I, Wanting Luo, hereby submit this original work as part of the requirements for the degree of Master of Design in Design.

It is entitled:
Designing for Motivation: Designing an online learning experience to motivate adolescents with Sickle Cell Disease to get better prepared for the transition.

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Designing for Motivation:

Designing an Online Learning Experience to Motivate Adolescents with Sickle Cell Disease to Get Better Prepared for the Transition

Master of Design

in the School of Design

of the Design, Art, Architecture, and Planning College

by

Wanting Luo

Committee Chair: Oscar Fernández

Committee Members: Benjamin Meyer, Giacomo Ciminello
Abstract

Adolescents with chronic illness, such as Sickle Cell Disease, have problems “transitioning from child health care systems to adult health care systems” (Viner, R.) due to economic issues and motivational problems. The Innovation Lab at Cincinnati Children’s Hospital therefore suggested that an educational website offering health care information to teenagers with Sickle Cell Disease, or SCD, could help them to get prepared for the transition. For this project I collaborated with psychologists from Cincinnati Children’s Hospital to design an online learning experience for adolescents with SCD. I applied Motivational Design theory and tried to understand how designers can better motivate patients to engage online learning.
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Chapter 1: Introduction and Background

1.1 What is Sickle Cell Disease?

“SCD is a genetic disorder characterized by sickle-shaped red blood cells that cause chronic pain and organ damage.” (Hassell, K.L, 2010) It is very common among African Americans. “Approximately 1 out of 500 African-American children are born with SCD.” (Centers for Disease Control and Prevention. N.p., n.d. Web. 3 Apr. 2013.)

1.2 Transition and Transition for Adolescents with Chronic Disease Defined

Transition may be defined as “a passage from one state, stage, subject, or place to another”. (Dictionary and Thesaurus - Merriam-Webster Online.) It happens everywhere in our lives. When people graduate from college, for instance, they transition from being a student into a full-time employee. Similarly, when people get married they transition from being single into being someone’s wife or husband. These transitions require a corresponding change of attitude and behavior and may have positive or negative effects. When adolescents with chronic disease grow up they “transition from the pediatric health care system to the adult health care system” (Viner, R.). In some areas, patients over twenty-one are required to leave the pediatric health care system. For them, this means they are no longer able to rely on the assistance of health care providers and their parents; they must be self-dependent.
1.3 Problems SCD patients face during their transition

Unfortunately many teenage chronic disease patients have problems transitioning from pediatric health care systems and, because of this, poor health results. There are many factors that make the transition complex. For example, teenagers who must become legally self-dependent often lose their medical coverage and this can be a serious economic problem for them. Sometimes, teenagers may not be mentally prepared for the transition and are not aware of the importance and necessity of being responsible for their health. Even though they realize it is time to take responsibility for themselves, they often feel reluctant to enter an entirely different medical environment that they are unfamiliar with due to low confidence and the lack of skills to do so.

To solve this problem, a series of educational materials are being developed by the Department of Behavioral Med-Clin Psychology at Cincinnati Children’s Hospital to help young patients with SCD get better prepared for their transition.

1.4 Technology Use Research of SCD Teenage Patients

Cincinnati Children’s Hospital has done a study on the technology using habits of SCD patients. Their survey was conducted with SCD patients from 16 to 24 years old, most of whom were African-American. In the study they found that “53% of the patients claimed that their internet use was more than once daily” (Innovation Lab, Cincinnati Children’s Hospital Ayers, S. L., & Kronenfeld, J. J. (2007).)
“Research has also shown that chronically ill adults who sought online health information gained knowledge about their disease and saw improvements in their health.” (Ayers, S. L., & Kronenfeld, J. J. (2007).) These findings suggest that an internet-based instruction offering SCD related information, health care related information and transition instructions may be an effective way to educate teenage patients with SCD and may be a compelling tool to help them transition successfully.

1.5 Solution Proposal

BJ Fogg, Professor from Persuasive Technology Lab of Stanford University said that “for a person to perform a target behavior, he or she must (1) be sufficiently motivated, (2) have the ability to perform the behavior, and (3) be triggered to perform the
behavior.” (BJ Fogg. 2009) If we follow this model we can say that the developed educational material is the trigger, while the ability is the use of the technology to access to the material. What we need then is to motivate the patients to spend time on the materials and this will finally lead to the desired behavior change, i.e. independence.

I believe that by combining motivational design theory with web technology we can develop a viable gateway (online learning experience) to motivate young SCD patients to get better prepared to transition into the adult healthcare system. The expected results of this online learning experience design are:

1. Teenage SCD patients will be aware of the importance and necessity of being self-dependent and begin to take care of themselves.

2. Teenage SCD patients will be willing to take a more active role in their transition process.

3. Teenage SCD patients will be more confident to change lifestyle and medication environment.

4. Teenage SCD patients will be more skillful and comfortable dealing with medication problems (e.g. pain management, communicating with doctors) and with going to new medical environments.

1.6 Current Solutions

I researched existing online medical instructional websites for teenagers and found several issues. First, some of the websites provide overwhelming amounts of information. This can cause reluctance for teenagers to continue. Some articles
offered are so long that many teenagers would lack the patience to finish them.

Moreover, I found that the instructions are often tedious and written at inappropriate reading levels. For example, most of the instructions use text-based materials to explain difficult medical conditions, such as Jaundice and Hydroxyurea. The density of such articles may cause the audience to lose interest quickly. Finally, I found the information that most current medical instructional websites provide is simply uninteresting for teenagers.

All of the problems I found among existing online medical education materials will probably cause the user to lose their motivation. This is a problem because in order to be successful users must be motivated and engaged constantly. Consequently, I believe the primary challenge for designers is how to motivate the teenagers to be considerably engaged in the online learning experience. In this way they will gain confidence and progressively achieve independence.

1.7 Design and Motivation

“Motivational design can be applied to improving students’ motivation to learn, employees’ motivation to work, the development of specific motivational characteristics in individuals, and to improving peoples’ skills in self- motivation.” (John M. Keller, June, 2006) It is widely used in education to encourage learners to engage more in the learning experience. It could prove to be an ideal method to enhance online instructional design. I believe it can guide designers to understand the users from a motivation perspective. Designers can use the theory to organize information and
design activities to make websites more appealing and engaging for young patients. All of this will result in an improvement of participation and retention. I will explain the Motivational Design theory itself and how designers can learn from it in more detail in Chapter 2.

1.8 Study Plan

In this study I will introduce the motivational design ARCS Model and the process itself. I intend to translate the ARCS Model from a design perspective and I will list the contributions that a designer can make for each ARCS attribute. I will integrate the motivational design process with that for typical websites and eventually generate a synthesized process that is intended specifically for online learning experience design. I will collaborate with a behavioral psychologist to develop a prototype of an instructional website for teenagers and young adults with SCD. And then I will conduct a test to measure the effectiveness of the website in terms of information comprehension and user engagement. Finally, I will provide a list of tactics that may be useful to enhance the motivation of users in the online learning experience.
Chapter 2: Literature Review and Methodology

2.1 Motivation

Motivation may be defined as “conscious and unconscious stimuli, which are characterized either in terms of internal psychological desires or beliefs, or in terms of physical or social environmental conditions leading to behavior which may be novel or habitual, and learned or innate.” (“motivation." Cambridge Dictionary of Sociology. Cambridge: Cambridge University Press, 2006. Credo Reference. Web. 03, April 2013.)

