LDT 505 Academic Reflection and Design Principles:
Mobile technology in the classroom to support elementary student with ADHD

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**Academic Reflection**

My interest in integrating mobile technology into the learning environment is focused on two main objectives. Mobile technology can serve to assist in the creation of a safe, effective, and responsive learning environment for students with ADHD as well as for the ADHD student’s classmates. I strongly believe that the social environment, culture, and interactions that a learner experiences drive their learning. By creating an environment that supports the ADHD student, they can learn valuable life skills through experiential learning, with the aid of mobile technology. (Looi, et al., 2010) Additionally, by creating a suite of applications that can serve to communicate the student’s growth in self-regulation as well as facilitate communication between the parent, teacher, doctor, and student, the burden of assessing and managing the child’s behavior and communicating comments, questions, or status can be lessened. The incorporation of mobile technology in the classroom environment can be used to positively influence attention focus and success for the ADHD student.

**Learner Description**

The learner is an elementary school child (K-6) who has been diagnosed with ADHD, resulting in behavioral or emotional challenges. The learner has not yet mastered the skills required to self-regulate and experiences classroom disrupting episodic events. The parent, teacher, and physician are actively involved in managing the ADHD student.

**Setting**

The setting is primarily a formal learning environment in an elementary school primary classroom that will allow for the teacher to serve as the main evaluator and implementer of episodic events, student behavior, and classroom strategies for the ADHD student. Episodic events can also be monitored outside of the classroom in informal settings with the use of a
wearable technology. The parent may also use a wearable device to record episodic events when the student is not in a learning environment with the teacher.

**Capstone Project**

Classroom Charged, is focused on integrated technology to help create classroom environment supporting attention focus as well as create an application suite that will support the ADHD student by facilitating communication and management of the ADHD student. The two main components of Classroom Charged are Motion Charged and Breathing Room.

**Motion Charged**

The Motion Charged suite consists of applications to ease and increase communication between the student, teacher, doctor, and parent. The communication between parents and teachers is often a challenge. Improved outcomes are shown to occur when effective communication about school activities and child development are shared in a clear and effective way. (Ho et al., 2013) The design of Motion Charged includes wearable devices for the parent and teacher to record events as well as the ability to later annotate the event through an application, along with circumstantial information based on a pre-defined schedule will serve as an effective communication instrument to reduce communication frustrations and ambiguity about the frequency or circumstances surrounding episodic events. (Ho et al., 2013) The application will provide analysis tools and reports for the doctor, teacher and parent to look for correlations between episodic frequency and a variety of factors.

In addition, parental involvement through the use of the wearable device and mobile interfaces to record episodes, send messages to the student, receive alerts, and communicate through blogs serves to increase their involvement in the child’s learning experience. Parental involvement in a student’s education is often lacking. (Ozcinar & Ekizoglu, 2012) By providing
instruments for the parent, more accurate data can be obtained as well as increasing the likelihood that parental involvement will be secured.

The incorporation of blogs in to Motion Charged will assist in facilitating communication and relationship development between the student, parent, and teacher. The doctor is also invited, but not required, to participate. It has been shown that increased parental involvement and improved success for the student are linked. (Jeynes, 2012) By providing a blog for asynchronous informal communication between the parent and teacher, a stronger relationship, increased trust, and effective sharing can not only increase the attitudes about each other, but also positively influence the child’s whole learning experience. (Ozcinar & Ekizoglu, 2012)

A blog that is for the student use to express their thoughts and feelings as it relates to their learning will also be incorporated. The teacher and parent are encouraged to respond and engage with the student on the blog. If the teacher is willing to engage authentically with the student, trust can be built as the student recognizes the teacher’s caring qualities. (Hew, 2011)

