

INTRODUCTION

The domain our group has chosen is *Art history*, and the sub-domain is Classics, more specifically *Homer's The Odyssey*.

Some of our ideas are inspirations borrowed from already existing applications which include:

- Skype
- Facebook
- Messenger
- Peerwise
- Google Docs

References/Sources

- <http://www.nzqa.govt.nz/nqfdocs/ncea-resource/exemplars/2016/91200-exp-2016-achievement.pdf>
- <http://www.bartleby.com/22/12.html>
- <http://www.lipsum.com/feed/html>
- <http://clipart-library.com/images/zIX5yag7T.jpg>
- https://image.freepik.com/free-icon/gaming-console-silhouette_318-33875.jpg
- <https://s-media-cache-ak0.pinimg.com/736x/8a/5c/03/8a5c0385d676827ed8aa3f7fa7865761.jpg>
- <http://www.clipartbest.com/cliparts/Kcn/LnK/KcnLnKA9i.jpg>
- Meador, Derrick (2016). Personality types of students you will find in a typical classroom. Retrieved from <https://www.thoughtco.com/personality-types-of-students-3194677>

PERSONAS

Rationale:

Our group decided that we should work on both ends of the spectrum of students -- attempting to create two students that would typically use the system, but each with vastly different motivations.

Peter Holloway:

The concept behind Peter was that he would be your typical (unmotivated) student; hands in assignments late, studies the bare minimum for his tests/exams and tries to find shortcuts to learning weeks' worth of material. His goals for this learning environment was to study for his Classics test amongst his (busy) schedule. For him, it needed to be engaging and time-effective. We gathered this idea not only from our own lives, but from online resources (Meador, 2016), in which Peter fits the "Unorganized" and "Unmotivated" personalities. In our own lives, since we are still students, we've all gone through the procrastination phase, where we left everything to the last minute. Peter is a relatable and real persona in that sense.

Olivia Li:

As the system is designed to help students work challenging problems for their age, we wanted to have a student who is studious and is a high achiever because they are most likely to make use of this system. We were also interested in having a younger student (around 13 years or younger) who's attending a public school so that we could see how well young students are able to adapt to a new learning experience, having already been exposed to specific learning environments in public schools. The system has a strong social element (giving/receiving feedback and group discussions), so it is important that our student/persona is involved in extracurricular activities, as they would likely have well-developed social skills to interact with other peers using the system.

Olivia Li



The studious student

“ I would like to be able to have a way to talk about and study classical books with students around the world. ”

Olivia is a studious and adventurous student at Auckland Girls' Grammar School. Growing up as an only child of Asian parents with high expectations, Olivia was often in the top percentile of rankings for her year group and because of this, she strived to do her best in whatever endeavour she pursued.

Although she took a variety of extracurricular classes at the request of her parents (who divorced only a few years ago), it was not until she joined the Girl Scouts that her passion for adventure out of her structured life was piqued. Seeking solace amidst her rocky home life (moving between the two households), Olivia turned to books for a sense of escape and comfort. Since then, Olivia has branched her own personal studies into classical literature, and most recently on Homer's The Odyssey.

However even though Olivia is a brilliant student, since the book is not within her academic curriculum, she feels that without a platform to discuss and study the book she cannot fully grasp the key concepts.

Olivia would love a learning environment where students her age could discuss ideas, participate in projects and give feedback on whichever piece of literature she chooses to study.

Even though Olivia respects her peers, she would prefer if an adult with formal studying in the subject reviewed her (and her group's) work.

Gender Female

Age 13 (year 9)

Ethnicity Chinese

School Auckland Girls Grammar School

Family

Only child

Parents (divorced)

Dad's occupation is a realtor

Mum's occupation is a chartered accountant

Moves between two households



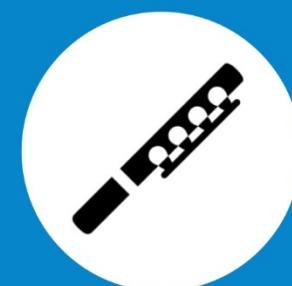
Interests

Plays flute

Mythology

Archery

Girl scouts



Peter Holloway



The easy-going student

“ I would like a peer feedback system where I can study quickly and efficiently. ”

Kiwi-born Peter is the middle-child in a family of women, because of this, he was always shy amidst his audacious sisters and maintained an easygoing attitude towards life. Even as a year 13 at Edgewater College, Peter is still unsure of what he wants to do after high school. As a result, Peter only does the bare minimum to pass his classes, and is indifferent to the grades he obtains.

He spends most of his time gaming (PC), and as a result is very tech-savvy. He's great at navigating most websites and knows various shortcuts to different applications he frequents.

With his mum as a preschool teacher, and his dad as a car salesman, Peter's parents could not afford to keep up with his hobbies. So with his expertise of the gaming world, Peter took on a part-time job at EB Games to put less of a strain on his family's finances.

His apathetic attitude towards school, combined with his job and his gaming habits has made it difficult for Peter to do well academically (often doing assignments at the last minute). Peter is looking for an application that will help him study for his tests and exams and that will improve his grades with little effort. With his upcoming Classics test, he is short on time to study, and would appreciate a simple to use, memorable, and engaging educational platform.