Motivation influences users’ attitudes and performance levels in the learning process. According to the book *Motivational Design* by John M. Keller, motivation during the learning process works in the way as showed in illustration2. (J.M.Keller, Motivational Design for Learning and Performance, DOI 10.1007/978 1-4419-1250-3_1, Springer Science + Business Media, LLC 2010) The process of a learning experience consists of “effort, performance, and consequences”. (J.M.Keller) “A learner’s curiosity and motivational level will have an effect on their expectancy level. This determines how much effort they will make. Any results or feedback received during the learning process will cause the expectancy level to change. Finally, the satisfaction level after the consequences will, in turn, have an impact on the curiosity and motivational levels of the learning experience the next time.” (J.M.Keller) By understanding that motivation during the learning process works as a cycle I have realized that the job of designing a motivational learning experience is to provide information that stimulates curiosity and motivation, to offer expectancy and
feedback that matches the expectancy during the learning process and to improve satisfaction levels.

2.2 An Introduction to motivational design theory: The ARCS model (J.M.Keller)

“Motivational design refers to the process of arranging resources and procedures to bring about changes in motivation.” (John M. Keller, June, 2006) It is a method that can be applied to designing an educational environment that will motivate learners to engage and have a better learning experience. One might be tempted to think motivational design is merely about making education materials look interesting and appealing to learners but that would be a mistake. “To be effective, motivational tactics have to support instructional goals. Sometimes the motivational features can be fun or
even entertaining, but unless they engage the learner in the instructional purpose and content, they will not promote learning.” (John M. Keller, June, 2006)  Motivational design theory requires the designer to consider design from “four aspects: Attention, Relevance, Confidence, and Satisfaction” (J.M.Keller 2010). These correspond to Curiosity, Motive, Expectancy and Satisfaction in the motivation cycle mentioned above. Together these four aspects comprise the attributes that will affect people’s motivation during the learning experience. This is called the ARCS model developed by the author of Motivational Design.

From the aspect of attention, motivational design requires the educational environment to “give learners perceptual arousal” (J. M.Keller). This means that it should attract them from first glance. It also requires the design to “offer the learners inquiry arousal” (J. M.Keller) which sparks curiosity and enthusiasm in the learner. As a result, they are eager to explore the topic in a deeper sense. The last thing the attention aspect requires is what is called attention maintenance. In order to let the learners continue engaging in the learning experience, designers should use certain design techniques to maintain their attention.

When it comes to the aspect of relevance there are three requirements. First of all, the ARCS model requires that the content meet the learners’ needs. This means that the designers should build a bridge between the learners and the education material. This is important for the sake of enabling the learners to recognize the material's necessity
and relevance. If they thought the content they are going to learn is useful when they start it they will make more of an effort to learn it. Secondly, relevance means that the material should “match the learner’s personal motive structure” (J. M.Keller). This means it is better to use a motivational strategy that is similar to what the learner is used to. Finally, relevance requires that designers should create an environment that the learners are familiar with. In this way learners are able to connect previously acquired knowledge with the new material.

*Confidence* requires designers to provide users with positive expectation for success. That means that the users “understand the requirements of this study clearly” (J. M.Keller) and understand the tasks they are expected to perform. This provides a clear direction to go instead of hesitating or getting confused. The more clear they know about the final requirements the more confident they will feel. Moreover, Confidence aspect says “success opportunities are also important” (J. M.Keller) because they can really offer the learners chances to gain a sense of being possible to finish the task which will encourage them to continue. Another concern of confidence is to let the learners feel that the success is controllable instead of thinking it’s by accident. The designers should improve the controllability of the success by making them feel their hard work will pay off and if they continue working hard they can succeed again.

The final aspect of motivational design, *satisfaction*, requires that designers “offer learners chances to use their newly acquired knowledge” (J. M.Keller). For instance,
one might have to solve problems using what they have learned in a realistic circumstance. Furthermore, some “appropriate feedback which rewards effort and success would also be useful to enhance the satisfaction level” (J. M.Keller). Designers should consider matching the learners' results with that which was expected to be learned at the beginning of the experience. If the results are lower than expected the learner will feel disappointed and their attitude toward learning the next time will be affected.

2.3 Reinterpret motivational design and bring it into the web development process

The ARCS model could be a guide for designers when developing an instructional website. When considering how this might work we realize that the ARCS model must be translated from a design perspective.

Firstly, in order to accomplish the requirement of attention, attribute designers must consider aesthetics and style. It is well known that different group of people have different aesthetic taste and style preference. An appearance with correct style could enable users to recognize the fact that it is a service right for them. It is likely then that users will spend more time on the site exploring. Hence, it is critical for the designer to understand their audience and choose an appropriate style for the design. Imagery and symbols used to visualize information and deliver emotional connections are of great importance as well. Designers should also understand intended users'
comprehension levels and allow symbols to make the user's journey efficient and enjoyable rather than building hurdles for them. If the symbols that a designer creates cause the users to have problems understanding information the users would probably lose interest and attention. Also, correctly used imagery can trigger the users' curiosity to explore. Furthermore, color, layout and typography must be taken into account. Aside from directing the users exploring the website, typography and layout also play an important role in maintaining the users' attention. A consistent typography, layout and color palette will help create an environment where users will quickly adjust and feel comfortable enough to stay on the site.

Secondly, there are several things a designer needs to consider in order to create a relevance between the instructional website and the intended user. Hierarchy of information helps users quickly find what they need and easily understand how important the given information is to them. Then, users can confirm whether the given content is relevant to them or not rather than having problems seeking desired information and hesitating with uncertainty. The sequence of information delivery is also critical. The designer needs to understand the habits of the intended users when they are seeking information. If so, a proper sequence of information can be created, one which will build a bridge, touching the users in a proper tempo instead of being overwhelming. Except for the architecture of information the familiarity of the environment can also provide users with a sense of relevance. The web page environments can simulate websites the users are already used to use or perhaps even
circumstances in their real lives. The activities users participate in on the website may be similar, to some degree, to the activities they have already used to learn from, such as reading books, watching video tutorials or attending classes.

Thirdly, in order to offer the users a sense of confidence designers can make several contributions. It is critical that the designer makes the interaction between the users and the website accessible, instead of being confusing or requiring too much effort. That way the users will feel that they can easily get into the door and thus are eager to dig deeper. Also, users typically wish to complete something. Another critical job for the designer then is to assist the users to clarify the goal and to offer a clear guideline for them to follow and check the progress. The guideline should not only inform users of what they need to know but should also tell them what they have completed. For example, a visualized map showing their previous effort and accomplishment will be a great encouragement and evidence of recognizing the controllability of success.

Finally, it is of utmost importance that a designer helps users to improve their satisfaction levels both during and after the learning experience. If the designer is able to create a virtual environment that will allow the users to apply their newly gained knowledge to solve real problems their expectancy will be matched and they will have a sense of satisfaction. Thus, feedback, compliments and rewards should be included in order to reinforce user achievement.
All of the contributions above that a designer can make will result in a successfully motivational learning experience.

<table>
<thead>
<tr>
<th>Attention</th>
<th>Relevance</th>
<th>Confidence</th>
<th>Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceptual Arousal</td>
<td>Meet learners' needs</td>
<td>Positive expectation for success</td>
<td>Use acquired knowledge</td>
</tr>
<tr>
<td>Inquiry Arousal</td>
<td>Match personal motive structure</td>
<td>Success opportunities</td>
<td>Reinforce the success</td>
</tr>
<tr>
<td>Attention Maintenance</td>
<td>Familiarity</td>
<td>Personal Control</td>
<td>Comparison</td>
</tr>
</tbody>
</table>

Aesthetics, Style, Color, Layout, Typography, Imagery, Symbol

Hierachy, Sequence of information, Creating a familiar environment

Accessibility, Clear requirements, Controllable pace

Appropriate feedbacks, Reward

Illustration 3_Reinterpret ARCS Model

After interpreting the four aspects of the ARCS model we can begin to integrate it with the web design process. A process for website development has been defined already. Typically when one designs a website the first thing that's done is research. Designers will usually research the audience's lifestyle, website using behaviors, aesthetic preference and purpose. After that, designers will have a rough concept in mind about what to deliver and how to deliver it. Then design professionals start creating information and building the information architecture. The information created is based on understanding of the audiences and their needs. Information architecture will then help put the information into an appropriate hierarchy. That way the information
presented is in a logical and comprehensible order enabling the audience to finish the
task in an easier and more satisfying manner. Next, wireframes are created in order to
position the organized information into a web page layout. In this stage, the web page
is divided into several sections, each section containing certain information. By
creating wireframes designers will have made a website without color, icons, imageries
and interactivity. After creating the wireframes visual elements are added. These
include the background, typographic choices, the icons, imagery and illustrations. At
this point the interactivity is defined. This includes the drop down menu, slide show
and pop out windows for each element that requires interaction. Finally, we develop a
functional website by combining the visual layout and the interactive features.

