BREAKING THE BRAIN BARRIER: THE EFFECT OF BRAIN BREAKS ON FIDGETING BEHAVIORS IN A LECTURE BASED COLLEGE CLASSROOM

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BREAKING THE BRAIN BARRIER: THE EFFECT OF BRAIN BREAKS ON FIDGETING BEHAVIORS IN A LECTURE BASED COLLEGE CLASSROOM

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ABSTRACT

Concentration and focus in class is sacrificed for longer class periods with more students per class. In a college classroom, lecture style dominated programs and crowded classrooms make it more likely for students to experience lower attentiveness during class. This research seeks to provide a possible remedy for attention drops through the use of brain break" protocols in lecture style classrooms. Brain breaks in this case, are five to ten-minute activities with the goal of refreshing student's minds and allowing them to focus better in the remainder of their class period. This work examines research on natural brain breaks and fidgeting behaviors and relates them via a case study performed in an hour and twenty-minute long college class in order to examine the benefit of placing breaks in lecture presentations. The brain break protocol was created using several different Brain Gym exercises and a fidgeting behavior checklist was generated based off of behaviors observed in a typical lecture class. Benefits were tracked using this checklist of eight chosen behaviors. Three students were observed in this case study, with each having their fidgeting behaviors frequencies recorded before and after brain breaks. The three students in this case study all showed improvements in attentiveness and lower frequencies of fidgeting behaviors. As a result, it is practical to say that in order to enrich the learning environment, professors and teachers should aim to incorporate brain break activities into their teaching styles.

I. INTRODUCTION

As a university in service to undergraduate and graduate students, many institutions include in their mission statement a variation of being "an intellectual environment nurturing the human mind and spirit."[1] For this statement to ring true, the curriculum provided should allow for an active learning environment to some capacity. In this case, active learning meaning the incorporation of engaging, non-obstructive breaks into a lecture style of teaching. However, while the teaching style of the professor is at the mercy of their own pedagogy, students are responsible for trying new methods of remaining focused or fall into the pit of distraction while class carries on.

Additionally, classroom dynamics are affected by the length of the class and classroom size. Some classes may have up to 400 students in a single lecture hall with the class length varying from fifty minutes to three hours in length. The addition of technology also provides a large obstacle to maintaining attention, as student's phone and laptop use in classrooms continues to grow.[2] These dynamics further cripple the effectiveness of lecture style classrooms as a student sitting in a college classroom for hours without a break in the lecture has little hope of staying focused the entirety of the class period. As students are held accountable for their ability to gain information in the classroom setting, the need for a positive intervention to improve the quality of attention in the classroom is undeniable.

Positive steps toward a more "mentally nourishing" environment should target active participation or engagement with activities that will allow the student to learn how to focus in the classroom. These activities can be worked into the fabric of the classroom curriculum so that they are less invasive but still effective in improving attention in the

classroom. However, in order to understand how to weave these activities in the classroom, it is important to understand current research in education and focus along with possibilities of activities.

i. Education and Focus

University professors are poised to teach in the ways that they were once taught. The teacher-centered approach lends itself to lecture style classes, which may not be the best style of learning for students. Student-centered learning in this case being a system in which the student is able to address their own learning interests and needs. In a teacher-centered environment, students are more prone to becoming disinterested in their work.[3] The support of student's learning potential allows a student to perform more effectively, with their ability to make sense of what they know and learn through the guidance of their professor.

In order to create working systems for student-centered learning, professors benefit from using active learning practices in their classrooms. Active learning in this case being any activity that eliminates complete passive listening in a lecture-based class.[4] Professors may create simple tasks that do not impede on the flow of class such as clarification pauses or allowing students to move around the class to generate thoughtful conversation. These simple tasks increase the likelihood for students to become more attentive and thoughtful on the information being presented in class.

As a student sits in a classroom, every minute of attention counts. For college students, motivation to pay attention in the classroom may be broken down into three categories according to Mark Cieliebak, Amani Magid, and Beatrice Pardarelli. Motivation may be based on personal interest, entertainment, or fear of an event such as a

test.[5] By sitting in class, listening to their professor lecture they will gage how much they should be paying attention based on whether or not it will benefit them to do so. Students will process information differently for a subject that falls within the student's major, when there is an entertaining video or slide show, or if the student is solely concerned about test material. Instructors are then forced to adapt their lecture styles in order to satisfy at least one of these motivation areas in order for their students to focus more effectively.

In order to create classrooms with more attentive students, programs like that of the University of Iowa[5], have been created with interaction in mind. For the University of Iowa's "Introduction to Environmental Science" course, a transition was created to divert from a normal traditional lecture to an interactive classroom. In this style of classroom tasks are assigned to groups of students, quizzes are done online, and lecture time allotted to professors was decrease by a third. As a result, increased student participation and noticeably higher engagement levels with the course materials was observed.[6] This adaptation to a college classroom curriculum stems from the need to create a more interactive system of schooling. Higher interaction causes more breaks in longer lecture classes, which allows the brain to process and memorize the information being taught.[7]

ii. The Brain Barrier

The brain is exceedingly dynamic. As an individual grows, their brain adapts and increases in functional capacity in order to intake a variety of information. In the college-aged years of development, activities can influence the actual mass and organization of the brain.[8] As a student learns, input from the outside world is processed by various areas

of the brain. According to Eric Jenson, author of *Meet Your Amazing Brain*, "input to the brain arrives from the five senses or is generated internally through imagination or reflection."[8] Initial processing is performed thalamus, but information is also routed simultaneously to specific areas for further processing. For example, visual stimuli are routed to the occipital lobe, language is routed to the temporal lobe, and so on. As these processes occur in the brain, the environment in which students are involved is extremely important. Any support given to the brain to fully process material will improve cognition and the ability for the student to focus in class.

