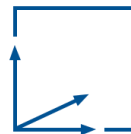


The Impact of Different Presentation Modes of Museum Exhibits on the Knowledge Transfer

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Final: Bachelor Informatics

Supervisor: Prof. Gudrun Klinker, Ph.D.

Advisor: Dr. David A. Plecher

Introduction / Motivation

- Important role in society
- Demand for digital technologies
- Opportunities
 - Support preservation of exhibits
 - Content accessible anytime and anywhere
 - Improve knowledge transfer

Related Work

- Existing digital approaches used by museums
 - Within the museum
 - Location-independent
- COVID-19
 - Accelerated development of digital content
 - Intentions for continue future use
- Impact on Knowledge Transfer
 - In general, a positive impact is assumed
 - Digital technologies have potential for supporting knowledge transfer

Goal of this Thesis / Approach

- Compare two different applications and their impact on the knowledge transfer
- Develop two applications for two different exhibits
 1. Web application
 2. AR application
- Evaluate applications using a survey to determine
 - Usability
 - Approximate time spent with
 - Correctly answered questions about each exhibit
 - Preferred application

Implementation (1)

- Example exhibits from the Museum für Abgüsse Klassischer Bildwerke München



Sog. Ganswürger



Modell der Igeler Säule

[Museum für Abgüsse Klassischer Bildwerke, Roy Hessing, Modell der Igeler Säule (Südseite), CC BY 4.0]

Implementation (2)

- 3D Model Acquisition
 - Using photogrammetry (Metashape)

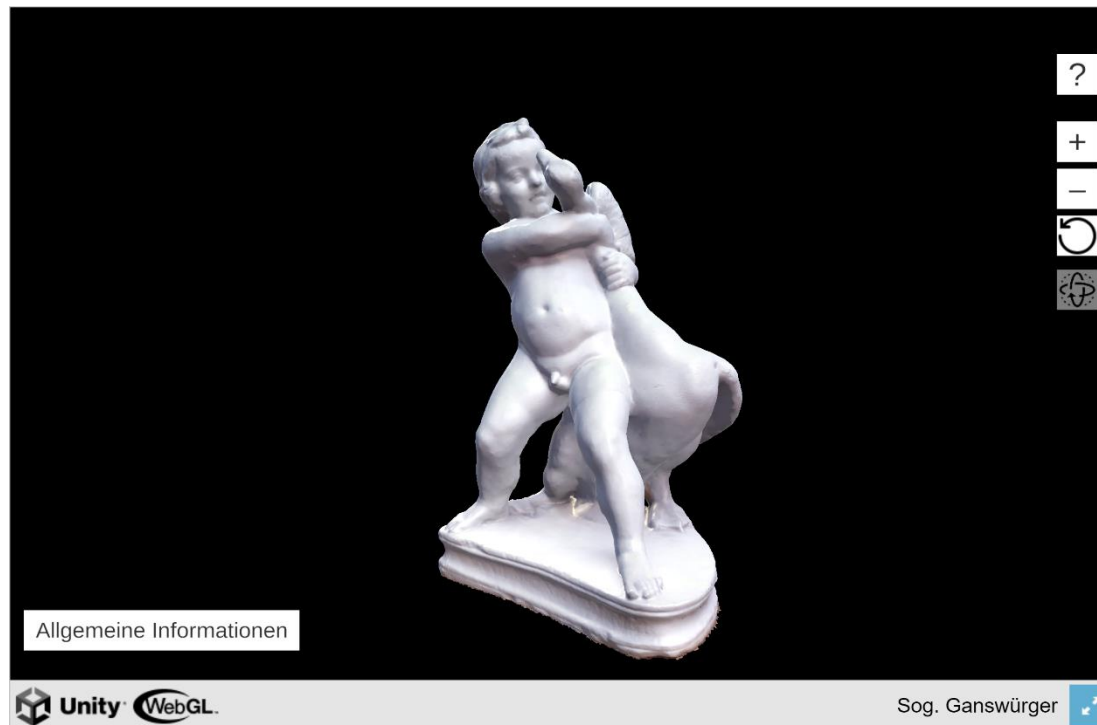


Final model with texture

- 3D model reprocessed using Blender

Implementation (3)

