The Best Seat at UD

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I. INTRODUCTION

Chairs and the culture of sitting down developed in Ancient Egypt [1]. Egyptian chairs, at least those preserved in tombs, look quite different from the 21st century chair. They sat closer to the ground and were made from lavish materials on a wooden frame—far from any UD chair. Everyone has experienced the dreadful ergonomics of Smith 209. The backrest angle feels awkward for taking notes and the arm rests are egregiously high to the point where one cannot even relax the shoulders comfortably. On the other hand, Willard 319 features adjustable chairs and plentiful desk space disconnected from the chair itself.

Experiencing both immaculate and disastrous seating raises the question: what is the best seat at UD? To answer this question (and the funnier question of what is the worst seat at UD) we need to probe the population of desks around campus. Then, once a representative sample of desk and chair parameters is collected it can be analyzed as a whole and also compared to each other to figure out how UD's desks fare overall and if any desks are fantastic or deeply flawed.

Ergonomics researchers acknowledge the importance of ergonomics for students' experience and generally concludes sitting in fixed tables and chairs lead to strained posture and poor experiences [2]. A pair of studies [2] [3] measured college students in Iran and Sri Lanka and developed chair dimensions based on their knowledge of sitting ergonomics and certain quantiles of their anthropic college student measurements. Table I shares how [2] determined their chair parameters and Table II shares the same information for [3]. Table III includes the measurements [2] and [3] determined were optimal for college student desks.[1]

TABLE I
CHAIR FEATURES AND DETERMINANTS FROM [2]

Chair Feature	Determinant
Seat surface height	Seat height boundary case + 25 mm allowance
Desktop height	Elbow height, sitting boundary case
Desktop length	50%ile Forearm–finger tip length
Desktop width	As per existing desktop width

[1]the dimensions provided by [2] were first converted from milimeters to centimeters before being included in Table III.

TABLE II
CHAIR FEATURES AND DETERMINANTS FROM [3]

Chair Feature	Determinant
Seat height	5th percentile (female) of popliteal height
Desk height	5th–95th percentile (all) of elbow height
Desk length	95th percentile (male) of elbow-fingertip length
Desk width	95th percentile (male) of elbow to elbow width

TABLE III
COMPARISON OF DESIGN DIMENSIONS FROM [2] & [3]

Chair Feature	Dimension [2] (cm)	Dimension [3] (cm)
Seat height	44.5	44
Desk height	22.9	19–29
Desk length	45.3	51
Desk width	19.8	65

Using the dimensions provided by the literature, desks and chairs found in common UD lecture rooms, specifically rooms classified by the central classroom inventory, may be compared to a standard and the faults of poor seats may be understood from an objective angle rather than personal experiences of uncomfort while sitting in them.

II. METHODS

In an effort to collect the most accurate data, it's important to adhere to the same procedure during each instance of data collection. To start, identify the building, room number, and room type that the measurements are being taken in. Next, identify the desk "type" that is being measured. When performing this step, each time you encounter a new desk "type", add it to a reference document with an image and description to catalog all different styles of desk encountered. Doing so allows for easier data collection as descriptions and images don't have to be repeated between rooms when the desks are of the same "type", and can instead be generalized per desk "type".

Next, begin taking physical measurements of the desk. Despite the generalization for descriptions and images, it's important to take separate data measurements per room. Even when the desks appear visually similar or the same, they could have slightly different measurements. Start by measuring the height from the floor to the tallest point of the seat of the desk (i.e. where someone would sit). Next, measure the height

from the floor to the tallest point of the physical desk (i.e. the writing surface). For both of these measurements, the seat and desk surface may not be flat and/or could be at an angle, so it's important to measure to the highest point of the surface to be consistent. Lastly, measure the width and length of the "useable" desk area (i.e. not including the armrest portion) by approximating it as a rectangle. For shared tables or desks, this can be calculated by finding the overall area and then dividing by the number of seats at the table, thus giving the usable area per person at the table. It is recommended to collect this data in a spreadsheet application with the following columns: building, room number, room type, desk type, seat height, desk height, desk width, and desk length.