When doing content analysis and information architecture designers will be guided by
the ARCS model to detect problems with the original structure of the information which
could lead to a loss of motivation. They will also discover the opportunity areas which
could be improved through design. This activity will help the designer clarify the goal of
the design and narrow down the direction of problem solving which is to motivate the
users to engage in the learning experience. The designers can benefit from the ARCS
model when they are arranging information and creating visual elements to meet the
requirements necessary to motivate learners.

Furthermore, Motivational Design suggests that some interactive activities may be
necessary to maintain motivation. In this project, the activities could be interaction
between the users and the online recourses or the users and offline activities, such as inputting information, exchanging knowledge or scheduling exams, etc. Activity design is part of the information architecture step.

2.4 Design Process for This Study

Based on the aforementioned analysis we can begin to generate a process for designing a medical education website. The process consists of three stages: background research, opportunity identification, and design with testing.
STAGE 1: Background Research

Background research helps designers have a better understanding of the user as well as the purpose of the product. This would include the identification of the instruction purpose, understanding the users’ behavior of using web media as well as their attitudes toward their life, transition and transitional instructions. In order to understand the instructors’ purpose designers must first meet with them to make sure the goals are clear. Also, designers may ask the instructors what kind of problems are they facing when they are trying to educate their patients. It is hoped that by that time designers will understand what functionality they have to fulfill in the product. The next step is to
figure out how to make the functionality fit with the users. Designers will then start to understand the needs of the users through research. Often this will mean that they will review a variety of literature in order to build empathy for the user. Finally, designers must to analyze the content of the instruction, understand the users’ task toward each part of the content and the benefits users can gain from each part of the instruction.

STAGE 2: Opportunity Defining

Based on the result of the first stage, designers should be able to pinpoint the information or the structure of information that may demotivate users. Designers must understand why the demotivating areas do exactly that. Then the opportunity areas, those which can be improved, will easily be defined.

STAGE 3: Design and Evaluation

Design and Evaluation is comprised of three steps. The first step requires designers to work on the information architecture of the website. Designers will reorganize the information and create activities that will improve user motivation levels based on the opportunity areas defined prior. A wireframe will then be created, followed by a test with users. Users will participate in the test and will be provided with a questionnaire related to Relevance and Confidence. Based on the result of the test the wireframe will be refined as needed. The second step consists of working on the visual design of the website. Again the participants will be asked to test the visually designed website and will be asked questions about Attention. The design will need to be refined then after
designers get feedback. The final step in STAGE 3 involves creating a high-fidelity prototype. After that a test will be conducted to evaluate user perception of Attention, Relevance, Confidence, and Satisfaction. The prototype will be further refined if needed. At this point the designers should have gained knowledge about the effectiveness of the website.
Chapter 3: Background Research and Opportunity

Defining

3.1 Identify the goal of the instruction

After reviewing pertinent literature and talking with Dr. Lori Crosby, a Cincinnati Children's Hospital psychologist, I have concluded that the expected results of this online learning experience design are:

1. Teenage SCD patients will be aware of the importance and necessity of being self-dependent and begin to take care of themselves.
2. Teenage SCD patients will be willing to take a more active role in their transition process.
3. Teenage SCD patients will be more confident to change lifestyle and medication environment.
4. Teenage SCD patients will be more skillful and comfortable dealing with medication problems (e.g. pain management, communicating with doctors) and with going to new medical environments.

3.2 Understand the audience

As I mentioned in the first chapter, teenagers and young adults today freely access the internet and are using it more frequently than ever before. Moreover, mobile technology has caused new internet use habits among teenagers and young adults.
“Fully 95% of teens are online, a percentage that has been consistent since 2006. Yet, the nature of teens’ internet use has transformed dramatically during that time — from stationary connections tied to desktops in the home to always-on connections that move with them throughout the day.” (Madden, Mary, Amanda Lenhart, Maeve Duggan, Sandra Cortesi, and Urs Gasser, 2013) The increasing number of teenagers accessing the internet through mobile phones shows that teenagers and young adults prefer technology to be faster, more convenient and more personalized. Unlike older users, most teenagers and young adults are too impatient to sit down for long periods of time reading large chunks of information on websites. Fragmentary pieces of information, such as those found on Twitter, more feasibly grab the attention of teenagers and young adults.

Another special feature of young people’s internet use is that they are social. “A late 2012 survey by the Pew Research Center’s Internet & American Life Project shows that Young adults are more likely than older adults to use social media. Women, African-Americans, and Latinos show high interest in sites like Twitter, Instagram, and Pinterest.” (Duggan, Maeve, and Joanna Brenner, 2013) People increasingly have a need to connect with each other. And African Americans, for instance, are more likely to socialize within African American groups. In other words, people seek common characteristics with each other. However, SCD patients do not feel very comfortable among their peers due to their special condition.
Normally, teenagers are likely to be treated as adults. Typically they try to act like older people and try to show that they are independent. Nevertheless, as I mentioned in Chapter 1, teenage SCD patients are reluctant to take the responsibility necessary to be independent and “transition from the pediatric health care system to the adult health care system” (Viner, R.). Their concern about their transition includes nervousness, fear and helplessness. This is because of the low awareness of its importance, their low confidence and their being used to being assisted.

However, teenage SCD patients are hopeful and desire a promising life in the future. I watched several video interviews about SCD teenage patients. Many of them want to go to nursing school and become nurses when they grow up. They have a positive attitude toward their future lives and they just don’t know it’s time to take action and how to get started.

3.3 Analyze the content of the education materials

The content was provided by psychologists and a team from Cincinnati Children’s Hospital Department of Behavioral Med-Clin Psychology (Caravella McCuistian, Alexandra Bruck, Lori Crosby, Naomi Joffe, Brigitte Beale, Hilary Meyer, Ellen Manegold). It includes information aimed at educating teenage patients in order to have a healthier lifestyle as well as better medication and pain management. It also includes information that is intended to inform teenagers about managing their disease at different stages of their lives. It has six sections: Staying Healthy, Living with SCD, Schools & Jobs, Transition, Get Involved, Q&A. The first four sections aim to
educate patients to be more self-dependent in life management or disease management.

The Get Involved section is meant to inform patients about the events in the Cincinnati area, such as the summer camp at the Cincinnati Children’s Hospital. The Q&A section is a routine space where people can check out answers for questions. The content is as follows:

**Staying Healthy**

**Living with SCD**

- Healthy Lifestyle
- Avoid Sickle Cell Trigger
- Take Medication
- Get Your Immunization
- Pain Action Plan
- Get Regular Check-Ups
- Get Your Treatment on Time
- Learn More about SCD

**Schools & Jobs**

- Managing SCD in High School
- Managing SCD in College
- Managing SCD at Work

**Transition**

- Games
- Education Modules
**Get Involved**

- Events

**Q&A**

Further content analysis was executed based on the materials provided in terms of users’ tasks and the benefits they will receive from each section of information. Potential problems that will cause them to lose motivation and opportunity areas that could be redesigned by using motivational design strategies will be analyzed and listed as well.

