Element K: Reflection on the design project

This entry would be likely to receive a score of 1, based on the EDPPSR. The designers attempt a comprehensive review of and reflection on their project, but often simply state what they did for a particular task or where to find particular documentation (e.g., "We had testers fill our a questionnaire for the functionality test," "Our conclusion is listed in section I"). Much of the content was not really reflective and was often very general. Many of the headings name/identify artifacts (web page, multimedia display) rather than referring to the elements of the engineering design process embodied in the EDPPSR.

The very last heading is "Electronic Portfolio," and the text beneath it ("We participated in the Innovation Portal so that we would have an electronic portfolio of our work") suggests what may be at the root of the low score level of this entry for Element K—that is, that the designers were using a different organizational schema for their project and only adapted what they could to the structure of the Innovation Portal at or near the end of the project. This "scrapbooking" of artifacts in the e-portfolio after the fact rather than using the EDPPSR as a framework for learning about and engaging in the engineering design process may explain why this broad review of a project failed to provide clear and developed reflections on, and value judgments of, most major steps in the project based on the elements of the EDPPSR.

Engineering Design Process Portfolio Scoring Rubric
Component and Element Titles

Component I: Presenting and Justifying a Problem and Solution Requirements

- Element A: Presentation and justification of the problem
- Element B. Documentation and analysis of prior solution attempts
- Element C. Presentation and justification of solution design requirements

Component II: Generating and Defending an Original Solution

- Element D: Design concept generation, analysis, and selection
- Element E: Application of STEM principles and practices
- Element F: Consideration of design viability

Component III: Constructing and Testing a Prototype

- Element G: Construction of a testable prototype
- Element H: Prototype testing and data collection plan
- Element I: Testing, data collection and analysis

Component IV: Evaluation, Reflection, and Recommendations

- Element J: Documentation of external evaluation
- ***Element K: Reflection on the design project***
- Element L: Presentation of designer's recommendations

Component V: Documenting and Presenting the Project

- Element M: Presentation of the project portfolio
- Element N: Writing like an Engineer

Please Note: Elements M and N require no submission from the portfolio author(s) and are intended to be scored based on the portfolio work as a whole from what has been submitted from Elements A through L

Element K: Reflection on the design project

5 The project designer provides a consistently clear, insightful, and comprehensive reflection on, and value judgment of, each major step in the project; the reflection includes a substantive summary of lessons learned that would be clearly useful to others attempting the same or similar project.

4 The project designer provides a clear, insightful and well-developed reflection on, and value judgment of, each major step in the project; the reflection includes a summary of lessons learned that would be clearly useful to others attempting the same or similar project.

3 The project designer provides a generally clear and insightful, adequately-developed reflection on, and value judgment of, major steps in the project, although one or two steps may be addressed in a more cursory manner; the reflection includes a summary of lessons learned, at least most of which would be useful to others attempting the same or similar project.

2 The project designer provides a generally clear, at least somewhat insightful, and partially developed reflection on, and value judgment of, most if not all of the major steps in the project; the reflection includes some lessons learned which would be useful to others attempting the same or similar project.

1 The project designer provides a reflection on, and value judgment of, at least some of the major steps in the project, although the reflection may be partial, overly-general and/or superficial; the reflection includes a few lessons learned of which at least one would be useful to others attempting the same or similar project.

0 The project designer attempts a reflection on, and value judgment of, at least one or two of the major steps in the project, although the reflection may be minimal, unclear, and/or extremely superficial; any lessons learned are unclear and/or of no likely use to others attempting the same or similar project; OR there is no evidence of a reflection and/or lessons learned.

Reflective Questions for Element K;

- ***If I/we were going to do this project over, what should be done differently during the design process to improve the project and how would those recommendations make the project better overall?***

Palm Rejection Device Accessory for iPad/Tablet with Stylus

Project Reflections

Research and Exploration

Problem Selection

We wrote then collaborated our likes and dislikes. We individually picked our own top problems such as Stylus accessory for Tablets, merged screen technology, and plastic bottle smasher. All members thought about possible improvements for 3 problems. We created a Decision Matrix to score and weigh categories like valid problem, feasibility, time, cost, and able to experience the teaching process. The Table/iPad Palm Rest was chosen.

Topic Background

The topic chosen was developed from a member's personal experiences with a Stylus device that was not 100% accurate on touch screens of electronic Tablets. We researched how the device is used and experimented on its uses plus malfunctions.

Problem Statement

After experiencing the device's malfunctions, our problems became the malfunctions. We researched why the device was invented originally. We found articles that about how it helped people with syndrome and articles about how the device did not work to expectations and technologies developed to improve the devices function.

Statement of Purpose

Our purpose was to develop an accessory that would improve the Stylus device's performance and meet a user's expectations.

Cited Validation

Cited Justification

We found many articles supporting our venture for creating an accessory. Some articles related to support from people with carpal tunnel syndrome.

Past & Present Solutions

It was difficult to find any Patents on such products that would strap around a wrist. We did find other devices (i.e. glove, rest pad, attachment to the Stylus to keep palm from resting) but none meet our potential customers' need which was to be able to rest their palm on the screen.

Market Research

We performed a survey using Google Docs – easy and simple software for e-responses. We gathered about 45 responses with 81% willing to use a Stylus and the accessory for about $17.

