CS 361
Project B: The Global Classroom

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i. Project Overview

The goal of this project is to provide people around the world access to free education. Free education from this project would give the less fortunate a better chance at competing with the select few of people that can afford to attend higher education schools. A majority of people that have more education are able to obtain more success in their life than those that do not.

The project concept is to create a website that allows people to access free lecture materials, practice exams, and worksheet activities that has been provided by a volunteer based academia community. To implement the project concept, eXtreme Programming (XP) design model was used to create a rapid prototype. So far, two XP cycles have been completed to demonstrate a working model. Once the working website is thriving and completed, the next phase would be to implement a mobile app to broaden the range of free education access.

The Project URL is: http://web.engr.oregonstate.edu/~maillarw/wordpress/

ii. Acknowledgement

The following project report was written for Daniel O'Farrell based on his Vision Statement [1] . The material in this report supports his initial idea of the project, to create a website that provides free educational resources to the less fortunate of people around the world.

1.0 The First XP Cycle

1.1 List of All User Stories

1. Login capability. Users can login into web application using standard credentials.

2. Registration capability. Users can create an account containing a profile with items   such as age, grade, and location.

3. Search for relevant material. Users (UU/RU) can search for material based on categories and subjects. For example, User A can search for: science, elementary school, then biology, and finally select amphibians.

4. Take Tests. Unregistered users (UU) can view lectures and take tests/worksheets, but nothing is saved or stored.

5. Users Take Tests/Activities. Registered users (RU) can view and take tests/activities, and have the scores and feedback saved.

6. Upload new activities. RU can submit new worksheets, tests, or lectures. Worksheets can be simple multiple choice activities where relevant questions and possible answers are posted. An answer key will also be included.

7. Upload new lectures. RU can submit links to youtube videos.

8. Upload new tests. RU can submit new tests. Tests would be differentiated from activities by having time limits, subjectively more challenging questions, and maybe written sections.

9. RU rank activities, tests, and lectures. The more positive scores will bubble these items up the list. The poor quality or uninformative items will be demoted.

10. Item Pruning. In order to keep the content high quality, a pruning system should eliminate items whose score reaches a certain threshold.

11. Achievement Chest to display victories. After completing arbitrary actions, users can be given awards to display on their profile or homepage. For example: 10 amphibian lectures award or, 5 perfect scores of tests.

12. Friends List. RU can friend or follow other accounts and receive notifications when that friend uploads a new item. The friendship should be mutual, meaning a handshake at some point. RU's should also possess the option to remove someone from their friends list.

13. Users can message their friends. RU's should be able to contact their friends

14. Leaderboards can display the best users in a given subject. Search results or subjects should list somewhere a section which displays the top RU in a given category. This would help RU's feel a greater sense of accomplishment.

1.2 Estimate Effort of the Tasks

USER STORY	UNITS ESTIMATED (CONSERVATIVE)	UNITS ESTIMATED (QUICK)	NOTES:	ACTUAL UNITS
1. Login capability	3 UNITS	2 UNITS	Requires data-base set up	2.5
Registration capability	3 UNITS	2 UNITS		2
1. Search for relevant material	4 UNITS	3 UNITS		1.25
2. Take Tests	2 UNITS	1 UNIT		NA
3. Users Take Tests/Activities	4 UNITS	4 UNITS		NA
1. Upload new activities	4 UNITS	3 UNITS	So long as we have the access to a database and users can upload materials, this should be fairly simple to make.	2
2. Upload new lectures	3 UNITS	3 UNITS		2
3. Upload new tests	4 UNITS	3 UNITS		2
4. RU rank activities, tests, and lectures	2 UNITS	1 UNIT		1
5. Item Pruning	6 UNITS	4 UNITS		NA
1. Achievement Chest to display victories	4 UNITS	2 UNITS		NA
2. Friends List	4 UNITS	2 UNITS	A boolean where both match on both, allows friendship could be created	3
3. Users can message their friends	2 UNITS	--	Should be able to be done with Item 13	1
4. Leaderboards	3 UNITS	2 UNITS		NA
5. UP FRONT SET UP - Acquisition of web space etc...	50 Units	25 Units	Does not actually need to be done for project, simply for assumption sake.	5 Units*
NOTE: UNIT LENGTH =	*OSU server was used so this does not reflect server set-up time.			
2 HOURS (DESIGN AND TESTING)				

