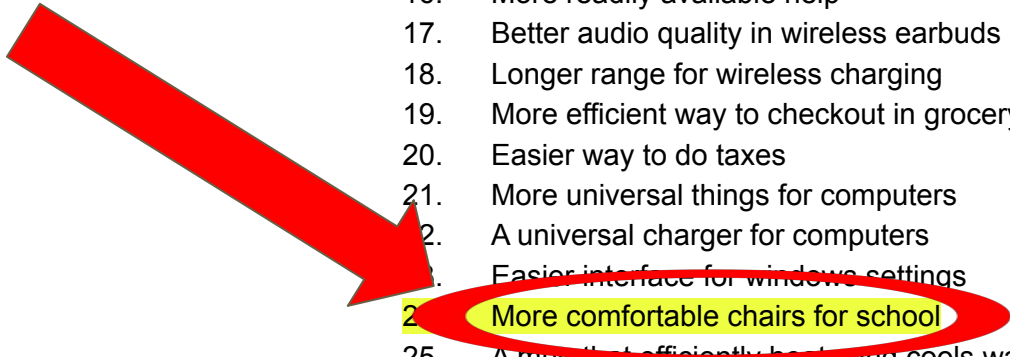
1. Need better public security
2. Safer equipment for lab
3. Bigger notebooks
4. Faster computer charger
5. Faster phone charger
6. Better wireless charging technology
7. Better bluetooth connection
8. Better streaming services
9. Faster internet connection
10. Less fragile engineering notebook
11. Smaller AP textbooks
12. More efficient cooling systems for PCs
13. Better designed cases for PC
14. The Chip shortage
15. Bad drivers
16. More readily available help
17. Better audio quality in wireless earbuds
18. Longer range for wireless charging
19. More efficient way to checkout in grocery stores
20. Easier way to do taxes
21. More universal things for computers
22. A universal charger for computers
23. Easier interface for windows settings
24. More comfortable chairs for school
25. A mug that efficiently heats and cools water/goods

# Narrowed Down Problem Statements

All three of us took a try at making a proposed problem statement on this topic:

## Ian Khoo 28d

### School furniture is bad - Ian Khoo

edtechmagazine.com

**More Than 50 Percent of Teachers Report 1:1 Computing**

Since laptops started being the norm for learning in the in the classrooms in the 1990s, it is shown that there is not enough space on the desk to accommodate for all the schoolwork and a laptop at the same time. According to a study, "In February 2017 edtechmagazine reported more than 50% of teachers reported using 1:1 computing" So furniture needs to evolve to compensate for newer 21st century educational ideas by being able to hold more, specifically a laptop, while having more space for papers and textbooks.

## Carter Pomponio 2h

### Problem Statement

12-15 year olds in 2013 were getting physically hurt by desks -- " almost two thirds (~60%) of the students studied suffered from back pain and that large differences between desk height and elbow height was associated with a greater likelihood of the adolescents having this problem." (Science Daily)-- but also they are not learning as well because of the pain --"the current available evidence points indirectly to a stronger association of low education with longer duration and/or higher recurrence of back pain than to an association with onset" (PMC Labs)--.

-Carter

## Anonymous 1mo

### Problem Statement -Pedro

Awkward?    Seat too hard?

Enough space?

Students and teachers working in the class room have trouble with staying organized between specific teacher and student needs based on the type of class room (English vs Science vs Math ect). Modern desks are the same as desks from hundreds of years ago. We need ne desks that can accommodate the needs for each specific class room type.

https://www.edutopia.org/comfortable-truth

# Why are we still using 19th century furniture in 21st century learning?

Since laptops started being the norm for learning in the in the classrooms All thein the 1990s, it is shown that **there is not enough space on the desk** to accommodate for all the schoolwork and a laptop at the same time. This causes the desks to be overcrowded with items that are not efficiently organized and utilized. Some examples of these desks are the Desk+Chair combo and the "newer" separated desk and chair. We have been using these desks since the 1880s, when the first school desk was first invented (SchoolFurnishings), however it simply cannot keep up with the modern learning environment.


Example of a Desk+Chair


Example of a "Newer" separated desk

# Why is this a problem?

Students and teachers in the educational environment recognize the problem that school desks do not effectively support students. **School desks are not designed for the modern learning environment** that incorporates more materials and new technology into the classroom. This is a prominent problem for many school systems; "as of 2017, 50% of teachers have reported using a 1:1 laptop to student program"(Edtech), officially outdating current school furniture.
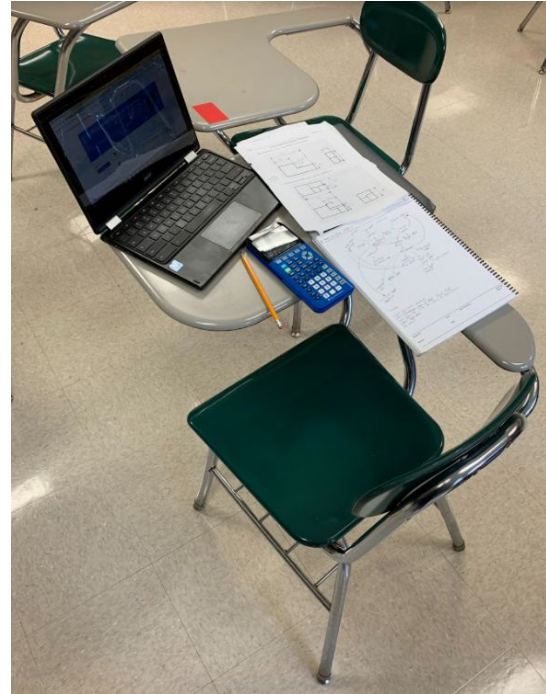
# Who does this problem effect?

