Ponderosa Pinecones

2022 Concrete Canoe

Enhanced Focus Area Report

Northern Arizona University

Table of Contents

List of Tables

List of Figures

1.0 Enhanced Focus Area Selection Process

The Northern Arizona University (NAU) *Pinecone* Canoe team had many avenues to choose from when it came to our enhanced focus area. The decision matrix in Table 1 shows all the choices for enhanced focus areas that were considered. With the topics of the enhanced focus area brainstormed, criteria were chosen and given weights based on the importance of the criteria to the team: Innovation (40%), Sustainability (20%), Cost (15%), and Practicality (25%). The team decided that innovation was the most important criteria and thus gave it a weight of 40%. This was decided because innovation is ultimately what will help most in achieving success in the ASCE Concrete Canoe Competition. The second highest weight went to practicality at 25%. The practicality of the enhanced focus area is vitally important to the team since we have rather limited funds, resources, and manpower. This means that we had to decide on some enhanced focus areas that were going to be helpful to us and teams in the future, something that was not going to put hinder or burden the team. Sustainability was decided to be weighted at 20%. This sustainability category was looking more so at the sustainability of the enhanced focus areas on NAU's Concrete Canoe Program. We wanted whatever we did to leave a legacy and resources to future teams. Lastly, cost associated with the enhanced focus area was considered with a weight of 15%. We knew that the enhanced focus area could not cost us too much monetarily. Like previously mentioned, funding for this project was low, so the enhanced focus area could not be cost prohibitive for the team.

After using the decision matrix in Table 1, the team decided to have two enhanced focus areas. These two enhanced focus areas were to invest in our mentee training and to create a website for future teams to access our documentation of the project. These two areas scored well in terms of practicality and cost since both of these will cost very little for the team to invest in and these areas provide knowledge to teams in the future.

Table 1: Decision Matrix

Enhanced Focus Areas: Decision Matrix						
	Criteria	Innovation	Sustainability	Cost	Practicality	Total Score
Alternatives	Weight	0.40	0.20	0.15	0.25	100%
Advanced Reinforcing	Raw Score	6	3	2	3	4.05
	Weighted	2.4	0.6	0.3	0.75	
Construction Techniques	Raw Score	5	5	2	6	4.8
	Weighted	2	1	0.3	1.5	
Website for Future Teams	Raw Score	5	8	9	7	6.7
	Weighted	2	1.6	1.35	1.75	
Fluid Dynamic Analysis	Raw Score	7	6	4	2	5.1
	Weighted	2.8	1.2	0.6	0.5	
Mentee Training	Raw Score	4	9	7	8	6.45
	Weighted	1.6	1.8	1.05	2	
Full Scale Construction Plans	Raw Score	6	4	7	4	5.25
	Weighted	2.4	0.8	1.05	1	

2.0 Enhanced Focus Area Value Added

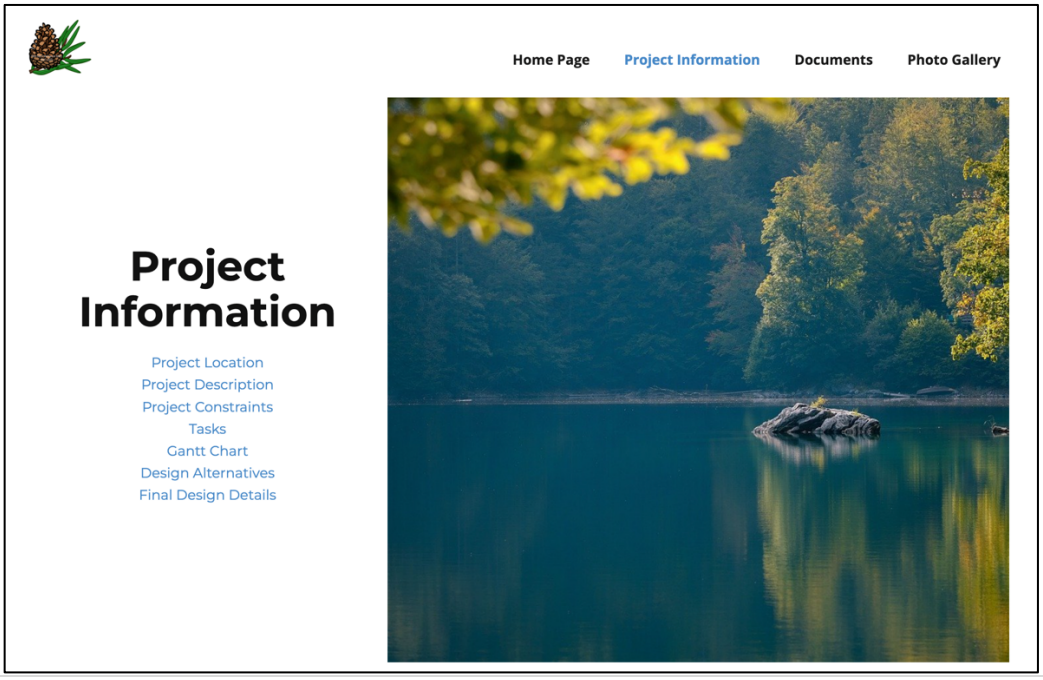
The mentee training conducted and still to be conducted actually helped the team this year more than expected. Having extra hands during mix design and construction were extremely helpful to increasing the efficiency of the project. Also, the mentees got invaluable experience that provides the sustained success of the NAU Concrete Canoe Program. An inadvertent result of focusing on the mentee program was an added element of fresh knowledge and innovative ideas to the design process. Possibly the greatest value the mentee training added to the project was that the captains were challenged to understand the technical content of the project to a greater extent. It is often said that the best way to learn is to teach. This is relevant and applicable to the experiences the captains had throughout the training.