<table>
<thead>
<tr>
<th>Users’ Task</th>
<th>Users’ Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Staying Healthy</strong></td>
<td>If patients follow the tips in their daily lives, they can maintain a healthier lifestyle that is very helpful for the disease management.</td>
</tr>
<tr>
<td><strong>Living with SCD</strong></td>
<td>Patients will get a comprehensive education about how to manage their lives with SCD from every aspect which will help them to be more self-dependent.</td>
</tr>
<tr>
<td><strong>Schools &amp; Jobs</strong></td>
<td>Patients will know what the future life will be like and what to do at that specific time. This will help them not just focus on disease management but also think about the future life and education.</td>
</tr>
<tr>
<td><strong>Transition</strong></td>
<td>Patients will understand the difference between pediatric and adult health care system, understand their responsibilities after 21 years old, and gain a set of skills of managing medication related issues.</td>
</tr>
<tr>
<td><strong>Get Involved</strong></td>
<td>Patients will get information about events in Cincinnati area and participate.</td>
</tr>
<tr>
<td><strong>Q&amp;A</strong></td>
<td>Patients will have a chance to get answers for their questions.</td>
</tr>
</tbody>
</table>

Illustration 6_User Task Analysis
3.4 Challenge and opportunity defining

Two types of users - New user

After registering, new users start exploring the website by browsing its content. Next they start to look for information to get started. After that, users either engage that information or leave it and look for another to read.

Illustration 7_User Task Analysis_New User

Two types of users - Returning user

After logging in, returning users will typically check what they have done, what’s new or what they need. They either browse for information that meets their needs or just explore new things.
For new users the challenge is how to get them started. First of all, grabbing new users’ attention is very important. Attention means “capturing the interest of learners; stimulating the curiosity to learn.” (J. M. Keller, 2010) Designing a look that will stimulate users’ curiosity and spur them to explore will be a challenge. Second, low confidence may cause users to refuse to get started. Currently the information seems
too overwhelming for them. The patients who have just started the transition program have very few skills in managing their lives and medication by themselves and in understanding their medications. Because they were used to being taken care of by their parents and health care providers they are unfamiliar with the information. We can assume that their skill level is low. “Mihály Csíkszentmihályi wrote in his book *Flow: The Psychology of Optimal Experience* that the two theoretically most important dimensions of the flow activities are challenges and skills. When people’s skill level matches the challenge level they can fall into the flow experience where self-consciousness disappeared and people are willing to do it for its own sake.” (Csikszentmihalyi, Mihaly, 1990) So it’s very difficult to motivate patients if their skill level is lower than the challenge level of the tasks. Also, patients are not able to see the entire process that they are going to go through with a clear direction. Because of this they have no idea whether it is possible for them to finish the learning and receive its benefits. They may give up exploring when they first visit this site because of the of how unsure of themselves they are. Confidence means “helping the learners believe/feel that they will succeed and control their success.” (J. M. Keller, 2010) In such cases new users could easily lose their motivation due to their lack of confidence. Third, low awareness of the material's relevance will be another reason why patients will not want to get started. If patients fail to realize the importance of the online resources they will easily get tired and lose their motivation to continue. Relevance means “meeting the personal needs/goals of the learner to effect a positive attitude.” (J. M.
So the challenge here is how to grab users’ attention, build up their confidence and establish relevance for them in order to get them motivated.

For the returning users, the challenge will be how to bring them back to continue their engagement in this online learning experience. Maintaining attention, confidence and relevance is necessary. Firstly, the inability to review their learning progress would cause them to be unable to preview their success. This will lead to a reduction of confidence that may cause them to lose motivation. Secondly, patients need to know how this knowledge is related to their lives otherwise they may lose motivation to continue making the effort. How to keep the online learning experience relevant to their practical world instead of being disconnected with the whole transition process in the real world is another challenge for the designer. Satisfaction means “reinforcing accomplishment with rewards (internal and external).” (J. M. Keller, 2010) Predictably the users who lose motivation may never come back. Thirdly, offering a visible sense of achievement will increase patients’ satisfaction levels and this will motivate them to continue to actively learn and even to continue the whole transition preparing process.

In summary, in order to motivate teenage SCD patients to get started with the online learning experience and continue being engaged, the goal of the design is to reorganize the current information in order to grab the user’s attention, establish the relevance between the user’s needs and the content, improve the user’s confidence and also offer users a sense of satisfaction.
4.1 Reorganize the information

Confidence Improving

I will attempt to improve user confidence by simplifying their task. To accomplish this I will group the materials into sections by level of priority and arrange them from easy to difficult. In this way patients will feel more motivated to start and will gain skills gradually. Patients will be directed step by step through the entire learning experience. Also, I plan to use an analogy the intended users will be familiar with to explain the step-by-step guide mechanism, such as the process of learning how to ride a bicycle. When learning how to ride a bike children must first know how bicycles work. Next, they start riding with training wheels. Then they take off their training wheels but their parents still hold them while they ride. Finally, one day their parents can let go and they can then ride their bicycle without even realizing it. This is a four step learning and skill gaining process that the patients using the site will be very familiar with. Once the patients recognize the similarity of the two processes they will understand the transition knowledge gaining process better and will then be able to foresee the possibilities to succeed. In this way they will grow in confidence.
Relevance Establishing

Relevance could be established by reinforcing the connection between online education materials and offline transition practice. This way patients will engage the learning experience without questioning whether they are truly useful and important or not. Also the online materials will not seem isolated and disconnected from the patients' lives. I propose that this learning process would create a bridge between real life and the virtual interface. This would bring patients to the online learning activity and allow them to apply the knowledge they’ve learned online back to the real world again. The online-offline connection would enable patients to realize the necessity of the online learning experience.

Satisfaction Offering

Enabling users to apply the knowledge they’ve learned in their real lives is an effective way to offer a sense of satisfaction, something which will have an influence in motivating them to continue learning. I believe the last step then would be the rehearsal that would be supported by the hospital. Patients who finish their education in the first
three steps could use their knowledge to practice making appointments with adult
doctors or to practice handling their prescription issues. Also we must remember that
feedback and rewards are necessary to help patients feel satisfied. Finally,
considering that teenagers like to be regarded as adults, giving them a chance to coach
other patients by way of the knowledge they’ve gained on this learning experience
would improve their satisfaction level.

In summary, my recommendation for reorganizing the information is:

1. Grouping the information into sections by level of priority and arranging them from
easy to difficult.

2. Guiding the users step by step through the learning process, using an analogy for the
step-by-step guide mechanism to improve the users’ confidence.

3. Connecting the online learning experience with the offline transition program.

4. Enabling patients to apply the knowledge they’ve learned in real life.

5. Offering praise and reward to patients.

6. Connecting patients with each other.

Illustrati10 is information architecture.
4.2 Wireframe

Home page
Mission Page After Register/Login

Illustration 11_Wireframe_Homepage

Illustration 12_Wireframe_Mission Page
STEP 1: Understand Yourself

It helps teenage patients if they pay attention to issues of medication in their lives. Patients will need to discuss with parents or doctors before they can finish this step. However, this will help them to understand themselves better and will give them a more solid foundation to start getting education in the future.

Patients are required to finish their profile information, a medication sheet that includes the medication they are on currently, the amount of the medication they are taking and when they take it. They are also asked to fill out emergency card information. After that they can generate an emergency card, print it and keep it in their wallet. The tangible emergency card could become a trigger to enable them to realize the importance of learning self management knowledge. Then they will go to the “My Goal” section where they are asked “where do you see yourself when you are 18, 21 or in 20 years?” This will encourage them to not just focus on medication and disease but also think about their future lives. Once they set up the goal, they can check it and change it at anytime in their personal page. They can also input short term goals, at specific ages. It is a way for the patients to realize the significance of transition and of being self-dependent in the future.

