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Stanford Clinical Anatomy (SCAnS) Library:
How High School Students Can Access the Resources of an Academic Medical Center

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UPDATE

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The Stanford Clinical Anatomy (SCAnS) Library

How High School Students Can Access the Resources of an Academic Medical Center

Future of Content Project Update October 2013

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Background

Learning about human anatomy and biology in today's digital world has been enriched by the ability to view 3D, highly interactive, volumetric CT scans. The computational demand related to rendering such images has, however, restricted this activity to professional medical labs or high-end computers running specialized software. We proposed to tackle this challenge and evaluate its effectiveness by using Vizua, in which high-end servers store CT scans and perform the processor-intensive 'back-end' task of manipulating and rendering the visualizations. Any student using a computer through a web browser, or via an iPad, can connect to the Vizua servers over the network and access the library of Stanford-provided scans. In our earlier reports, we detailed technical specifications and lesson plans used in our project. In this final report, we summarize the evaluation results.

Evaluation Result

We completed a formal evaluation protocol through a standardized survey sent to all participants. The survey asked students to rate their experience compared to other instructional methods, to describe their interaction with the SCAnS content and the platform, and to evaluate the various capabilities of the software including their perception of its limitations and strengths.

Our primary learners were a total of 66 students from the 7^{th} grade who used our tool to

study brain anatomy. There were also a total of 26 students from the 9th-12th grades who used our tool to study a variety of anatomical regions.

7th Grade Survey Results

The vast majority of 7th grade students (52 out of 66) used the tool 2-3 times, 10 used it only once and four used it 4-6 times. In terms of features that the students liked most, there were two predominant characteristics: the high-quality models represented in 3D and the ability to rotate or manipulate the displayed models. Students additionally commented, though to a lesser extent, that the ability to cut through models, use preset views and zoom in on these models were highlights of the presented interface. Beyond the functionality of the system, students also commented that the system was fun, offered 'realistic' high-quality images, assisted in the comprehension of 3D relationships and replaced the need to handle or use real specimens.

In response to a question asking what they liked least, the most common response indicated that students felt that the system was 'glitchy' and responded slowly or even crashed. The second and third most common responses related to difficulties in the provided labeling protocol, as well as the steep learning curve associated with the system making it not user-friendly. Contrary to the positive feedback of what students liked most, some students indicated that the cutting tool was difficult to use and not enjoyable, that images were difficult to see or were not clear enough, that the models were difficult to rotate and that the iPad interface did not offer the same interactive features or responded slowly. Additionally, approximately 15% of respondents indicated that they found nothing they didn't like, or that what they liked least was limited time with the system.

When asked if students would change anything about the system, as expected based on the feedback for what they liked least, students responded most commonly that in general they would like to make a more user-friendly and easier-to-use interface. The top two features students would want to change beyond the over-all user-friendliness of the system related to the speed of the system, requesting that it become less 'glitchy' in the process, and that changes be made to the provided labeling features of the software. Aside from nine students who commented that they would change nothing about the system, students additionally commented on adding additional regions of interest, images or information on the system to be studied, and modifying the cutting tool and the various features currently available on the iPad interface.

9th & 12th Grade Survey Results

This group consisted mostly of 12th-grade students (22 out of 26), with eight students from the 11th grade and one student from the 9th grade. Of the 26 students in this group, 12 used the tool 4-6 times, 10 used the tool 2-3 times, eight used it only once and one used it 7-10 times. Students used the tool to learn about a variety of anatomical regions—the two most common regions were the thorax and the lower limbs.

In terms of features that the students liked most, there were two predominant characteristics: the high-quality models represented in 3D and the ability to rotate or manipulate the displayed models – the same two features most liked by the 7th-grade students. Again, similar to the 7th-grade students, they additionally commented that features such as the ability to cut through models, use preset views and zoom in on these models were highlights of the presented interface.

Of the three most common tasks that needed to be completed as part of the lesson-plan requirements, students ranked their ease of use with these three features. The easiest was the ability to 'view structures' (19 ranked it as 'easy' or 'very easy'), followed by 'manipulate structures' (10 ranked it as 'easy' or 'very easy'), and finally 'label structures' (nine ranked it as 'easy' or 'very easy').

Note the responses related to the task of labeling structures. An overwhelming majority of students ranked the labeling functionality as the feature they liked least about the tool and ranked it as the one change they would make to the tool if they could change something.

Teacher Survey Results

Two teachers used the tool with their respective classes. In general, the teachers' views echoed the students' responses. The two teachers had a similar view regarding the most-liked and least-liked features and also about the ease of use of the tool.

Summary

In summary, students and teachers indicated that they enjoyed the interactivity and appearance of the 3D models within the Vizua interface yet felt that the system's response time and user-friendliness were lacking, emphasizing that the provided labeling feature was the least-liked component of the system. Despite providing video content that demonstrated the various features of the system prior to student use, this method of instruction via third-party videos appears not to have met the concerns of the students and merits further investigation into the best way to implement the current version of the software into school curricula.

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Additional Reading:

Future of Content Research Theme
http://mediax.stanford.edu/FOC/concept

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