This problem not only affects students but also teachers as well. The student's ability to learn is harrowed by the cramped and uncomfortable space. Edutopia says, "A considerable body of research about environmental design shows the positive effect comfort can have on learning, human productivity, and creativity" They are forced to juggle between different papers, books and technology on their desk ruining their learning experience. This directly affects the teacher's ability to teach as each student is having a harder time paying attention.

# Past and Current solutions? Standing Desk

A current solution to our problem is the adjustable desk (Patent, US 9232855B2)

UPLIFT Standing desk (V1 and V2) is a commercial product on the market that is a current solution.

The Company is UPLIFT Desks, who make high quality adjustable desks for companies and schools. They can be reached at 800-349-3839, info@upliftdesk.com, 2139 W anderson Ln,Austin, TX, 78757

This product is highly rate, 5 Stars - 10,576 reviews

https://www.upliftdesk.com/uplift-v2-standing-desk-v2-or-v2-commercial/

# Past and Current solutions? Cont.

Uplift Specs and Features

- "strength and durability"
- 48 accessory mounting system,
- 3 stage legs,
- 33% more height than 2 stage legs,
- 1 touch desk adjustment,
- 15 year warranty,
- can be assembled in ~15 mins,
- Fits most people 5'4"-6'10"
- Cost: $599

What we hope to incorporate into our design.

- Strength and durability ~ 20 years life
- Quick Assembly
- Fits a large range of people / Adjustable
- Reduced cost for accessibility

# Past and Current solutions? Seat Desk Combo

**Vicro 3400BRM - Student Combo Desk**

- $222.85 per desk
- 10 year warranty
- Longevity ~ does not warp
- Dimensions: 35.75" Length x 22.75" Width x 29.625" High
- Seat Height: 18"
- Top Size: 18" x 24"

**Pros**

- Has some Space
- Has some Storage
- Long Life time

**Cons**

- Expensive
- Ridgid, not comfortable
- Not Adjustable
- Not enough Space

https://www.schooloutlet.com/3400BRM_Student_Classroom_Chair_Desk_p/3400brm.htm

# Past and Current solutions? Seat and Desk Separate

## Luxor STUDENT-STK1PK

- $182.85 per desk
- Minimalist, light weight
- Dimensions, desk: 27" W x 22" D x 28" H
- Dimensions, chair: 19" W x 21" D x 31.5" H
- Weight desk: 16 lbs.
- Weight chair: 10 lbs.

## Pros

- Pencil Storage
- Light weight
- Stackable

## Cons

- Expensive
- Ridgid, not comfortable
- Not Adjustable
- Not enough Space
- No Storage

https://www.schooloutlet.com/Luxor_Large_Student_Desk_and_Chair_p/lux-student-stk1pk.htm

# Past and Current solutions? Standing Desk Converter

**FlexiSpot - AlcoveRiser Standing Desk Converters M7B - 28"**

- $109.99 per Converter



## Pros

- Converts Normal desk into Standing Desk
- Don't need to buy new desks

## Cons

- Needs Flat, Large, Strong Desk to sit on
- Expensive
- Ridgid, not comfortable for hands
- Not Adjustable
- Possibly not enough Space
- No Storage

https://www.flexispot.com/desks/standing-desk-converters/alcoveriser-standing-desk-converters-m7-28-inch

# Constraints



Time
- We are limited by the short amount of time we are given to design, build and prototype. We start designing and prototyping as of November 8th, testable prototype by February 14th and the finished product is due May 25th.

Money
- We are going to be given $100 in order to create the desired design

Resources
- We would need the materials in order to build the prototype when the time comes. We do not know what resources are available to us. Ideally we would like to use aluminum for any metal parts and [a good type of wood] for the furnishings

OSHA
- There are currently no OSHA rules that apply to standing desks or desks in general. However, there are OSHA recommendations for what to look for in a desk:

https://www.osha.gov/etools/computer-workstations/checklists/purchasing-guide#:~:text=There%20should%20be%20sufficient%20space%20underneath%20for%20the%20legs%20while,20%20inches%20for%20knee%20height.

Size
- Big enough to fit all school materials on desk
- Small enough to fit 30 in a room

Weight
- Light to Medium > 20 lb

Cost
- Affordable >$200 per desk

Material → Soft / Ridgid
- Product Life ~ 10 - 20 years

# Our Survey

This is the survey we are using to collect the data for the criteria, feel free to take it, if you have time

https://docs.google.com/forms/d/e/1FAIpQLSdFMY_1G-VHAIPa2ssEqk-PlMvADjNgFlHDniBgDVMT7V4XWQ/viewform?usp=sf_link

We created a survey because we felt that the product should be for the people, by the people. It seemed that the information was inadequate surrounding this topic specifically. So we wanted to hear their opinions as well. As a result, it would be taken by Students, educators and parents alike.



