PUSL3122 HCI PUSL3122 HCI

Coursework

Group

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Introduction

The purpose of this PDF document is to provide a comprehensive report on the design, implementation, and evaluation studies conducted for the development of an application focused on teaching primary school children about shapes in both 2D and 3D formats. The application aims to provide an interactive and engaging learning experience for children while covering the fundamentals of shape drawing and polygons.

Starting with the product vision and functional requirements, we will go into the numerous facets of the development process in this study. The application's goals and objectives are outlined in the product vision, which also highlights the educational institution's unique needs for functions such as form generation, scaling, shading, and editing.

The project's design and execution phases are the main topics of the following parts of this publication. We will examine the low-fidelity and high-fidelity prototyping phases of the user interface (UI) design process. Appendix A will contain thorough justifications and illustrations of the UI designs.

We will now discuss the implementation stage, emphasizing the rationale behind the selected design choices. This part will offer details on the decision-making procedure, as well as the justification for the chosen features and functionalities. We will also go over the factors that were taken into account when turning the design into a fully operational application.

User studies form a crucial component of the evaluation process, and this report will extensively cover their details. We will provide information on the participants involved in the studies, including how they were invited to participate and the necessary consent forms obtained. The user testing studies will be thoroughly examined, shedding light on the methods and techniques employed, the evidence of study settings, and a comprehensive user testing plan.

This document's main objective is to give a thorough explanation of the design, implementation, and evaluation processes that went into creating this shape learning application. The knowledge gleaned from this study can be applied to future initiatives in the area of educational technology and help to maintain the improvement of primary school students' shape learning experiences.

Product Vision

The shape learning application's product objective is to provide an interactive educational tool that will captivate and motivate primary school students to learn about shapes in both 2D and 3D forms. The program aims to offer a user-friendly interface that encourages geometric concept exploration, creativity, and understanding.

- Shape Creation: The application should allow users to create new shapes, providing them with the flexibility to define dimensions and customize various attributes such as color and shading. This feature aims to encourage creativity and enable children to experiment with different geometric configurations.

- Visualization: The application ought to offer 2D and 3D visual representations of forms. Children can have a better knowledge of the spatial relationships and characteristics of various forms by providing them with interactive and dynamic graphics.

- Users should be able to resize the shapes they design in order to experiment with variations in size and proportion. This function encourages a more thorough comprehension of geometric ideas like resemblance and proportionality.

By fulfilling these objectives, the shape learning application aims to provide an immersive and comprehensive learning experience for primary school children. Through hands-on exploration and manipulation of shapes, children can develop a solid foundation in geometry, fostering their spatial reasoning abilities and laying the groundwork for further mathematical understanding.

Functional Requirements

Shape Creation
Shape Visualization
Scaling
Shade and Color Customization
Saving and Editing
User-Friendly Interface
Compatibility and Accessibility

These functional specifications are designed to guarantee that the shape learning application offers elementary school students a complete and user-friendly experience. These needs can help the program enable interactive shape discovery, boost creativity, and promote a deeper comprehension of geometric ideas.