- Web application
 - Developed using Unity



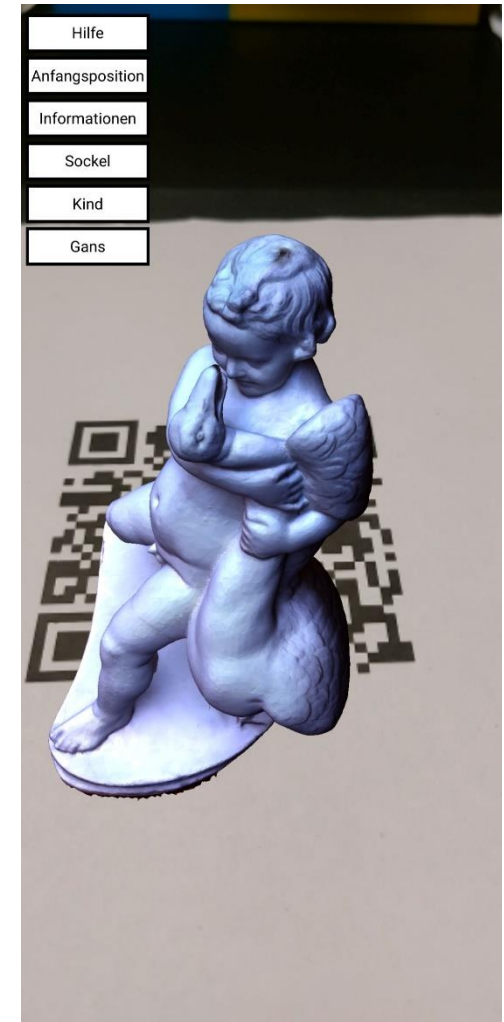
Web application

Implementation (4)

- Web application
 - Developed using Unity
 - Functionalities
 - Navigation of model / (De)activation of navigation
 - Zooming
 - Changing of target
 - Reset
 - Help
 - General information
 - Annotations
 - Performance optimization
 - Published on itch.io

Implementation (5)

- AR application
 - Developed using AR.js and A-Frame
 - Functionalities
 - Placement on marker
 - Rotation of model
 - Scaling of model
 - Reset
 - Help
 - General information
 - Annotations
 - Performance optimization
 - Published on itch.io



AR application

Implementation (6)

- Deriving applications presenting the second exhibit
 - Changes in implementations
 - Model
 - Annotations
 - Information texts
 - Modifications
 - Modification of code
 - Addition of images



Workflow of deriving applications for second exhibit

Evaluation – Setting (1)

- two groups of five participants each
 - All above age 21
 - Different order of presenting applications
 - Invitation via email containing
 - Basic information/instructions
 - QR code and marker
 - Ten days' time

Evaluation – Setting (2)

- Questionnaire
 - General information about the survey
 - Two different applications displaying different exhibits
 - Questions related to each application
 - Approximate time spent
 - Usability
 - Questions about the exhibit
 - General questions at the end
 - preferred application
 - demographic data
 - previous experience with AR
 - Comment section

Evaluation – Results and Discussion (1)

- SUS score results

Web application

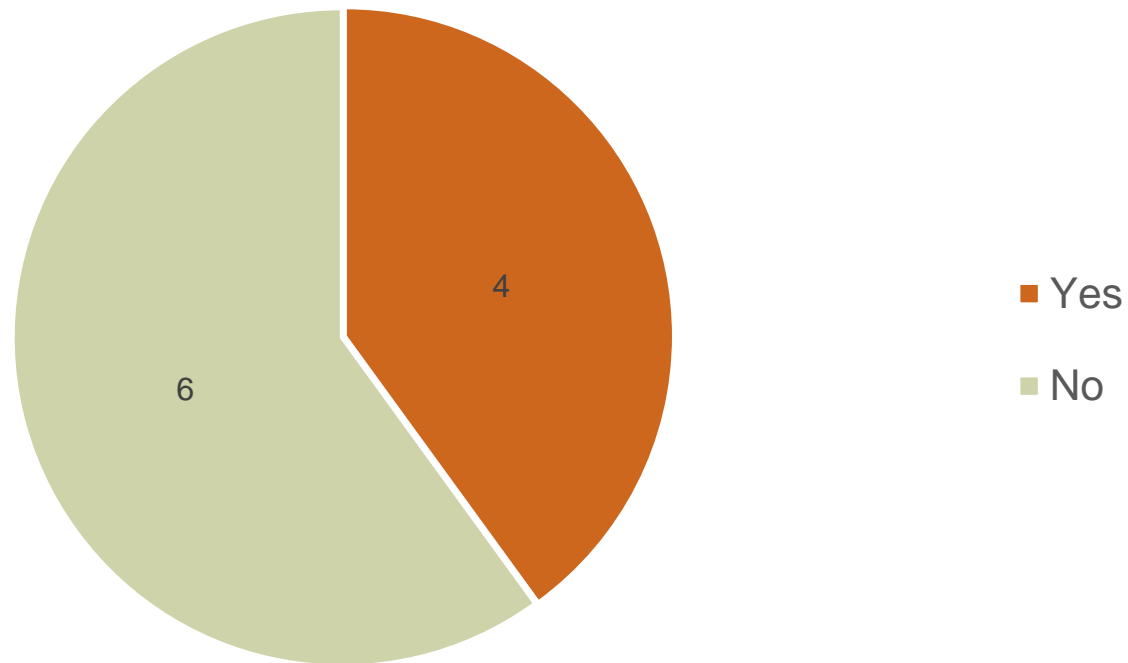
	Mean ± SD
Group 1	87.5 ± 17.410
Group 2	84.5 ± 9.421
All	86 ± 13.292