Further, as the brain has to process information, some drops in attention are seen every ten to eighteen minutes where the brain begins to catalog input.[9] The brain sorts information taken in during those eight to ten minute segments before "resetting" to intake the next chunk of information. Due to the existence of these natural breaks in attention, an individual unknowingly begins to drift out of being focused in the activity they are participating in. The individual is then forced to re-focus in order to remain efficient. Further research into attention span has even cited a twelve to eight second drop in the ability to fully concentrate on a single task in the last decade.[10] With that in consideration, it's understandable that traditional lecture styles lead students to lose track of what their professor is lecturing on. This "brain barrier" is not impenetrable however, as structured breaks in instruction help increase the efficiency of the brain and coincide with natural breaks in attention.

iii. Fidgeting Behaviors

Tapping on a desk, bouncing legs, and countless more behaviors befall students sitting in their desks. Outwardly produced behaviors and movements may be the best

way to gage what internal thoughts and attitudes may exist in a student sitting in a classroom. Fidgeting behaviors have varied causes, but for the purpose of this research fidgeting is a behavior caused by the constant stimulation of a classroom. For students who fidget, different behaviors manifest while lapses in attention occur. These behaviors can be disruptive to students around the person and instructors teaching the class.[11]

As discussed previously, student's ability to remain attentive suffers in lecture-based classrooms. Hour long lectures demand for the student to listen, take notes, and watch for changes in PowerPoint slides or written notes. By bombarding each student with a mass of information and no breaks to process, their minds begin to wander. According to James Farley et. Al (2013) in their article on attention and lecture retention, there is a positive correlation between tendencies to fidget and daydream while in the classroom environment. [12.] As these student's fidget, they create a sort of "mental break" in order to supplement the high demand for attention. In a sense, fidgeting can be seen as a mark of attentiveness and can be a way to track when would be the best time to add breaks to a lecture.[13]

Understanding these behaviors and the impact they have in the classroom is an important lesson for both students and teachers/professors. In order to operate a classroom with highly attentive students, instructors must be aware of lapses in attention and where fidgeting behaviors most often occur. For students, the best improvement to lectures would be to add natural breaks in the lecture that can allow for the student to process information and restore an optimal level of attentiveness.

iv. Breaking the Barrier

Implementing a form of brain break is used to bridge the gap between natural breaks in attention and the need to maintain focus for students in a classroom. These breaks may be full body movements, or simple in-chair exercises. The goal is to improve blood flow, include motor control, and divert attention momentarily while the brain processes material taught in class.

For this investigation, the programs from Brain Gym International were explored. The company focuses on movement with intention in order to create a deeper learning experience. The activities being used in this study are Lazy eights, thinking caps, brain buttons, hook up's and cross crawls. These activities require minimal movements so that they are more readily incorporated into the classroom setting. Students may also independently do them in class if they feel that their attention is beginning to drift. [14]

In "lazy eights" students use their fingers to "draw" figure eights either in the air with their fingers or on a piece of paper. They may begin with their dominant hand and challenge themselves to perform the activity with the non-dominant hand as the activity becomes easier. According to the company, "When students use their non-dominant hand to draw the figure eight, it engages the creativity portions of the brain, making this variation a good warm-up for art or creative writing lessons." Along with brain activation, the drawing of figure eights loosens up the muscles in the arm and wrist, and may serve to ready students for writing essays. In the minute taken to complete the activity, students will be refreshed mentally and physically so that they might complete their in-class activities.

"Thinking caps" is an energy exercise in which massage and movement are used to induce relaxation and refocusing. In the activity, students will turn their head to the

right and left, looking as far back as they seemingly can. They are then challenged to massage their ears by "rolling and unrolling" the crease, beginning at the top and going all the way to the bottom. They may also pause and massage the earlobes for a few seconds before beginning to move back up to the top of the ear. The activity is then repeated three times. Students then re-asses how far they are able to turn their head right and left immediately following the "thinking cap." By releasing tension in the neck, the body is then better to organize itself more effectively and focus in class will be improved.

"Brain buttons" help to reduce stress and are ideal exercises to perform during breaks in class or slides in lecture. The exercises are especially helpful when students show frustration with a concept or assignment. To perform the exercise, students press their fingertips lightly against their foreheads above each eye, about halfway between the eyebrows and the hairline. Students then close their eyes and breathe slowly. They may also move down their face and neck to press against their cheeks, clavicles and shoulders. In order to pace the exercise, it may be beneficial to count to five for the duration of inhaling and count to five for exhaling. By repeating this exercise three times, the brain is able to reset and de-stress. In turn, students may be better able to focus in class following the exercise.

"Hook Ups" are an activity where students will sit in their chairs, cross their right legs over their left at the ankles, place their right wrist over their left and curl their hands inwards to interlock fingers. They will then rotate their wrists in so that their fingers point up toward their head and elbows are out, and their arms are close to the chest. Students will stay in this position for a few minutes, taking deep, slow breaths. The instructor will ask the students to raise certain fingers on their hands to see if the students

can complete the task. They will then "un-hook" their legs and arms to end the exercise. This activity challenges the student to remain attentive and calm as they raise each finger without making a mistake.

"Cross Crawls" are an activity where the students will be standing. They will touch their right knee to their left elbow while their right arm is behind their body. They will then perform the action with the opposite arm and knee. Students will then perform the exercise for about two minutes. This exercise causes a cardiovascular response to activity, allowing movement to ease tension developed from sitting in a chair throughout the lecture. As this break is more physically and spatially demanding, it is most effective for use in classrooms that are not restricted to stadium seating styled classrooms.

In order to maximize the effectiveness of these Grain Gym activities, they should be performed every twenty to twenty-five minutes. In this time, student attention is likely to have lowered in this time frame, however it allows for enough material to be presented in lecture to not impede on the progress of the class. A combination of these classes will also add enough variety that the brain break does not become overused. It is important to explore different breaks and implement them randomly in order to continue the effects that they might produce for students.