Gender Male

Age 17 (Year 13)

Ethnicity Kiwi/European

School Edgewater College

Family

Has older and younger sister (middle child)

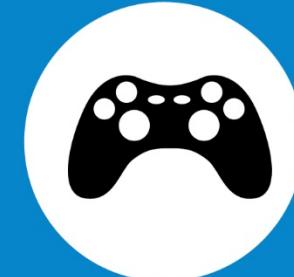
Parents together for 20 years

Dad's occupation is a car salesman

Mum's occupation is a preschool teacher



Interests



Likes history

Tech-savvy

Gamer

SCENARIOS

Scenario 1

People: Olivia Li (Year 9 student)

Activities: Using the website to access links that are required to reach her desired page.

Context: During her leisure time at home alone.

Technology: Google Chrome on her home laptop.

Scenario: Olivia wants to use the website to broaden her knowledge in classical literature and to test herself on the subject. As a student, she logs onto the system through the start-up screen and navigates to the case for structured question link. Options for timers appear and the countdown begins when a timer is selected leading us to the question page. Answers may be deleted if unfinished and timer runs out. When answer is completed, answers are to be submitted. Once submitted, Olivia will be redirected by random to a student's answer for her to give feedback and rate the answer.

Scenario 2

People: Olivia Li (Year 9 student)

Activities: Using the website to access links that are required to reach her desired page.

Context: During her leisure time at home alone.

Technology: Google Chrome on her home laptop.

Scenario: Olivia wants to use the website to have academic discussions with her peers, by working together with a group peers. As a student, she logs onto the system through the start-up screen and navigates to the conference on x link. From here the system randomly puts her into a group of 2-5 students. The group is assigned a question they need to answer collaboratively, first by brainstorming together and then when finished they will be redirected to write up their own answer. Once they are satisfied with their answers, they may publish their answers.

Scenario 3

Goal: To be able to practice exam questions for his upcoming test.

People: Peter Holloway (Year 13 student)

Activities: Answer questions on the system.

Context: On his personal laptop during a 1-week study break before the exam.

Technology: Google Chrome on personal laptop.

Scenario: Peter is studying for his exams and decides to get some practice on answering test/exam questions. He decides to answer questions that are in the 'case with structured questions' format. Since he does not want to spend too much time on lengthy questions, he attempts the questions that require relatively shorter amounts of time, starting first with the 2 minute question. He reads through the case, answers the question and submits his answer. He then views his previous answers and replies to a comment left on his question.

Scenario

4

Goal: Getting practice completing essay questions with assistance from peers.

People: Peter Holloway (Year 13 student).

Activities: Working with peers on the system to answer essay questions.

Context: On his personal laptop during a 1-week study break before the exam.

Technology: Google Chrome on personal laptop.

Scenario: Peter is studying for his exams and decides to get practice answering essay questions. He decides to answer questions that are in the 'conference X' format. The system matches him up in a group with a few other peers. He contributes ideas to the brainstorm and collaborates with others for the brainstorm. The group proceeds to the formal write-up section of the question. Peter changes his mind and decides he does not want to bother writing such a long essay, so he jumps to the end of the question without inputting an answer.

REQUIREMENTS

Domain/sub-domains/system in general:

- Notifications - Similar to Facebook, students will receive notifications when someone has commented on something they have answered on the system and posted publically.
- Questions/project assignments - A random question may be chosen from a set of past exam questions, or created by an expert with formal education on the subject (the type will depend on the problem-based assignment). There will be an option to have the exam questions chosen only from a particular country or education standard.
- Past answers - Students will be directed to a list of their past answers screen when they click on the 'Browse Answers' button. There they may select any answer they wish to view (for feedback, replying to comments and etc.).
- Feedback - After a question/project has been completed, the student will be directed to a random other student's answer, where they can give feedback. Aside from the comments the user and educators may post, each question will have a star rating system (out of 5).
- Expert feedback - Due to the system containing too many questions to be assessed by too little staff with formal education for each subject; only the top percentile (out of the 5 star ratings) of questions/projects will be reviewed by the system's staff.
- Comment rating system - Students and educators may up vote or down vote the feedbacks made on a post.
- Navigation - Aside from the start-up screen, if the student clicks on the 'Menu' button the menu expands to allow them to navigate the platform.

Case with structured questions:

- Composition - Once a student is ready to answer a question (start button pressed), depending on the selected type of questions, a timer will be set. The student will be presented with a case which they will need to review in order to answer the questions.
 - 2 minute - 1 question.
 - 10 minutes - Quick-fire quiz questions (2 minutes per question, so 5 total). One sentence answers.
 - 20 minutes - Short answer questions only requiring around 300 words or less.
 - 1 hour - Questions will require around 500 words or less.
- Case - All questions will have a selected passage to read from the book (for accessibility, selecting any part of the text will highlight parts of the passage and vice versa, selecting highlighted parts of the text will de-highlight it); sidebar will contain the passage.
- Timer finish - At the end of the timer, if the student's answer is unfinished, they may choose to scrap/delete their answer.
- Question submit - If the student finishes answering the question before the time is up, they may submit their answer when they are ready, with the 'submit' button.

Conference on X:

Call System:

- Composition - 2-5 students are able to be in an online audio call (similar to Skype), however it does not have any video, but instead each student is represented by an avatar.
 - The avatars sidebar will appear as a dock (each section enlarges when hovered over) on the right side of the screen.
- Messaging system - If any or all students do not wish to participate in the call, there is an option to use the chat box on the side of the screen, in which each student's textbox will be uniquely coloured (similar to Messenger).
 - The chat box will have a '+' and '-' button (to shrink and expand the chat box), as well as a scrolling function to view the entire chat history.
- Mute - It is also possible to mute anybody in the call (maybe for harassment, audio issues, etc.). Mute button is grey when unmuted and red when muted.