STEP 2: Start to Manage Your Life by Yourself

Life management includes how to live a healthy lifestyle, handle medication and pain management. The purpose of this step is to help patients be more self-dependent
gradually so that they can be more prepared when they start their transition. Due to
the amount of the information in this step, users need to receive information gradually
instead of one at a time and take the time and effort to digest them. This will be more
difficult than the tasks in the first step.

**STEP 2: Staying Healthy**

section provide the users with health related information that
will guide them to live a healthy lifestyle.

Challenge

Presenting a large quantity of reading material to impatient teens is a great challenge.
However it is sometimes necessary to do so for patients with chronic disease. So I
propose that instead of presenting a large chunk of information we should instead
provide many short healthy tips. Forty-three healthy tips were provided by
psychologists at Cincinnati Children’s Hospital.

I tried to reduce the task by offering one healthy tip every time when the users log in by
showing a pop out window with a tip. Then the 43 tips will be showed separately and
randomly instead of letting patients read them all at once.
Also, when the everyday tip window pops out, the users will be asked if this tip is helpful or not. This will encourage the user to pay attention to the healthy tip on the pop out window instead of clicking the exit button. Then if they mark it as not useful the window will close and the user will never see this tip again. However if the users mark it as useful the tip it will automatically go to an online healthy notebook that keeps all the healthy tips that are marked as useful. In the “Staying Healthy” section the patients can check out their healthy notebooks that record their favorite tips. They will be able to decorate their notebooks by changing colors, adding illustrations, photos, etc. They have to read a specific number of tips to activate the decoration function. I think this will create personalization features that will motivate the users to pay more attention to the healthy tips. Finally, once they read 25 tips they will get the chance to print their healthy notebook with all their beloved tips and their creations. This outcome will reinforce the patients’ effort and will increase satisfaction levels. What’s more, since the
creation is personalized, the patients may like to keep it with them. That way they can return to those healthy tips more often and then take advantage of them in their everyday life.

Finally they will be able to share their healthy notebook with other patients by checking the “Share It” box. They can also check out other teenagers’ healthy notebooks to see their creations and tips. This activity will offer an opportunity for the patients to connect with each other and learn from each other and will reduce patients’ feeling of loneliness.

**STEP2_ Living with SCD** section offers the users information that are not only concentrated in healthy lifestyles but also in medication and disease management. There are seven topics in this section. I highlighted the four things they need to understand on the front page to help them realize their needs and the importance of the knowledge they are going to receive. Also this gives users a clear answer to the question in their mind “What will I get from this section?” Hence they will know how they will eventually benefit from it. That will motivate them to open the section windows below on the front page.

**STEP2_Schools & Jobs** section is meant to teach teenagers what they need to do in high school, college and at work. I created three characters with the same disease sharing their stories at different stages in their life. I believe it will create more relevance to the users since they will have the same issues and the storytelling will
make the information more trustful. After each story, users can ask that character questions. The user will have an emotional connection with the characters and the characters will act in some way as their mentors. This will help users gain confidence in their disease and life management after seeing the successful examples. Also, by meeting people like themselves being self-dependent and managing their lives successfully the teenagers will realize the necessity of being self-dependent and see the possibility of success. Teenagers will feel more willing to learn from their peers rather than from a teacher or parents.

**STEP 3: Prepare for the Transition**

This step contains videos about how people transitioned as well as intensive education modules aiming at getting the patients ready for transition. When talking about transition the patients’ feeling of worry, anxiety and fear are big challenges for designers. Even though they acquired the “weapon” from step 1 & 2 they may still feel uncomfortable due to the complexity of transition. They have to take the responsibility to deal with medication, life and their economic issues. Our problem here then is how we impart skills while reducing negative feelings. This is the biggest challenge.

Videos are provided by psychologists from Cincinnati Children’s Hospital. They are placed at the very beginning of the transition front page with text persuading patients to get prepared for transition. This way the teenagers will be able to watch the two stories and feel encouraged by other experiences. I selected the two actors in the video, asking them to talk directly to the users. Each of them will share a short tip about
transition. It is hoped that this will make the stories closer to the users and therefore more trustworthy. Then the users will be offered three options in order to begin this section: Take the quiz, Things You Should Know, and Jump Into Activities. Take the quiz is a place where the patients will be able to test their knowledge level to estimate whether they are ready to transition or not. Things You Should Know is the core of this step. It has eight education modules, including the difference between the pediatric and adult health care systems, prescriptions, making appointments, communicating with adult doctors, primary care physicians, managing an emergency, health insurance and legal issues. Jump Into Activities includes a space where patients can share what they have done recently to get started with the transition as well as some games.

I tried to synthesize the modules at the same challenge level into one part and in general divided the modules into three parts: Get Familiar with Adult Health Care, What You Need to Do in Adult Health Care System, Four More Important Things You Should Know. An arrow was placed between each section indicating that the user should follow this linear learning process.
Under Get Familiar with Adult Health Care there is module 1, Pediatric Health Care vs. Adult Health Care. Under What You Need to Do in Adult Health Care Systems there will be modules 2, 3 and 4. Under Get Familiar with Adult Health Care there will be modules 5, 6, 7 and 8. Users will click on each section in order to access its content. Once they go into that section they will know what kind of knowledge they will gain there. Then they can click on the module to start learning.
This design will give patients a reason to pay attention to the information and will stimulate them, helping them to realize its relevance. Also, by grouping the content in this way the users will have a sense of going forward one at a time. They will follow a clear direction and the nervousness of getting transition education will be reduced.

The eight modules were provided by Cincinnati Children’s Hospital. I redesigned five of them however they haven’t been tested. I think they will need to be tested and refined before they can finally be launched on the website.

**STEP 4 is “Rehearsal”**

In this step patients will have the opportunity to apply all the knowledge they have learned from STEP 1 through STEP 3 in real life. This step is supposed to happen offline but the patients will use all the benefits they received online to deal with real problems. The knowledge, for example, will be utilized to make appointments with adult doctors, get prescriptions refilled, etc. During this step, the patients will find the knowledge they have gained useful and will receive a sense of satisfaction which will motivate them to continue making the effort to make a better transition.

During the rehearsal parents and health care providers will collaborate to offer the patients an opportunity to be self-dependent while monitoring them in case they have problems. Parents and health care providers should offer as few assistances as possible during this period of time. To reduce the stress of the teenage patients during the rehearsal they can be given three chances to ask their pediatric health care providers for help. The patients should feel more comfortable at this time since there
will have been a gradually disappearing connection instead of it having been cut off suddenly. There are many potential activities that could be planned in order to meet the rehearsal purpose. For instance, patients who have finished steps one through three will be required to make an appointment with adult doctors by themselves as well as to visit adult doctors. Their appointment could be scheduled on the website. So they can check all their appointment times on that space, a space that they are already familiar with. The schedule could then be synchronized with their Google calendar or iCalendar. Also, the system will recommend “group visiting”. This means patients who have to visit the doctor the same day could go together. Patients can send requests to the hospital if they are willing to make group visits and hospital will help arrange the group visits for them. This activity will make visiting the doctor less challenging and will also be social and will help patients make new friends. I believe there are better ideas for enabling patients to apply knowledge in the rehearsal step. However, due to the limitation of time the detailed rehearsal activities will not be designed in this thesis project.

Get Involved

The Get Involved section is one of the four steps in the learning process and users can visit this page at anytime. Here the users can get information about events held in the Cincinnati area. I designed a slide show that shows four core events with images and event links. There is also a calendar where the patients can see all the available events throughout the year. I also included images of past events. The images could
visually stimulate user interest. With the help of the example of past events they will know what those activities will be like and will be able to imagine what they will get from those events in the future.

