STIMULATING PEN FOR LOW-INCOME CHILDREN WITH ADHD
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PROBLEM

In the United States, around 6.4 million children between ages 4 and 7 are diagnosed with ADHD/ADD each year, with an increase in diagnose of 42% with respect to 8 years ago. Furthermore, according to www.healthline.com the probability of having ADHD increases for children who live under two times the poverty level, making it a real health concern among underdeserved communities in the United States.

One of the most common symptoms of ADHD is the constant attention shifts that the individuals with the disorder present. It is to our understanding that many of these attention shifts happen unconsciously and the individuals usually do not realize when their attention shifts from some task they might be performing to some other unrelated task, hindering their performance in the initial task. This leads these individuals to have concentration problems in school, which overall affects their academic performance in tests and during classes, for example by making it hard for them to properly take notes or finishing a test on time, potentially damaging their capabilities of getting into good universities, or even attending one.

Furthermore, according to a recent study on cost-effectiveness ADHD treatments, “the costs for the family member with ADHD were three times higher than those for comparison subjects ($2,128 versus $741). Notably, only 13% of the costs for patients with ADHD were attributable to treatment of the disorder, possibly because most of them were not regularly receiving treatment” [1].

TARGET COMMUNITY

Tchula, Mississippi
  Population: 2,332 people
  White: 3.43%
  African American: 95.93%
  Native American: 0.09%
Reason: “The per capita income for the town was $6,373. About 49.4% of families and 54.4% of the population were below the poverty line, including 66.6% of those under age 18” [2]. We chose this community not only to alleviate the effects of ADHD in children with low-income, but also to reduce the racial gap between African Americans and White Americans in the United States.

MATERIALS USED
- 1 LED
- 2 Buttons
- Simple motor
- Wires
- Customized pen
- Arduino*

*We used an Arduino to prototype the

**USE**

Our product is intended to help students with ADHD control their attention shifts during school time by using a stimulating mechanical pencil, which provides stimuli under certain situations. These stimuli help the individual realize when his attention has shifted, allowing him to correct his behavior and return to the task at hand as efficiently as possible. Furthermore, the mechanical pencil is also equipped with simple anxiety relieving and stimulating tasks that help alleviate the need to do something else, while still making it possible for them to pay attention in class.

The device works as a positive reinforcement to children with ADHD. When the student stop taking notes in class, the pen starts vibrating after 5 seconds to attract the attention to the previous activity. The button on top of the pencil provides simple stimulation by pressing it, and as long as it is being pressed, the vibrations will stop, encouraging them to press the button whenever they are consciously deciding not to write. Furthermore, if they press the button for more than 10 seconds, an LED will light up to remind the student that he has been pressing the button and that he ought to return to work.

This simple approach allows for sustained concentration periods by constantly reminding the student that he must continue with the task at hand, as well as it provide anxiety relieving techniques by pressing the button at the top of the device. Furthermore, which this is just a prototype, it is possible to improve upon it, adding new simple tasks or activities that the student can perform in order to sustain his concentration longer.

With this technology, we are hoping that more students with ADHD have the tools and the ability to have a better opportunity to go to college. The point of this pencil is to try and cut back a bit on the use of drugs to help students concentrate in school. The better their ability to concentrate, the better their grades can be. Students with
ADHD are at a great disadvantage when it comes to school. One study has shown that only 31% of students in 1998 graduated from high school. “Vulnerability is seen in the first two years, with notable difficulty in transition from secondary to postsecondary settings, particularly among young people with LD, ADHD, and psychiatric disorders. Part of this vulnerability may be due to the fact that students with disabilities are more likely to be only minimally qualified for four-year programs and thus academically underprepared for college. Once in college, students with disabilities may require more remedial or skills-level courses to maintain enrollment and may take longer to attain a degree or certificate. Nearly half of all disabled students drop out, compared with one-third of students without disabilities. The dropout rate climbs to nearly two-thirds for students with learning disabilities or “other” disabilities.”[3]

IMPLEMENTATION

Given the low cost materials that can be used to develop this product (see Table 1). It is likely to be accessible and in the budget of the target market presented at the beginning of this report. Furthermore because of its low cost, we are considering this product could be given to public schools maybe through government funding allowing teachers to provide the device to the students they feel need it the most. This way we could prevent the students from losing the pencil and potentially increasing costs. We expect the device to be accepted in standardized tests and college classrooms by making it less distracting to other students.

<table>
<thead>
<tr>
<th>Component</th>
<th>Price</th>
<th>Per Pen</th>
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</thead>
<tbody>
<tr>
<td>Specialized micro-chip</td>
<td>20 for $7</td>
<td>$0.35</td>
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<tr>
<td>Simple button</td>
<td>$ 0.34</td>
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<td>Customized pen</td>
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<td>$1</td>
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<tr>
<td>LED</td>
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<tr>
<td>Wires</td>
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<tr>
<td>TOTAL</td>
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REFERENCES