School Desks: What do you think?

A brief survey of your personal experience with the desks commonly found in the educational environment. This is for the a group performing research for a PLTW Capstone project, your input would be greatly appreciated

Sign in to Google to save your progress. Learn more

* Required

Are you a... *

◯ Student

◯ Educator

◯ Parent

Next                                                    Clear form

Never submit passwords through Google Forms.

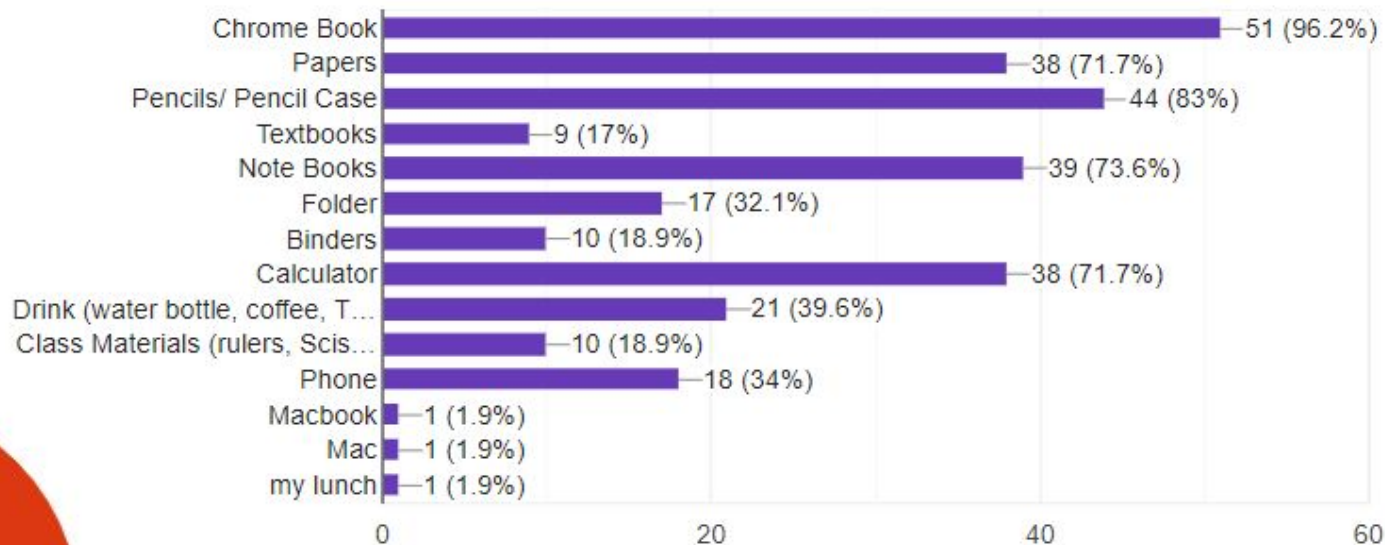This form was created inside of Medway Public Schools. Report Abuse

Google Forms

What items do you usually have on your desk? (ex: Chromebook, papers, pencil, textbooks, notebook, folder, binder, etc...)

53 responses
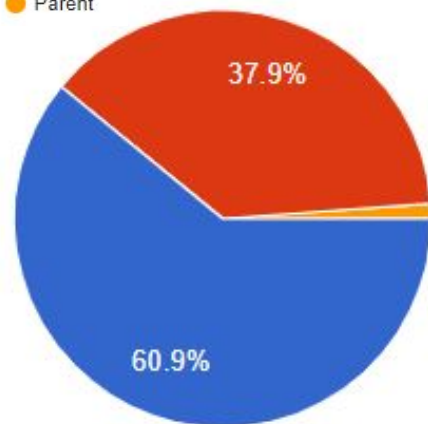
Are you a...

87 responses

- Student
- Educator
- Parent

Chrome Book — 51 (96.2%)
Papers — 38 (71.7%)
Pencils/ Pencil Case — 44 (83%)
Textbooks — 9 (17%)
Note Books — 39 (73.6%)
Folder — 17 (32.1%)
Binders — 10 (18.9%)
Calculator — 38 (71.7%)
Drink (water bottle, coffee, T... — 21 (39.6%)
Class Materials (rulers, Scis... — 10 (18.9%)
Phone — 18 (34%)
Macbook — 1 (1.9%)
Mac — 1 (1.9%)
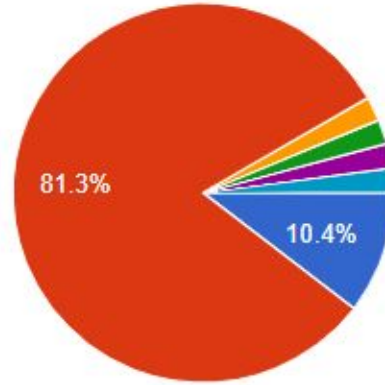my lunch — 1 (1.9%)

