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Assessing Old and New Individual Study Desks

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Assessing Old and New Individual Study Desks

Introduction

Changes to academic library spaces require input from primary users to develop the spaces they want and need (Hall and Kapa, 2015; Loder, 2000; Walton, 2006; Zhang and Maddison, 2016). These spaces include open spaces with tables, group study spaces, innovation spaces, and individual study spaces. Each has advantages and drawbacks. For example, Loder (2000) indicates that tables provide the opportunity to spread out materials, but when used by more than one student, tables make it difficult to define an individual's workspace. While individual study desks (since many students do not understand the term *carrel*, we call them "individual study desks," or ISDs) define a student's workspace, there is little room for spreading out materials, nor is there opportunity to add amenities (e.g. electrical and USB outlets) that aid studying students.

Since their inception, ISDs typically resembled a wood box on stilts with a confined writing surface and a shelf. Chairs were normally wood built more to last than to be comfortable. As far back as the 1960s there were calls to improve ISD design so they would have an excellent study lamp, contain a larger desk with considerable writing surface, and have a comfortable seat (Sommer and Peterson, 1967). These changes could enable ISDs to better fit students' learning and research needs.

Background

In 1976, the first of two additions to the CCC opened. The addition included the purchase of more than 400 ISDs and accompanying wooden chairs. These ISDs were distributed across the library's five public floors.

In early 2014, a faculty member who teaches a Technology 312: Innovation Bootcamp course asked if the library had a project that the students could do as part of the course. The library suggested developing a replacement for the library's nearly forty-year-old ISDs. The Innovation Bootcamp students applied the USERS model to approach the problem (Skaggs et al., 2012). USERS stands for

- U–Understand (Observe/Experience/Inquire)
- S–Shape (Organize/Simplify/Clarify)
- E–Explore (Question/Compare/Combine)
- R–Refine (Visualize/Validate/Iterate)
- S–Share

Based on surveys, observations, and informal focus groups, three different teams from the class developed and shared solutions with library administrators. Using the common themes identified by the Innovation Bootcamp teams (more space, privacy, shelving, electrical and USB outlets, lighting, a footrest, a reading stand, a whiteboard, and a comfortable chair), a design

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5 team that included library and university physical facilities personnel developed two prototype
6 ISDs.

7 Each prototype included desired features (e.g., LED vs. fluorescent lighting or a small vs.
8 large shelf). The prototypes were placed side-by-side in a high traffic area of the library, and
9 students passing by (convenience sample) were invited to sit in each and provide feedback via an
10 online survey. The ISD prototypes were then placed on four different floors over the course of a
11 month for students to use. Students using the ISD prototypes were asked to complete a paper
12 survey about their experience.
13

14
15 Based on the input from these two surveys, the design team made changes to the alpha
16 prototypes and retested the resulting beta prototypes in the same way. The results of the beta
17 surveys resulted in a final design for the new ISDs. Since 2016, the library began replacing the
18 old ISDs with batches of new ISDs. At the time of this study, the library had replaced about half
19 of the old ISDs with new ISDs. It was determined that a follow-up study was needed to answer
20 the following questions:
21

- 22 1. In what ways are the new ISDs better than the old ISDs?
 - 23 2. What, if any, difference do the new ISDs make to the students using them?
- 24
25 This paper reports on the results of the follow-up study.
26

27 28 **Method**

29
30 Two parallel surveys used a convenience sample and had identical questions except for
31 questions asking about use patterns and amenities specific to the new ISDs (see Appendix A).
32 Students were invited to participate in each survey via a QR code or a URL link shown on flyers
33 placed in each ISD for one week. The QR code and URL links corresponded to the survey
34 matching the ISD (e.g., links on flyers in new ISDs connected to the new ISD survey). Library
35 personnel reviewed each ISD daily to replace any flyers that had been taken or moved. As an
36 incentive to participate, those completing a survey could enter into a draw for one of five \$10
37 cash rewards. As this study examined and compared use patterns of the two ISDs, having the
38 same student use and comment on both types of ISD was considered an advantage rather than a
39 bias.
40
41

42
43 The surveys included three open-ended questions to understand why students studied
44 where they did, what improvements to the desk itself were needed, and what was otherwise
45 needed to improve the students' experience when working at an ISD. Two student researchers
46 independently coded all comments from the three open-ended questions using the list of themes
47 developed from responses (see Appendix B). Researchers counted how often comments were
48 independently assigned to the same theme by both coders to determine the trustworthiness of
49 coding. For example, if both coders agreed on the coding of the comment, the coding was
50 accepted and considered trustworthy. However, if coders did not agree on how the comment
51 should be coded, they discussed reasons why it should or should not be coded to a certain theme
52 until they reached a consensus on how the comment should be coded.
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All assessment procedures were approved by the university's IRB committee.

Findings

Demographics

Over the week that both surveys were active, a total of 1,288 responses were received (old ISD = 591, new ISD = 697). Both surveys had a gender response rate of about 60% male and 45% female (see Table 1). Sophomore and senior use of the two ISD types did not differ significantly (see Table 2). However, freshmen used old ISDs significantly more than new ISDs (29% vs. 23%) while juniors used new ISDs significantly more than old ISDs (28% vs. 23%). The use of the old ISDs by students appears to decline as students' time at the university increases; seniors used both old and new ISDs at about the same rate. The "other" category includes students working in a university entrance program, students from neighboring universities, and those visiting the university.

[Insert Tables 1 & 2 about here]

Desk Use

Students used both desk types a comparable number of times weekly (see Table 3), but varied in length of stay for each visit (see Table 4). Significantly more students stayed at old ISDs for durations of 31–60 minutes or 61–90 minutes. Significantly more students stayed at new ISDs for durations of 91–120 minutes or over 120 minutes.