Other:

- Help button - There is a help button with a timer so that it can't be spam clicked. But when activated, it calls an available tutor to help; if there are no tutors available, it will place the student group in a queue until there is one.
- Local/international interaction - There will be an option to select either:
 - Local group - For when it is necessary to select a set range of students either randomly or selectively sorted into groups. Such an example of this in use is if a class is doing a group project and wants the student groups to only consist of students within their school/class.
 - Each set range of students will have a class login they must go through in order to use the system.
 - A selected question/project may also be chosen to be used instead of a randomly generated one (allocated by the admin(s) of the class).
 - International interaction - For when the student wishes to be sorted into random groups with students all over the world (or region) to participate with peers their age in a collaborative learning environment.
- Work allocation - who will be assigned to answer which part of the question/project? There will be sidebar/dock on the left side of the screen with a bullet point list for each member of the group as to which tasks they have to complete, which will be decided as a group.

Brainstorming screen:

- Brainstorm text field - There will be a text field at the bottom of the screen for brainstorming ideas.
 - How it works:
 - A student will enter whatever text they wish to appear as a new brainstorm bubble and press enter when ready - the textbox will expand vertically depending on the amount of text (much like Facebook Messenger).

- If a bubble already exists and the student wishes to branch out of it - click on the existing bubble (selected bubble will be emphasized with a thick border), and then enter their desired text.
- Double click on an existing brainstorm bubble to change the text - but ONLY by its creator.
- When a student selects a bubble they created (and the bubble has no branches), an 'x' button will appear on the edge of the bubble which when clicked will delete the bubble. A bubble can ONLY be deleted by its creator. If the student selects a bubble they have no created (or the bubble currently has bubbles branching off it), then the 'x' button will be greyed out.
- Ctrl + Z can reverse/undo the previous action related to the brainstorm bubbles.
- When a student clicks on the "Finish" button, their avatar will have a distinct green glow (to signal they are ready to move on), but all students will remain on the brainstorming screen until everyone has clicked the "Finish" button (at which point all the students will move on to the formal answers screen).

Formal answers screen:

- Brainstorm screen - When in the formal answers screen, there will be a button to go back to the brainstorming screen to view it, but not to alter it.
- Work allocation - Will appear as a sidebar/dock on the left of the screen (carried over from the brainstorming screen).
- Question - The group's given question will appear on the top of the screen in a box.
- Feedback - Much like Google Doc, each student will be able to view, comment and provide feedback on their group members' formal answers.
- Publish button - Once answer completed, to the bottom right of the page lies the submit button for students to publish their answers online.
- Reply - Allows peers to reply to feedback on a published answers.

CONCEPTUAL DESIGN

The task was to create a problem-based learning environment for students aged 11-18 that supports peer interaction for English-speaking users.

We began by choosing our domain - Art history, coupled with our sub-domain - Classics, but more specifically, Homer's The Odyssey.