A messaging application that includes feature on the wearable devices, student iPod, teacher iPod, student desk display, and main application will allow for the communication of self-regulation messages from either the teacher, parent, or application to the student when it is noticed that the student’s level of anxiety is increasing. This will allow the teacher or application to support the student in the development self-regulatory skills as well as possibly averting an episodic event. (Guderjan et al., 2013) The student’s wearable device also serves as a heart rate monitor to allow the software to detect the when a student’s anxiety is rising. Wearable technology is increasingly able to gather personal data about the human body giving software the ability to monitor how the user is feeling and adapt it’s behavior accordingly. (Nakamura, 2015) These measurements can help to communicate not only self-regulation messages to the child so
that child can grow their self-monitoring and self-regulation skills, but also to inform the parent, teacher, and doctor of the child’s progress and possible triggers. (Nakamura, 2015) The incorporation of a reward system will serve as motivation for the ADHD student to learn to control their body’s reaction to stressful situation and promote change in the student and their awareness. (Looi et al., 2010)

**Breathing Room**

Because the amount of auditory exposure can lower a child’s attention and have a detrimental effect on their learning, it is important to manage the classroom noise levels and create an environment that will promote attention focus for the ADHD student. (Dewi et al., 2015) (Cassuto et al., 2013) The inclusion of a noise monitoring app and display allows promotes not only a classroom with a managed noise level, it helps all students in the class to self-manage their own exertion sound. By providing the tools the alert students of elevated noise levels, and providing a reward system for sustaining an acceptable level of noise, the class students can strengthen their self-monitoring and self-regulation skills through their experiences. (Looi et al., 2010)(Kearney et al., 2012)

Breathing Room includes an application for the teacher to play classical music in the background within the classroom in order to promote a learning environment that encourages increased focus and concentration. Classical music used as background music has been shown to create a calmer environment that (Rana et al., 2014) that can strengthen cognitive abilities, deficits, and inattention disorganization while increasing attention (Dewi et al., 2015) and improving concentration ability of students. (Rana et al, 2014) By utilizing music throughout the classroom, learning potential can be increased in both ADHD and non-ADHD students. Additionally, the ADHD student is provided with headphones and an iPod so that they can listen
to classical music at times when classical music is not playing in the classroom. This also allows for portability of use in informal learning environments.
### Design Principles