For professors to implement these programs in their classrooms, there is no need to be concerned with affecting productivity of the lecture. Instead, if they are worked into PowerPoint slides, they can expect where and when attention may drop and where students may need a break. Also, if breaks utilize class materials to enrich the activities performed, professors may see immediate feedback from students.[15]

II. Methods

i. Participants

Participants were selected for this research based off of their enrollment in a course under the Human Health and Performance Department and Texas State University. The class was chosen based on the availability of the instructor, lecture-based instruction, and possibility of altering class PowerPoints to include the brain break activities. After selecting a class of about sixty students, the instructor allowed me to enter the classroom to speak to the students about this investigation. For the purpose of diversity and inclusivity, the entire class was selected as possible candidates for participating in the case study.

In order to participate, the students must have signed an informed consent form (see Appendix D) explaining the case study observations and brain breaks that would be performed in their hour and a half long class. Participants were given a thorough explanation of brain breaks before the first classroom visit so that they might better understand the purpose and process of performing brain breaks before they were required to turn in their informed consent forms. All genders, ages and ability levels were allowed to participate or choose to not participate in both the brain breaks and observations made of the classroom.

ii. Procedure

This investigation was formulated to follow a case study format. The goal of the case study was to provide the opportunity to observe a single set of students and perform a brain break program at least once per visit in the classroom. It was decided by the instructor and myself that I would visit the classroom three times. In order to decrease

my impact in the classroom setting, the instructor conducted the brain breaks while I observed from the back of the classroom throughout the class. The instructor was given the freedom to choose which brain break they wanted to perform and when they would like to perform the break as long as it was within twenty-five to forty minutes into the class time.

Before the three days of true observation, the instructor and myself took note of any and all fidgeting behaviors that were noted within the classroom on the day that the students were introduced to the investigation. These general observations were translated into a checklist of fidgeting behaviors seen most often in the classroom (see Appendix A and B). These behaviors were leg shaking, toe/finger tapping, pen/pencil shaking, doodling, clockwatching/zoning out, biting finger nails, playing with hair, cell phone use, and doing other classwork.

For the three days the case study was implemented, data was obtained by performing one general and two targeted observations. The students followed at least one brain break in the first thirty minutes of the class (see Appendix C). Observations were to be taken before and after each brain break performed in the class during that day of observation. Each observation pre and post brain break were then recorded in their corresponding tables (see Tables 1-14).

Day one of the investigation was spent observing the class as a whole to obtain a base of understanding as to which students fidgeted the most. In order to gage the impact brain breaks had on the students in the classroom, three students (A, B, C) were observed during two targeted days of observation. The data was then compiled into frequency tables (see Appendix A) computed to demonstrate a percentage change in fidgeting

behaviors for particular students (A, B, C) after three days of class where brain breaks were performed (see Tables 15-18 and Figure 1).

iii. Observations

In the overall class observations, there were a total of fifteen fidgeting behaviors recorded from observing approximately forty-five students who had returned informed consent forms before a brain break was performed. The fidgeting varied, with most students observed biting their nails with eight total fidgets seen from eight different students (see Table 1). In the pre-brain break stage of class, the students overall seemed to have a problem remaining attentive during the lecture, and some students looked to the back of the classroom as fidgeting was being recorded in the fidgeting table worksheet. Following the brain break, the class seemed more attentive, which is supported by the drop in the frequency from fifteen fidgets to nine fidgets. Although cell phone use was seen to have increased (see Table 2), the students seemed to have re-focused on the class at hand as observations continued until the end of class.

The first of the targeted observation days were focused on students A, B, and C. This observation took place five days after the first observation. Each student was watched periodically throughout the first thirty minutes of class before the brain break was performed in order to avoid the student noticing the observer and actively trying to alter their typical classroom behaviors. Student A was observed as having seven fidgets before the brain break was performed. This student was also noted to have not been paying attention to the lecture as they were on their laptop throughout the entire class. They had one instance of clock watching, four instances of biting their finger nails, and two instances of doing other classwork on their laptop (see Table 3). They did however

exhibit a decrease in fidgets as they only displayed five fidgets for the rest of class. They only had two instances of biting their finger nails, one instance of cell phone use and two instances of doing other classwork on their computer (see Table 4). Student B began with a relatively low number of fidgets before the brain break with only four observed fidgets. They were observed tapping their fingers once, shaking their pen once, watching the clock once and doing other classwork once (see Table 5). Following the brain break, the student only exhibited three fidgeting behaviors throughout the remainder of class. They continued to watch the clock once, bit their fingernails once, and played with their hair once (see Table 6). Student C exhibited five fidgeting behaviors pre-brain break on the first day of observation. During the first thirty minutes of class they had one instance of shaking their leg, two instances of tapping their fingers, one instance of biting their nails, and one instance of using their phone (see Table 7). They exhibited a positive drop in fidgeting behaviors with only two seen after the brain break was performed. Following the brain break they had one instance of shaking their leg and one instance of biting their toes (see table 8).