Pie chart: 60.9%, 37.9%

**Survey Results (Desk A) Student**

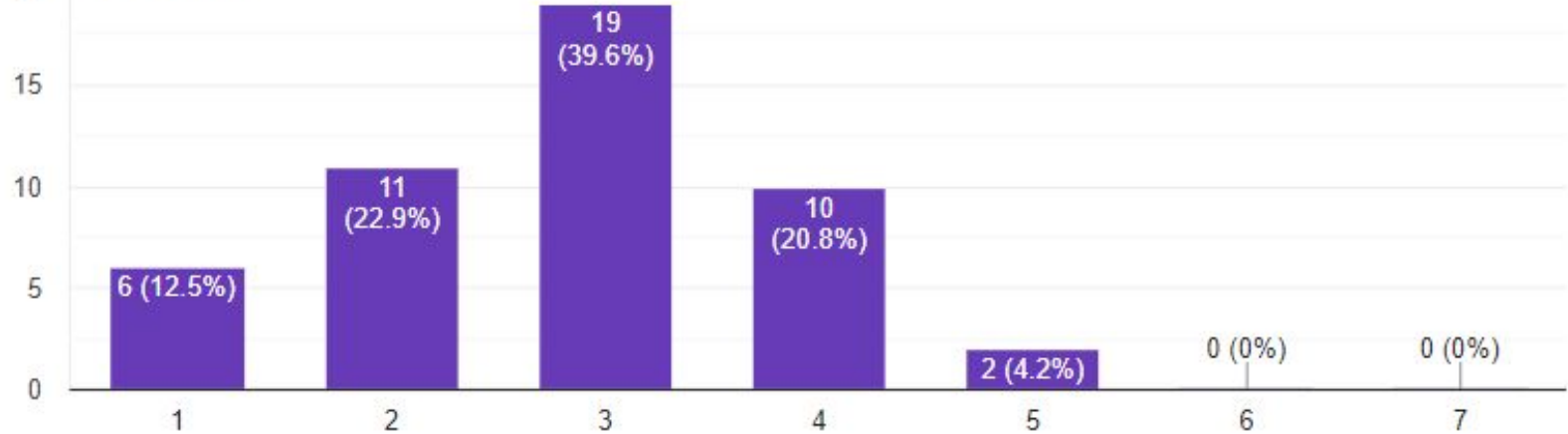Is there enough room on this Desk for you to work efficiently?

48 responses

- Yes
- No
- Usually yes, sometimes is a pain to have chromebook and notebook
- Depends on what I'm doing
- Depending on what you're working on
- In my opinion, I think my workspace isn't the most spacious or open.

81.3%

10.4%

How comfortable are you in this desk?

48 responses

- 6 (12.5%)
- 11 (22.9%)
- 19 (39.6%)
- 10 (20.8%)
- 2 (4.2%)
- 0 (0%)
- 0 (0%)

1 - Least comfortable

7 - Most comfortable

**Survey Results (Desk B) Student**

Is there enough room on this Desk for you to work efficiently?

52 responses

- Yes — 61.5%
- No — 25%
- Mostly, sometimes you need more than one desk
- If using one set of materials (i.e. just a...
- I suppose
- sometimes, depending on the material...
- Depends on what you're working on
- Sometimes
- Most of the times

How comfortable are you in this desk?

52 responses

- 1: 1 (1.9%)
- 2: 2 (3.8%)
- 3: 5 (9.6%)
- 4: 13 (25%)
- 5: 24 (46.2%)
- 6: 5 (9.6%)
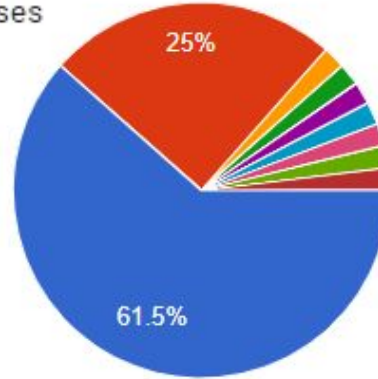- 7: 2 (3.8%)