1.3 Priority List of User Stories

Required:

    1.   **Login capability. Users can login into web application using standard credentials.**

    2.   **Registration capability. Users can create an account containing a profile with items such as age, grade, and location.**

Feature 1:

    3.   **Search for relevant material. Users (UU/RU) can search for material based on categories and subjects. For example, User A can search for: science, elementary school, then biology, and finally select amphibians.**

    4.   Take Tests. Unregistered users (UU) can view lectures and take tests/worksheets, but nothing is saved or stored.

    5.   Users Take Tests/Activities. Registered users (RU) can view and take tests/activities, and have the scores and feedback saved.

Feature 2:

    6.   **Upload new activities. RU can submit new worksheets, tests, or lectures. Worksheets can be simple multiple choice activities where relevant questions and possible answers are posted. An answer key will also be included.**

    7.   **Upload new lectures. RU can submit links to youtube videos.**

    8.   Upload new tests. RU can submit new tests. Tests would be differentiated from activities by having time limits, subjectively more challenging questions, and maybe written sections.

    9.   RU rank activities, tests, and lectures. The more positive scores will bubble these items up the list. The poor quality or uninformative items will be demoted.

    10.   Item Pruning. In order to keep the content high quality, a pruning system should eliminate items whose score reaches a certain threshold.

1.4 Team Pairing Summary - Part 1

The team of 6 people assigned to this project were divided into groups of 2 and had a simple naming convention of group A, group B and group C for easy reference as each group accomplished separate blocks in the XP cycles. Each team used the "pilot and co-pilot" approach to accomplish tasks when applicable. The medium used for screen sharing was done with TeamViewer [2]. Teamviewer provided one-to-one screen sharing as well as group meeting sessions, allowing for multiple co-pilots to observe a pilot.

One problem that arose from using the pilot and co-pilot method was trying arrange a time that was convenient for both group members. Every person in our entire team had very busy and somewhat unpredictable weekly schedules that made it very hard to get together and work in pairs at the same time. However, the use of the pilot/co-pilot system was found to be useful and how it would be very helpful for programmers using XP that work in the same office together.

One of the solutions to the schedule conflict that each group had, was done by having another person from a different group fill in and take the role as either a pilot or co-pilot. Another solution was implemented by recording the pilot screens and have the co-pilot watch it later to identify any possible bugs or improvements.

1.5 Unit Test

List of required test cases
These test cases are tentatively correspondent to Unit Estimation Sheet and can be modified to fit the pace of the project and the priorities of requested features.

Unit Test ID	Test case Description	Expected Result	Current Status	Notes
1	Login Capability	Users can login into web application using standard credentials	PASS	
2	Registration/ Profile Editing	UU can create account and RU can edit profile	PASS	Registration works.
3	Access to different classrooms	Navigate to different class pages via Courses Menu	PASS	
4	Add educational material to class pages	Admin/ Appointed users are able to edit class page/ post info (blog based information, links, media, etc)	PASS	
5	Upload new activity	RU can upload new worksheet, test and lectures	PASS	PASSES, but uploading lecture is a bit difficult without direct embedding. Requires more savvy than our users might otherwise have
6	Communication 3	RU can message their friends	PASS	Works fine for private, public notifications have slight delay.
7	Communication 4	Can add friends	PASS	Friendship works. Sends notification emails.

Test Data

Test data is either provided in the following format or presented in supplementary documents if actual coding is used to process unit tests.

Test ID	Tester	Unit	Method	Remarks / Action Taken
1	Dat Tran	0.5	Create account for testing units via Register link on Meta list	Fully functioning. Account was created and ready to use.
2	Brett Irvin	0.25	Updated profile and verified that changes were saved.	Changes were applied to the profile successfully.
3	Brett Irvin	0.25	Attempted to navigate between available courses, both through the Courses menu and through the Subjects sidebar	Both the Courses nav bar and the Subjects sidebar function properly. Everything redirects as it should.
4	Andrew Calhoun	0.5	Uploaded lecture with YouTube Embedding and the current system	Works, but is a bit difficult for lay persons to do. Should have a way to directly connect to a youtube or vimeo account maybe?
5	Andrew Calhoun	0.5	Tested Social Networking Functionality via standard manual user testing.	Friendships work. Private messages work. Twitter style/facebook style updates work. Pointed (@username) updates work. Notifications work.
6	Dat Tran	0.25	Logged out and tried to access other pages by hitting back button	Logout splash screen showed up, all the available courses hidden - OK
7	Dat Tran	0.25	Tried to use contact page when logged out.	~~Contact page redirected to homepage.~~ Contact page opened for guest