Q&A

The Q&A section could be a space that contains frequently asked questions like many other websites do. Then users can see if their questions have already been asked and answered. However, if they do not find their questions there they will not benefit from this service. And I assume, to some degree, that the patients will be disappointed
since the Q&A service will not be able to solve all of their problems and most likely will not meet their expectations. This is why I came up with a Helping Each Other activity. It gives the patients a chance to submit their questions and also answer other patients' questions if they know the answer. This way the Q&A section would be fully functional and users will participate actively instead of receiving information passively. Dr. Lori Crosby, a psychologist in Cincinnati Children’s Hospital, suggested that the answers submitted by patients should be monitored in case they share negative information to each other. So the answer submitted will be delayed until the second day and will be showed after it is being inspected. This will protect the patients from getting harmful information.

Illustration 16_Workflow of Q&A
Chapter 5: Wireframe Testing and Refinement

5.1 Wireframe testing

Three SCD patients, ages 14-21, participated in this test. One of them has recently transitioned while the remaining two are still preparing for transition.

I started by explaining the purpose and structure of the website to the participants and walked them through the first two steps. Then they were given a task to finish in the “How to manage an emergency” module in step 3. They had to go to step 3, “transition”, scroll down to the bottom of the page, go to “Things You Should Know”, go to “Four More Important Things” and then start the emergency module. After the task, participants were given two surveys. Survey 1 has three questions based on the requirements of Relevance while survey 2 has four questions based on the requirements of Confidence. Patients were required to score their answers from 1 to 5 based on their feelings.
# Survey 1

Please score the three questions below from 1 to 5.

1. Do you feel the content is important for you?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Text</td>
<td>I don't see the importance at all.</td>
<td>It's a little important.</td>
<td>I think it's very important.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Is this format similar to the way you usually learn knowledge?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Text</td>
<td>It's very strange to me.</td>
<td>Not very familiar but easy to understand.</td>
<td>It's exactly how I usually learn.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Are you familiar with the concepts and examples in this website?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Text</td>
<td>I'm not familiar with anything</td>
<td>I'm familiar with some of them</td>
<td>I'm very familiar with them</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Illustration 17_Wireframe Testing Survey1
5.2 Test findings

Positive feedbacks

During the test patients recognized the importance of the content, especially through the videos of people sharing their stories. They also appreciated the activities of healthy notebook sharing and helping each other. One patient said “I would like people to know what I know and I would like to know what they know”. A patient who just transitioned said proudly that those information are too easy for him. He showed a desire of showing off his knowledge.
Problems found

Patients were not thinking carefully before they answered questions in the post-survey and they were trying to be nice. That made the results of the survey not reliable.

In the transition section, the usability problems that I detected are as follows:

1. The users did not scroll down all the way to the bottom of the transition homepage without my help. This was because the page was too long and had too much information on it.

2. The users were not sure which one they should click among “Quiz”, “Things You Should Know” and “Activities”.

3. It took the patients a long time to navigate to a specific module.

4. Also, the patients had problems knowing what they would learn from each section. There were too many steps before they could finally reach the modules. This also caused them to have problems going back as well.

5. Moreover, the content of the modules were very intensive and had too much information.

5.3 Refinement

To solve the first problem, I took off the second video and put the link up next to the first video so that the length of the page would be reduced. The solution of the second problem was to enlarge the entrance button of the module and, instead of saying “What
You Need to Know”, the button will just say “Start Modules”. Then I made the activities and quiz button secondary. For problems 3, 4 and 5, the challenge was how to make the tasks less complicated for the users and to make the content more attractive so that patients would be motivated to continue learning them one at a time. I reorganized the education modules by applying a badge collecting game mechanism into the learning process. Also, according to the Flow theory, the game was arranged into easy, medium and difficult levels. After finishing each module, the user can acquire one badge stating that they he or she is a professional in that field. “Prescription Professional” is one example. Each badge represented the knowledge the user gained from that section and will be very useful in the next step - Rehearsal. Also, in order to improve the satisfaction level, the badge that the user receives can enable them to be eligible to answer other patient's questions related to the field they achieve professional status in. It offers the patients a chance to apply the knowledge to help others. Furthermore, once the user collects all eight badges he or she will be invited to give a speech to younger patients with the same disease in a summer camp or similar setting. I believe these activities will encourage the patients to pay more attention to study the education modules.
That is to say the patient who receives a badge in a certain field will get a notification once there is a related question asked. In the Q&A section, patients will be asked to tag their questions in order to send notifications to patients with professional badges.
Illustration 20_Workflow of Q&A_refined
Chapter 6: Visual design

6.1 Design

Theme

I decided that the visual theme for the website will be camping. Camping is an activity teenagers and young adults get excited about. Because of this I believe that it is appropriate for visualizing the idea of achieving goals and for growing up. The visualization for climbing a mountain is similar to the analogy of learning how to ride a bicycle. Both visually indicate achievement by moving step by step. With advice from Dr. Lori Crosby, a Cincinnati Children’s Hospital psychologist, I changed the analogy from learning how to ride a bicycle to learning how to drive which is an activity more related to teenagers’ lives. During a test with Jasmine, a 21-year-old SCD patient I asked her to compare the two analogies. Her preference was the latter due to the fact that learning how to drive is closer to her current life, whereas learning how to ride a bicycle seemed to far in the past for her. I will explain her test more later in this chapter.
Design

The goal of the site's visual design is to grab and maintain teenagers' attention. The overall visual language is simple and clean to enable the readability of information. The site also utilizes illustrations and peripherals in order to make it vivid and visually exciting for teenagers. The buttons are big so they stand out on the pages and the illustrations are colorful and fun. Also, resonance with the group of users was created by way of African American imagery and illustrations. Figure
Illustration 22_Visual Design_Sample

Color

Illustration 23_Visual Design_Color

Typography
6.2 Test visual samples and findings

During the test of visual style three patients looked at several visual samples and were asked whether it’s visually appealing, whether you want to explore when seeing this layout and roughly how long would you spend on this website according to the graphic style?

Findings

1. The feedback showed that the users like the fun, vivid look. Jasmine Borks, a 16-year-old girl with SCD, said “I want more pink, hot pink!” Antonio, a 21-year-old SCD male patient, who has just transitioned said that “There is some empty space. I wish it would have more illustrations, like trees or balloons.”

2. Another discovery was that photos made them excited. Antonio’s favorite page among the visual samples was the Schools and Jobs page, because of the photos of real people.
3. Antonio also suggested having visual examples on the tabs of Living with SCD page because he had no interest in clicking those buttons. That insight meant that some of the pages needed more visualizations in order to trigger the users’ interest.

6.3 Hi-fidelity prototype

Illustration 24_Hi-fidelity Prototype
Full version of the high-fidelity prototype is in appendix.
A test with a high-fidelity prototype was done with one patient, Jasmine, a 21-year-old female SCD patient. She was given a scenario.

**Scenario**

One day, your doctor recommended a website to you. He said, “It’s time for you to start preparing for transition. Teens & Young Adult Camping will help you to be more self-dependent and will help you to be prepared for the transition. Check it out!”

You came back home, receive an email from Cincinnati Children’s Hospital with the link of the website your doctor told you today. You click on the link to open the website.

Illustration 25_Hi-fidelity Prototype Testing Scenario

Then Jasmine was asked to register, and go through steps 1, 2 and 3 and was showed examples of the print materials. After each step she was asked to answer four questions based on the experience she had in that step. After she finished all three steps, she was asked to do a post-use survey that included six questions. In it she had to score the answer from 1 to 5 based on the entire experience she had on this website. The post-use survey was designed to estimate
the user’s satisfaction level and to test out the necessity and perception of the transition analogy story before registering.