1 - Least comfortable

7 - Most comfortable

# Survey Results (Desk C) Student



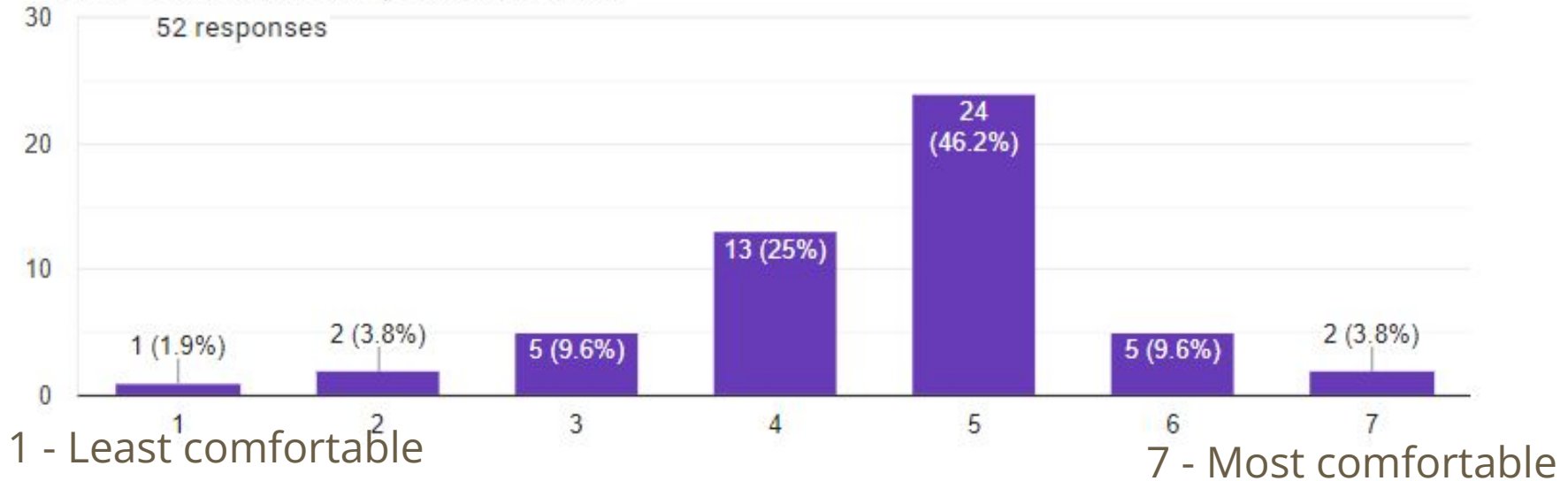## Is there enough room on this Desk for you to work efficiently?
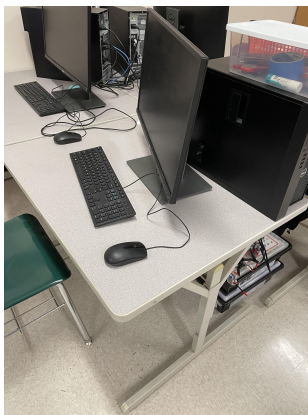50 responses



- Yes — 58%
- No — 26%
- I don't know. I've never worked at one...
- kind of
- Yes, but sometimes it can be hard to fi...
- Sometimes
- There's only enough room if I'm only u...
- enough room, but with everything like...
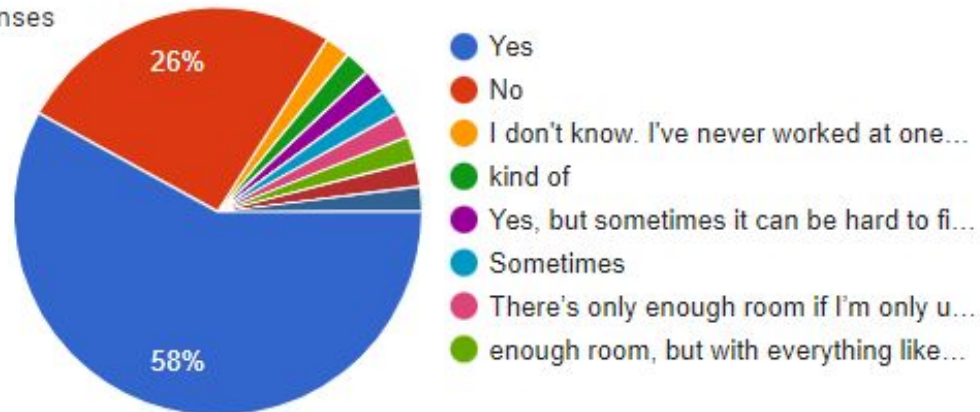
## How comfortable are you in this desk?
51 responses



- 1: 0 (0%)
- 2: 0 (0%)
- 3: 8 (15.7%)
- 4: 12 (23.5%)
- 5: 17 (33.3%)
- 6: 11 (21.6%)
- 7: 3 (5.9%)
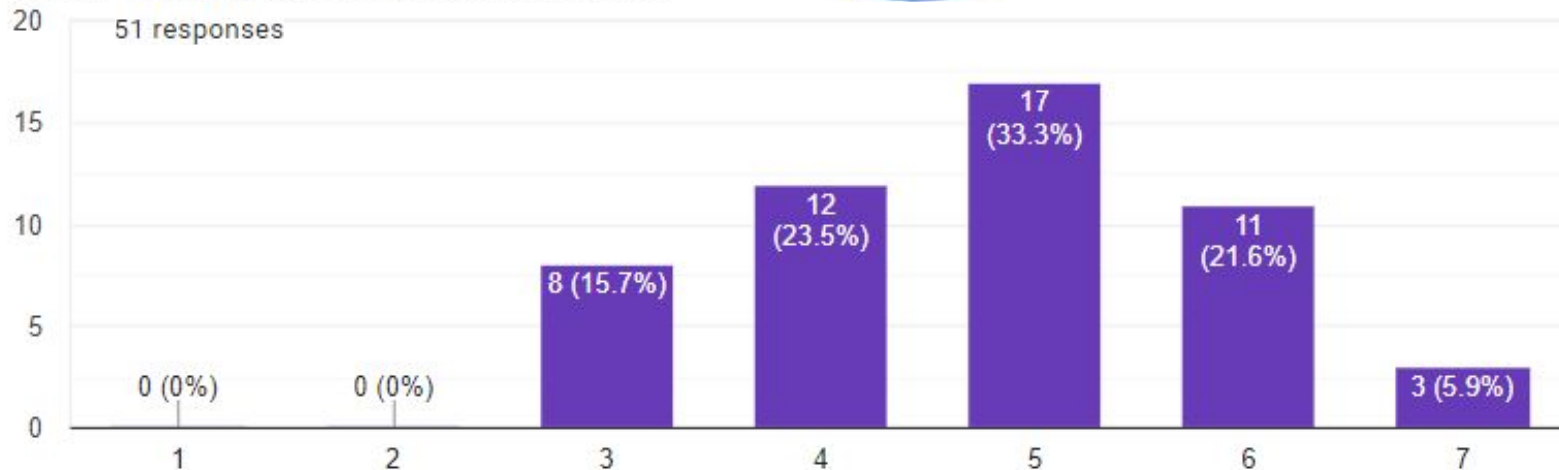
1 - Least comfortable