The team website that was created will greatly assist future teams in their knowledge of the ASCE Concrete Canoe Competition. As teams in the future use this website for reference, they will see the effort and standard that it takes to be successful in the competition. The design that we create will also provide a basis for future NAU teams to work from. This saves a lot of preliminary design that may be done when starting the project from scratch. This will allow teams in the future to have more time to innovate rather than figuring things out on their own.

3.0 Enhanced Focus Area

The problem that has led us to the enhanced focus area of making a website is to provide education to future concrete canoe teams, and those generally interested in the process of what goes into making the concrete canoe. To understand the concept and general purpose of a website of this nature, the team conducted research. The team's research was based heavily on reviewing past Northern Arizona University teams' websites and taking note to what seems to work, and what does not. The background research on the topic was achievable by the team, as the NAU civil and environmental engineering capstone program requires students to create websites based upon their respective projects.

Figure 1: Ponderosa Pinecone 'Project Information' Page on Website



The team took a collaborative approach when working on this focus area, of a website. Ahead of creating the website, the team had discussions regarding what content should be included to best represent the work completed. To address the problem statement, an understanding of how to create an educational website for future team members, and the general population was to be had. To start, a general skeleton of a website was created that outlined what information was to be included. Along with this step, a development of a general design of the website was commenced. Then technical details were input into the site in a way to be read in an orderly and efficient fashion. Assumptions made in the process of creating the website, is that other websites with similar information do not provide information that can be digested by the standard citizen, as there is great use of engineering technical terms used. The Ponderosa Pinecones would like to work towards creating a website that better cater to the public, not solely those that are already familiar with the project and general engineering practices.

To aid in the technical approach, the program NicePage was used. This website allowed for the team to create a website utilizing the program's design tools. From there, the website design can be converted into HTML format, which allowed for it to be published on the NAU network. This enhanced focus area impacted the project in a positive direction overall. This is due to the amount of research completed regarding work by past teams. As research was conducted into past teams, we were able to get better insight into processes those teams took to complete various tasks. The 2021 NAU concrete canoe team, the Ponderosa Pinecones plan considers expanding on what previous teams have accomplished with their websites and making it so the information is understandable by all. The final results of the website appear to do so. The information provided is written and displayed to be comprehensible for all. Methods for transferring the knowledge acquired through conducting work on this enhanced focus area is able to happen through making the website publicly available to future teams. The website includes information on the process of creation, so other teams can build upon what is readily accessible.

The problem statement that produced the enhanced focus area for the mentee program is that Northern Arizona's concrete canoe team has seen a lack of information being passed from team to team and has hindered work for this year's team and previous years teams as well. The background research that was conducted to best solve this problem was done by interviewing two previous canoe team members and 10 mentees from previous years to find out what was lacking in the mentee program. The collaborative team approach that was utilized for conducting work for the mentee program was as follows: discussing team tasks on how to best implement the mentees and expanding their knowledge. Hannah, the quality assurance/quality control manager oversaw promoting the program to students to let them know what it entails, and how it can benefit their future career as a student at Northern Arizona University. Hannah would be in consistent communication with mentees as to when the team could use mentee assistance for large, time-consuming parts of the project. Hunter and Cole, project manager and mix design manager, oversaw leading the mentees to show them how to conduct various tasks in the most efficient and effective way. Mentees were shown how to do tasks correctly, so that they can replicate them in the future, and can consider things they may want to incorporate or not incorporate when they do the project.

Figure 2: Mentees Conducting Slump Test [1]

The main assumption that was made during the course of analysis was that mentees had knowledge specific to concrete canoe construction prior to working with our team which led to a disconnect and an inefficient work environment. The tools that were used to aid in the mentee program were the Microsoft Office suite, and the Northern Arizona University, department of Civil Engineering and Construction Management research and testing facility. The impact of the mentee program on this year's proposed canoe is to improve the final constructed product as having properly trained and educated mentees will create a better product than if the mentees were not trained and education on the construction of a concrete canoe. The final result of a mentee education and training program was a more helpful and insightful group of mentees that were more capable of helping with the construction of this year's concrete canoe. In addition, this group of mentees will possess more information and knowledge about the process of creating a concrete canoe than the group of mentees from previous years which meet the problem statement presented above. Lastly, the way that the knowledge that is acquired through the focus area of a mentee program is transferred to future teams is through the mentees. Through the mentee training program that is presented in this focus area the mentees for our team will gain knowledge and skills that they will take on for use with future teams.

4.0 References

[1] Ponderosa, "2021 Concrete Canoe Technical Proposal," Nothern Arizona University, Flagstaff, 2021.