Summary of Bugs and Fixes:

There were several bugs found during testing. One of which was that uploading user photos, either profile pictures or cover photos, was failing for registered users. This failure was occurring for both administrative users and general users. The order of events for the failure was: first, the user would be prompted to browse for a photo, then, after the user selected a photo, the website would state that the photo had been uploaded successfully. The website would then display a broken photo image to the user at that point. The correct sequence of events for the photo upload was: the user would upload the photo, the user would be prompted to crop the photo, and then the success message would be displayed and the user would be shown their photo. Upon inspection, using Google Chrome's Developer Tools, it was found that the website was giving a 403: Access Denied/Forbidden error after the user uploaded the photo and attempted to view it. It was also found that the user's photo was infact uploaded to the server in

the correct location (where the browser was attempting to access, but was giving the 403 error). The photo, however, was not being copied into this location on the server in multiple sizes, which is the correct behavior (so that the website can fetch the correct sized image depending on the user's view size).

Several avenues were used to try to remedy this bug. The first was the all of the files in the websites directory were giving complete read, write, and edit permissions (chmod 777), which is undesirable because it gives the public access to the edit the website's files, but it is a good tool for debugging. It was found that this did not remedy the problem.

The next possible fix that was tried was: a "test.php" file was created and added to the same directory as the website on the server. This file was used to display the details about the server with the phpinfo() built in function. The logic behind this check was that it was possible that GD was not installed and therefore causing the failure. GD is a graphics editing add-on in PHP that helps when cropping/resizing photos and if it is not installed then it would cause the failure. It turned out the gd was installed and up to date.

The final check and the solution to the problem was to ensure that their were not any conflicted plugins within the website that could be overwriting the natural behavior of the file uploading plugin (BuddyPress). To check this, every plugin was turned off except BuddyPress. Then each plugin was turned on one by one until all of them were on. It turns out that this immediately fixed the problem. The ordering of how plugins are turned on affects the precedence of the plugins (i.e. features in plugins turned on later will be overwritten by plugins that were installed before them.) This test both found the problem and fixed it.

Another bug that occurred during testing and creation of the website was that the website began giving 404: Page Not Found errors on every page of the site. It was assumed that this problem was caused by an error in a vital piece of PHP code because it occurred while one of our engineers was attempting to modify some code. Nothing vital was created between this error occuring and the last backup of the website, so the site was just reverted back to its closest backuped state. This solved the error.

Further testing revealed an issue where random links on the website had [L] appended. Initially, this seemed to be a bug, since there appeared to be no consistency to how which links were appended and which were not; however, the [L] ended up being a Wordpress feature intended to denote content that is accessible only to logged in users. This feature is only active when an administrator is viewing (and presumably editing) the site, and is not visible to regular users. The "Your Notes" and "Post Your Lecture" features should only be visible to registered users; thus, this bug turned out not to be a bug at all, but a fairly useful feature.

Andrew fixed the 'bug' where the coursework was hidden from the world at large, by removing the user restrictions that were built into the framework we installed. Originally, only logged in users could see what was offered by the site, and once these restrictions were removed, everything worked swimmingly.

1.6 Acceptance Test

Acceptance testing was carried out by showing the customer - Daniel, our progress on the website. The feedback was positive. Daniel liked what we did a lot and did a test drive on a few required features, which includes Registration - Login - Navigation and Information foraging. Every step ran as smoothly as it did in the unit tests.

The only minor glitch on the entire acceptance test is that Daniel could not post a new lecture since his user level was limited to general web access. So we boosted his account up to premium user and that was it. The lesson learned from the experience is that we have to define a detailed process/workflow on how we want to filter requests and then upgrade skilled users into qualified lecturers. The team had discussed a few options that we want to try in the future improvements or maybe even in the 2nd XP cycle if time allowed.