[Insert Tables 3 and 4 about here]

A 5-point rating scale (1 = not very comfortable, 5 = very comfortable) was used to examine the comfort level of each desk type. A higher, non-significant proportion of students rated the old ISDs as less comfortable than the new ISDs (see Table 5). Conversely, significantly more students rated the new ISDs as more comfortable at either the second highest or highest levels of comfort. This finding complements the previous finding as a better level of comfort encourages students to stay longer.

[Insert Table 5 about here]

ISD Activities

Users of both old and new ISDs were asked to identify all of the activities they engaged in and the degree to which they engaged in each activity (a lot, some, and rarely or never) while using an ISD. Table 6 shows the students' level of engagement for each activity by desk type.

Primary activities in the "done a lot" category for both desks included doing homework assignments, studying for exams, and academic reading. Of these activities, significantly more

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5 students studied for exams in new ISDs than in old ISDs ($p < 0.05$). Conversely, significantly
6 more academic reading took place in old ISDs than in new ISDs ($p < 0.05$).

7 For activities in the “done some” category, significantly more students did exam study in
8 old ISDs than in new ISDs ($p < 0.05$). Significantly more personal reading took place in new
9 ISDs than in old ISDs ($p < 0.05$). No activities “done rarely or never” had significant differences
10 between the ISD types, but activities that ranked lower in the “done a lot” category (i.e., gaming,
11 sleeping, personal reading, praying, and meditating or pondering) were activities that most
12 students engaged in rarely or never.
13
14

15
16 [Insert Table 6 about here]
17

18
19 Secondary uses for the desk (used by less than 50% of the students but more than 20%)
20 included more personal activities such as personal watching or listening, meditating or
21 pondering, praying, and sleeping.
22

23 New ISDs include a whiteboard on the long sidewall of the desk. Over 90% of students
24 used the whiteboard, with most using it to solve equations, map out strategies, summarize class
25 notes/readings, and/or create writing outlines (see Table 7).
26
27

28 [Insert Table 7 about here]
29
30

31 *Desk Amenities*

32 We also examined student preference for the specific amenities of the new ISDs.
33 Amenities preferred by 70% or more of students included (in order of preference) electrical
34 outlets, the whiteboard, desk space, a movable footrest, and under-the-shelf lighting.
35
36

37 *Open-Ended Survey Comments*

38 Where possible the same themes for comparing responses for the three questions were
39 used. However, some themes were unique to particular questions. Themes and their descriptions
40 are in Appendix B.
41
42

43 *Reasons for study.* Among students’ primary reasons for choosing a new ISD were
44 privacy and the ability to focus. Those using old ISDs indicated that ISD location, typically in
45 low traffic areas allowing more privacy, was more important than using a new ISD. Students also
46 adopted the new ISD as their personal space; similar to findings in other studies (Bodaghi and
47 Zainab, 2013). Typical student responses included:
48
49

50
51 . . . *I really like having my own little study space to focus and work on homework.*
52 *I think that I am more productive in this type of environment because it is less*
53 *distracting than having a lot of people coming and going and that gives me*
54 *enough space to just plug into what I’m doing.*
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6 *I can focus better here because of the walls. I'm not distracted by other people, I*
7 *can focus on my work.*
8
9

10 Unique to those choosing a new ISD were comments on amenities (e.g., whiteboard and
11 space) as key reasons for the choice. Most comments indicated that these amenities facilitated
12 studying and concentration. Typical comments were:
13
14

15 *The extended desk space is super nice, I like to lay out all my books, computer,*
16 *and notebooks without feeling cluttered. The light is really nice too and the*
17 *personal outlet for charging your phone or computer. And since I usually spend a*
18 *few hours studying for a big exam at these desks, the swivel office chair is so*
19 *much more comfortable than a wooden chair.*
20
21
22

23 *The white boards are awesome for scratch work and save me from using a lot of*
24 *paper. The chairs are more comfortable than any of the wooden chairs in the*
25 *library. Lots of desk space and easy access to electrical outlets.*
26
27

28 *Improved desk and experience.* Comments referring to what could improve the desk or
29 the student's experience using the desk took a bit of an ironic twist. Those using an old ISD
30 indicated that they wanted a better chair, power outlets, and a whiteboard—amenities that would
31 make the old ISDs similar to the new ISDs.
32
33

34 One indication of the success of the new ISDs was the more than 44% of comments
35 positively mentioned one or more amenities of the new desks. Users of new ISDs wanted to
36 ensure that dry erase markers and erasers were available for the whiteboards. The two most
37 common comments from new ISD users were requests for more new ISDs and statements that no
38 improvements were needed. For example:
39
40

41 *Just have more of them. It is a bummer when they are all filled because then I*
42 *have to sit at a desk which usually leads to me getting distracted by friends and*
43 *my studying is less effective.*
44
45
46

47 **Discussion**

48 These findings indicate that, while the number of visits each week is similar between the
49 two desk types, significantly more students using old ISDs stay for shorter periods of time and
50 significantly more students using new ISDs stay for longer periods of time.
51

52 When we combine the totals for the “done a lot” and “done some” categories, it is
53 apparent that both ISDs are primarily used for academic activities. Almost 100% of students
54 used the ISDs for studying for exams and completing homework assignments. More than 75%
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4 of students indicated that they read, watched, or listened to academic material while at an ISD.
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6 These findings support the idea that ISDs **are** generally used for academic pursuits typical of the
7 focuser persona (i.e., a student who wishes to study alone and be focused on a given activity
8 without interruptions; Zaugg and Rackham, 2016; Zaugg, 2017). These results support findings
9 that students use ISDs primarily for academic and personal activities (Loder, 2000; Walton,
10 2006).
11
12
13

14 **Conclusion**

15 The success of the new ISDs is attributed to an effective and iterative design process
16 based on feedback and prototyping. Using feedback from users of old ISDs, Innovation
17 Bootcamp class members created concepts for new ISDs. Prototypes helped to refine these ISD
18 concepts into a new ISD that students use more, value more, and better meet their needs.
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Appendix A: Surveys for New and Old ISDs

New ISD

Q1 We are examining how students use our new individual study desks. We invite you to take a few minutes and complete our short survey to help us understand how these individual study desks are working as a study space for you and what we can do to improve them. If you start the survey, you may refuse to answer any question or you may stop answering the survey at any time. However, we would appreciate you completing the survey. Those completing the survey have the chance to enter a draw for one of five \$10 Cougar Cash incentives. This study is being conducted by a research team led by BBB, Assessment Librarian (801-422-4718 or BBB@AAA.edu). If you have any questions or concerns, please contact him. You may also contact AAA's Office of Research & Creative Activities if you have any concerns about this survey.