AR application

	Mean ± SD
Group 1	58 ± 18.320
Group 2	58.5 ± 15.871
All	58.25 ± 16.161

Evaluation – Results and Discussion (2)

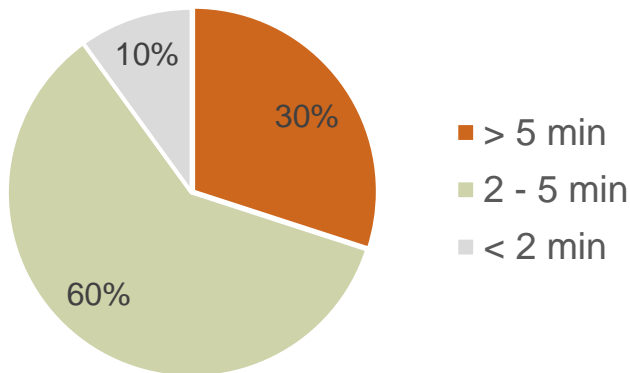
- Previous experience with Augmented Reality



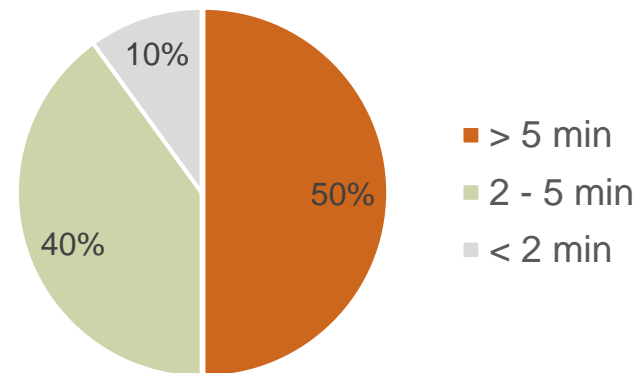
Evaluation – Results and Discussion (3)

- Time spent with application

Web application –
“Modell der Igeler Säule”