7 - Most comfortable

# Survey Results Educator

## What grade(s) do you teach?

33 responses

| Grade | Count |
|-------|-------|
| 1-4 | 9 (27.3%) |
| 5-8 | 13 (39.4%) |
| 9 | 9 (27.3%) |
| 10 | 11 (33.3%) |
| 11 | 13 (39.4%) |
| 12 | 14 (42.4%) |

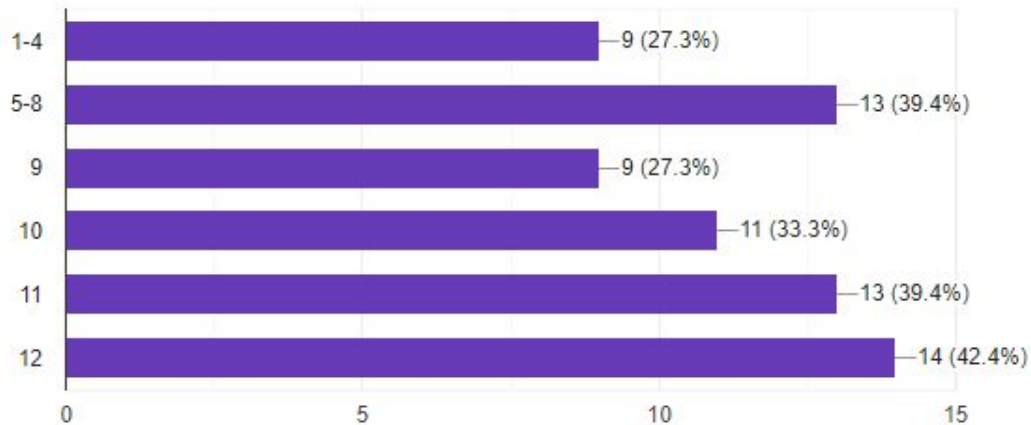## How often do your students comment on the comfort of the furniture in your classroom?

33 responses

| Rating | Count |
|--------|-------|
| 1 | 3 (9.1%) |
| 2 | 12 (36.4%) |
| 3 | 6 (18.2%) |
| 4 | 5 (15.2%) |
| 5 | 6 (18.2%) |
| 6 | 0 (0%) |
| 7 | 1 (3%) |