Yes, I will participate

No, I do not want to participate.

Q2 What is your gender?

Male

Female

Q3 What is your status at AAA?

Freshman (year 1)

Sophomore (year 2)

Junior (year 3)

Senior (year 4)

Super-senior (year 5+)

Graduate student

Other (please specify) _____

Q4 How many times per week do you typically use an individual study desk like this one?

1–5

6–10

11+

Q5 For what length of time do you stay during a typical visit?

0–30 minutes

31–60 minutes

61–90 minutes

91–120 minutes

Over 120 minutes

Q6 How physically comfortable is studying in this individual study desk?

(1 = not very comfortable, 5 = very comfortable)

	Not very comfortable	2	3	4	Very comfortable
ISD physical comfort					

Q7 If an individual study desk like the one you are in was not available, where would you go to study?

Another type of individual study desk

A table

A lounge chair

A bar desk spot

A group study room

Other (please specify) _____

I would leave the library and study elsewhere.

Q8 Please drag and drop each activity into the appropriate box to best describe what you typically do in an individual study desk.

Studying for exams

Working on homework assignments

Academic reading

Personal reading

Academic watching/listening

Personal watching/listening

Gaming

Sleeping

Praying

Meditating or pondering

Other (please specify)

I do this a lot	I do this some of the time	I rarely or never do this

Q9 What do you do on the white board?

I do not use the white board

Solve equations

Map out strategies

1
2
3
4
5 Create outlines for writing

6 Summarize class notes/readings

7 Write motivational quotes

8 Drawing/doodling

9 Other (please specify) _____
10

11
12 Q10 Which of the following best describes you?

13 I typically try to get an individual study desk in the same general area of the library.

14 I use individual study desks in various locations depending on my mood.
15
16

17
18 Q11 What features of the study desks do you use? Only check the things you use.

19 Light under shelf

20 Electric plug

21 Desk extension

22 USB Plugs

23 Moveable footrest

24 Shelf
25
26
27

28 Q12 What features of these individual study desks do you like?

29 Color

30 Size of side walls

31 Desk space

32 Shelf

33 Location
34
35
36
37

38 Q13 How can we make individual study desks like this one better?

39 _____
40 _____
41

42
43 Q14 In what ways can we improve your experience using the individual study desks like this
44 one?
45

46 _____
47 _____
48

49 Q15 Think back to where you studied before we had these new individual study desks.

50 Comparing your study experience with this individual study desk and your previous study space,
51 why do you choose to study here?
52

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54 _____
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6 Q16 As our way of saying thanks for filling out the survey, we are having a draw where five
7 people who completed the survey will have \$10 Cougar Cash deposited to their account. If you
8 would like to enter the draw please provide your name, email, and net ID below.
9

10 Name _____

11 Email _____

12 Net ID _____
13
14
15

16 **2018 Old ISD**

17 Q1 We are examining how students use our individual study desks. We invite you to take a few
18 minutes and complete our short survey to help us understand how these individual study desks
19 are working as a study space for you. If you start the survey, you may refuse to answer any
20 question or you may stop answering the survey at any time. However, we would appreciate you
21 completing the survey. Those completing the survey have the chance to enter a draw for one of
22 five \$10 Cougar Cash incentives. This study is being conducted by a research team led by BBB,
23 Assessment Librarian (801-422-4718 or BBB@AAA.edu). If you have any questions or
24 concerns, please contact him. You may also contact AAA's Office of Research & Creative
25 Activities if you have any concerns about this survey.
26
27 Yes, I will participate
28 No, I do not want to participate.
29

30

31

32
33 Q2 What is your gender?

34 Male

35 Female
36
37
38

39 Q3 What is your status at AAA?

40 Freshman (year 1)

41 Sophomore (year 2)

42 Junior (year 3)

43 Senior (year 4)

44 Super-senior (year 5+)

45 Graduate student

46 Other (please specify) _____
47
48
49

50 Q4 How many times per week do you typically use an individual study desk like this one?

51 1-5

52 6-10

53 11+
54
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60

Q5 For what length of time do you stay during a typical visit?

0–30 minutes

31–60 minutes

61–90 minutes

91–120 minutes

Over 120 minutes

Q6 How physically comfortable is studying in this individual study desk?

(1 = not very comfortable, 5 = very comfortable)

	Not very comfortable	2	3	4	Very comfortable
ISD physical comfort					

Q7 If an individual study desk like the one you are in was not available, where would you go to study?

Another type of individual study desk

A table

A lounge chair

A bar desk spot

A group study room

Other (please specify) _____

I would leave the library and study elsewhere.

Q8 Please drag and drop each activity into the appropriate box to best describe what you typically do in an individual study desk.

Studying for exams

Working on homework assignments

Academic reading

Personal reading

Academic watching/listening

Personal watching/listening

Gaming

Sleeping

Praying

Meditating or pondering

Other (please specify)

I do this a lot	I do this some of the time	I rarely or never do this

1
2
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6
7
8 Q9 Which of the following best describes you?