UIs Design

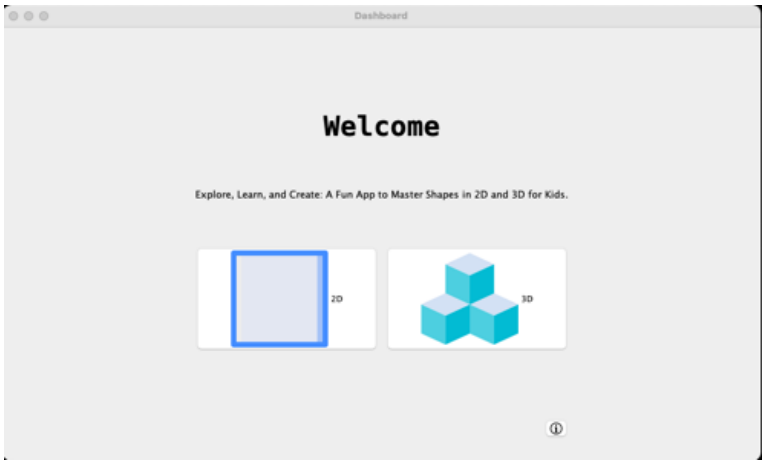

Figure 1welcome

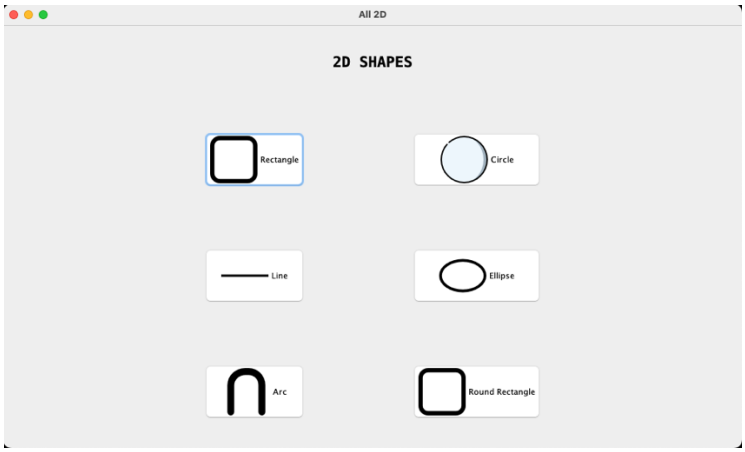

Figure 2 2D Dashboard

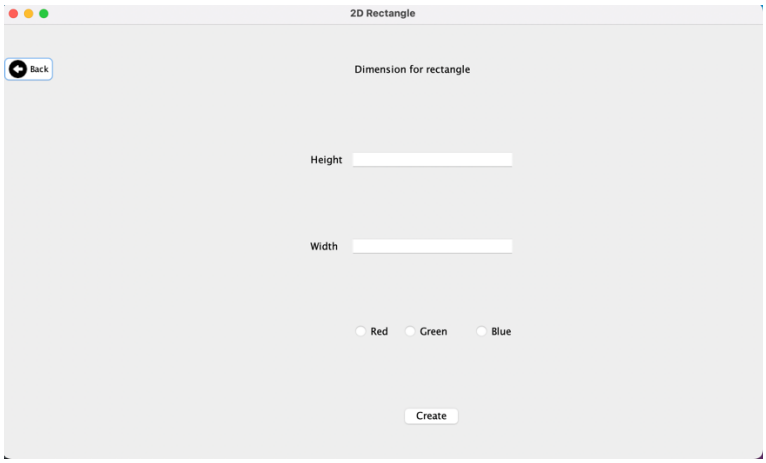

Figure 3 input 2D rectangle dimension

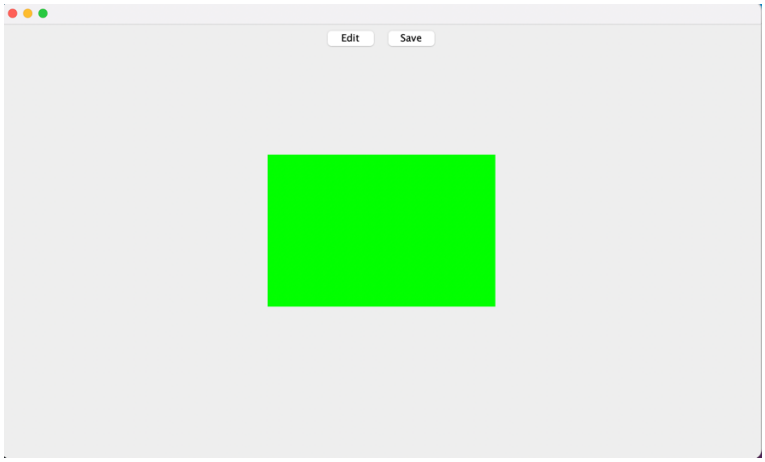

Figure 4 view 2D rectangle

Figure 5 Dimension for 2D circle

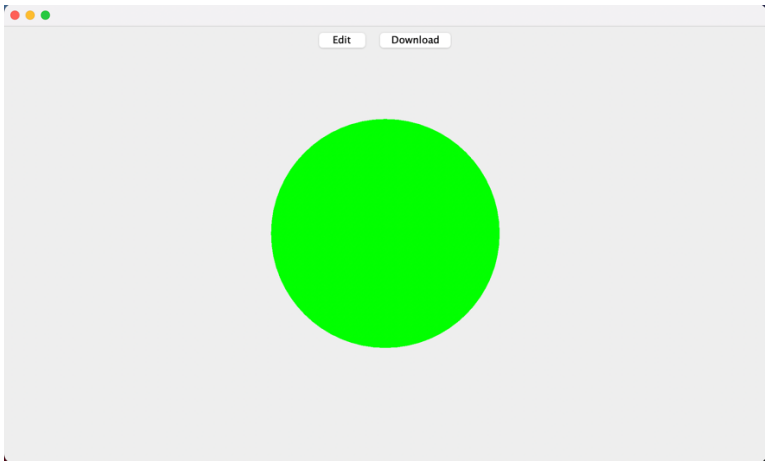

Figure 6 view 2D circle

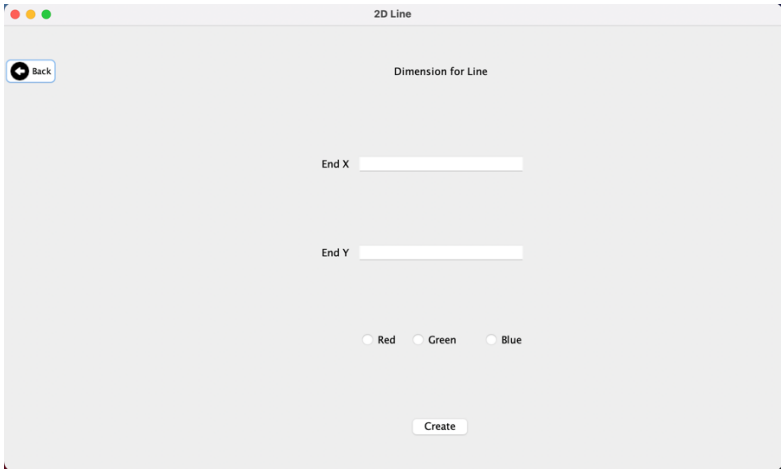

Figure 7 Dimension for 2D line

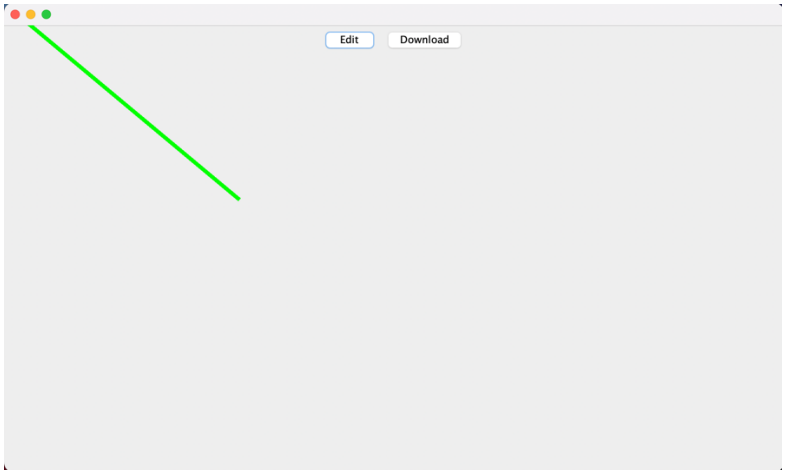

Figure 8 View 2D line

Figure 9 Dimension for 2D ellipse

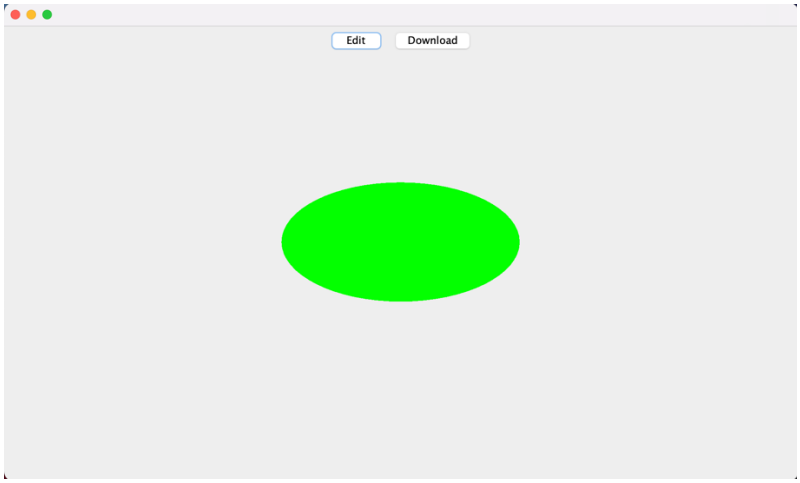

Figure 10 view 2D ellipse

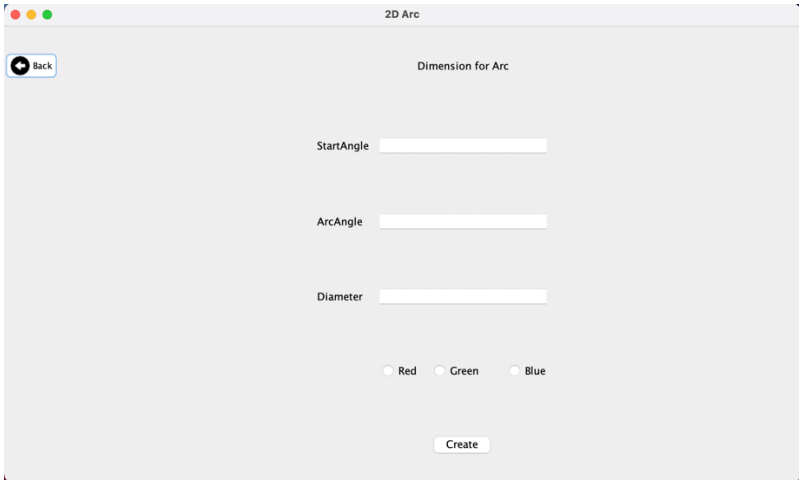

Figure 11 Dimension for 2D arc

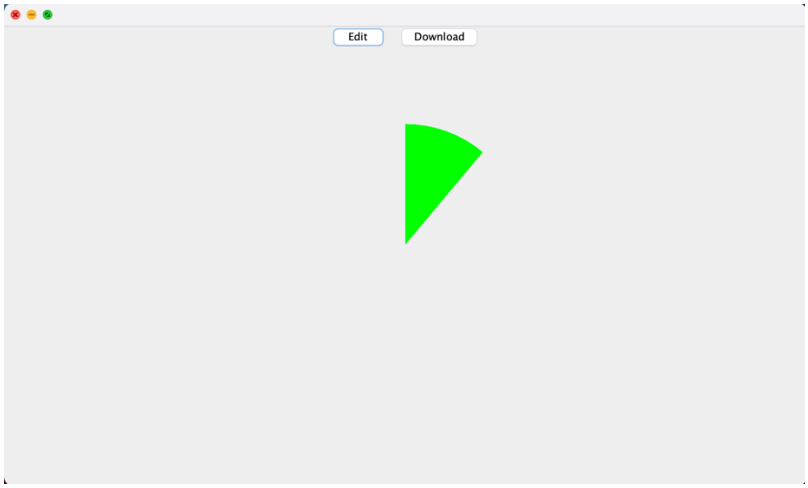

Figure 12 view 2D arc

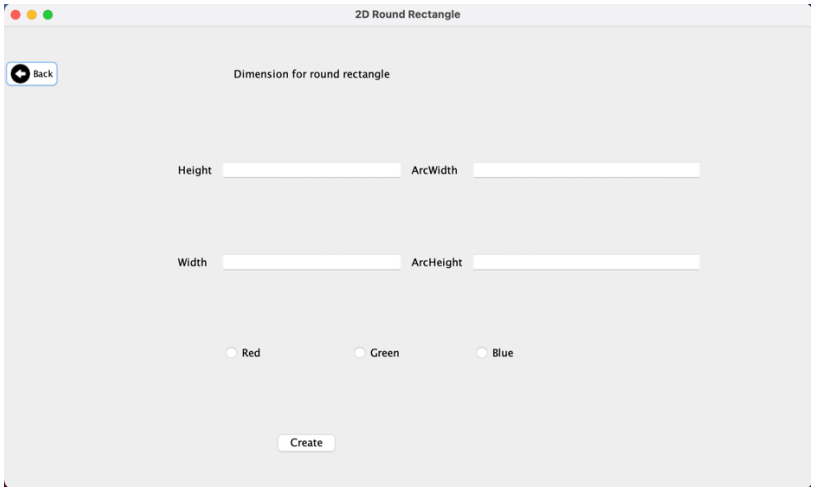

Figure 13dimension for 2D rectangle

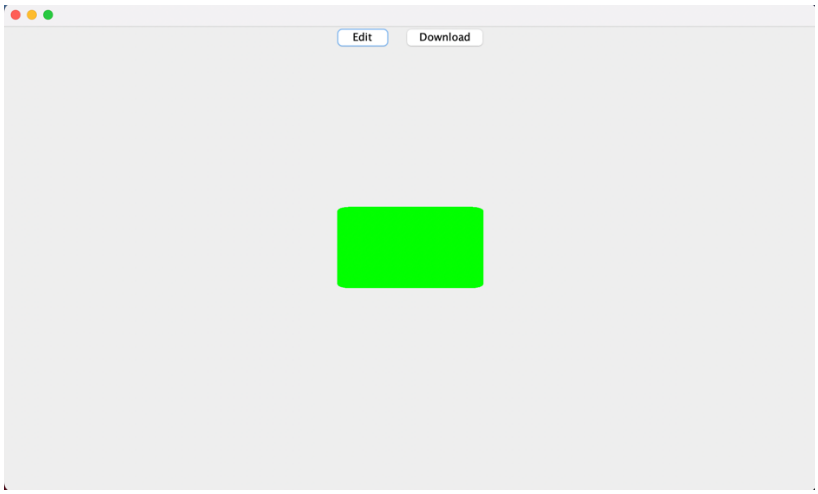

Figure 14 View 2D rectangle

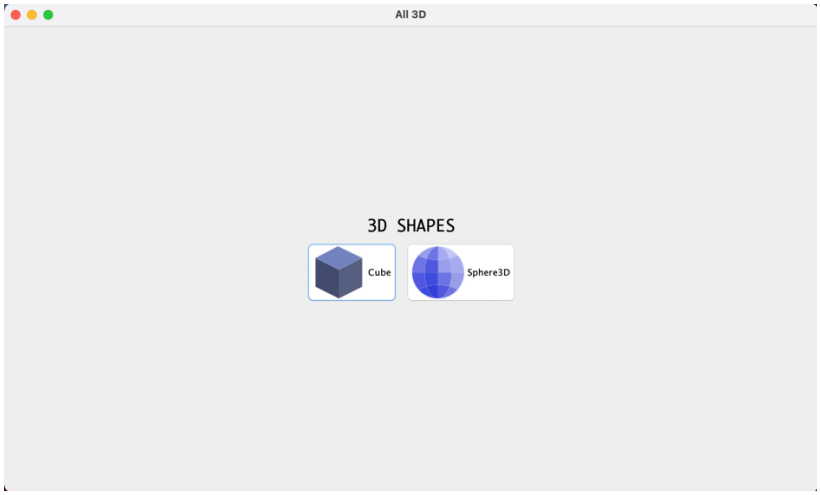

Figure 15 3D dashboard

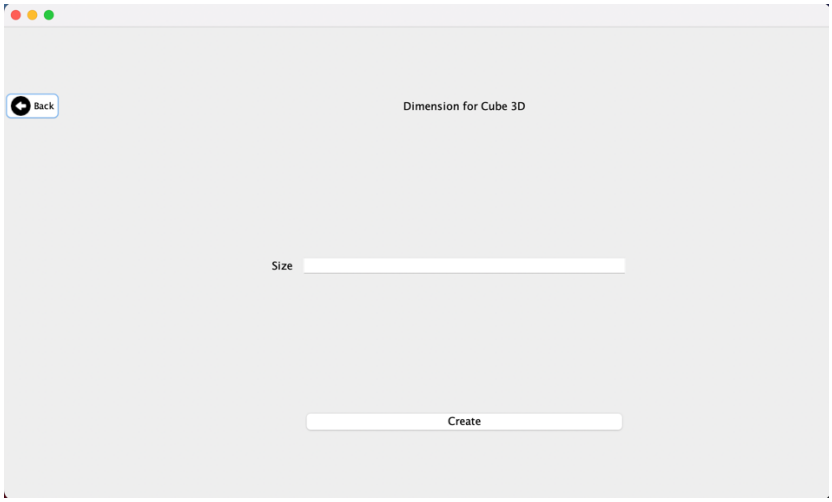

Figure 16 Dimension for 3D cube