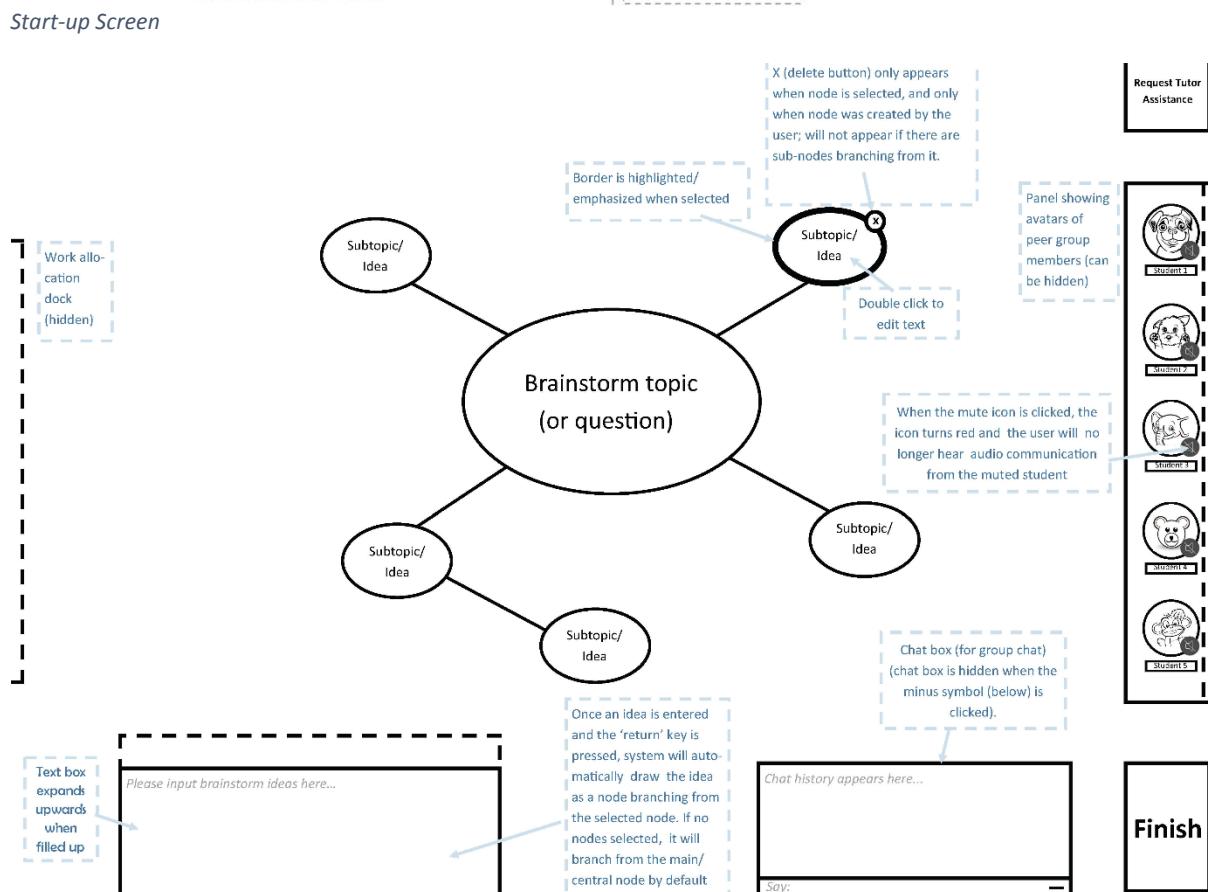
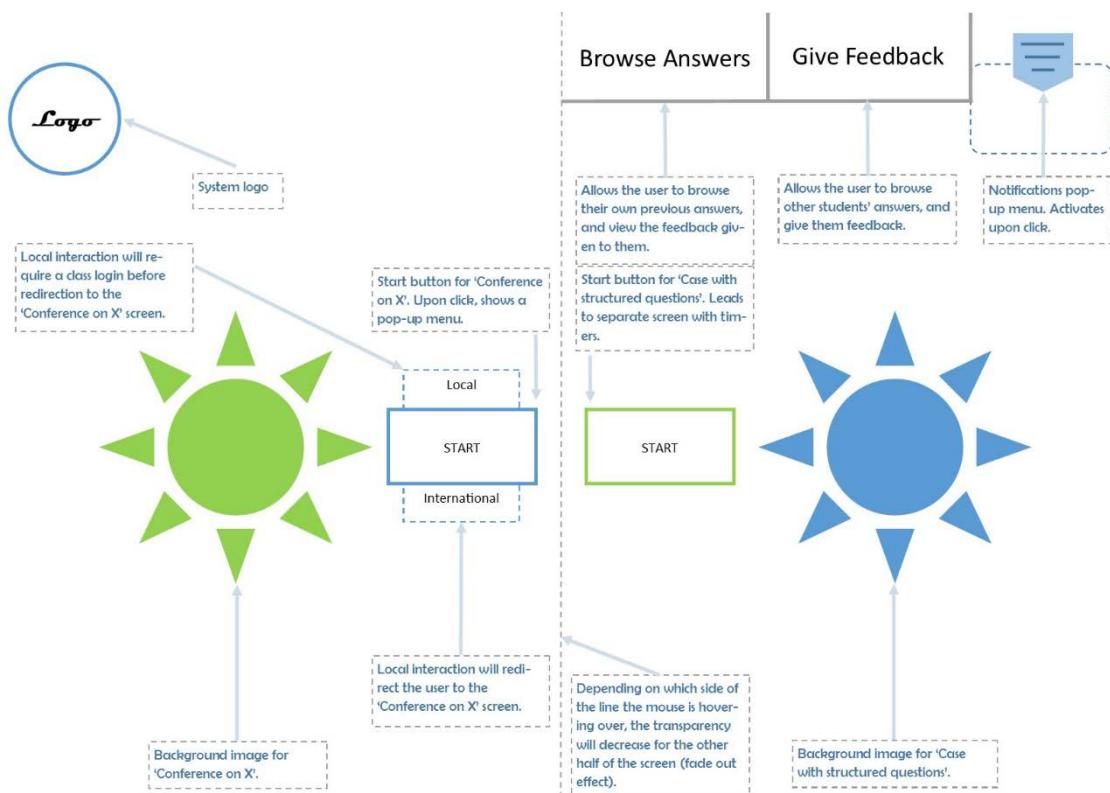
We thought an interesting and appropriate way to produce this learning environment for these topics would be creating a website designed to have a 'case with structured questions' and a 'conference on x', which would both ensure peer interaction and have a feedback system.

We came together and started jotting down all the ideas we had for design elements and functionalities we wanted in our system, then grouped the related elements together.

Below is a supporting photo of our conceptual design process:



Below are our electronic conceptual designs:



Work allocation dock

Back to Brainstorm

Explain the relationship between two characters, as demonstrated through their interactions. In what ways does this relationship reflect the expectations of classical society?

Please insert answer here ...

Publish

Formal Write-up Screen

Rating the quality of the answer

Rating:

Explain the relationship between two characters, as demonstrated through their interactions. In what ways does this relationship reflect the expectations of classical society?

In the epic poem , " The odyssey", a relationship that reflects lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut laoreet convallis risus eget ullamcorper. Aliquam tristique justo et urna eleifend suscipit. Aliquam vestibulum pulvinar urna in lobortis. Mauris diam ipsum, egestas sit amet imperdiet sed, sodales ac sapien. Nullam eu dolor lorem. Mauris sit amet volutpat diam, quis viverra felis.

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Right click to delete comment

Example doesn't support the explanation.

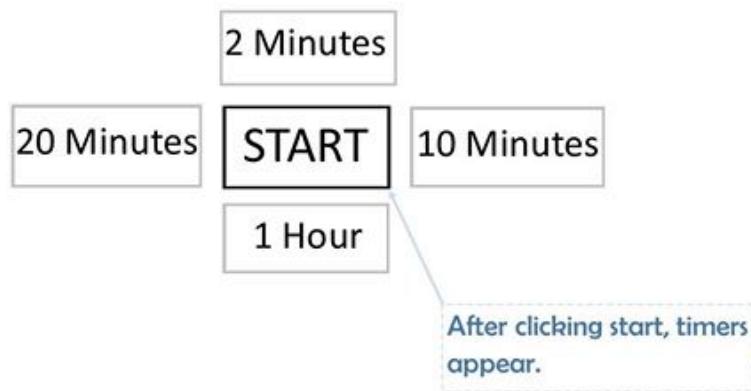
Please explain?