9 I typically try to get an individual study desk in the same general area of the library.

10 I use individual study desks in various locations depending on my mood.
11
12
13

14 Q10 What features of these individual study desks do you like? Only check the things you like.

15 Color

16 Size of side walls

17 Desk space

18 Shelf

19 Location
20
21
22
23

24 Q11 In what ways could we make individual study desks like this one better?

25 _____
26 _____
27 _____
28

29 Q12 In what ways can we improve your experience using individual study desks like this one?

30 _____
31 _____
32 _____
33

34 Q13 Think back to where you have studied in the library. Comparing your study experience with
35 this individual study desk and your previous study space, why do you choose to study here?
36

37 _____
38 _____
39 _____
40

41 Q14 As our way of saying thanks for filling out the survey, we are having a draw where five
42 people who completed the survey will have \$10 Cougar Cash deposited to their account. If you
43 would like to enter the draw please provide your name, email, and net ID below.

44 Name _____

45 Email _____

46 Net ID _____
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Appendix B: Themes for Open-Ended Questions

In what ways could we make individual study desks like this one better?

Theme	Description
Amenities: Chair	Asks for or specifically refers to chair or seating
Amenities: Desk light	Asks for or specifically refers to desk light or lighting
Amenities: Footrest	Asks for or specifically refers to footrest
Amenities: Other	Asks for or refers to a specific amenity of the ISD
Amenities: Outlets	Asks for or specifically refers to outlets, USB or plugs
Amenities: Size	Asks for or specifically refers to room or size of desk
Amenities: Walls	Asks for or specifically refers to walls of desk, including wall color
Amenities: White board	Asks for or specifically refers to white board, erasers, or pens
Cleaner	Comments that desks need to be cleaned more often
Location/orientation	Indicates a general or specific place that the ISD may be located
More new desks	Specifically asks for more new ISDs
OK	Indicates that the desk is fine the way it is
Other	Any comment that does not fit within the other categories
Snacks/food	Comments on the ability to eat food or snacks at an ISD or the problems it may cause
Surrounding area	Comments on the area or amenities around the desk but not the desk itself

In what ways can we improve your experience using individual study desks like this one?

Theme	Description
Amenities: Chair	Asks for or specifically refers to chair or seating
Amenities: Desk light	Asks for or specifically refers to desk light or lighting
Amenities: Footrest	Asks for or specifically refers to footrest
Amenities: Other	Asks for or refers to a specific amenity of the ISD
Amenities: Outlets	Asks for or specifically refers to outlets, USB or plugs
Amenities: Size	Asks for or specifically refers to room or size of desk
Amenities: Walls	Asks for or specifically refers to walls of desk, including wall color
Amenities: White board	Asks for or specifically refers to white board, erasers, or pens
Cleaner	Comments that desks need to be cleaned more often
Direction of desk	Indicates a preference for a desk to face a certain direction
Location/orientation	Indicates a general or specific place that the ISD may be located
More new desks	Would like there to be more ISDs
Nothing	There is nothing to improve or no comment
OK	Indicates that the desk is fine the way it is
Other	Any comment that does not fit within the other categories
Snacks/food	Comments on the ability to eat food or snacks at an ISD or the problems it may cause
Surrounding area	Comments on the area or amenities around the desk but not the desk itself

Think back to where you have studied in the library. Comparing your study experience with this individual study desk and your previous study space, why do you choose to study here?

Theme	Description
Amenities: Chair	Discusses or specifically refers to chair or seating
Amenities: Desk light	Discusses or specifically refers to desk light or lighting
Amenities: Footrest	Discusses or specifically refers to footrest
Amenities: Outlets	Discusses or specifically refers to outlets, USB or plugs
Amenities: Size	Discusses or specifically refers to room or size of desk
Amenities: Walls	Discusses or specifically refers to walls of desk, including color
Amenities: White board	Discusses or specifically refers to white board
Amenities: Other	Discusses or refers to a specific amenity of the ISD
Accessibility	Comments on help with learning disability
Availability/convenience	Comments on availability of use or unavailability of preferred space
Focus	Comments on ability to focus on activity for a variety of reasons
Location	Comments on physical location, ambiance of things around it, and access
Mental health	Refers to improving feelings about studying
Privacy	Comments on avoiding interruptions, distractions, or noise
Type of study space	They study there because it is a desk for use just by the person
Other	Any comment that does not fit within the other categories or is not related to ISDs, no comment, or generic approval

Table 1

Total respondents by gender.

Gender	Old		New	
	<i>n</i>	%	<i>n</i>	%
Male	341	58	420	60
Female	248	42	279	40
Total	591		697	

Table 2

Percentage of participant desk usage by student status.

Status	Old	New	<i>p</i> -value
Freshman (year 1)	29%	23%	0.018
Sophomore (year 2)	25%	26%	
Junior (year 3)	23%	28%	0.016
Senior (year 4)	14%	15%	
Super-senior (year 5+)	5%	5%	
Graduate student	3%	2%	
Other	1%	0.3%	

Note: Boldface indicates a significant difference between groups.

Table 3

Percentage of participant desk usage by frequency of use.

Times used/week	Old	New
1–5	76%	79%
6–10	18%	17%
11+	6%	4%

Table 4

Percentage of participant desk usage by length of stay.

Length of stay (min)	Old	New	<i>p</i> -value
0–30	2%	1%	
31–60	21%	13%	<0.001
61–90	42%	35%	0.020
91–120	22%	30%	<0.001
120+	13%	20%	0.002

Note: Boldface indicates significant difference between groups.

Table 5

Percentage of participant desk usage by physical comfort rating.

Level of physical comfort	Old	New	<i>p</i> -value
1 (not very comfortable)	6%	0.3%	
2	29%	2%	
3	37%	10%	
4	23%	44%	< 0.001
5 (very comfortable)	5%	44%	< 0.001

Table 6

Percentage of participant desk usage by activity frequency.