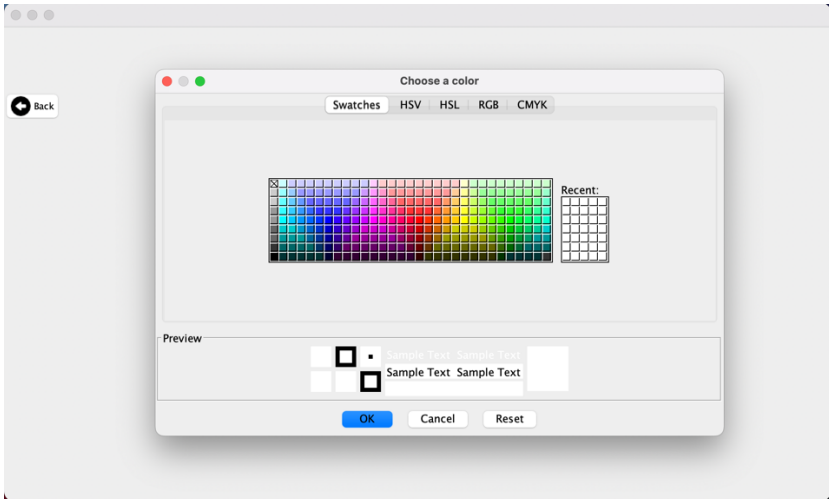

Figure 17 select color for cube

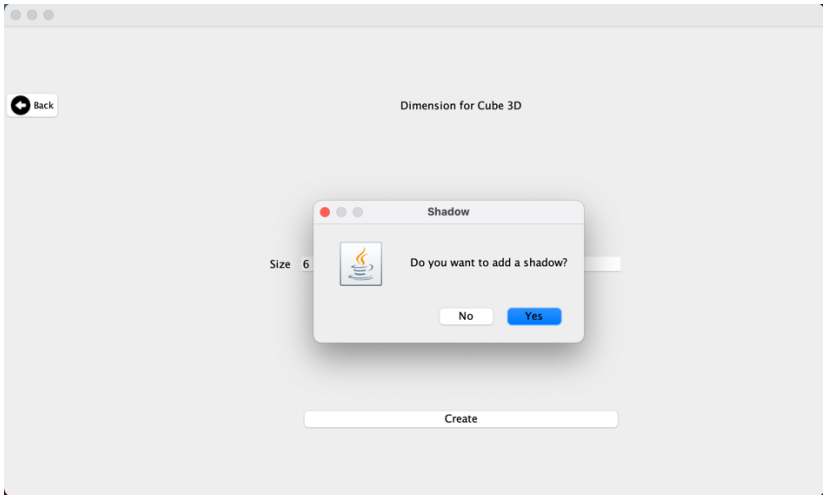

Figure 18 Shadow

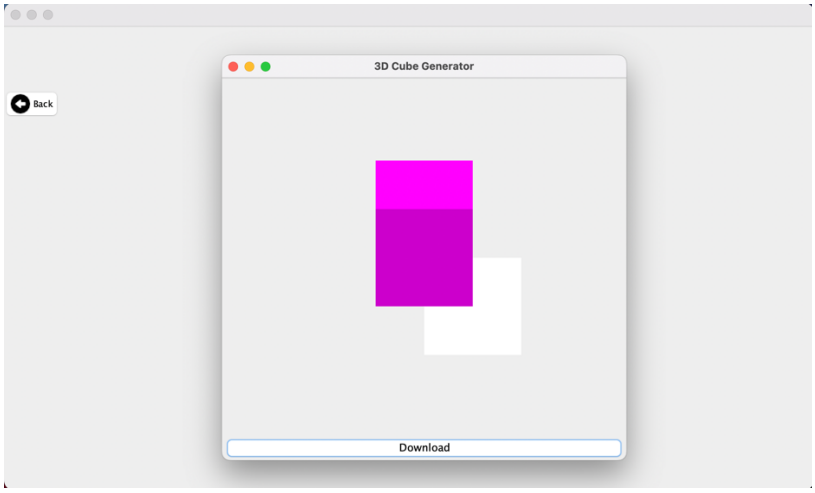

Figure 19 3D cube view

Figure 20 Dimension for 3D sphere

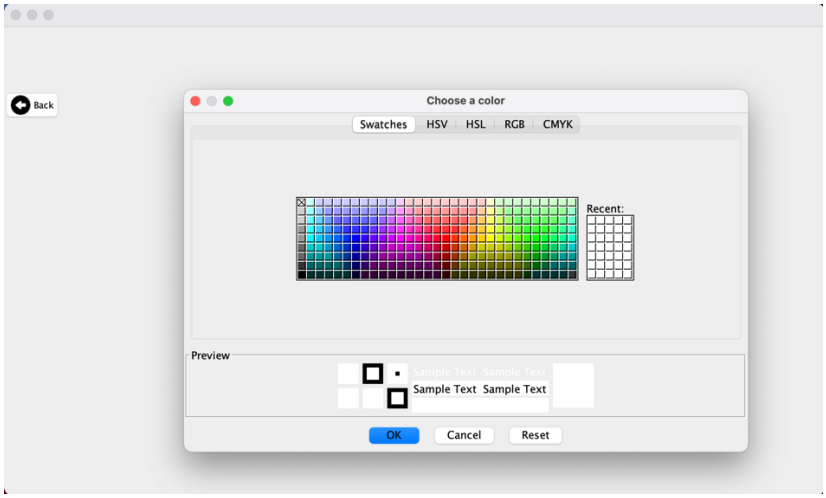

Figure 21 select color for Sphere

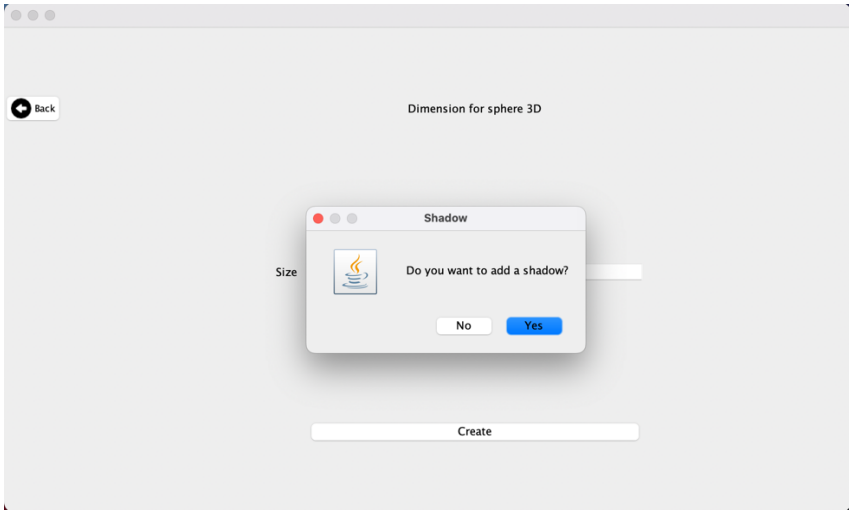

Figure 22 Shadow

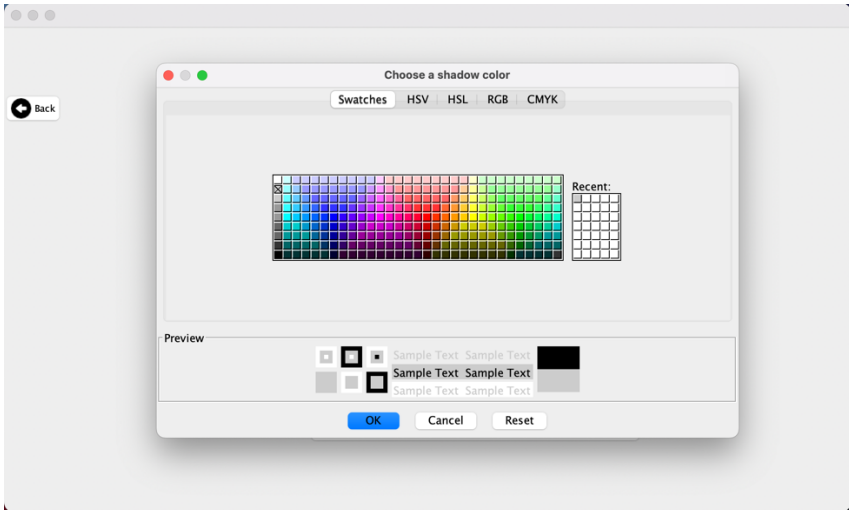

Figure 23 Shadow color

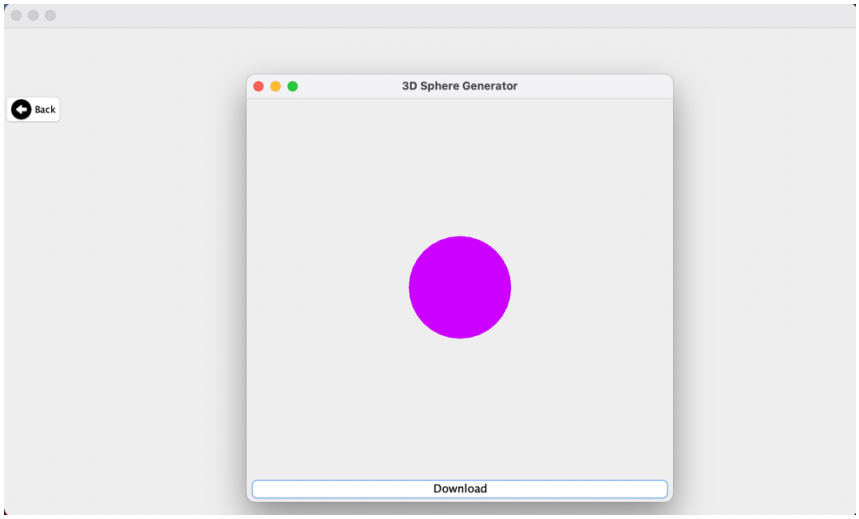

Figure 24 3D sphere

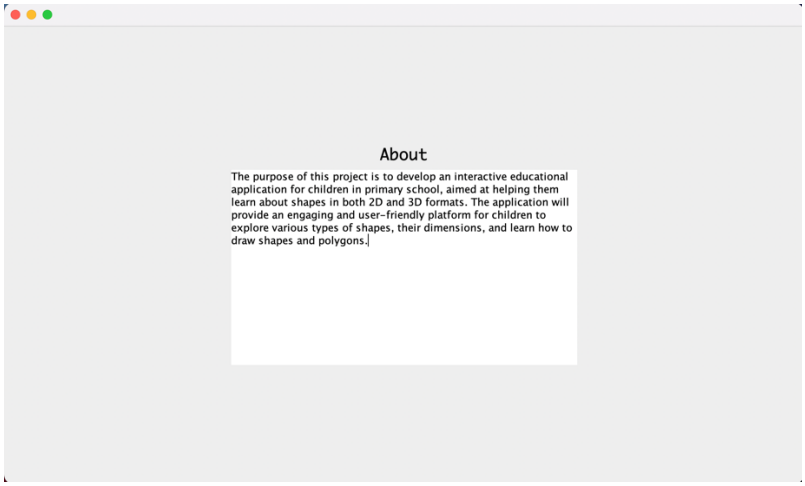

Figure 25 About

Implementation Phase

The implementation phase of the shape learning application involves translating the design solutions into a fully functional software system. This section of the report highlights the key aspects of the implementation process and provides insights into the justification behind the chosen design solutions.

Justification of Design Solutions

- It is important to emphasize how the chosen design solutions fit with the intended use of the product and the functional specifications while justifying their selection.