Day two of targeted observation continued to focus on student A, B and C. This observation took place ten days after the first day of targeted observations. Student A was observed as having five fidgets in the first thirty minutes of class on day two of targeted observations. On this day, the student was on their laptop throughout the entire class, but fidgeting behaviors before the brain break were not remarkably better. The student moved in their seat frequently shaking their leg three times and biting their fingernails three times (see Table 9). However, following the brain break the student seemed much more attentive and only exhibited three fidgeting behaviors. They moved in their chair

once, doodled once and bit their nails once (see Table 10). Student B had increased fidgeting behaviors during day two of targeted observation. They were observed shifting in their chair once, tapping their fingers on their arm once, looking to their sides once, biting their nails twice and was on their phone once (see Table 11). Following the brain break, they only had one observed fidgeting behavior. They looked up at the clock for some time following the brain break but were attentive for the rest of the class (see Table 12). Student C had the most fidgets on day two of targeted observation with seven recorded fidgets. They moved around in their chair and shook their leg three times, tapped their fingers on their desk once, shook their pencil once, bit their fingernails once and were on their phone before the brain break (see Table 13). After the brain break, their fidgeting behaviors decreased to four observed fidgets. They continued to shake their leg once, tapped their pen on the desk, put their head in their hands once and bit their fingernails once (see Table 14).

iv. Tables

Table 1: Overall Class Observations – Pre-Brain Break 2/22/18

Fidgeting Behaviors Checklist **Class overall observations Pre-Brain Break**

Ahrens - 3329 TH Spring 2018

DATE	Behavior	Time Noted/ Notes	Frequency
2/22/18	Leg Shaking	1 leg shake 12:56	1
2/22/18	Toe/Finger Tapping	1 student at 1:10	1
2/22/18	Pen/Pencil Shaking	1 at 12:55	1
2/22/18	Doodling		
2/22/18	Clock Watching/Zoning Out		
2/22/18	Biting Finger Nails	four people at 12:45, three people at 12:54, one at 12:58	8
2/22/18	Playing with Hair	1 student at 12:58, same student 1:11,	2
2/22/18	Cell Phone Use		
2/22/18	Doing Other Classwork	2 student at 1	2
		Total	**15**

Table 2: Overall Class Observations – Post-Brain Break 2/22/18

Fidgeting Behaviors Checklist **Overall Class Observations Post-Brain Break**

Ahrens - 3329 TH Spring 2018

DATE	Behavior	Time Noted/ Notes	Frequency
2/22/18	Leg Shaking	1 at 1:35	1
2/22/18	Toe/Finger Tapping	1 at 1:44	1
2/22/18	Pen/Pencil Shaking	1 at 1:41	1
2/22/18	Doodling		
2/22/18	Clock Watching/Zoning Out		
2/22/18	Biting Finger Nails	1 at 1:41	1
2/22/18	Playing with Hair		
2/22/18	Cell Phone Use	1 at 1:23, 1 at 1:24, 4 at 1:40	6
2/22/18	Doing Other Classwork		
		Total	**9**

Pre-Brain Break Frequency	15
Post-Brain Break Frequency:	9
Post-Brain Break Improvement in Frequency of Fidgeting Behaviors:	40%

Table 3: Student A – Pre-Brain Break Observations 2/27/18

Fidgeting Behaviors Checklist **Student A - Pre-Brain Break**

Ahrens - 3329 TH Spring 2018

DATE	Behavior	Time Noted/ Notes	Frequency
2/27/18	Leg Shaking		
2/27/18	Toe/Finger Tapping		
2/27/18	Pen/Pencil Shaking		
2/27/18	Doodling		
2/27/18	Clock Watching/Zoning Out	12:45	1
2/27/18	Biting Finger Nails	12:38, 12:43, 1:16, 1:20	4
2/27/18	Playing with Hair		
2/27/18	Cell Phone Use		
2/27/18	Doing Other Classwork	12:47, 12:53	2
		Total	7

Notes: student not paying attention at all to the class

Table 4: Student A – Post-Brain Break Observations 2/27/18

Fidgeting Behaviors Checklist **Student A - Post Brain Break**

Ahrens - 3329 TH Spring 2018

DATE	Behavior	Time Noted/ Notes	Frequency
2/27/18	Leg Shaking		
2/27/18	Toe/Finger Tapping		
2/27/18	Pen/Pencil Shaking		
2/27/18	Doodling		
2/27/18	Clock Watching/Zoning Out		
2/27/18	Biting Finger Nails	1:16, 1:20	2
2/27/18	Playing with Hair		
2/27/18	Cell Phone Use	1:29	1
2/27/18	Doing Other Classwork	1:18, 1:25	2
		Total	5

Pre-Brain Break Frequency	7
Post-Brain Break Frequency:	5
Post-Brain Break Improvement in Frequency of Fidgeting Behaviors:	29%

Notes: Student was checked out the entire class.

laptop was a major ditraction

Table 5: Student B – Pre-Brain Break Observations 2/27/18

Fidgeting Behaviors Checklist **Student B Pre-Brain Break**

Ahrens - 3329 TH Spring 2018

DATE	Behavior	Time Noted/ Notes	Frequency
2/27/18	Leg Shaking		
2/27/18	Toe/Finger Tapping	12:39	1
2/27/18	Pen/Pencil Shaking	12:47	1
2/27/18	Doodling		
2/27/18	Clock Watching/Zoning Out	12:39	1
2/27/18	Biting Finger Nails		
2/27/18	Playing with Hair		
2/27/18	Cell Phone Use		
2/27/18	Doing Other Classwork	12:53	1
		Total	4

Table 6: Student B – Post-Brain Break Observations 2/27/18

Fidgeting Behaviors Checklist **Student B Post-Brain Break**

Ahrens - 3329 TH Spring 2018

DATE	Behavior	Time Noted/ Notes	Frequency
2/27/18	Leg Shaking		
2/27/18	Toe/Finger Tapping		
2/27/18	Pen/Pencil Shaking		
2/27/18	Doodling		
2/27/18	Clock Watching/Zoning Out	1:28	1
2/27/18	Biting Finger Nails	1:17	1
2/27/18	Playing with Hair	1:26	1
2/27/18	Cell Phone Use		
2/27/18	Doing Other Classwork		
		Total	3

Pre-Brain Break Frequency	4
Post-Brain Break Frequency	3
Post-Brain Break Improvement in Frequency of Fidgeting Behaviors	25%

Notes:

Better focused in the second half of class

Two brain breaks - findings after 1:20 are from break break 2

Table 7: Student C – Pre-Brain Break Observations 2/27/18

Fidgeting Behaviors Checklist **Student C Pre-Brain Break**

Ahrens - 3329 TH Spring 2018

DATE	Behavior	Time Noted/ Notes	Frequency
2/27/18	Leg Shaking	12:51	1
2/27/18	Toe/Finger Tapping	12:55, 1:03	2
2/27/18	Pen/Pencil Shaking		
2/27/18	Doodling		
2/27/18	Clock Watching/Zoning Out		
2/27/18	Biting Finger Nails	12:52	1
2/27/18	Playing with Hair		
2/27/18	Cell Phone Use	12:54	1
2/27/18	Doing Other Classwork		
		Total	5

Table 8: Student C – Post-Brain Break Observations 2/27/18

Fidgeting Behaviors Checklist **Student C Post-Brain Break**

Ahrens - 3329 TH Spring 2018

DATE	Behavior	Time Noted/ Notes	Frequency
2/27/18	Leg Shaking	1:28	1
2/27/18	Toe/Finger Tapping		
2/27/18	Pen/Pencil Shaking		
2/27/18	Doodling		
2/27/18	Clock Watching/Zoning Out		
2/27/18	Biting Finger Nails	1:21	1
2/27/18	Playing with Hair		
2/27/18	Cell Phone Use		
2/27/18	Doing Other Classwork		
		Total	2
		Pre-Brain Break Frquency	5
		Post-Brain Break Frequency	2
		Post-Brain Break Improvement in Fidgeting Frequency	60%
Notes	Two brain breaks - findings after 1:20 are from break break 2		

Table 9: Student A – Pre-Brain Break Observations 3/6/18

Fidgeting Behaviors Checklist **Student A Pre-Brain Break**

Ahrens - 3329 TH Spring 2018

DATE	Behavior	Time Noted/ Notes	Frequency
3/6/18	Leg Shaking	12:38, 12:48, 12:53, moving around in the chair	3
3/6/18	Toe/Finger Tapping		
3/6/18	Pen/Pencil Shaking		
3/6/18	Doodling		
3/6/18	Clock Watching/Zoning Out		
3/6/18	Biting Finger Nails	12:42, 12:47, biting fingernails, 1:06 - looking at nails (zoned)	3
3/6/18	Playing with Hair		
3/6/18	Cell Phone Use		
3/6/18	Doing Other Classwork		
		Total	6
Notes:	Student not on laptop today		

Table 10: Student A – Post-Brain Break Observations 3/6/18

Fidgeting Behaviors Checklist **Student A Post-Brain Break**

Ahrens - 3329 TH Spring 2018

DATE	Behavior	Time Noted/ Notes	Frequency
3/6/18	Leg Shaking	1:21 - moving around in the chair	1
3/6/18	Toe/Finger Tapping		
3/6/18	Pen/Pencil Shaking		
3/6/18	Doodling	1:12 - dotting page	1
3/6/18	Clock Watching/Zoning Out		
3/6/18	Biting Finger Nails	1:17 - biting nails/fingers around mouth	1
3/6/18	Playing with Hair		
3/6/18	Cell Phone Use		
3/6/18	Doing Other Classwork		
		Total	3
		Pre-Brain Break Frequency	6
		Post-Brain Break Frequency	3
`		Post-Brain Break Fidgeting Frequency Improvement	50%
Notes	Cross Crawls 1:13 - noise in the classroom got some in the back row talking/zoned out.		

Table 11: Student B – Pre-Brain Break Observations 3/6/18

Fidgeting Behaviors Check — **Student B Pre-Brain Break**

Ahrens - 3329 TH Spring 2018

DATE	Behavior	Time Noted/ Notes	Frequency
3/6/18	Leg Shaking	12:46 - shifting in chair	1
3/6/18	Toe/Finger Tapping	12:52 - tapping on arm	1
3/6/18	Pen/Pencil Shaking		
3/6/18	Doodling		
3/6/18	Clock Watching/Zoning Out	12:48 - looking off to the side	1
3/6/18	Biting Finger Nails	12:41, 12:47 - biting on nails and pen tip	2
3/6/18	Playing with Hair		
3/6/18	Cell Phone Use	12:54 - on phone, talked to neighbor	1
3/6/18	Doing Other Classwork		
		Total	6

Notes	**1:02 - student talked to neighbor for about 5-10 min**

Table 12: Student B – Post-Brain Break Observations 3/6/18

Fidgeting Behaviors Checklist — **Student B Post-Brain Break**

Ahrens - 3329 TH Spring 2018

DATE	Behavior	Time Noted/ Notes	Frequency
3/6/18	Leg Shaking		
3/6/18	Toe/Finger Tapping		
3/6/18	Pen/Pencil Shaking		
3/6/18	Doodling		
3/6/18	Clock Watching/Zoning Out	1:18 - zoning out, looking at hands	1
3/6/18	Biting Finger Nails		
3/6/18	Playing with Hair		
3/6/18	Cell Phone Use		
3/6/18	Doing Other Classwork		
		Total	1

Pre-Brain Break Frequency	**6**
Post-Brain Break Frequency	**1**
Post-Brain Break Improvement in Fidgeting Frequency	**83%**

Notes	1:13 - noise in the classroom got some in the back row talking/zoned out.