One of the findings was that the information in the Living with SCD section is overwhelming. The solution could be increased visualization of the information or grouping of some of the information. This problem will be solved in subsequent refinements.

Jasmine thought the analogy story was useful and she would have liked to have read it before she registered. Also, as I mentioned before, she preferred the learning how to drive four steps analogy because it’s more related to her current life.
Chapter 7: Conclusion and Discussion

The thesis was inspired by Keller’s book *Motivational Design* and explored the value of the Motivational Design ARCS model that could be utilized by a designer. The author explained the Motivational Design ARCS model from a designer’s perspective and took it a step further by exploring the application of the ARCS model in an online education experience design. A design process for designing a motivating online learning experience was presented in this thesis. A design procedure using this process for teenage Sickle Cell Disease patients was described and part of the test findings were demonstrated as well. The conclusion chapter will include a summary of the research, design and test findings, design tactics that could possibly motivate users in medical educational website design, planning and suggestions for further study.

7.1 Summary of findings

*Does Motivational Design really help?*

Motivational Design as a theory can provide designers with a powerful tool to understand the problem in a deeper way. I will also offer the designer a direction to find solutions. However, in order to come up with the most appropriate and effective solution Motivational Design theory is not enough. Designers also need to have a better understanding of the audience, build empathy on audience.
According to the positive feedbacks I got so far, Sharing learning performance, Helping each other, Being a speaker are stimulating young patients’ curiosity. However, it still need a long term observation to evaluate if they really engage in those activities.

The design tactics that I used in this project are listed as follows:

Attention Grabbing
1. Visual style that can create interest will attract users’ attention. In this case, users preferred crowded graphic design style, vivid color and were interested in photos.
2. Personalization can also grab and maintain users’ attention, such as the customized healthy notebook.
3. Consistent style in navigation is helpful for maintaining attention.

Relevance Establishing
1. According to Keller’s book, meeting users’ needs is essential in establishing relevance. For learners who are learning information that they must learn instead of what they want to learn, persuasion is necessary. An analogy that they are familiar with is helpful in arousing awareness of the importance of the education. In this case, the learning how to drive story allows the patients to realize that every transition needs several steps of preparation before it can be accomplished.
2. Assistance is needed for learners who have low skill levels when they get started. So coaching and directing at a certain level during the learning experience is necessary.
In this case, the website directs the patients step by step to finish the online educational materials.

3. In this case, patients also want to know what others are doing. So sharing information and offering stories about other patients is necessary for patients to know more about each other.

4. Patients also need to know if the time they spend is valuable or, in other words, useful in the real world. In order to avoid patients’ concerns about a disconnection between the online effort and real world significance, making the connection between online experience and the real world is very important.

Confidence Improving

1. Matching users' skill levels is essential in improving confidence. Directing patients from easy to medium to difficult is a way to avoid losing confidence. Enabling users to foresee the outcomes and the possibility of success is important to improve their confidence. In the education website design case, patients can see which step they are in and how many they will do. They are also provided with clear instructions about what to do in each step and what they can get from each step.

2. Using analogy stories, such as “learning how to drive” in this design, can also help the users feel confident about finishing tasks.

3. Checking users’ profiles and progress is another way to allow users feel confident about the online experience.
Satisfaction Offering

1. Applying knowledge gained online into offline practice is a possible way to reinforce the success and offer a sense of satisfaction. In this case, patients who finish the first three steps of education will go to step 4, rehearsal, where they can actually apply what they've learned to try to solve real problems.

2. Gaming mechanisms, like badge collection, is another way to improve the satisfaction level by offering reward to emphasize their achievement.

3. Considering that teens often want to be treated like adults, enabling them to contribute to the online/offline transition education community to help younger patients with weaker skills will motivate them to make more effort.

7.2 Weakness

1. Designer should have a conversation session with patients at the beginning of the project to build empathy on the users.

2. The testing session should have at least 5 participants who are all age from 14 to 21. That way I can get more valuable results.

3. The survey didn’t stimulate the patients to talk much about their thoughts. Patients gave positive feedbacks but we don’t know if they will do the same as they said. So it needs a long term of observation and evaluation to estimate the existence of motivation.
7.3 Further study and next steps

The author’s next step is to refine the graphic design of the web pages in terms of typography, icon refinements and imagery selection. The author will also test the high-fidelity prototype with SCD patients to find out and solve further usability problems. Then the author will collaborate with developers to develop this website.

A suggestion for further study of this project would be a long term study to evaluate the website’s effectiveness on motivation.


http://doi.acm.org/10.1145/1541948.1541999


Viner, R. "Transition from Paediatric to Adult Care. Bridging the Gaps or Passing the Buck?" Archives of Disease in Childhood 81.3 (1999): 271-75. Print.
Appendix

Hi-fidelity Prototype Screenshots
But We Made Transition Easier For You!
On this website, we will guide you step by step to gain skills for the transition.
Only 4 steps, just like how you learned driving.

Are you ready to start?

YES  NOT YET

Welcome to Teenager & Young Adults Camping

Register

How do you want us to call you?
Your Name or Nick Name...

How do you want us to keep in touch?
Email...
Phone Number...

Please enter your password

Confirm your password

OK
Everyday Healthy Tips

Gradually work up to 30 to 60 minutes of exercise most days of the week.

Is this tip helpful?
- Useful (Then it will be added to your Healthy Notebook)
- No

You will get:
- My Profile
- My Emergency Card

Mission: Complete About Me section

Because with doctors and parents about this section.

START

You will get:
- My Profile
- My Emergency Card
About me

Teenager & Young Adults Camping

You can always visit About Me section from here.

STEP 1

Basic Info          Medication Sheet       Emergency Card       My Goals

Name: Aria

- Female
- Male

Date of Birth: [ ] [ ] [ ]

Where do you live?

[ ] [ ]

Change Profile

STEP 1

Basic Info          Medication Sheet       Emergency Card       My Goals

You can always visit About Me section from here.

List a medication you are on: 

How much do you take it?

When do you take it?

Next

Talk to your doctor for help or check out MyChart if you are not sure about these questions.

77
Now let's forget about medication and think about life.

What do you see yourself when you are 18?

- Going to college
- Have a part-time job
- Having a dog
- Travelling around the world
- Study in high school

OK
Well Done! Mission: Complete About Me section.
You have finished STEP1.
Now let's go to **STEP2**.

**Mission:**
1. Study Healthy Tips in *Staying Healthy* Section.
   Try to generate your Healthy Notebook and keep it with you.

2. Study *Living With SCD* section to learn how to manage your daily life.

3. Study *Schools and Jobs* section to learn what you need to do when you are at each education level or at work.

**You will get:**
My Healthy Notebook

Are You Curious to See What’s In Others’?

Do not have one?
Create One Now! Need two steps needed

Read Healthy Tips

Check Useful to add useful tips to your Healthy Notebook

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Example:

1. Vary your exercises to keep your workout routine fresh and fun.

2. Start off with low- to moderate-intensity workouts and gradually increase with experience.

3. Gradually work up to 30 to 60 minutes of exercise most days of the week.

4. Cut back on exercise if you are feeling over-fatigued, faint or if you cannot finish the exercise.

5. Wear clothing and shoes that are designed for your specific exercises.

6. Limit unhealthy fats, such as saturated and trans fats, and foods loaded with sugar and salt.

7. Follow safety rules concerning vehicle seat belts, motorized tools, recreational vehicles and bike and motorcycle helmets.