- Justifications ought to take into account elements like usefulness, aesthetic appeal, scalability, and technical viability.
- Any design choices that differ from the original prototypes or specifications ought to be justified, giving a detailed explanation of why they were made.

Technical Implementation

Details of the technologies Java, swing
Tools IntelliJ

User Interface Implementation

- The low-fidelity and high-fidelity user interface (UI) ideas should be converted into useful UI elements.

- Maintaining continuity with the original design during implementation will make for a seamless and simple user experience.
- It is important to handle difficulties faced during UI implementation, such as responsive design for various screen sizes.

Testing and Quality Assurance

- A description of the testing techniques used throughout the implementation phase, including user acceptability testing, unit testing, and integration testing.
- Talk about any problems that came up during the testing process and how they were resolved.
- Implemented quality control procedures guarantee the application's dependability, effectiveness, and usability.

Evaluation Results and Recommendations

During the development of the shape learning application, various evaluation studies were conducted to assess its effectiveness, usability, and user satisfaction. This section of the report presents the results of these evaluation studies and provides recommendations for enhancing the application based on the findings.

The evaluation studies showed promising results in terms of how well the program taught form ideas to elementary school students. It was discovered that interactive visualizations of 2D and 3D forms were interesting and successful at promoting comprehension and spatial reasoning. Users mentioned having more understanding and being able to recognize and work with various shapes more easily.

The application's usability was widely praised by users, who found the user interface to be clear and simple to use. Children can utilize the user-friendly shape building and editing