Table 13: Student C – Pre-Brain Break Observations 3/6/18

Fidgeting Behaviors Checklist — **Student C Pre-Brain break**

Ahrens - 3329 TH Spring 2018

DATE	Behavior	Time Noted/ Notes	Frequency
3/6/18	Leg Shaking	12:45, 12:53 - shifting in chair, 1:03 - leg shaking	3
3/6/18	Toe/Finger Tapping	12:39 tapping on desk	1
3/6/18	Pen/Pencil Shaking	1:01 - playing with pencil	1
3/6/18	Doodling		
3/6/18	Clock Watching/Zoning Out		
3/6/18	Biting Finger Nails	12:44 biting fingernails, messing w and looking at nails	1
3/6/18	Playing with Hair		
3/6/18	Cell Phone Use	12:40 on phone behind backpack	1
3/6/18	Doing Other Classwork		
		Total	7

Table 14: Student C – Post-Brain Break Observations 3/6/18

Fidgeting Behaviors Checklist **Student C Post-Brain Break**

Ahrens - 3329 TH Spring 2018

DATE	Behavior	Time Noted/ Notes	Frequency
3/6/18	Leg Shaking	1:18 - leg shaking	1
	Toe/Finger Tapping		
	Pen/Pencil Shaking	1:12 - tapped pen on the table	1
	Doodling		
	Clock Watching/Zoning Out	1:11 - head in hands, rubbing eyes	1
	Biting Finger Nails	1:22 - biting fingernails	1
	Playing with Hair		
	Cell Phone Use		
	Doing Other Classwork		
		Total	4
		Pre-Brain Break Frequency	**7**
		Post-Brain Break Frequency	**4**
		Post-Brain Break Improvement in Fidgeting Frequency	**43%**

Notes	1:13 - noise in the classroom got some in the back row talking/zoned out.

v. Analysis

For each of the three students that were observed in this investigation, brain breaks caused a decrease in the frequency of fidgeting behaviors. In order to calculate a percentage improvement in the frequency of fidgeting behaviors, the post-break frequency was subtracted from the pre-break frequency and then divided by the total fidgeting frequency (pre plus post frequencies). This was done for each of the three students (see Tables 15-17). Student A forty-two percent improvement in fidgeting behaviors, student B saw a sixty percent improvement, and student C saw a fifty percent improvement (see Table 18, Figure 1). Together, the students averaged about a fifty percent improvement in their fidgeting behaviors when a brain break was introduced in the first thirty minutes of the class period.

Table 15: Total Fidgeting Frequencies Student A

Student A	Pre-Break Frequency	Post-Break Frequency	Improvement in Fidgeting Behaviors
2/27/18	15.00	9.00	40%
3/6/18	6.00	3.00	50%
[redacted]			
Total:	21.00	12.00	42.00%

Table 16: Total Fidgeting Frequencies Student B

Student B	Pre-Break Frequency	Post-Break Frequency	Improvement in Fidgeting Behaviors
2/27/18	4.00	3.00	25%
3/6/18	6.00	1.00	83%
[redacted]			
Total:	10.00	4.00	60.00%

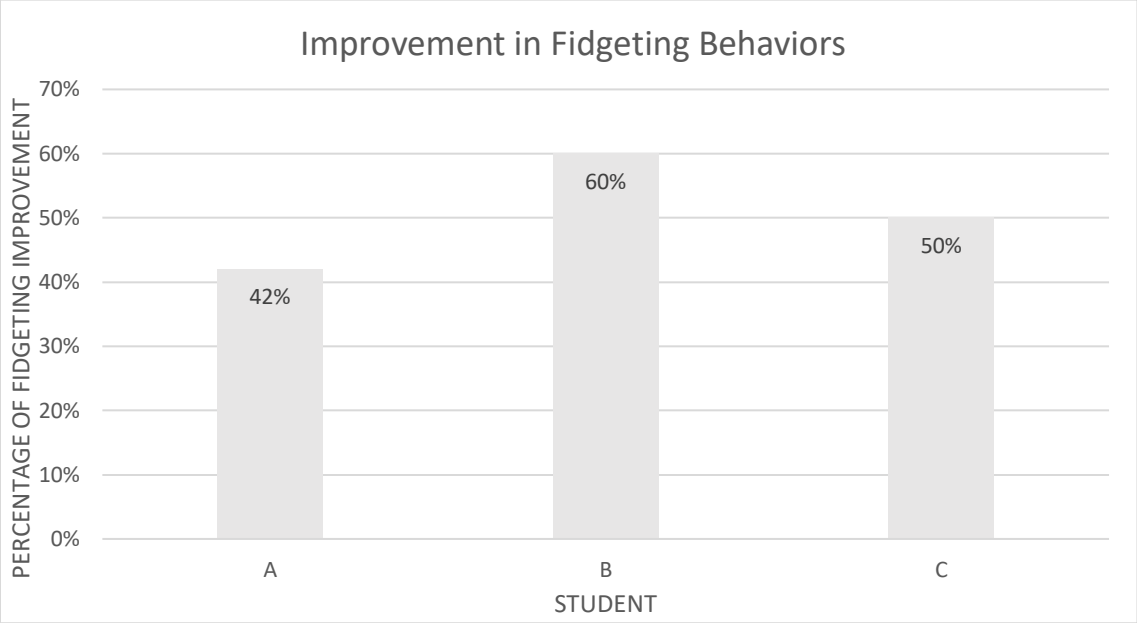
Table 17: Total Fidgeting Frequencies Student C

Student C	Pre-Break Frequency	Post-Break Frequency	Improvement in Fidgeting Behaviors
2/27/18	5.00	2.00	60%
3/6/18	7.00	4.00	43%
[redacted]			
Total:	12.00	6.00	50.00%

Table 18: Overall Improvement in Fidgeting Behaviors

Student	Percentage Improvement in Fidgeting Behaviors
A	42%
B	60%
C	50%

Figure 1: Overall Improvement in Fidgeting Behaviors Chart



III. Conclusion

Students are at the mercy of the style of teaching their professors elects to use. Regardless of the evidence suggesting that allowing a student to more effectively learn, it may be difficult to try an alter a lecture to fit the natural breaks their brains need to take in order to process information. The addition of supplemental activities may even seem impossible when professors are faced with the challenge of teaching as much information as they possibly can in the span of fifty to 120 minutes. However, given that many universities state in their missions that they seek to provide enriching learning environments, it should be stressed to instructors that it is possible to add breaks in whatever form seems most appropriate for their learning styles. Students should be given the opportunity to learn at their maximum capacity in the classroom or be taught tools that can be used to enrich their own classroom experiences.