ACKNOWLEDGMENT

A thank you is due to any CHEG304080 student who offered feedback during our in class presentations. A specific thank you is owed to Prof. Enszer for suggesting to look at UD's central classroom inventory.
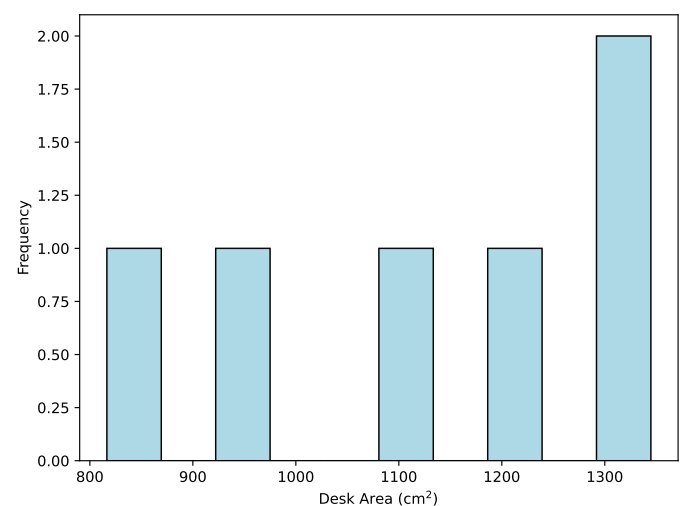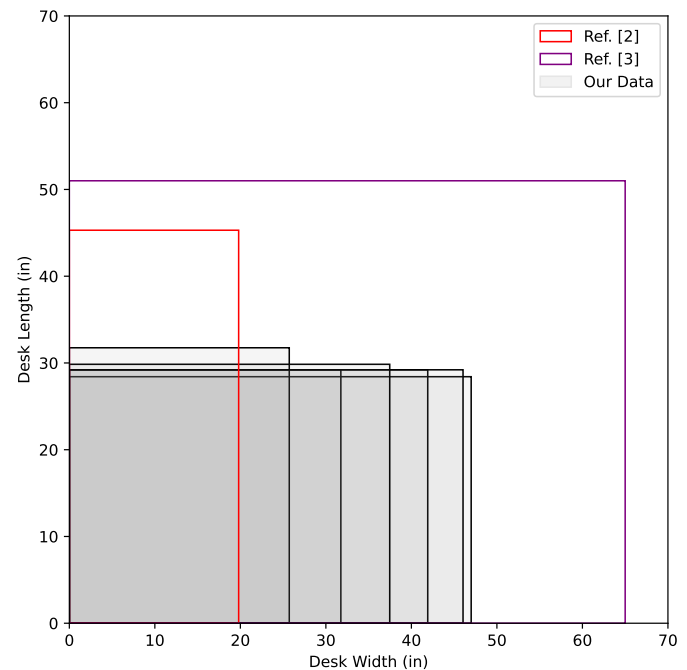
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[2] M. Mohamed Thariq, H. Munasinghe, and J. Abeysekara, "Designing chairs with mounted desktop for university students: Ergonomics and comfort," vol. 40, no. 1, pp. 8–18. [Online]. Available: https://linkinghub.elsevier.com/retrieve/pii/S0169814109001280

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APPENDIX

A. Notes on Data Storage and Analysis

Data was stored in a shared google sheet file for access-ability reasons. Analysis and visualization was completed in Jupyter Notebooks using python. As far as packages go, pandas was used to wrangle the data and matplotlib was used to create the visualizations.
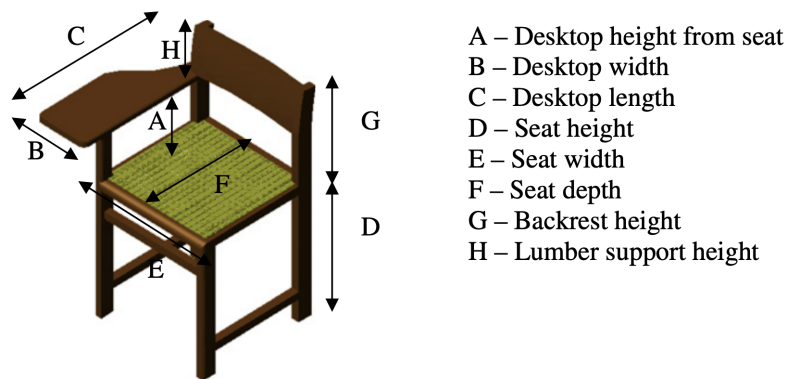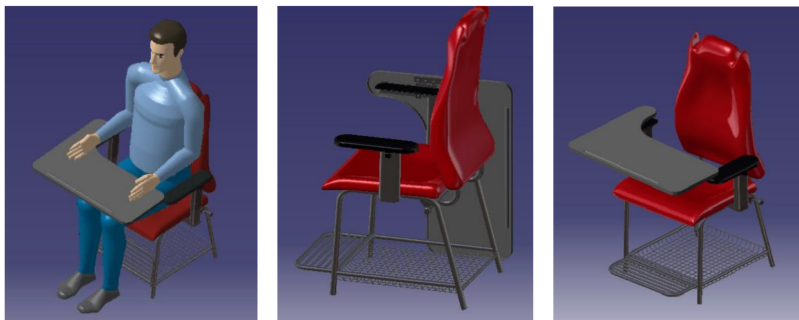
B. Additional visualizations

Fig. 8. Proposed side-mounted desktop chair.

A – Desktop height from seat
B – Desktop width
C – Desktop length
D – Seat height
E – Seat width
F – Seat depth
G – Backrest height
H – Lumber support height

this "figure 8" is reproduced without permission from [2]. this is a representative 3d visualization of their optimal chair.

this chair design is reproduced without permission from [3]. suprise suprise this is also a representitive 3d visualization of their optimal chair. but from 3 angles.

D. literally just all of our data

see the next page for our data. it was originally collected in inches but was converted it into centimeters to make the comparison with literature a little easier for those who have trouble multiplying numbers by 2.54.

Building	Room	Room Type	Desk Width (cm)	Desk Length (cm)	Desk Height (cm)	Seat Height (cm)
Recitation Hall	101	LCTR	46.99	28.42	70.49	44.13
Smith Hall	209	LCTR	31.75	29.21	73.03	43.18
Purnell Hall	115	AUD	25.72	31.75	59.69	40.64
Purnell Hall	227	LCTR	41.91	29.21	71.12	43.18
Ewing Hall	204	FLEX	46.04	29.21	68.58	43.82
Gore Hall	308	LCTR	37.47	29.85	74.93	46.36