2.0 The Second XP Cycle

2.1 Update to the list of User Stories

Our client, Daniel O'Farrell was very impressed with the state of the website when we presented it to him and did not offer any additional user stories. Functionality was largely in place and he was happy with what he was seeing. He offered one suggestion though:

There was an issue with accessibility of courses and being able to post if the user did not have a certain level of access or was not signed in. This was changed and now unregistered users can look at, watch, and read course materials.

For improvements, we'll shift our focus more on user's access to tests and the capability to grade tests. These features were addressed in the first cycle but were not considered in the required specifications

2.2 Revised Estimate effort of Tasks

The previous effort estimates were accurate and the group was able to tackle tasks quickly and effectively. This is largely credited to the use of the Wordpress framework. Once we figured out which plugins to use and modify, the work proceeded at a rapid pace.

This included testing and other improvements that had to be made to the site to meet both the client's vision and the level of quality that our group strived for. Based on previous unit test efforts, we are confident that once the appropriate plug-ins are implemented to adapt the user's' stories (2nd cycle), it would take no more than 75% of the time estimated in the section 1.2 table.

2.3 Priority List of User Stories

User Stories for Future Improvements:

1.   Take Tests. Unregistered users (UU) can view lectures and take tests/worksheets, but nothing is saved or stored.
2.   Upload new tests. RU can submit new tests. Tests would be differentiated from activities by having time limits, subjectively more challenging questions, and maybe written sections.
3.   Registered Users Take Tests/Activities. Registered users (RU) can view and take tests/activities, and have the scores and feedback saved.
4.   Achievement Chest to display victories. After completing arbitrary actions, users can be given awards to display on their profile or homepage. For example: 10 amphibian lectures award or, 5 perfect scores of tests.
5.   Leaderboards can display the best users in a given subject. Search results or subjects should list somewhere a section which displays the top RU in a given category. This would help RU's feel a greater sense of accomplishment.

2.4 Team Pairing Summary - Part 2

The group continued to be flexible with the pairings, but as a rule, we checked each other's work and either informed one another about bugs or fixed them. The pilot/co-pilot methodology was largely eschewed for this phase but there was limited TeamViewer interaction. Again, the pilot/co-pilot method was inconvenient, due to our unpredictable and busy schedules. It was useful; however, to find bugs and other improvements for the project.

As a group, we still met and discussed issues in the project and worked closely with our various partners for aspects of the project that needed at least one extra set of eyes. One such example is looking for bugs in PHP code that might have otherwise caused issues or portions of the code to not render or fail to otherwise work.

2.5 Unit Test

Quick drive tests using the unit test list of the 1st XP cycle are also carried out to make sure that existing modules are not being affected by the new plug-in installations as well as new settings that go with them.

<u>List of required test cases</u>

These test cases are tentatively correspondent to Unit Estimation Sheet and can be modified to fit the pace of the project and the priorities of requested features.

Unit Test ID	Test case Description	Expected Result	Current Status	Notes
1	Search for relevant material	UU/RU can search for material based on categories and subjects	PASS	On going testing
2	Communication 1	UU can view material. RU can view, download and post reply	PASS	
3	Item Pruning	RU can rank activities, test, lectures. Poor quality items will be demoted	PASS	
4	Communication 2	RU's notified when subscribed class page has new item	NA	Notification for new posts, not lecture
5	Video upload	UU/RU can post videos	PASS	
6	Document upload/download	UU/RU can upload/download documents from posts	PASS	

Test Data

Test data is either provided in the following format or presented in supplementary documents if actual coding is used to process unit tests.

Test ID	Tester	Unit	Method	Remarks / Action Taken
1	Corey Hemphill	0.5	Tested category/subject hierarchy to ensure easy navigation of subjects for UU/RU	Category/subject hierarchy is logical and functions properly
2	Corey Hemphill	0.5	Tested post rating functionality for both quality and placement of posts	Rating system is appropriate and functions properly
3	Dat Tran	0.25	Submit multiple ratings on several posts	Working correctly. Doesn't allow double rating which is good.
5	Dat Tran	0.25	Upload Youtube video using youtube embedder plugin	WP already has oembed that help simplify and speed up the process.
6	Andrew M. Calhoun	0.25	Upload of documents to lecture/course materials tested	Works properly

Summary of Bugs and Fixes:

No issue or bug is detected at the moment.