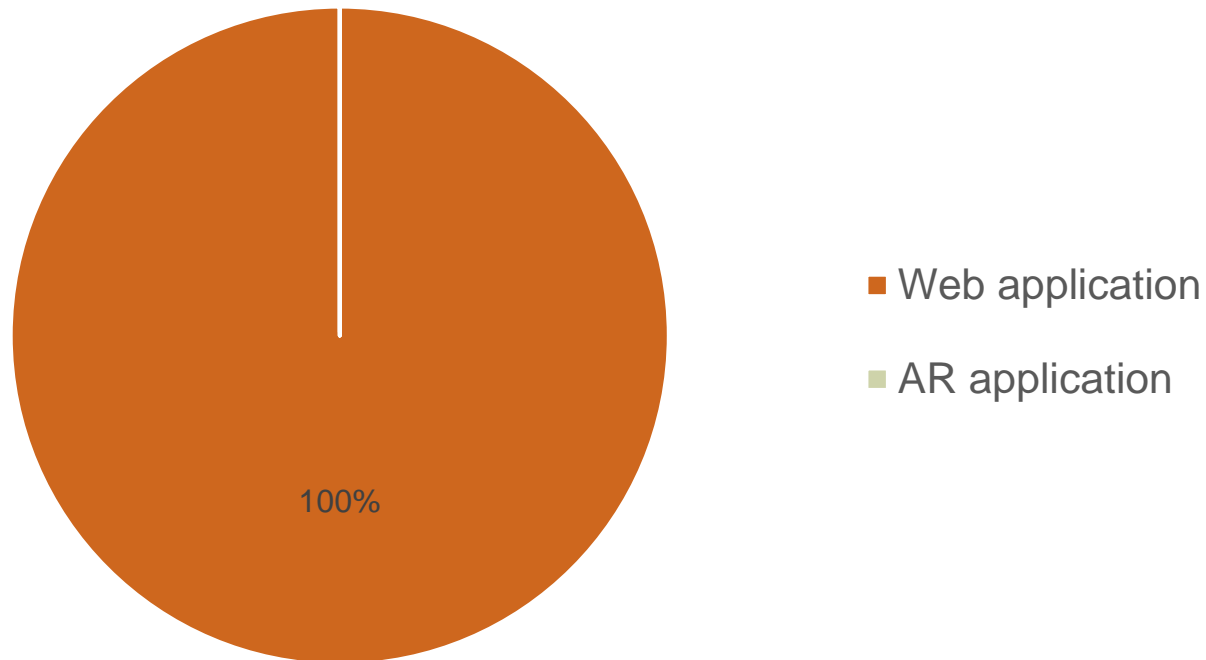


AR application –
“Sog. Ganswürger”



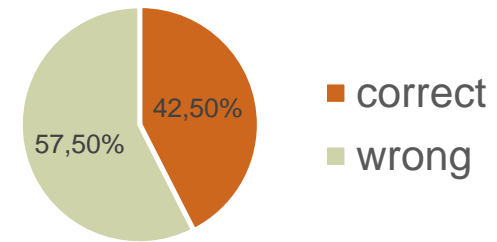
Evaluation – Results and Discussion (4)

- Preferred application

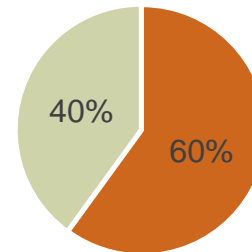


Evaluation – Results and Discussion (5)

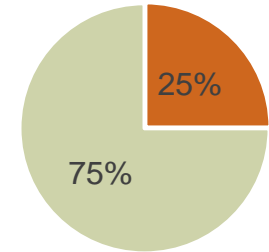
- On average correctly answered questions overall ...



- ... depending on presenting order of applications

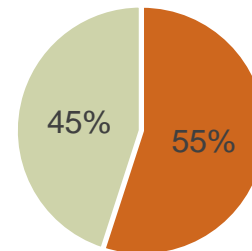


Web application first

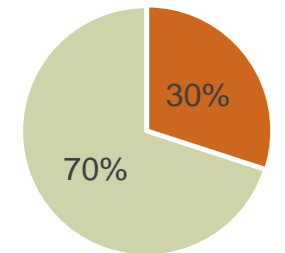


AR application first

- ... depending on application



Web application



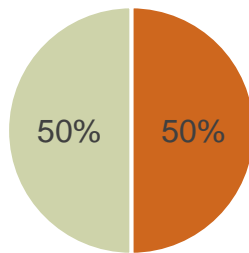
AR application

Evaluation – Results and Discussion (6)

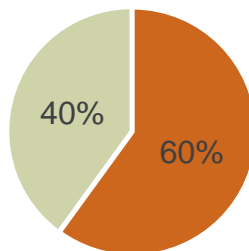
- Correctly answered questions depending on question

Web application

What was probably the purpose of the column?

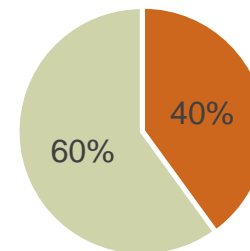


Which sides of the base are destroyed?

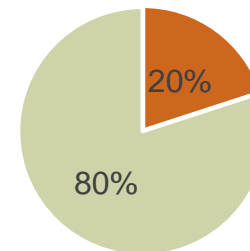


AR application

Are the teeth of the goose visible?



Where is the goose probably supposed to look to?



Evaluation – Results and Discussion (7)

- Correctly answered questions depending on time spent on average (number of responses)

Application	< 2 min	2 – 5 min	5 min
Web Application	100% (1)	50% (6)	50% (3)
AR Application	0% (1)	25% (4)	40% (5)

Evaluation – Results and Discussion (8)

- Results
 - Both application indicate potential in transferring knowledge
 - The web application performed superior
 - Limitations
 - Technical problems
 - Significantly different usability
 - Small group size
 - Motivation of participants

Suggested Future Work

- Further research topics
 - Comparison of onsite visit and online visit
 - Impact on long-term knowledge transfer
- Future work on applications
 - Addressing of technical problems
 - Use of different tracking methods
 - Extension of the applications

Conclusion

- Topic: The impact of different presentation modes of museum exhibits on the knowledge transfer
- Two implementations for two different exhibits
 - Web application
 - AR application
- Evaluation using a survey
 - Both application showed potential
 - The web application performed superior
- Possible future work
 - Improvements or extension of the applications
 - Further research topics

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