ISD activity	Done a lot		Done some		Done rarely or never	
	Old	New	Old	New	Old	New
Studying for exams	75%	84%	19%	13%	3%	2%
Working on homework assignments	86%	90%	10%	8%	2%	1%
Academic reading	57%	52%	30%	33%	8%	9%
Personal reading	7%	5%	19%	26%	65%	62%
Academic watching/listening	34%	35%	42%	43%	16%	14%
Personal watching/listening	11%	7%	37%	40%	44%	46%
Gaming	0.3%	1%	8%	5%	84%	87%
Sleeping	4%	2%	24%	20%	66%	70%
Praying	5%	7%	30%	29%	56%	55%
Meditating or pondering	7%	6%	34%	37%	51%	51%
Other	3%	3%	2%	1%	9%	7%
<i>N</i>	591	697	591	697	591	697

Note: Boldface indicates significant difference between groups. Students could select more than one option.

Table 7

Percentage of students using new ISD whiteboards for specific tasks.

White Board Uses	%
Solving equations	25
Mapping out strategies	19
Summarizing class notes/readings	16
Creating writing outlines	14
Drawing/doodling	5
Writing motivational quotes	3
Did not use	9
Other	9

Note: Participants could select more than one feature so percentages are not out of 100.

Assessing Old and New Individual Study Desks

Introduction

Changes to academic library spaces require input from primary users to develop the spaces they want and need (Hall and Kapa, 2015; Loder, 2000; Walton, 2006; Zhang and Maddison, 2016). These spaces include open spaces with tables, group study spaces, innovation spaces, and individual study spaces. Each has advantages and drawbacks. For example, Loder (2000) indicates that tables provide the opportunity to spread out materials, but when used by more than one student, tables make it difficult to define an individual's workspace. While individual study desks (since many students do not understand the term *carrel*, we call them "individual study desks," or ISDs) define a student's workspace, there is little room for spreading out materials, nor is there opportunity to add amenities (e.g. electrical and USB outlets) that aid studying students.

Since their inception, ISDs typically resembled a wood box on stilts with a confined writing surface and a shelf. Chairs were normally wood built more to last than to be comfortable. As far back as the 1960s there were calls to improve ISD design so they would have an excellent study lamp, contain a larger desk with considerable writing surface, and have a comfortable seat (Sommer and Peterson, 1967). These changes could enable ISDs to better fit students' learning and research needs.

Background

In 1976, the first of two additions to the CCC opened. The addition included the purchase of more than 400 ISDs and accompanying wooden chairs. These ISDs were distributed across the library's five public floors.

In early 2014, a faculty member who teaches a Technology 312: Innovation Bootcamp course asked if the library had a project that the students could do as part of the course. The library suggested developing a replacement for the library's nearly forty-year-old ISDs. The Innovation Bootcamp students applied the USERS model to approach the problem (Skaggs et al., 2012). USERS stands for

- U–Understand (Observe/Experience/Inquire)
- S–Shape (Organize/Simplify/Clarify)
- E–Explore (Question/Compare/Combine)
- R–Refine (Visualize/Validate/Iterate)
- S–Share

Based on surveys, observations, and informal focus groups, three different teams from the class developed and shared solutions with library administrators. Using the common themes identified by the Innovation Bootcamp teams (more space, privacy, shelving, electrical and USB outlets, lighting, a footrest, a reading stand, a whiteboard, and a comfortable chair), a design

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5 team that included library and university physical facilities personnel developed two prototype
6 ISDs.

7 Each prototype included desired features (e.g., LED vs. fluorescent lighting or a small vs.
8 large shelf). The prototypes were placed side-by-side in a high traffic area of the library, and
9 students passing by (convenience sample) were invited to sit in each and provide feedback via an
10 online survey. The ISD prototypes were then placed on four different floors over the course of a
11 month for students to use. Students using the ISD prototypes were asked to complete a paper
12 survey about their experience.
13

14
15 Based on the input from these two surveys, the design team made changes to the alpha
16 prototypes and retested the resulting beta prototypes in the same way. The results of the beta
17 surveys resulted in a final design for the new ISDs. Since 2016, the library began replacing the
18 old ISDs with batches of new ISDs. At the time of this study, the library had replaced about half
19 of the old ISDs with new ISDs. It was determined that a follow-up study was needed to answer
20 the following questions:
21

- 22 1. In what ways are the new ISDs better than the old ISDs?
- 23 2. What, if any, difference do the new ISDs make to the students using them?

24 This paper reports on the results of the follow-up study.
25
26

27 28 **Method**

29 Two parallel surveys used a convenience sample and had identical questions except for
30 questions asking about use patterns and amenities specific to the new ISDs (see Appendix A).
31 The two surveys were developed by the authors using information from other library
32 assessments, including the original assessments done by the Innovation Bootcamp. The intent of
33 the survey questions was to compare student use patterns of the two desks to determine if there
34 was a difference and, if so, what was the difference between the desks. The intent of the survey
35 was not to create a measurement tool to be used by other universities, but to examine whether
36 changes made in this institution made a difference in student learning. While the survey was not
37 developed or intended for broader use, other institutions may use it as a model for comparison
38 assessments of furniture and space changes to their institution.
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43 Students were invited to participate in each survey via a QR code or a URL link shown
44 on flyers placed in each ISD for one week. The QR code and URL links corresponded to the
45 survey matching the ISD (e.g., links on flyers in new ISDs connected to the new ISD survey).
46 Library personnel reviewed each ISD daily to replace any flyers that had been taken or moved.
47 As an incentive to participate, those completing a survey could enter into a draw for one of five
48 \$10 cash rewards. As this study examined and compared use patterns of the two ISDs, having the
49 same student use and comment on both types of ISD was considered an advantage rather than a
50 bias.
51

52
53 The surveys included three open-ended questions to understand why students studied
54 where they did, what improvements to the desk itself were needed, and what was otherwise
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needed to improve the students' experience when working at an ISD. Two student researchers independently coded all comments from the three open-ended questions using the list of themes developed from responses (see Appendix B). Researchers counted how often comments were independently assigned to the same theme by both coders to determine the trustworthiness of coding. For example, if both coders agreed on the coding of the comment, the coding was accepted and considered trustworthy. However, if coders did not agree on how the comment should be coded, they discussed reasons why it should or should not be coded to a certain theme until they reached a consensus on how the comment should be coded.

