

PROJECT THREE MILESTONE FIVE: EXECUTION OF THE TEST PLAN AND FINALIZING THE DESIGN

MILESTONE 5 – COVER PAGE

Team ID:

Thursd-13

Please list full names and MacID's of all *present* Team Members

Full Name:	MacID:
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MILESTONE 5.1 - FINAL EVALUATION OF THE OBJECTIVES AND CONSTRAINTS

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As a team, for the last time, restate the quantitative and qualitative objectives, along with constraints that you had stated in your refined testing plan of Milestone 4. If these objectives/constraints, metrics, and testing methods have changed over the course of your project, that is OK. Use the objectives/constraints, metrics, and testing methods that are most in line with your current design. You can refer to the Test Plan Guideline (can be found under P3 documents) for more details.

State your Quantitative Objectives and their Metrics below:

Low cost	Ratio of our cost / market cost
Sufficient sheet music storage	Maximum # of sheet music files stored
Eco-friendly	Granta eco audit results

State your Qualitative Objectives and their Metrics below:

Perceived safety	User rating out of 5
Ease of use	% of customizable options found w/o instruction
Logical/intuitive code	% of test cases that resolve properly/logically

State your Constraints and their Metrics below:

Must be feasible for us to create in the time limit	Can we create a Gantt chart we all agree to which covers all the required steps? (Y/N)
Must solely use resources feasible to us	Can we create a fabrication plan using available materials? (Y/N)
Must cost under \$100	Will the cost of materials surpass \$100? (Y/N)

Restate your current testing plan that you will be implementing today.

*Insert your **Present Testing Plan** (how you will test your prototype).*

For **low cost**, we will perform a final analysis of the total cost of fabrication for our project. We will sum up our total costs and present a final cost. Then, we will research the market to see how much it costs to purchase a similar item from another manufacturer. To determine the market price, we will take the average cost of the three most-purchased alternatives to our product on amazon.com. We will then divide our cost of manufacturing by the market price to get our final metric for cost.

For **sufficient sheet music storage**, we will find the average size of a sheet music pdf, from a sample size of 10 random songs. We will then find the maximum theoretical storage limit of the device which we will be doing our demonstration on, which is an iPad Pro. We will then divide the theoretical storage limit by the average sheet music size to find our theoretical maximum sheet music storage.

To test **eco-friendliness**, we will create a Granta eco-audit for our prototype, to measure the ecological impact of our product.

For **percieved safety**, we will get feedback from users to make sure everything feels secure. We will ask 3 people to experiment with using the hardware for 2 minutes each, and then we will ask them to give a score out of 5 on perceived safety.

To test **customizability/ease of use**, we'll have users adjust settings like text size and brightness to see if they find it easy to personalize. We will ask 3 people to use the software without any instruction for 1 minute and measure the % of customizability features they could find in that time. We will then ask them for any customizability features they desired, but we did not include, and we will subtract the average number from the average % customizability features found to get our final customizability metric.

For testing **website functionality**, we'll run test cases and debug to make sure the system works as expected and covers all key functions. We will go through the website code and create test cases for any edge-case situations that might possibly occur. For each test case, we will then run through the website code and predict the expected output. We will then record the % of test cases that match the prediction correctly for our final website code functionality metric.

Finally, to ensure we passed all our constraints, we will ask ourselves the following questions: "Could we create a Gantt chart we all agree to which covers all the required steps?", "Could we create a fabrication plan solely using available materials?", and "Did the cost of materials surpass \$100?". The answers to these questions will reveal whether or not we passed our metrics of **feasibility within time**, **feasibility within resources**, and **final cost**.

State and justify any changes you made from last week.

We made quite a few changes from last week's testing plan. For instance, we realized that although our previous testing plan was possible and feasible for us to execute, it would not reveal much information about our progress towards our objectives, and it wouldn't give very accurate results. For this reason, we changed the methods that we would be using for testing into more concrete methods, while also relying on user feedback to judge subjective scores. We also realized that some of our objectives did not have proper testing methods, such as **eco-friendliness**, so we made sure to add them to this week's testing plan.

MILESTONE 5.2 – TESTING PLAN EXECUTION AND DISCUSSION

Team ID: Thursd-
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Execute your testing plan for your Quantitative Objectives:

State and discuss the results of your testing plan in this box.

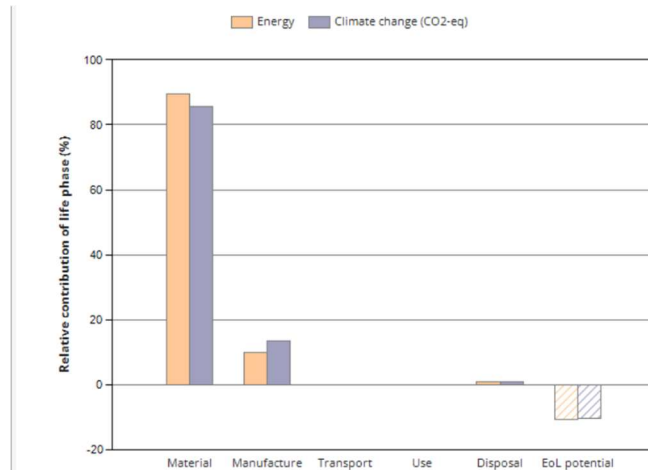
Low Cost:

Ratio of production cost over market price: 0.507 (\$60.00 CAD / \$118.38 CAD)

Sheet Music Storage:

Max # of sheets stored: ~3174603 (200 gB / 63 kB)

Eco-Friendliness:



[Energy details](#)

[Climate change \(CO2-eq\) details](#)

Phase	Energy (MJ)	Energy (%)	Climate change (CO2-eq) (kg)	Climate change (CO2-eq) (%)
Material	185	89.4	9.78	85.6
Manufacture	20.3	9.8	1.53	13.4
Transport	0	0.0	0	0.0
Use	0	0.0	0	0.0
Disposal	1.72	0.8	0.12	1.1
Total (for first life)	207	100	11.4	100
End of life potential	-22.2		-1.17	

Results Discussion:

From testing our quantitative objectives, we conclude that we have reached our objectives in full capacity. Starting with our objective of low cost, we found a ratio of 0.507 for our cost compared to market price. This means that our product costs almost half the cost of purchasing elsewhere, which means our product has a very low cost for its capabilities.

For our objective of sufficient sheet music storage, we calculated a theoretical maximum of over 3 million pages of sheet music. This is because of the iPad has 200 gB of storage, and our average sheet music size was 63 kB. This amount of storage is much more than sufficient for a single user, so we have surpassed our objectives.

For the objective of eco-friendliness, we found a final EoL potential of –22.2 MJ of energy and – 1.17 Kg of CO₂. This is a very small environmental impact, approximately equal to driving a car 3 Km. Considering that our product is not designed to be replaced very often, we have determined this is an acceptable eco-friendliness, meaning we have reached our objective.

Execute your testing plan for your Qualitative Objectives:

State and discuss the results of your testing plan in this box.

Safety:

Average perceived safety: 3/5 (3,5, 3, 3.5)

Ease of use:

Average % of customizability features found without instruction: 100% (100%, 100%, 100%)

Customizability:

Average # of desired customizability features not included: 0.66 (0, 0, 1)

Website Functionality:

% of test cases resolving properly: 83.3% (5/6)

Results Discussion:

Overall, our testing shows that we did quite well in our qualitative objectives, although there are still some areas for improvement. Starting off with our objective of safety, we received an average perceived safety score of 3/5. This is not as high as we were initially predicting and showed that we are lacking some safety features we will require in our final design. Some feedback we received included sharp edges, finger catch points, and snap points on the design.

For our objective of ease of use, all 3 of our testers could find all the customizability features without any instruction. This demonstrates that we did a good job at making all our customizability features clear and easy to use, since all the testers could find and use them without complications.

For our objective of customizability, we got an average of 0.66 desired customizability features which were not included in our website. Both these desired features were for a way to change the colors of our website. This shows to us that we did not fully add enough customizability features to our website, although we are quite close.

For our objective of website functionality, out of the 5/6 of the test cases resolved properly, with one test case not resolving as intended. This shows that we did not fully reach our objective, and that we must change our code to fix this issue.

Execute your testing plan for your Constraints:

State and discuss the results of your testing plan in this box.

Could we create a Gantt chart we all agree to which covers all the required steps?

Yes

Could we create a fabrication plan using available materials?

Yes

Did the cost of materials surpass \$100?

No (final cost of materials: \$60 CAD)

Results Discussion:

Through this analysis of our constraints, we found that we have abided by all three of our constraints.

As a team, discuss the results of your testing plan. How did your design do? Did it meet all expectations you had from your design? Did you go through any iteration based on the execution and the results of your test plan? How did the test plan influence your iterative process? Remember, focus on the overall functionality of your design rather than the aesthetic quality.

State and discuss the modifications of your design in this box.

Overall, our testing gave us fairly positive results, with many objectives being met and the rest being close to being met. Out of the 7 objectives we tested, we found that only 2 of them were unsatisfactory in our design, and out of our 3 constraints, we found that we had met all 3. The execution of our testing plan did not give us any iterations, but the results certainly did. Especially in the aspects of **safety** and **logical website programming**, we received direct feedback and ways to improve in the areas we were not doing good enough in. To fix our pseudocode, it was a simple task of reworking our programs logic and running further tests. To improve our safety, we had to perform further iterations on design to reduce/eliminate risks of injury present in our design. This had a huge influence on our iterative process, as we were given a direction to proceed in how to improve and how to ensure we were achieving our objectives, while being confident that our constraints were being met.

MILESTONE 5.3 – SUMMARY OF PERSONAL PERFORMANCE

Team ID: THURS-13

Use the space below to document all your contributions to project so that it can be discussed during your weekly TA check-in

Team Member	Personal Contributions
Maximus Wang	<ul style="list-style-type: none"> - Reworked testing plan - Executed testing plan - Provided feedback and discussions for the results of testing plan
Abhay Shenoy	<ul style="list-style-type: none"> -Finished AI recognition tool for website and started testing -Helped with execution of testing plan -improved UI for website
Omar Abumoghli	<ul style="list-style-type: none"> - Worked on the present testing plan