Works similar to google docs

Reply button

Upvote system

Student Answer Screen



Timer Screen

Timer: 2:00

Timer is in minutes : seconds. This is a quick-fire quiz with 1 question per session.

Please answer the following question:

Penelope is the accumsan et ultrices blandit ligula?

Odysseus, his passage by the Sirens, and by Scylla and Charybdis. The sacrilege committed lorem ipsum dolor sit amet, consectetur adipiscing elit, pulvinar mauris eget, vestibulum felis. Aliquam in purus turpis.

Please write your answer here...

Question box with instructions on the task.

Scrollbar will shrink if there is too much text.

Word limit recommendation should be around one sentence.

User clicks 'Submit' button when they are ready—confirmation screen will appear after.

Submit

Case with structured questions: 2-min

Timer is in minutes : seconds. This is a quick-fire quiz with 5 questions per session.

Timer: 10:00

Please answer the following question:

How is Calypso related to accumsan et ultrices blandit ligula?

Please write your answer here...

Question box with instructions on the task.

Passage/case study for user to use to assist with answering the question.

Odysseus, his passage by the Sirens, and by Scylla and Charybdis. The sacrilege committed lorem ipsum dolor sit amet, consecetur adipiscing elit, pulvinar mauris eget, vestibulum felis. Aliquam in purus turpis.

Scrollbar will shrink if there is too much text.

Word limit recommendation should be around one sentence.

User clicks 'Submit' button when they are ready—confirmation screen will appear after.

Submit

Case with structured questions: 10-min

Timer is in minutes : seconds. When the timer runs out, a screen will appear asking the user to publish or discard their answer.

Timer: 20:00

Please answer the following question:

In what way does Athena orci quis eleifend vive nisl quam, facilisis eget accumsan et, ultrices blandit ligula?

Please write your answer here...

Question box with instructions on the task.

Passage/case study for user to use to assist with answering the question.

Odysseus, his passage by the Sirens, and by Scylla and Charybdis. The sacrilege committed lorem ipsum dolor sit amet, consecetur adipiscing elit, pulvinar mauris eget, vestibulum felis. Aliquam in purus turpis.

Scrollbar will shrink if there is too much text.

Word limit recommendation should be around 300 words.

User clicks 'Submit' button when they are ready—confirmation screen will appear after.

Submit

Case with structured questions: 20-min

Selecting any part of the text will highlight it, and vice versa, highlighted texts will be de-highlighted.

Timer: 60:00

Odysseus, his passage by the Sirens, and by Scylla and Charybdis. The sacrifice committed lorem ipsum dolor sit amet, consectetur adipiscing elit. Vestibulum condimentum venenatis tortor, eget vulputate nunc cursus vel. Vestibulum ac felis scelerisque, pulvinar mauris eget, vestibulum felis. Aliquam in purus turpis.

Nullam finibus facilisis ante, eu fermentum odio sagittis sed. Pellentesque id tincidunt lacus. In sit amet rhoncus augue. Aliquam facilisis lobortis gravida. Sed congue hendrerit lobortis. Nullam pulvinar nunc sapien, ac pharetra turpis posuere in. Quisque efficitur finibus lorem a sodales. Phasellus dictum, orci vitae feugiat lobortis, libero risus finibus lectus, id posuere nunc dolor in eros. Nam vitae mi urna. Sed nec mauris a lectus suscipit luctus nec non est.

Please use the passage on the left to answer the following question:

In this passage of book XII, please analyse and explain orci quis eleifend vive nisl quam, facilisis eget accumsan et, ultrices blandit ligula.

Please write your answer here...

Scrollbar will shrink if there is too much text.

Question box with instructions on the task.

Word limit recommendation should be around 500 words.

Submit

User clicks 'Submit' button when they are ready—confirmation screen will appear after.

Case with structured questions: 1-hour

... Mauris ac, vestibulum urna. Donec pulvinar arcu eget neque auctor, viverra lacinia libero blandit. Nunc vitae blandit purus, id dignissim turpis. Donec et tincidunt justo. Maecenas at turpis risus. Vivamus euismod libero volutpat, consequat purus vel, semper felis. In vel nulla velit. ...

... Vestibulum vestibulum hendrerit purus. Vestibulum dignissim posuere convallis. Vivamus imperdiet, nibh quis dignissim aliquam, libero elit elementum tortor, vestibulum consequat lectus velit eu magna. Ut id tempore lectus. Proin ac enim a erat viverra auctor. Nulla sollicitudin ante eu condimentum malesuada. ...

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... Praesent cursus mauris sed magna faucibus facilisis. Donec blandit condimentum posuere. Praesent molestie hendrerit mollis. Mauris hendrerit, erat ut luctus commodo, purus lorem tincidunt arcu, sed finibus sapien eros ut est. Proin urna nisi, sodales in posuere nec, molestie a ex. Quisque hendrerit faucibus tortor, nec pretium lorem aliquam et. Vivamus nec sem sit amet nisl pharetra suscipit. Duis sit amet leo at nisi auctor dictum vitae vitae enim. Curabitur suscipit orci et enim venenatis laoreet. Donec semper convallis est placerat semper. Morbi ultrices nulla felis. Donec id quam vitae nisl finibus finibus. Morbi ultrices....