All assessment procedures were approved by the university's IRB committee.

Findings

Demographics

Over the week that both surveys were active, a total of 1,288 responses were received (old ISD = 591, new ISD = 697). Both surveys had a gender response rate of about 60% male and 45% female (see Table 1). Sophomore and senior use of the two ISD types did not differ significantly (see Table 2). However, freshmen used old ISDs significantly more than new ISDs (29% vs. 23%) while juniors used new ISDs significantly more than old ISDs (28% vs. 23%). The use of the old ISDs by students appears to decline as students' time at the university increases; seniors used both old and new ISDs at about the same rate. The "other" category includes students working in a university entrance program, students from neighboring universities, and those visiting the university.

[Insert Tables 1 & 2 about here]

Desk Use

Students used both desk types a comparable number of times weekly (see Table 3), but varied in length of stay for each visit (see Table 4). Significantly more students stayed at old ISDs for durations of 31–60 minutes or 61–90 minutes. Significantly more students stayed at new ISDs for durations of 91–120 minutes or over 120 minutes.

[Insert Tables 3 and 4 about here]

A 5-point rating scale (1 = not very comfortable, 5 = very comfortable) was used to examine the comfort level of each desk type. A higher, non-significant proportion of students rated the old ISDs as less comfortable than the new ISDs (see Table 5). Conversely, significantly more students rated the new ISDs as more comfortable at either the second highest or highest levels of comfort. This finding complements the previous finding as a better level of comfort encourages students to stay longer.

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5 [Insert Table 5 about here]
6

7 *ISD Activities*

8 Users of both old and new ISDs were asked to identify all of the activities they engaged
9 in and the degree to which they engaged in each activity (a lot, some, and rarely or never) while
10 using an ISD. Table 6 shows the students' level of engagement for each activity by desk type.

11 Primary activities in the "done a lot" category for both desks included doing homework
12 assignments, studying for exams, and academic reading. Of these activities, significantly more
13 students studied for exams in new ISDs than in old ISDs ($p < 0.05$). Conversely, significantly
14 more academic reading took place in old ISDs than in new ISDs ($p < 0.05$).
15

16 For activities in the "done some" category, significantly more students did exam study in
17 old ISDs than in new ISDs ($p < 0.05$). Significantly more personal reading took place in new
18 ISDs than in old ISDs ($p < 0.05$). No activities "done rarely or never" had significant differences
19 between the ISD types, but activities that ranked lower in the "done a lot" category (i.e., gaming,
20 sleeping, personal reading, praying, and meditating or pondering) were activities that most
21 students engaged in rarely or never.
22

23
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26
27 [Insert Table 6 about here]
28

29 Secondary uses for the desk (used by less than 50% of the students but more than 20%)
30 included more personal activities such as personal watching or listening, meditating or
31 pondering, praying, and sleeping.
32

33 New ISDs include a whiteboard on the long sidewall of the desk. Over 90% of students
34 used the whiteboard, with most using it to solve equations, map out strategies, summarize class
35 notes/readings, and/or create writing outlines (see Table 7).
36
37

38
39 [Insert Table 7 about here]
40

41 *Desk Amenities*

42 We also examined student preference for the specific amenities of the new ISDs.
43 Amenities preferred by 70% or more of students included (in order of preference) electrical
44 outlets, the whiteboard, desk space, a movable footrest, and under-the-shelf lighting.
45
46

47 *Open-Ended Survey Comments*

48 Where possible the same themes for comparing responses for the three questions were
49 used. However, some themes were unique to particular questions. Themes and their descriptions
50 are in Appendix B.
51

52 *Reasons for study.* Among students' primary reasons for choosing a new ISD were
53 privacy and the ability to focus. Those using old ISDs indicated that ISD location, typically in
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low traffic areas allowing more privacy, was more important than using a new ISD. Students also adopted the new ISD as their personal space; similar to findings in other studies (Bodaghi and Zainab, 2013). Typical student responses included:

... I really like having my own little study space to focus and work on homework. I think that I am more productive in this type of environment because it is less distracting than having a lot of people coming and going and that gives me enough space to just plug into what I'm doing.

I can focus better here because of the walls. I'm not distracted by other people, I can focus on my work.

Unique to those choosing a new ISD were comments on amenities (e.g., whiteboard and space) as key reasons for the choice. Most comments indicated that these amenities facilitated studying and concentration. Typical comments were:

The extended desk space is super nice, I like to lay out all my books, computer, and notebooks without feeling cluttered. The light is really nice too and the personal outlet for charging your phone or computer. And since I usually spend a few hours studying for a big exam at these desks, the swivel office chair is so much more comfortable than a wooden chair.

The white boards are awesome for scratch work and save me from using a lot of paper. The chairs are more comfortable than any of the wooden chairs in the library. Lots of desk space and easy access to electrical outlets.

Improved desk and experience. Comments referring to what could improve the desk or the student's experience using the desk took a bit of an ironic twist. Those using an old ISD indicated that they wanted a better chair, power outlets, and a whiteboard—amenities that would make the old ISDs similar to the new ISDs.