By examining existing research into the brain's natural breaks and the principles of fidgeting as a maker for attentiveness, it is important to understand how this relationship may play as a benefit to these students who have trouble staying attentive in class. Using exercises, like Brain Gym's brain breaks, students and their professors may benefit from the exercises aimed at relaxing, refreshing and resetting the brain and body. While the work done in this investigation and case study encompasses a small population of students and all fidgeting behaviors could not possibly be observed in the class period, the general effects seen on fidgeting behaviors are something that cannot be ignored. For a student to go from having six fidgets to one within a class period, some aspect of the brain break must have been effective for that student.

This work is not to be a defamation of the lecture style system. Rather, it should be seen as a commentary on why it should be improved and one of many methods that may be used to do so. Brain breaks are not only effective on large classroom behaviors, individual students performing their own brain breaks in their chair may see the largest benefits. As a tool in the arsenal of a bright and determined student, brain breaks may be the remedy for stressful, over packed, and under stimulating college classrooms.

APPENDIX A
Fidgeting Behaviors Checklist

Fidgeting Behaviors Checklist **Student A/B/C Pre/Post-Brain Break**

Ahrens - 3329 TH Spring 2018

DATE	Behavior	Time Noted/ Notes	Frequency
	Leg Shaking		
	Toe/Finger Tapping		
	Pen/Pencil Shaking		
	Doodling		
	Clock Watching/Zoning Out		
	Biting Finger Nails		
	Playing with Hair		
	Cell Phone Use		
	Doing Other Classwork		
			Total

APPENDIX B

Observed Fidgeting Behavior Descriptions

1. Leg shaking
    a. Excessive bouncing/movement of one or both legs while the student is sitting in their chair during the lecture.
2. Toe/Finger tapping
    a. Tapping their fingers on their paper/desk OR
    b. Tapping their toes on the ground while they sit in their chair
3. Pen/pencil shaking
    a. Taking their pencil or pen and waving, shaking, rolling or otherwise moving their pen so that their focus is on the pen's movements.
4. Doodling
    a. Drawing on their paper/notebook while the lecture is going on. Drawing not pertaining to the course material is especially noted.
5. Clock watching/Zoning out
    a. Students looking completely away from their instructor/board and watching the clock for time or the walls. Generally, not paying attention to the class they are in.
6. Biting finger nails
    a. Biting finger nails while class is going on. They look like they are focusing more on their hands while lecture is going on.
7. Playing with hair
    a. Longer hair being twirled, braided, or brushed with the fingers.
8. Lots of movements in the chair
    a. Student looks restless in their chair. They may be rocking, shifting, bouncing or subtly moving around in their chair throughout the lecture.
9. Cell phone use
    a. Looking at and using their cell phone during the class period. Periodic or constant.
10. Doing other work during class
    a. Working on classwork from another class while the lecture is going on. Checking whether they look up at the instructor/board or their notes or if they work on other material throughout the lecture.

APPENDIX C
Brain Gym – Brain Break Activities

Activity	Description	Picture
Brain Buttons	Students will sit in their chair and touch their foreheads above each eye. They will then close their eyes and breath deeply with five-second breath inward, holding for five seconds and exhaling slowly. They will repeat the exercise three times.	
Cross Crawls	The students will stand away from their desk. They will touch their right knee to their left elbow while their right arm is behind their body. They will then perform the action with the opposite arm and knee. Students will then perform the exercise for about 2 minutes.	

Hook-Ups	Students will sit in their chairs, cross their right legs over their left at the ankles, place their right wrist over their left and curl their hands inwards to interlock fingers. They will then rotate their wrists in so that their fingers point up toward their head and elbows are out, and their arms are close to the chest. Students will stay in this position for a few minutes, taking deep, slow breaths. The instructor will ask the students to raise certain fingers on their hands to see if the students can complete the task. They will then "un-hook" their legs and arms to end the exercise.	
Thinking Caps	Students will sit in their chairs, facing forward. They will then look over their left shoulder as far as they can. They will be asked to think about the tension in their neck and how far they can look behind them. They will then look to the other shoulder and repeat the activity. They will then be asked to roll in their ears, massaging their earlobes as they move up and down the length of their ears. They will repeat the ear massage three times and then re-perform the over-the-shoulder look.	

(Images: Dennison, P. E., & Dennison, G. (1994). Brain gym. Ventura, Calif. : Edu-Kinesthetics,Inc., c1994.)

APPENDIX D

Informed Consent Form

INFORMED CONSENT

Study Title: Effects of Brain Breaks on College Students

Principal Investigator: Isabel Valdez **Co-Investigator/Faculty Advisor: Dr. Jennifer Ahrens**
Email: icv3@txstate.edu **Email: ja27@txstate.edu**

This consent form will give you the information you will need to understand why this research study is being done and why you are being invited to participate. It will also describe what you will need to do to participate as well as any known risks, inconveniences or discomforts that you may have while participating. We encourage you to ask questions at any time. If you decide to participate, you will be asked to sign this form and it will be a record of your agreement to participate. You will be given a copy of this form to keep.

PURPOSE AND BACKGROUND

You are invited to participate in a research study to learn more about the impact a brain break program will have on a student on a college classroom. The information gathered will be used to propose a brain break program that can be created and implemented in a college classroom. You are being asked to participate because this class is a lecture based classroom of college students over the age of 18.