functionalities to express their creativity and try out various characteristics like color and shading. various participants did, however, provide minor suggestions to improve the responsiveness and fluidity of various interactive aspects.

Ratings of user satisfaction showed a high degree of interest and enjoyment in the program. Users reported a desire to keep using the program after the review period due to the aesthetic appeal and interactive nature of the shapes. The creation and manipulation of shapes gave several participants a sense of success, and they also mentioned an increased interest in geometry.

Several suggestions have been made to improve the shape learning application based on the evaluation's findings. A better user experience will result from enhancing interactive elements' responsiveness and optimizing performance. Additional educational components that incorporate guided exercises or interactive lessons might offer more structured learning opportunities and accommodate various learning preferences.

Additionally, taking user input into account, adding additional form manipulation options, including rotation and symmetry, could enhance learning and promote a deeper comprehension of geometric ideas. Incorporating tests or quizzes inside the program can also offer chances for self-evaluation and reinforcement of learning objectives.

It is important to note that the recommendations provided are iterative in nature, and ongoing evaluation and user feedback should be considered in future development cycles. By continuously incorporating user perspectives and emerging trends in educational technology, the shape learning application can evolve to meet the evolving needs of primary school children, fostering their engagement and understanding of shapes in a meaningful and enjoyable way.

Conclusion

In summary, this PDF document offers an in-depth analysis of the design, implementation, evaluation research, and suggestions for improving a shape learning application for elementary school students. The goal of the product vision was to develop a fun and interactive teaching tool that makes it easier to learn shapes in both 2D and 3D forms. The functional requirements were created to support the construction of shapes, their depiction, scaling, modification of shade and hue, as well as their saving, editing, and deletion.

The implementation phase involved justifying design solutions, implementing the user interface, shape creation and visualization, interactive features, persistence and editing functionalities, and ensuring compatibility and accessibility. The technical aspects and decision-making processes were explained to provide transparency and accountability.

The design, implementation, evaluation studies, and suggestions for improving a shape learning application are all thoroughly covered in this PDF paper. The knowledge gathered from this study adds to the field of educational technology and has the potential to improve primary school students' learning environments.

Reference

https://docs.oracle.com/javase/tutorial/uiswing/
https://docs.oracle.com/en/java/
https://www.codespeedy.com/draw-shapes-in-java-swing/