1 - Never                    7 - Every Day
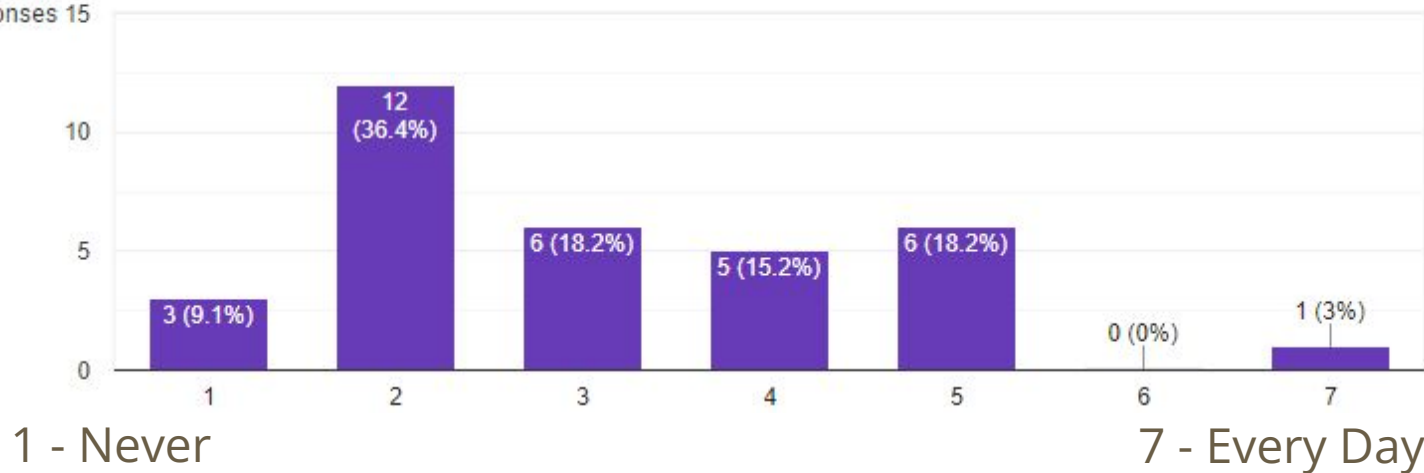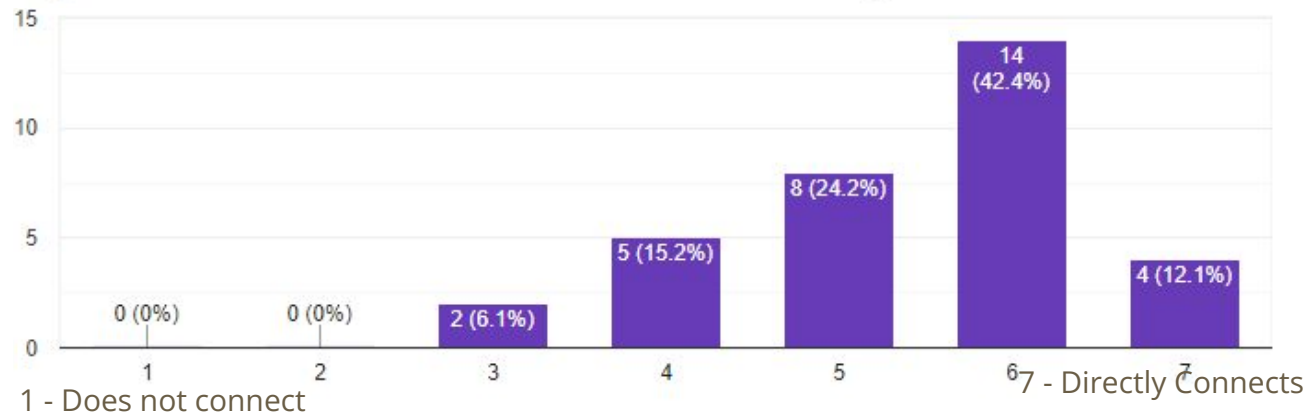
# Survey Results Educator

How much do you think students comfort connects to students learning at school?

33 responses



1 - Does not connect                    7 - Directly Connects

If your student(s) do talk about the furniture in your classroom, how comfortable do they say it is?

28 responses
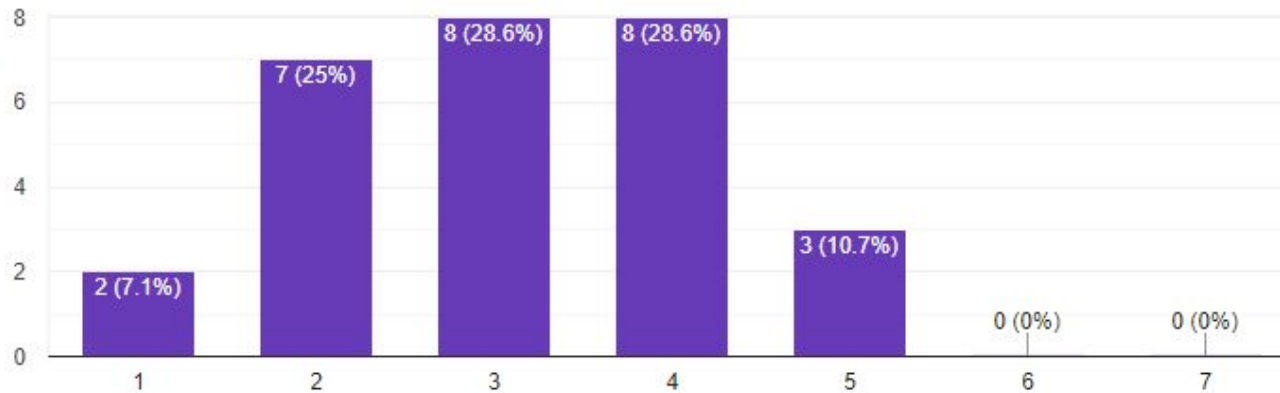


1 - Uncomfortable                    7 - Comfortable

# Validation-Survey Says?

Based on our survey results our problem is validated. **70.7%** of the people who filled out our survey said they **need more room** on desks that are connected to the chair and they felt **somewhat uncomfortable**. As for the separate chair and desk and the tech desks they felt more comfortable and had a bit more room however, **25%** of respondents said they **still needed more room**. Survey confirms our suspicions that 19th century furniture is inadequate for 21st century learning, and needs to be improved on, as the current furniture does not suit the needs of the modern learning environment.
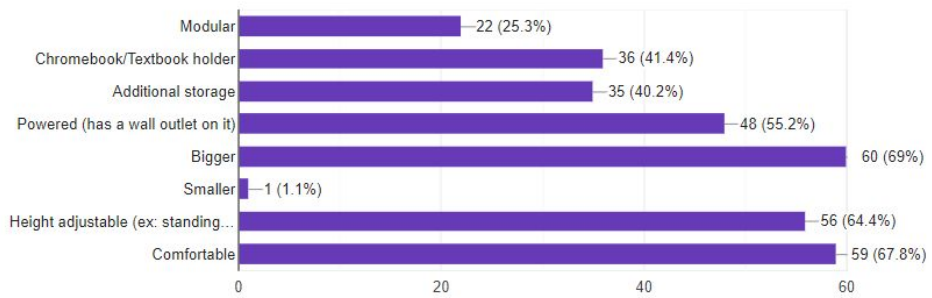
# What is would a good solution have?