PROCEDURES

If you agree to be in this study, you will participate in the following:

- Your behavior in class will be observed during two class days. The class will be conducted as usual, with your instructor teaching the class. During this time, Dr. Ahrens and I will be watching for behaviors such as fidgeting and attentiveness.
- 20-25 minutes into the class, a brain break activity will be demonstrated to the class. The class will then perform the activity.
- The brain break activities are as follows:
  - **Hook Ups** are an activity where students will sit in their chairs, cross their right legs over their left at the ankles, place their right wrist over their left and curl their hands inwards to interlock fingers. They will then rotate their wrists in so that their fingers point up toward their head and elbows are out, and their arms are close to the chest. Students will stay in this position for a few minutes, taking deep, slow breaths. The instructor will ask the students to raise certain fingers on their hands to see if the students can complete the task. They will then "un-hook" their legs and arms to end the exercise.
  - **Cross Crawls** are an activity where the students will be standing. They will touch their right knee to their left elbow while their right arm is behind their body. They will then perform the action with the opposite arm and knee. Students will then perform the exercise for about 2 minutes.
  - **Thinking Caps** are and activity where students will sit in their chairs, facing forward. They will then look over their left shoulder as far as they can. They will be asked to think about the tension in their neck and how far they can look behind them. They will then look to the other shoulder and repeat the activity. They will then be asked to roll in their ears,

massaging their earlobes as they move up and down the length of their ears. They will repeat the ear massage three times and then re-perform the over-the-shoulder look.
- **Brain Buttons** are an activity where the students, sitting will touch their foreheads above each eye. The students will then close their eyes and breath deeply with five-second breath inward, holding for five seconds and exhaling slowly. They will repeat the exercise three times.

- After performing the brain break, your class will continue as normal. Dr. Ahrens and I will then perform observations on behaviors after the activity is over.
- These brain breaks will be performed every 25 minutes.
- The class as a whole will be observed on two days during the semester.

RISKS/DISCOMFORTS

During the demonstration, you will need to be aware of their surroundings. There may be a possibly of hitting your desk, chair, or neighboring student. In order to avoid injuring yourself and others, you will need to give themselves enough room to comfortably perform the activities. As a result of the activities, you may experience elevated heart rate or fatigue.

BENEFITS/ALTERNATIVES

There will be no direct benefit to you from participating in this study. However, the study may provide you with tools and activities you can perform silently at your desks if you ever feel that you need to take a brain break. There is no extra credit given for this participation, and you will not be penalized for not participating. You will not be included in the observation process if you choose to not participate.

EXTENT OF CONFIDENTIALITY

Reasonable efforts will be made to keep the personal information in your research record private and confidential. Any identifiable information obtained in connection with this study will remain confidential and will be disclosed only with your permission or as required by law. The members of the research team and the Texas State University Office of Research Compliance (ORC) may access the data. The ORC monitors research studies to protect the rights and welfare of research participants.

Your name will not be used in any written reports or publications which result from this research. Data will be kept for three years (per federal regulations) after the study is completed and then destroyed.

PAYMENT/COMPENSATION

You will not be paid or given extra credit for your participation in this study.

PARTICIPATION IS VOLUNTARY

You do not have to be in this study if you do not want to. You may also refuse to answer any questions you do not want to answer. If you volunteer to be in this study, you may withdraw from it at any time without consequences of any kind or loss of benefits to which you are otherwise entitled.

QUESTIONS

If you have any questions or concerns about your participation in this study, you may contact the Principal Investigator, Isabel Valdez (cv3@txsate.edu)

This project was approved by the Texas State IRB on [date]. Pertinent questions or concerns about the research, research participants' rights, and/or research-related injuries to participants should be directed to the IRB Chair, Dr. Denise Gobert (512-245-8351 – dgobert@txstate.edu) or to Monica Gonzales, IRB Regulatory Manager (512-245-2334 – meg201@txstate.edu).

APPENDIX E

IRB Approval

TEXAS STATE UNIVERSITY
SAN MARCOS
The rising STAR of Texas

In future correspondence please refer to 2018388

January 23, 2018

Isabel Valdez
Texas State University
601 University Drive.
San Marcos, TX 78666

Dear Ms. Valdez:

Your IRB application 2018388 titled "The Effectiveness of Brain Breaks on College Classrooms" was reviewed and approved by the Texas State University IRB. It has been determined that risks to subjects are: (1) minimized and reasonable; and that (2) research procedures are consistent with a sound research design and do not expose the subjects to unnecessary risk. Reviewers determined that: (1) benefits to subjects are considered along with the importance of the topic and that outcomes are reasonable; (2) selection of subjects is equitable; and (3) the purposes of the research and the research setting is amenable to subjects' welfare and producing desired outcomes; that indications of coercion or prejudice are absent, and that participation is clearly voluntary.

1. In addition, the IRB found that you need to orient participants as follows: (1) signed informed consent is required; (2) Provision is made for collecting, using and storing data in a manner that protects the safety and privacy of the subjects and the confidentiality of the data; (3) Appropriate safeguards are included to protect the rights and welfare of the subjects.

This project is therefore approved at the Exempt Review Level

2. Please note that the institution is not responsible for any actions regarding this protocol before approval. If you expand the project at a later date to use other instruments, please re-apply. Copies of your request for human subjects review, your application, and this approval, are maintained in the Office of Research Integrity and Compliance.

Report any changes to this approved protocol to this office. All **unanticipated events and adverse events are to be reported to the IRB** within 3 days.

Sincerely,

Monica Gonzales

Monica Gonzales
IRB Regulatory Manager
Office of Research Integrity and Compliance

CC: Dr. Jennifer Ahrens

OFFICE OF THE ASSOCIATE VICE PRESIDENT FOR RESEARCH
601 University Drive | JCK #489 | San Marcos, Texas 78666-4616
Phone: 512.245.2314 | *fax:* 512.245.3847 | WWW.TXSTATE.EDU

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