2.6 Acceptance Test

The customer reviewed the website at the end of the second XP cycle and determined that it passed all of his acceptance tests related to his three user stories and one general use requirement listed below. The customer stated that, "I just attempted to add a youtube video as a lecture and it works great. You guys did a fantastic job on this project! All my acceptance testing has been passed."

Acceptance testing done by the user:

General:

1. Login capability. Users can login into web application using standard credentials.

2. Registration capability. Users can create an account containing a profile with items such as age, grade, and location.

Feature 1:

1. Search for relevant material. Users (UU/RU) can search for material based on categories and subjects. For example, User A can search for: science, elementary school, then biology, and finally select amphibians.

2. Take Tests. Unregistered users (UU) can view lectures and take tests/worksheets, but nothing is saved or stored.

3. Users Take Tests/Activities. Registered users (RU) can view and take tests/activities, and have the scores and feedback saved.

Feature 2:

1. Upload new activities. RU can submit new worksheets, tests, or lectures. Worksheets can be simple multiple choice activities where relevant questions and possible answers are posted. An answer key will also be included.

2. Upload new lectures. RU can submit links to youtube videos.

3. Upload new tests. RU can submit new tests. Tests would be differentiated from activities by having time limits, subjectively more challenging questions, and maybe written sections.

4. RU rank activities, tests, and lectures. The more positive scores will bubble these items up the list. The poor quality or uninformative items will be demoted.

5. Item Pruning. In order to keep the content high quality, a pruning system should eliminate items whose score reaches a certain threshold.

Feature 3:

1. Friends List. RU can friend or follow other accounts and receive notifications when that friend uploads a new item. The friendship should be mutual, meaning a handshake at some point. RU's should also possess the option to remove someone from their friends list.

2. Users can message their friends. RU's should be able to contact their friends

3.0 Reflection

In project A, the Waterfall model was used for the design process. The advantage of using this methodology is that the project relies heavily on documentation to outline the process for how the project will be implemented. This allowed the project to take shape by providing an overall outline map with a clear direction for the team to proceed before any coding was ever performed. One of the weaknesses discovered during Project A was the amount of time allocated for creating the documentation without ever creating an actual project. Another weakness of the Waterfall model was the unknown bugs or difficulty to actually implement the project. While it may look nice on paper, actual implementation may be too difficult or nearly impossible to achieve.

On the other hand, using XP allowed the team to quickly identify bugs and complications while producing a proof of concept that Waterfall could not provide. Another advantage is that XP allowed for the project to be brought to the marketplace more quickly than Waterfall. The close interaction between customer and programmer(s) using the XP model also provided another advantage over the Waterfall model as it provided quick feedback from the customer and their vision on how the project should look and perform.

One of the weaknesses of using the XP model cycle is using team pairing. This requires two programmers to work at the same time on the same code and finding a programmer that has the same coding style and thought process can be difficult.

A list of suggested features moving forward:

- Achievement Chest to display victories. After completing arbitrary actions, users can be given awards to display on their profile or homepage. For example: 10 amphibian lectures award or, 5 perfect scores of tests.

- Leaderboards can display the best users in a given subject. Search results or subjects should list somewhere a section which displays the top RU in a given category. This would help RU's feel a greater sense of accomplishment.

References

[1] OFarrell, Daniel. *Vision Statement: The Global Classroom*. Piazza Forum, 11 February 2016. Web. 10 March 2016. <https://piazza.com/class/iir5jzwlu5d3ph?cid=168>.

[2] *TeamViewer--Remote Support, Remote Access, Online Collaborations and Meetings*. Web. 10 March 2016. <http://www.teamviewer.com/en-us/>.

[3] *Cost of Raising a Child Soars*. Chosun Media. Web. 10 March 2016. <http://english.chosun.com/site/data/html_dir/2013/04/22/2013042200358.html>

[4] *Fertility Rate, Total (Births per Woman)*. The World Bank. Web. 10 March 2016. <http://data.worldbank.org/indicator/SP.DYN.TFRT.IN?order=wbapi_data_value_2013+wbapi_data_value+wbapi_data_value-last&sort=asc>

[5] *Science the Loser in Victoria's Alpine Grazing Trial*. The Conversation. 23 March 2011. Web. 10 March 2016. http://theconversation.com/south-korean-education-ranks-high-but-its-the-kids-who-pay-3