One indication of the success of the new ISDs was the more than 44% of comments positively mentioned one or more amenities of the new desks. Users of new ISDs wanted to ensure that dry erase markers and erasers were available for the whiteboards. The two most common comments from new ISD users were requests for more new ISDs and statements that no improvements were needed. For example:

Just have more of them. It is a bummer when they are all filled because then I have to sit at a desk which usually leads to me getting distracted by friends and my studying is less effective.

Discussion

These findings indicate that, while the number of visits each week is similar between the two desk types, significantly more students using old ISDs stay for shorter periods of time and significantly more students using new ISDs stay for longer periods of time.

When we combine the totals for the “done a lot” and “done some” categories, it is apparent that both ISDs are primarily used for academic activities. Almost 100% of students used the ISDs for studying for exams and completing homework assignments. More than 75% of students indicated that they read, watched, or listened to academic material while at an ISD. These findings support the idea that ISDs are generally used for academic pursuits typical of the focuser persona (i.e., a student who wishes to study alone and be focused on a given activity without interruptions; Zaugg and Rackham, 2016; Zaugg, 2017). These results support findings that students use ISDs primarily for academic and personal activities (Loder, 2000; Walton, 2006).

Conclusion

The success of the new ISDs is attributed to an effective and iterative design process based on feedback and prototyping. Using feedback from users of old ISDs, Innovation Bootcamp class members created concepts for new ISDs. Prototypes helped to refine these ISD concepts into a new ISD that students use more, value more, and better meet their needs.

The library continues to replace all of the old ISDs, with an anticipated completion date of 2021. Additionally, the library’s Assessment Office has completed and continues to evaluate other renovated spaces and altered services within the library as advocated by Zaugg (2018). This practice helps the library to know if changes made were improvements instead of just a change to something different.

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Appendix A: Surveys for New and Old ISDs

New ISD

Q1 We are examining how students use our new individual study desks. We invite you to take a few minutes and complete our short survey to help us understand how these individual study desks are working as a study space for you and what we can do to improve them. If you start the survey, you may refuse to answer any question or you may stop answering the survey at any time. However, we would appreciate you completing the survey. Those completing the survey have the chance to enter a draw for one of five \$10 Cougar Cash incentives. This study is being conducted by a research team led by BBB, Assessment Librarian (801-422-4718 or BBB@AAA.edu). If you have any questions or concerns, please contact him. You may also contact AAA's Office of Research & Creative Activities if you have any concerns about this survey.

Yes, I will participate

No, I do not want to participate.

Q2 What is your gender?

Male

Female

Q3 What is your status at AAA?

Freshman (year 1)

Sophomore (year 2)

Junior (year 3)

Senior (year 4)

Super-senior (year 5+)

Graduate student

Other (please specify) _____

Q4 How many times per week do you typically use an individual study desk like this one?

1–5

6–10

11+

Q5 For what length of time do you stay during a typical visit?

0–30 minutes

31–60 minutes

61–90 minutes

91–120 minutes

Over 120 minutes

Q6 How physically comfortable is studying in this individual study desk?
 (1 = not very comfortable, 5 = very comfortable)

	Not very comfortable	2	3	4	Very comfortable
ISD physical comfort					

Q7 If an individual study desk like the one you are in was not available, where would you go to study?

Another type of individual study desk

A table

A lounge chair

A bar desk spot

A group study room

Other (please specify) _____

I would leave the library and study elsewhere.

Q8 Please drag and drop each activity into the appropriate box to best describe what you typically do in an individual study desk.

Studying for exams

Working on homework assignments

Academic reading

Personal reading

Academic watching/listening

Personal watching/listening

Gaming

Sleeping

Praying

Meditating or pondering

Other (please specify)

I do this a lot	I do this some of the time	I rarely or never do this

Q9 What do you do on the white board?

I do not use the white board

Solve equations

Map out strategies

1
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3
4
5 Create outlines for writing

6 Summarize class notes/readings

7 Write motivational quotes

8 Drawing/doodling

9 Other (please specify) _____
10

11
12 Q10 Which of the following best describes you?

13 I typically try to get an individual study desk in the same general area of the library.

14 I use individual study desks in various locations depending on my mood.
15
16

17
18 Q11 What features of the study desks do you use? Only check the things you use.

19 Light under shelf

20 Electric plug

21 Desk extension

22 USB Plugs

23 Moveable footrest

24 Shelf
25
26
27

28 Q12 What features of these individual study desks do you like?

29 Color

30 Size of side walls

31 Desk space

32 Shelf

33 Location
34
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36
37

38 Q13 How can we make individual study desks like this one better?

39 _____
40 _____
41

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43 Q14 In what ways can we improve your experience using the individual study desks like this
44 one?
45

46 _____
47 _____
48

49 Q15 Think back to where you studied before we had these new individual study desks.

50 Comparing your study experience with this individual study desk and your previous study space,
51 why do you choose to study here?
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54 _____
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6 Q16 As our way of saying thanks for filling out the survey, we are having a draw where five
7 people who completed the survey will have \$10 Cougar Cash deposited to their account. If you
8 would like to enter the draw please provide your name, email, and net ID below.
9

10 Name _____

11 Email _____

12 Net ID _____
13
14
15

16 **2018 Old ISD**

17
18 Q1 We are examining how students use our individual study desks. We invite you to take a few
19 minutes and complete our short survey to help us understand how these individual study desks
20 are working as a study space for you. If you start the survey, you may refuse to answer any
21 question or you may stop answering the survey at any time. However, we would appreciate you
22 completing the survey. Those completing the survey have the chance to enter a draw for one of
23 five \$10 Cougar Cash incentives. This study is being conducted by a research team led by BBB,
24 Assessment Librarian (801-422-4718 or BBB@AAA.edu). If you have any questions or
25 concerns, please contact him. You may also contact AAA's Office of Research & Creative
26 Activities if you have any concerns about this survey.
27

28 Yes, I will participate

29 No, I do not want to participate.
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33 Q2 What is your gender?

34 Male

35 Female
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39 Q3 What is your status at AAA?

40 Freshman (year 1)

41 Sophomore (year 2)

42 Junior (year 3)

43 Senior (year 4)

44 Super-senior (year 5+)

45 Graduate student

46 Other (please specify) _____
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50 Q4 How many times per week do you typically use an individual study desk like this one?