List of student's past answers

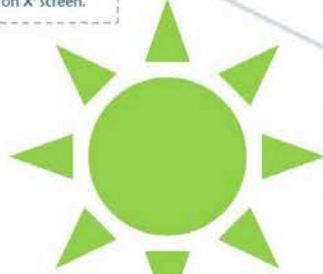
Below is our storyboard for the 'Conference on X' problem-based learning environment:

Start-up screen

Logo

System logo

Local interaction will require a class login before redirection to the 'Conference on X' screen.



Background image for 'Conference on X'.

Start button for 'Conference on X'. Upon click, shows a pop-up menu.



Local interaction will redirect the user to the 'Conference on X' screen.

START

Browse Answers

Give Feedback

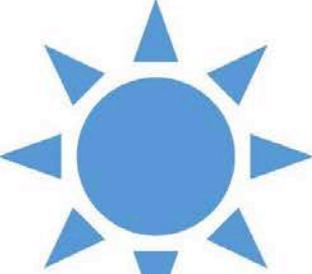
Allows the user to browse their own previous answers, and view the feedback given to them.

Start button for 'Case with structured questions'. Leads to separate screen with timers.

START

Allows the user to browse other students' answers, and give them feedback.

Notifications pop-up menu. Activates upon click.



Depending on which side of the line the mouse is hovering over, the transparency will decrease for the other half of the screen (fade out effect).

Background image for 'Case with structured questions'.

User clicks 'Start' button for 'Conference on X' and is directed to the brainstorming screen.

Brainstorming screen

Work allocation dock (hidden)

Subtopic/ Idea

Brainstorm topic (or question)

Subtopic/ Idea

Once an idea is entered and the 'return' key is pressed, system will automatically draw the idea as a node branching from the selected node. If no nodes selected, it will branch from the main/ central node by default

Please input brainstorm ideas here...

Text box expands upwards when filled up

Border is highlighted/ emphasized when selected

X (delete button) only appears when node is selected, and only when node was created by the user; will not appear if there are sub-nodes branching from it.

Double click to edit text

Request Tutor Assistance



When the mute icon is clicked, the icon turns red and the user will no longer hear audio communication from the muted student

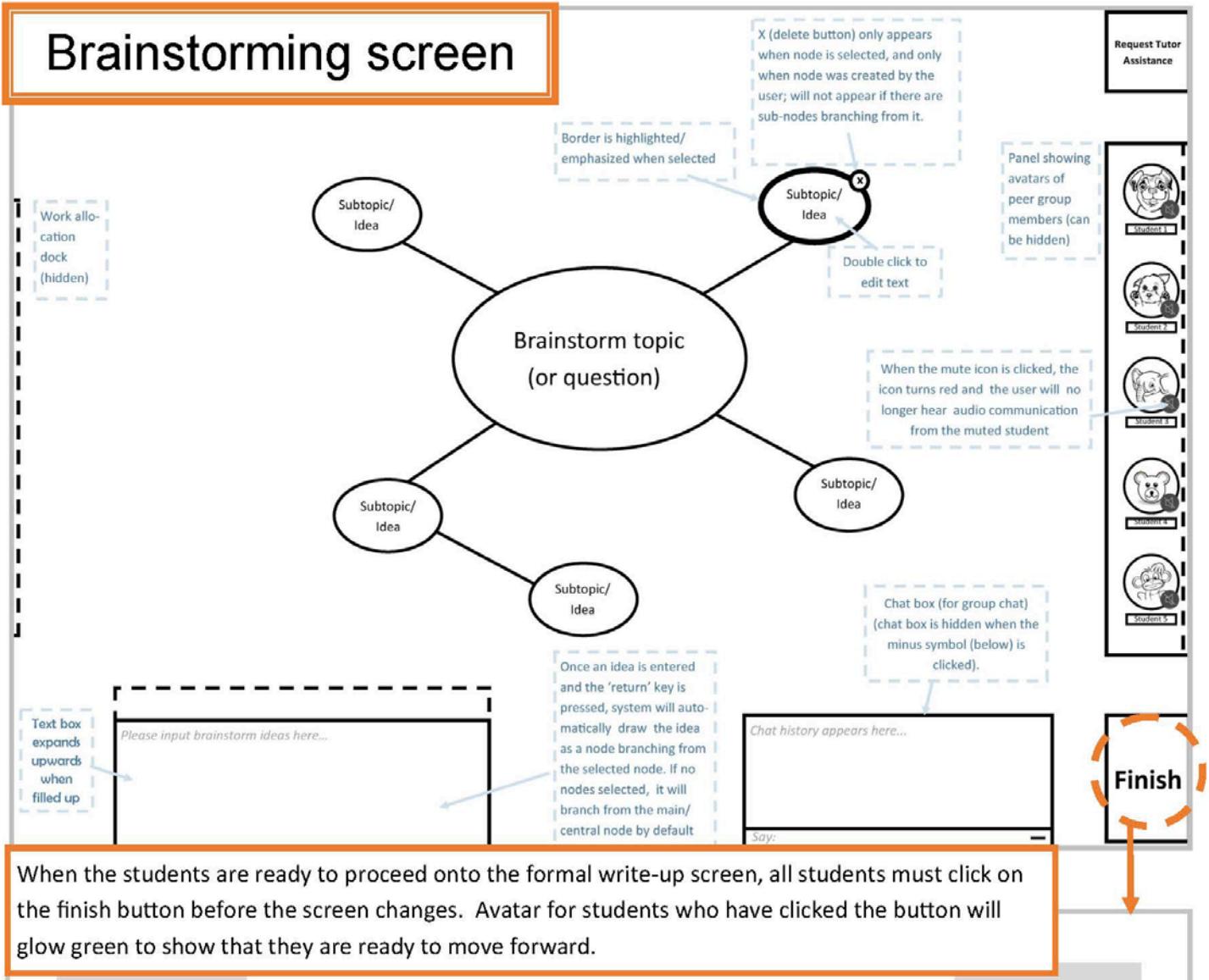
Chat box (for group chat) (chat box is hidden when the minus symbol (below) is clicked).