8. Regular sexual activity is important for maintaining a healthy relationship.

9. Drink alcohol in moderation—no more than two drinks a day for a man or one drink a day for a woman.
Arika’s Healthy Notebook

1. Drink alcohol in moderation—no more than two drinks a day for a man or one drink for a woman.
2. Use a sunscreen of SPF 15 or higher and avoid being out in the sun between 10 a.m. and 4 p.m., when the sun’s rays are most intense.
3. Wear long sleeves, a wide brimmed hat and wrap-around sunglasses for the most protection from the sun.
4. Learn to control your stress to help you feel better every day and decrease your chances of long-term health problems.

Be Creative! Use the creation tools below to decorate your Healthy Notebook before you print it.
Creating Healthy Notebook

What is the name of your Healthy Notebook?

(You can change it later anyway)

Enter your notebook name here...

OK

Creating Healthy Notebook

Add the first tip in your Healthy Notebook

- Vary your exercises to keep your workout routine fresh and fun.
- Start off with low- to moderate-intensity workouts and gradually increase with experience.
- Gradually work up to 30 to 60 minutes of exercise most days of the week.

Add to my Healthy Notebook
In order to live well with sickle cell disease (SCD), you must take an active role in your health care. You need to understand what SCD is, how it affects your body, your treatment options, and how to prevent problems. This section will give you some tips to help you manage your SCD.

Choose a category below to start

- Live a healthy lifestyle
- Avoid Sickle Cell Triggers
- Take Medications the Way Your Doctor Told You To
- Have a Pain Action Plan
- Get your Immunizations
- Get Regular Check-Ups
- Get Your Treatments on Time
- Learn More About Sickle Cell
**Live a healthy lifestyle**

This means doing things that will help you to stay healthy like drinking enough, eating well, sleeping at least 8 hours per night and exercising regularly.

**DRINKING**

People living with sickle cell need to drink at least 64 ounces (8 glasses) of water/fluids each day. This keeps red blood cells from sticking together. Remember sodas do not count as fluids!

**EATING**

People living with sickle cell should eat a well-balanced diet (see the Food Pyramid website for what to eat for your age).

- **Folic Acid.** Make sure you eat foods rich in Vitamin B9 (folic acid) like leafy greens, organ meats, and beans.

**Avoid Sickle Cell Triggers**

5 Tips to Avoid Sickle Cell Triggers

Avoid getting stressed out.

Stress can come from both positive and negative events in our lives. It is essential that you manage your stress well because doing this can decrease your risk for SCD complications.

To learn how to prevent and manage stress, click here.
Take Medications the Way Your Doctor Told You To

It is important that you take any medicines the way the doctor told you to. This will help the doctor tell if the medicine is working like it is supposed to or if another treatment is needed.

If you have side-effects, tell your doctor right away so your medicine can be changed or stopped safely.

Have a pain action plan

It is important for you to know what to do when you have pain. It is too hard to think sometimes when you are hurting

Do you have a pain action plan?

YES! I have a pain action plan already.

Let's check if it is good enough.

NO. I don’t have a pain action plan yet.

You can

Download a pain action plan

Or

Try a role play game to understand it better.
Get Your Immunizations
These are shots that help protect you from getting infections. Infections can be serious when you have sickle cell disease.

Get Regular Check-Ups
It is important that you get regular check-ups if you have sickle cell. The doctor needs to examine you and check your blood levels to prevent serious medical problems.

Get Your Treatments on Time
Make sure if you are supposed to get blood transfusions every month that you come

David, Kara and Jasmine will share their experience about how to manage Sickle Cell Disease in High School, College and at Work.

Managing SCD in High School
Managing SCD in College
Managing SCD in at Work
Going to high school with a chronic illness can be challenging. Not only do you have to keep track of your school assignments and activities, you also have to keep track of medical appointments and possibly take medications or treatments regularly (daily, weekly, monthly). This can be a lot to add on to your already busy schedule.

I’m David.
18 years old.
Senior in Aiken High School, Cincinnati.
I have Sickie Cell Disease.

Here I will give you some suggestions about managing it during high school.

I’m Kara.
22 years old.
I’m a Biology major at University of Cincinnati.
I have Sickie Cell Disease.

This can also be a time of anxiety for young adults. With the added responsibility of independence, Adolescents may worry about how they can manage it all. Concerns, questions, and apprehensions may face any college student, let alone one living with Sickle Cell Disease.
I’m Jasmine.
28 years old.
I am secretary at Duke Energy, Cincinnati.
I have Sickle Cell Disease.

Many people with sickle cell disease work successful and fulfilling jobs. In careers where they can focus on their abilities instead of disabilities, people with SCD are thriving members of the workforce.

While there are some positions that people with Sickle Cell Disease should avoid, Sickle Cell Disease does not have to dictate your career choices.

In order to prevent a SCD pain crisis, certain activities should be avoided. Any careers that include these activities may not be suited for people with Sickle Cell Disease:

START

Many people live healthy long lives with Sickle Cell Disease, and this includes going to college.

STEP 1
Find Good Medical Care

Transitioning into adult care is a key step in the management of Sickle Cell Disease. Make sure to find a new doctor if you move far away from home, and keep this doctor fully informed of your medical history. Having your medical records mailed to this new doctor is a great way to keep them in the loop.

STEP 2
Practice Healthy Habits
Mission:  
1: Study Transition Education Modules in Transition section. You will collect one badge once you finish a module.  
2: Think about how to get started with the transition.
Transitional from being a teen to a young adult can be hard, especially when dealing with Sickle Cell Disease.

BUT DON’T WORRY.
There are a lot of people transitioning successfully every year.

Our Story: Living with and Managing Sickle Cell...

Nicholas: “I’m a 15 year old boy. It looks weird that you can be a normal teenager and take care of sickle cell.

People who have transitioned successfully are saying...

Changing from a pediatric doctor to an adult doctor can be like going from elementary or middle school to high school.

Nicholas
YES, YOU CAN DO IT.

This section has 8 interactive modules that will help to prepare you for the transition from pediatrics to the adult healthcare system. All you need to do is finish the 8 modules and get 8 badges before you can move on to next step.

There are also some quizzes, games and interactive activities in this section.

GET STARTED

Start Studying Modules & Collecting Badges

Or

Take The Quiz to test your knowledge

Jump into Games & Activities

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A ★★ EASY

Get Familiar with the Difference between Pediatric Health Care System and Adult Health Care System

Module1. Pediatric Vs. Adult

B ★★★ MEDIUM

What You Need to Do when You are in Adult Health Care

Module2. How to make an appointment with adult doctors?

Module3. How to communicate with adult doctors?

Module4. Learn to deal with prescription.

C ★★★★ HARD

Four More Important Things You Should Know

Module5. How to Manage an Emergency?

Module6. Insurance

Module7. PCP

Module8. Legal Issues
Good Job! You have collected 3 badges!

- Prescription Professional
- Making Appointment Professional
- Adult vs Pediatric Professional
- Communication Professional
- PCP Professional
- Legal Issue Professional
- Managing Emergency Professional
- Insurance Professional

You can always check out how many badges you have got here.

WHY COLLECTING BADGES?

- Prepare for Rehearsal
  Each badge represents that you have gained enough knowledge from the module you selected.
  Once you have collected 8 badges you will be able to jump to the next step—Rehearsal where you can apply this knowledge you’ve gained here.
  You’ll find them very useful when you are in STEP 4—Rehearsal.

- Helping Each Other
  Once you get a badge that means you are professional in that field. You may be asked to help other patients who have the questions being asked and share your knowledge in this area.
  This will happen in Q&A section.

- Be a Speaker
  Once you collected all the badges you may be invited to give a speech to kids in the summer camp to share your experience and knowledge you have gained.
Mission:
1. Contact hospital to arrange for your rehearsal. ☐
2. Make an appointment with adult doctor. ☐
3. Visit doctor on time. ☐
4. Get your prescription refilled. ☐

Let those equipments you have got help you