51 1-5

52 6-10

53 11+
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Q5 For what length of time do you stay during a typical visit?

0–30 minutes

31–60 minutes

61–90 minutes

91–120 minutes

Over 120 minutes

Q6 How physically comfortable is studying in this individual study desk?

(1 = not very comfortable, 5 = very comfortable)

	Not very comfortable	2	3	4	Very comfortable
ISD physical comfort					

Q7 If an individual study desk like the one you are in was not available, where would you go to study?

Another type of individual study desk

A table

A lounge chair

A bar desk spot

A group study room

Other (please specify) _____

I would leave the library and study elsewhere.

Q8 Please drag and drop each activity into the appropriate box to best describe what you typically do in an individual study desk.

Studying for exams

Working on homework assignments

Academic reading

Personal reading

Academic watching/listening

Personal watching/listening

Gaming

Sleeping

Praying

Meditating or pondering

Other (please specify)

I do this a lot

I do this some of the time

I rarely or never do this

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8 Q9 Which of the following best describes you?

9 I typically try to get an individual study desk in the same general area of the library.

10 I use individual study desks in various locations depending on my mood.
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13

14 Q10 What features of these individual study desks do you like? Only check the things you like.

15 Color

16 Size of side walls

17 Desk space

18 Shelf

19 Location
20
21
22
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24 Q11 In what ways could we make individual study desks like this one better?

25 _____
26 _____
27 _____

28
29 Q12 In what ways can we improve your experience using individual study desks like this one?

30 _____
31 _____
32 _____
33

34 Q13 Think back to where you have studied in the library. Comparing your study experience with
35 this individual study desk and your previous study space, why do you choose to study here?
36

37 _____
38 _____
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41 Q14 As our way of saying thanks for filling out the survey, we are having a draw where five
42 people who completed the survey will have \$10 Cougar Cash deposited to their account. If you
43 would like to enter the draw please provide your name, email, and net ID below.

44 Name _____

45 Email _____

46 Net ID _____
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Appendix B: Themes for Open-Ended Questions

In what ways could we make individual study desks like this one better?

Theme	Description
Amenities: Chair	Asks for or specifically refers to chair or seating
Amenities: Desk light	Asks for or specifically refers to desk light or lighting
Amenities: Footrest	Asks for or specifically refers to footrest
Amenities: Other	Asks for or refers to a specific amenity of the ISD
Amenities: Outlets	Asks for or specifically refers to outlets, USB or plugs
Amenities: Size	Asks for or specifically refers to room or size of desk
Amenities: Walls	Asks for or specifically refers to walls of desk, including wall color
Amenities: White board	Asks for or specifically refers to white board, erasers, or pens
Cleaner	Comments that desks need to be cleaned more often
Location/orientation	Indicates a general or specific place that the ISD may be located
More new desks	Specifically asks for more new ISDs
OK	Indicates that the desk is fine the way it is
Other	Any comment that does not fit within the other categories
Snacks/food	Comments on the ability to eat food or snacks at an ISD or the problems it may cause
Surrounding area	Comments on the area or amenities around the desk but not the desk itself

In what ways can we improve your experience using individual study desks like this one?

Theme	Description
Amenities: Chair	Asks for or specifically refers to chair or seating
Amenities: Desk light	Asks for or specifically refers to desk light or lighting
Amenities: Footrest	Asks for or specifically refers to footrest
Amenities: Other	Asks for or refers to a specific amenity of the ISD
Amenities: Outlets	Asks for or specifically refers to outlets, USB or plugs
Amenities: Size	Asks for or specifically refers to room or size of desk
Amenities: Walls	Asks for or specifically refers to walls of desk, including wall color
Amenities: White board	Asks for or specifically refers to white board, erasers, or pens
Cleaner	Comments that desks need to be cleaned more often
Direction of desk	Indicates a preference for a desk to face a certain direction
Location/orientation	Indicates a general or specific place that the ISD may be located
More new desks	Would like there to be more ISDs
Nothing	There is nothing to improve or no comment
OK	Indicates that the desk is fine the way it is
Other	Any comment that does not fit within the other categories
Snacks/food	Comments on the ability to eat food or snacks at an ISD or the problems it may cause
Surrounding area	Comments on the area or amenities around the desk but not the desk itself

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5 Think back to where you have studied in the library. Comparing your study experience with this
6 individual study desk and your previous study space, why do you choose to study here?

7 Theme	Description
8 Amenities: Chair	Discusses or specifically refers to chair or seating
9 Amenities: Desk light	Discusses or specifically refers to desk light or lighting
10 Amenities: Footrest	Discusses or specifically refers to footrest
11 Amenities: Outlets	Discusses or specifically refers to outlets, USB or plugs
12 Amenities: Size	Discusses or specifically refers to room or size of desk
13 Amenities: Walls	Discusses or specifically refers to walls of desk, including color
14 Amenities: White board	Discusses or specifically refers to white board
15 Amenities: Other	Discusses or refers to a specific amenity of the ISD
16 Accessibility	Comments on help with learning disability
17 Availability/convenience	Comments on availability of use or unavailability of preferred
18	space
19 Focus	Comments on ability to focus on activity for a variety of reasons
20 Location	Comments on physical location, ambiance of things around it, and
21	access
22 Mental health	Refers to improving feelings about studying
23 Privacy	Comments on avoiding interruptions, distractions, or noise
24 Type of study space	They study there because it is a desk for use just by the person
25 Other	Any comment that does not fit within the other categories or is not
26	related to ISDs, no comment, or generic approval

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