Chat history appears here...

say:

Finish

Brainstorming screen



The diagram illustrates the Formal write-up screen interface:

- Work allocation dock**: A vertical dock on the left side.
- Please input brainstorm ideas here...**: A text input field.
- Explain the relationship between two characters, as demonstrated through their interactions. In what ways does this relationship reflect the expectations of classical society?**: A question box.
- Please insert answer here ...**: A text input field for the answer.
- Back to Brainstorm**: A button at the bottom left.
- Publish**: A button at the bottom right.

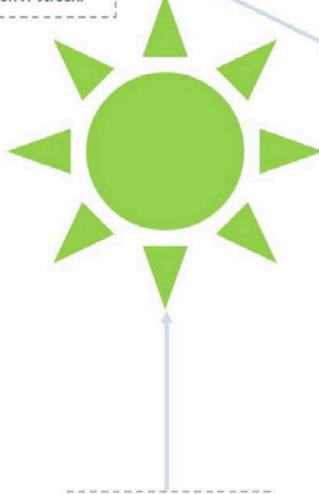
Formal write-up screen

Start-up screen

Logo

System logo

Local interaction will require a class login before redirection to the 'Conference on X' screen.



Background image for 'Conference on X'.

Start button for 'Conference on X'. Upon click, shows a pop-up menu.

Local

International

Local interaction will redirect the user to the 'Conference on X' screen.

START

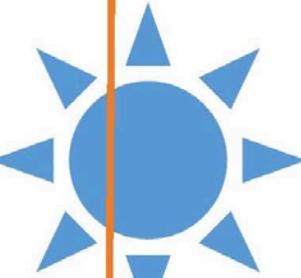
Browse Answers

Give Feedback

Allows the user to browse their own previous answers, and view the feedback given to them.

Allows the user to browse other student's answers, and give them feedback.

Notifications pop-up menu. Activates upon click.



Background image for 'Case with structured questions'.

User clicks 'Give Feedback' button and is directed to a random answer (from any student). There, the user can give feedback by commenting, upvoting/downvoting comments and rating the question.

Rating the quality of the answer

Rating:

Explain the relationship between two characters, as demonstrated through their interactions. In what ways does this relationship reflect the expectations of classical society?

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Right click to delete comment

Example doesn't support the explanation.

Please explain?

Works similar to google docs

Reply button

Upvote system

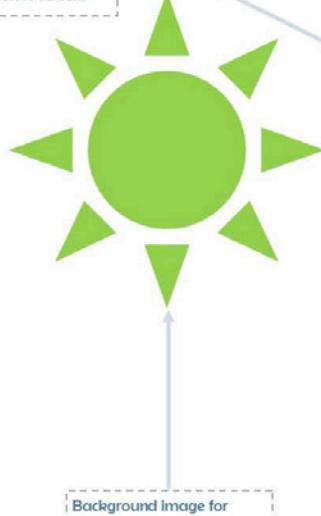
Student answer screen

Start-up screen

Logo

System logo

Local interaction will require a class login before redirection to the 'Conference on X' screen.



Background image for 'Conference on X'.

Start button for 'Conference on X'. Upon click, shows a pop-up menu.

Local

START

International

Local interaction will redirect the user to the 'Conference on X' screen.

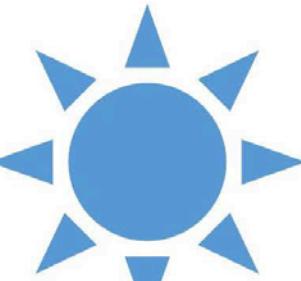
Browse Answers

Give Feedback

Allows the user to browse their own previous answers, and view the feedback given to them.

Allows the user to browse other students' answers, and give them feedback.

Notifications pop-up menu. Activates upon click.



Background image for 'Case with structured questions'.

START

Depending on which side of the line the mouse is hovering over, the transparency will decrease for the other half of the screen (fade out effect).

User clicks the 'Browse Answers' button and is directed to a screen full of their past answers. After selecting a past answer to view, the user can view comments from other students and reply to them (feedback system).

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Student past answers screen

Formal write-up screen

Work allocation dock

Explain the relationship between two characters, as demonstrated through their interactions. In what ways does this relationship reflect the expectations of classical society?

Please insert answer here ...

Back to Brainstorm

Publish

User clicks the 'Publish' button on the formal write-up screen when they are ready to submit their answer to the public and is directed to a random student's answer screen. Here they can comment (also upvote/downvote it) and rate the other student's answer to a question.

of the answer

Rating:



Explain the relationship between two characters, as demonstrated through their interactions. In what ways does this relationship reflect the expectations of classical society?

In the epic poem , " The odyssey", a relationship that reflects lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut laoreet convallis risus eget ullamcorper. Aliquam tristique justo et urna eleifend suscipit. Aliquam vestibulum pulvinar urna in lobortis. Mauris diam ipsum, egestas sit amet imperdiet sed, sodales ac sapien. Nullam eu dolor lorem. Mauris sit amet volutpat diam, quis viverra felis.