Project Proposal

Our goal is to produce a prototype of a marketable accessory for the Stylus that meets consumer needs in a growing Tablet and Stylus market.

Design and Construction

Design Specifications

We took in consideration the following specifications; cost, lifecycle, ease of use, adaptable, freedom of movement, aesthetics, clearance, ergonomics, usage with variety of products, weight and portability.

Decision Matrix

The Decision Matrix has the specifications with weighed ratings. Our goal is determine which specifications were more important that we should focus.

Concept Testing

We developed several versions of the Stylus accessory such as a mechanical glide, glove, and a sandal like products. We developed mock-ups and found the sandal like product. We also tested the materials for sheering and found that dense foam was the strongest and lightest. We also tested elastic bands and found that hardly lost elasticity over a time lapsed of 2 years.

Design Proposal

From our Concept Testing, we decided to move forward with the palm rest with wrist strap.

Gantt Chart

Our Gantt Chart was set up with days of the week and the Rules of Third that was in line with the 12 steps of the design process. We indicated that the Research Paper and Electronic Portfolio would span throughout the entire project. Other steps would progress steadily in groups of steps or individually to completion.

Sketching Refinement

We refined our sketches from a kidney shaped "sandal" as the base for the palm to a equally geometric mirrored shape with slots to receive the laces. We continued to refine by having the fabric wrap entirely around the base rather than a layer on the bottom of the base.

Technical Drawing

We drafted an assembly drawing and working drawings of each part that need manufacturing with a parts list. We also drafted a sewing pattern for fabric surrounding one of the parts.

Material List

We created a purchase order for supplies for our product and a parts list was inserted into our technical drawings.

Cost

We discovered the cost to manufacture is about $0.75 for parts and $0.75 for labor for a total of $1.50. For the prototypes, fabricating is about $30.

Tool Selection

We used a Rapid Prototyping machine with support and model material. It took about 1.75 hours to print out two 4x2 parts. We also used sewing equipment and scissors.

Tools Safety

We needed to use closed toe shoes and safety glasses.

Mock Up & Modeling

We developed a mockup with a plywood base then the rapid prototype material. We tried several different patterns for the elastic bands.

Prototype Build Procedure

We wrote a plan of procedures for each of the parts and then assembly. We included general procedures for the rapid prototyping machine. We

We wrote a plan of procedures for each of the parts and then assembly. We included general procedures for the rapid prototyping machine. We wrote the plan after the Prototype was built. We could work out any unnecessary steps.

Prototype Construction

The assembly of the product was simple but the challenge was cutting the fabric pattern then sewing the patterns together so it fit perfectly around the base and still allow the elastic bands to lace though the slots.

Testing, Documentation, and Presentation

Testing Criteria

We felt that there were three main items to test on the Palm Phantom: functionality, elasticity, and interferences. We wanted to make sure that the product functioned as intended when evaluated by testers, that the elastic would hold its form with multiple usage, and that the Palm Phantom did not interfere at all with the normal use of a tablet.

Testing Procedure

We developed three tests and wrote procedures for each. For each test, we listed the purpose, pass criteria, materials required, initial c conditions needed, safety concerns, and circumstances in which the test should be terminated. Lastly, we wrote step by step procedures for each test.

Physical Testing
We performed the three tests as indicated in our testing procedure. We tested functionality by having several people write a paragraph on a tablet using only a stylus and then write the same paragraph with the Palm Phantom and a stylus. We had testers fill out a survey.

For the Elasticity test, we developed an attachment for the hand drill that would simulate someone taking off and putting on the Palm Phantom repeatedly. We timed the test so that it would approximate the process for about twice a day for two years. We measured the initial and final length of the elastic.

To determine interferences, we performed what we called a heel / toe test. In this test, we had a user write normally on a tablet with the stylus and the Palm Phantom and then write while specifically trying to tip the Palm Phantom so that it was not flat on the tablet to see if it caused any spurious marks or unintended consequences.

Record Data

We had testers fill out a questionnaire for the functionality test. We then took those questionnaires and summarized them in an Excel document. For both the Elasticity and the heel / toe test, we recorded the results in our engineering notebooks.

Critical Design Review

We listed out our design specifications (with justification), the agenda for the review including a review of test results, expert input, list of current risks, "show stopper" events, schedule and budget, adjustments and tradeoffs, moving forward questions, minor modifications that could be made, and a summary. We met with our professors as well as others in our class to do the critical design review.

Redesign and Refine

We did not have time to complete this step however we did write out several changes we would like to make with more time. They are listed in section L of the Innovation Portal.

Re-test

Again, because we ran out of time, we were not able to re-test.

Determine Conclusion

Our conclusion is listed in section L of the Innovation Portal.

Recommendations

Our recommendations are listed in section L of the Innovation Portal.

Multimedia Display

For our final presentation / trade show, we created a tri-fold display, a Power Point that will run continuously, several displays that show actual mock-ups, materials and prototypes, and we also have a marketing brochure that we will pass out.

Web Page

We do not have a web page for the Palm Phantom, but we plan on making one if we are able to get a patent and go to production.

Research Paper

We did not write a final research paper, however, each stage of our design process is documented both in our engineering notebooks and on the Innovation Portal.

Electronic Portfolio

We participated in the Innovation Portal so that we would have an electronic portfolio of our work.