Table 2: Design principles related to elementary learners diagnosed with ADHD

<table>
<thead>
<tr>
<th>Design guideline for mobile technologies for students with ADHD in a school</th>
<th>Strategies or Resources to include in Mobile Technology Program</th>
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<tbody>
<tr>
<td>Minimize classroom noise levels to promote increased concentration. (Cassuto et al., 2013)</td>
<td>Utilize the Too Noisy App Pro with a large display so that the noise current noise level can be visually indicated to all members of the class and the teacher. The noise threshold can be set by the app or manually by the teacher.</td>
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<td>Promote self-regulation with all students to reduce classroom noise levels. (Cassuto, et. al., 2013)</td>
<td>Using the visual indicator for noise level from the Too Noisy App Pro, students in the class can note the noise level and adjust their behavior to a more acceptable level. Should the students fail to bring the noise level down, an alarm from the app will sound when the threshold is reached. The visual indicator promotes the students’ learning of self-monitoring and self-regulation skills as well as helping ADHD students be less distracted or experience frustration from many inputs or high noise levels.</td>
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<td>Increase level of attention in classroom for all learners by playing classical music in the background. (Rana et al, 2014)</td>
<td>Write an application that will allow for the teacher to play classical music through speakers in the classroom. Classical music as background music can increase attention, focus, and cognitive ability in learners. The teacher can select an appropriate playlist and use the audio controls to play the music throughout the room using the iPod application.</td>
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<tr>
<td>Increase level of attention and focus for ADHD student using classical music. (Dewi, et. al., 2015)</td>
<td>Provide the ADHD student with headphones and an iPod with a classical music app that is the companion to the teacher’s classroom music app. At times when music is not playing in the classroom or if the ADHD student feels they need the headphones, they can play music from the classical music playlists on their iPod through the custom developed app. The teachers also have the ability from their app to use the audio controls on the student’s iPod from their own device.</td>
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<td>Calm learners by playing classical music in the background. (Rana, et. al., 2014)</td>
<td>Using the classroom classical music application, the teacher will play classical music over the speakers in order to create a calmer environment. Using classical music as a background has been shown to have a calming effect on students with ADHD.</td>
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<td>Promote the use of self-regulation strategies by the ADHD student. (Guderjahn, et. al., 2013)</td>
<td>Display self-regulation or encouraging messages from teacher/parent on a mobile device for ADHD student if the teacher/classroom adult notices ADHD student is beginning to experience over stimulation, frustration, or an episode may be starting. This could help to remind the student of calming techniques or serve to distract the student from mental overstimulation and avert a full-blown episode.</td>
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<td>Acquire and analyze data gathered from a teacher’s</td>
<td>Using wearable technology, allow the teacher/parent to record episodes into a database and time stamped, and commented on later</td>
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<td>Wearable technology. (Lee, et. al., 2015)</td>
<td>by the teacher when they have free time. Provide charts relating episodes to various factors for analysis.</td>
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<td>Acquire and analyze health data gathered from a student’s wearable technology. (Lee, et. al., 2015)</td>
<td>Using wearable technology that monitors heart rate on the student, monitor levels as a notification of increased anxiety levels to predict episode. Automatically send self-regulation message to the student, notification to parent/teacher, and archive the data for sharing with stakeholders.</td>
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<td>Facilitate communication between parent, teacher, physician (stakeholders) (Ozcinar, Ekizoglu, 2013)</td>
<td>Using a closed blog, provide a space for discussion and information sharing between the parents, teacher, and doctor on the management of the ADHD student. Informal discussions promote trust, relationship, and strengthen communication.</td>
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<td>Facilitate the ease and clarity of communication of episodic data. (Ho et al., 2013)</td>
<td>Simplify basic data communication by using push button on wearable to record events, time, and circumstances based on schedule configure in app. Sharing of data permitted for parent, doctor, and teacher users.</td>
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<td>Facilitate communication of episodic data to stakeholders. (Spachos, et. al., 2014)</td>
<td>Display episodic data in a format that allows viewing and analysis by all non-student stakeholders (parent, teacher, physician). This will allow the non-student stakeholders to monitor episode frequency and determine if behavior or medication strategies are effective. The application will not make this determination, only display data/trends.</td>
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<td>Promote self-presence and awareness in the learning environment. (Kearney, et. al., 2012)</td>
<td>Use a custom developed application to allow the student to record their feelings and when they feel an episode coming on. In addition, allow the student the ability to record when the episode ends by selecting an option in the application to say “I’m OK now”. This allows the student to recognize that an episode is coming on, or that an episode happened and they recognize that they are now ok and the episode is over. They can then select from a list of emotions (shown as various smiley faces) what their current feelings are. This will allow the student to learn to recognize their current feelings, and when they may be feeling more anxious, or are feeling calmer. This can be used in both formal and informal spaces.</td>
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<td>Facilitate communication and conversation between the student and stakeholders. (Kearney, et. al., 2012)</td>
<td>Provide blog space for the student to express their feelings and thoughts about their educational and classroom experiences where the non-student stakeholders can respond and interact with the student. This will allow a controlled social interaction space where private conversations with the student can occur which will help shape their learning experiences while they manage their ADHD. Can be used in both formal and informal spaces.</td>
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<td>Facilitate Growth and Change in a student through their experiences. (Looi et. al., 2010)</td>
<td>Use a reward system to reward the students for keeping noise level at acceptable levels. The Too Noisy Pro app allows for star awards within the app for sustained acceptable levels. When the class has reached a defined number of levels reward all of the students with an extra recess, special activity, or another motivating activity.</td>
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References


Nakamura, C. G. (2015). HOW WEARABLE COMPUTING CAN HELP YOUNG CHILDREN WITH ADHD TO LEARN.