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Student answer screen

VISUAL AND INTERACTION DESIGN

Design Element 1

Central vs. Peripheral Vision

As our central vision contains more cone cells, we can therefore focus better and pay more attention to detail for what we see in the middle of the screen. Therefore only the important features, like the brainstorm map takes up more space in the middle of the screen than the rest of the features.

Our design contains a number of pop-out sidebar/dock features, for example our *work allocation* dock and our *avatar sidebar* dock. These remain hidden until the user hovers their mouse over them, for which it will then enlarge the area around the cursor. If the user clicks on it, it will sit on their screen until clicked again. As our peripheral vision contains less cells in general, but more rod cells (which have optimal functionality in the dark), it is therefore good at movement detection.

These features demonstrates the *central vs. peripheral vision* concept. By having the user only view what is most important for their current goal (brainstorming for an essay for the 'Conference on X' problem-based learning environment) the user is less distracted by the features of lesser importance (student avatars, work allocation, and etc.) and will have their attention drawn to them with cursor movement when it is necessary to use those features.

In the brainstorm screen, we decided to keep auxiliary components (*work allocation dock* and *avatar sidebar dock*) partially hidden by default.

The reason is that we wanted to keep the clutter on the screen to a minimum so that the user can focus on the central task (i.e. brainstorming). We were influenced by the Neilson heuristic of aesthetic and minimalist design which describes how extra units of information competes with the relevant units of information.

The reason we decided to keep the auxiliary components partially hidden instead of fully hidden is to achieve a balance between a minimalist design and discoverability. With the components in the partially hidden state, the user will know that additional components/functionalities exist. We were influenced by the Neilson heuristic of recognition rather than recall by making which describes how we should minimize the user's memory load by making options visible.

Design Element 2

Efficacy

Effectiveness

The system is effective as the designs provides the required functions for a student to use as a learning platform. Students can use the system to brainstorm, followed by answering questions. Or have quick-fire questions, short answer questions and test styled questions, as well as the ability to give feedback. This will help users to prepare for exams by familiarising the students with the exam style or to test their knowledge on the content and to see if they have fully grasp the ideas and explanations. It is further enhanced by allowing students to give feedback so they can discuss amongst themselves about the question at focus and if the statements provided are correct or incorrect.

There is also an undo function (ctrl+z) for the brainstorm, hence if anything is deleted it can be recovered, so it has a low degree of risk. The brainstorming of the system is flexible as it allows you to choose the size of the bubbles (expand and contract) and in the 1 hour reading passage, you are able to highlight significant quotes. Therefore because of the above, many diverse needs are addressed. There is monthly maintenance to ensure that the system will run fluidly.

Efficiency

Ockham's razor, which means simplicity is best, was used on this system which makes it easy to understand as it has a simple design/ layout.

In terms of simplicity, there are conventions in our design that include (but are not limited to) the chat box is universally understood as it is inspired from websites like Messenger, Skype, and etc., the sidebar/dock system where the user clicks on the dock to expand it - this looks similar to the Apple dock.

In terms of symbols, in the brainstorming screen for conference on x, there is a mute button (looks like a speaker with a line through it), which is grey if unmuted and turns red when the person is muted.

Memorability - there is always a dropdown menu in the top left corner that is accessible through all screens except the start-up screen. It is always in the same location and contains the same links throughout all the screens and is therefore easy for the user to remember when it is needed for use.

For redundancy in our design, even though we have our work allocation dock/sidebar appear on multiple screens (brainstorming and formal write-up), they are ONLY on two screens because they are only relevant on the two. Therefore the repetition of this design feature is not redundant.

Predictability - the location of the brainstorm question (for conference on x) is placed in the centre as it is the core purpose of the learning system. The chat boxes (brainstorm and person to person) are placed at the bottom (also logical grouping), as universally chat boxes are known to be present in the bottom of the screen.

Only some features are visible for each screen initially - some of the features are hidden (but partially visible) until clicked on, e.g. our dock/sidebar, the dropdown menu and the expandable chat boxes.

We decided that the best way to implement an electronic brainstorming system is to have the system control how ideas are displayed on screen, thereby restricting the user's control. The reason for this is because we wanted to minimize user error when displaying brainstorming ideas on screen. By restricting the user to just being able to send text input for a brainstorm (which is the main purpose of brainstorming), we minimize errors related to how the brainstorm is drawn (e.g. if we allowed users to draw the brainstorm manually, it is likely they will make many errors trying to draw using a computer mouse). We were influenced by the Neilson heuristic of error prevention which describes how it is better to design in such a way which prevents users from making an error.

Design Element 3 - component emphasized when selected

For our brainstorm structure, we decided that ideas which have been input into the brainstorm can be selected, so that it can be edited or deleted (also, selecting an idea allows the user to branch other ideas off it). When an idea is selected(clicked), the outline/border becomes thicker and darker (than the general line thickness used on the screen).

The first reason for this design element is to provide feedback to the user so they know that the idea they clicked has been selected. We were influenced by the first usability heuristic by Jakob Neilson, which is that the system should always keep the user informed about what is going on through appropriate feedback.

The second reason is to create emphasis by using a break in similarity. All the ideas displayed in the brainstorm have the same border shape and line thickness except when selected (in which case the line thickness will be increased). We wanted to create this emphasis because the selected idea becomes the one that new ideas input by the user will be branched from. We were influenced by the Gestalt principle that when there is a break in similarity, emphasis will be created for the dissimilar object.