The survey results indicate, a good solution would have to have:

- Bigger/more space (Larger than 18" x 24")
- Have more leg space (Moveable to higher then 29.625")
- Height adjustable (Moveable at all, 2" dif)
- Comfortable (survey after people try prototype)
- Have some sort of power option
- Have a chromebook/ textbook holder
- Have additional storage
- Desk not attached to chair



Given these options, which do you think would benefit you the most?

87 responses



| Option | Responses |
| --- | --- |
| Modular | 22 (25.3%) |
| Chromebook/Textbook holder | 36 (41.4%) |
| Additional storage | 35 (40.2%) |
| Powered (has a wall outlet on it) | 48 (55.2%) |
| Bigger | 60 (69%) |
| Smaller | 1 (1.1%) |
| Height adjustable (ex: standing… | 56 (64.4%) |
| Comfortable | 59 (67.8%) |

# Research (Cited Sources) (Documentation)

- "almost two thirds (~60%) of the students studied suffered from back pain and that large differences between desk height and elbow height was associated with a greater likelihood of the adolescents having this problem." (Science Daily)
- "the current available evidence points indirectly to a stronger association of low education with longer duration and/or higher recurrence of back pain than to an association with onset" (PMC Labs)
- "In February 2017 edtechmagazine reported more than 50% of teachers reported using 1:1 computing"(edtechmagazine)
- "A considerable body of research about environmental design shows the positive effect comfort can have on learning, human productivity, and creativity. As a result, over the past thirty years, major shifts in workplace, recreational, and home design have occurred. Whether it is Herman Miller's Aeron Chair, the Club World seating plans on British Airways jets, Panasonic's massage chairs, or the upgraded bedding installed by nearly every major hotel chain, comfort is the new black. Everywhere except schools." (Edutopia)

# Works Cited

Inderscience. "Most painful days of your life - school desks and chronic back pain." ScienceDaily. ScienceDaily, 23 September 2013. <www.sciencedaily.com/releases/2013/09/130923092750.htm>.

Dionne, C E, et al. "Formal Education and Back Pain: A Review." *Journal of Epidemiology and Community Health*, BMJ Group, July 2001, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1731944/ .

Staff, EdTech. "More than 50 Percent of Teachers Report 1:1 Computing." *Technology Solutions That Drive Education*, 10 May 2021, https://edtechmagazine.com/k12/article/2017/02/more-50-percent-teachers-report-11-computing .

Nair, Prakash. "A Comfortable Truth: Well-Planned Classrooms Make a Difference." *Edutopia*, George Lucas Educational Foundation, 28 Mar. 2007, https://www.edutopia.org/comfortable-truth .

"History of the Desk: School Furnishings." *School Furnishings | Providing Quality Furnishings to Schools, Libraries, Correction Facilities, Architects, and General Contractors*, 25 Mar. 2014, https://schoolfurnishings.com/history-of-the-desk-2/ .

"Department of Labor Logo United Statesdepartment of Labor." *ETools : Computer Workstations - Checklists - Purchasing Guide | Occupational Safety and Health Administration*, OSHA, https://www.osha.gov/etools/computer-workstations/checklists/purchasing-guide#:~:text=There%20should%20be%20sufficient%20space%20underneath%20for%20the%20legs%20while,20%20inches%20for%20knee%20height .

# Works Cited II.

Kiener, Michael, et al. *Using the Comfortability -in-Learning Scale to ... - Eric*. 2014, https://files.eric.ed.gov/fulltext/EJ1035847.pdf.

SHARE, TEAM. "Positive Classroom Environment through Classroom Design: Resilient Educator." *ResilientEducator.com*, 9 Apr. 2020, https://resilienteducator.com/classroom-resources/welcoming-classrooms-better-students/.

"The Importance of Comfort for Student Success." *Educational Furniture Solution Vendors*, 21 July 2021, https://www.martinpublicseating.com/blog/the-importance-of-comfort-for-student-success.

Eggebrecht-Weinschreider05/25/20, Cindy. "Comfort Is Critical for Student Success. Here Are 3 Simple Factors to Consider." *Spaces4Learning*, Impacting K-12, & Higher Education Learning, 25 May 2020, https://spaces4learning.com/articles/2020/05/25/comfort-is-critical-for-student-success.-here-are-3-simple-factors-to-consider.aspx#:~:text=Common%20sense%20tells%20us%20that,out%20in%20research%20as%20well.&text=Comfort%20is%20also%20one%20of,that%20supports%2021st%20century%20learning.