

ePerlego - the Social VLE to Promote Student Performance: Progress Report

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Abstract

Using the Project Specification (See Appendix 1) as its foundation, this report will detail the progress made in researching and developing the outlined system, noting any difficulties encountered and how well the project is being managed on the whole. The document will also outline any changes to the timetable established in the specification, in line with the current state of development.

1 Overview

1.1 Problem Statement

Through numerous studies, it has been consistently found that parental involvement in a student's education significantly improves their performance at school[1][2], yet the modern school system seldom invites such further than termly parent-teacher meetings and student report cards. Further to this, report cards rarely go into more detail than an 'expected' and an 'on-target-for' grade[3], poorly representing the many multi-faceted subjects pupils study. Where a report may state a student is achieving an average grade in Computing, for example, they may actually be scoring highly in more-practical programming modules but struggling with those that are more theoretical. This highlights the importance of data representation with regard to student performance through the course of their modules, allowing more targeted learning and focused revision to aid and improve their studies. Currently, this seldom extends further than a student manually tracking how well they perform across numerous tests and pieces of homework[4] - information which is very easily misplaced or forgotten. Though numerous virtual learning tools exist to this end, few manage to wholly encapsulate the range of other requirements posed by all members of the school body - from students to parents, teachers to governors - in a manner best applicable to each party.

1.2 Project Outline

This project entails the development and user test-driven evolution of a web-based VLE (Virtual Learning Environment) software, serving primarily as a student performance tracking tool to promote achievement and parental involvement in schools, employing strong UI (User Interface) design and thorough but intuitive data representation techniques to aid targeted learning across a multitude of modules. The software will incorporate a number of other features, including direct messaging between teachers, students and parents, timetables and event calendars, and homework tracking and submission, ultimately aiming to provide an unparalleled academic companion tool of significant educational benefit, applying feedback from user tests to ensure such.

1.3 System Branding

Since writing the specification, the project has undergone some degree of temporary branding under the working-title *ePerlego*. In terms of etymology, this name was selected

for its Latin translation - “*perlego*” meaning ‘to examine thoroughly’ or ‘to study’. An ‘e’ was prefixed to the word for a number of reasons:

1. An application of the same name already exists.[5]
2. The system should be easily identifiable as an online tool, ie. *email*.
3. *ePerlego* is largely unique in search results, returning fewer than 100 records in a Google search.

A makeshift logo (figure 1) has also been created for *ePerlego*, enabling a working-brand identity, largely for ease of reference in reporting and testing.



Figure 1: ePerlego working-logo

It is important to note that the working-identity of the system is by no means final, and is subject to change at any time. This is in part due to the decidedly challenging nature of remembering and/or spelling the name of the tool; a facet which, for a system in its production environment (the live build), is not particularly desirable.

2 Technical Progress

Significant progress has been made towards completing the tasks - detailed by the Project Timeline (See Appendix 1, Section 5) and Gantt Chart (See Appendix 1, Section 5.7) - through the course of this term, meeting a number of the technical objectives for the project in spite of some setbacks and delays.

2.1 Background Research

Prior to any implementation, it was important to research and study existing applications which cater to a similar audience. These included *Show My Homework*[6], *Fronter*[7] and *Firefly*[8], each of which is a highly commercial and well-rounded solution to the problem of education technology. Background research was completed within the given time bounds.

Show My Homework

Show My Homework, as the name would suggest, is an application based primarily around homework management and grading. Though it offers a suite of reports and insights into how a student or class has performed in a piece of assessed work, this insight fails to stretch across the students’ career, making it difficult to track performance in a given subject or module. The system incorporates a robust but limited set of additional features, including homework calendars, online grading of work and direct messaging between users.

Though simple in its feature-set, *Show My Homework* is an intuitive and powerful tool, driving high usage statistics largely through its utility and simplicity of use. This enforces the importance of building a system with strong and intuitive UI design; a confusing tool with contrived means to complete a seemingly-simple task is not very useful, and is unlikely to be utilised no matter how beneficial the information it contains may be.

Fronter

Fronter is a tool more targeted to teachers than any other member of the school body, offering a number of powerful tools to streamline the teaching workflow into the following categories:

- Plan
- Teach
- Assess
- Analyse

Each category is associated with a different set of tools within *Fronter*, for example the Assess section offers a range of online evaluation tools, enabling students to submit work and have it marked electronically rather than physically.

Most notably, the Analyse segment of the workflow offers a powerful student portfolio tool, allowing a pupil to view all the schoolwork and activities they have participated in alongside assignment evaluations and test results. This makes it very easy for a student, or teacher, to see a pupil's strengths and weaknesses, allowing a learning plan more tailored to the child's individual needs to be created. This[9], coupled with parental involvement[1][2], is widely considered key to unlocking a student's potential.

Firefly

Firefly is an extensive and powerful suite of integrated tools, extending beyond the school itself to involve parents in the educational process. A wide range of features, including homework setting, progress tracking, group-wide or direct messaging and resource sharing, make it one of the most capable ed-tech systems available.

Of note is the ease with which the system can be setup for new schools, integrating directly with a large number of existing MIS (Managed Information Systems) to seamlessly form a robust user-facing system rooted in the school's existing databases. This means that student lists, timetables, calendars, behaviour & attendance reports and more are all readily available to the system, provided they exist already.

What does this mean for ePerlego?

It is evident from the above research that a number of effective and robust tools exist within the development niche of this project, yet each fails to wholly encapsulate the

requirements of the school body. *Show My Homework*, though simple and highly usable, is very limited in its scope, seldom extending further than homework-related tools. *Fronter*, with its powerful student performance portfolios, focuses too heavily on being a tool for teachers, and does not natively support parents accessing and using the system. *Firefly*, a broad and feature-rich application, is limited in its ability to measure student performance over time, simply logging all results from graded work in a markbook tool.

ePerlego intends to bridge the gaps in functionality afforded by other solutions, providing a robust and simple system with a rich feature-set (See Appendix 1, Section 3), natively involving all members of the school body and enabling detailed & extensive metrics to analyse a student's performance through the course of their school career. This will be extended further to provide detailed insight into the performance of a school on a class, year or school-wide basis, allowing staff and governors to view this important information at a glance and in real time.

2.2 Gathering Resources

Before implementation of the project could begin, a number of resources needed to be gathered to allow for a smooth and uninhibited development cycle:

- Installed RubyDK using *RubyInstaller*.^[10]
- With Ruby setup, Rails framework and any further dependencies were easily installed using the command `$ gem install`, adding any dependencies to the Gemfile within the project root.
- Selected *RubyMine* as suitable IDE (Integrated Development Environment), supporting the Ruby language and Rails framework natively and allowing ease of development and navigation through the project directory and file structure. Registered under a free student license.
- Collated sample documents and templates to correctly outline ethical considerations of the project prior to submission of a request for ethical consent (See Appendix 2) to the BSREC (Biomedical and Scientific Research Ethics Committee).

2.3 Learning Ruby on Rails

Though chosen for their emphasis on *Convention over Configuration*, lessening the number of explicit decisions a developer must make while retaining flexibility of coding, and *Don't Repeat Yourself*, storing information in a single unambiguous place to significantly reduce repetition of code^[11], neither Ruby nor Rails are familiar to the developer, requiring time to be set aside prior to development to learn their intricacies. This was achieved by following tutorials^[12]^[13] and, where possible, applying their teachings to an early prototype build of the system - for example, the login system is very heavily based around the tutorials outlined by Michael Hartl.^[13]

2.4 Implementation

Rails operates under an MVC (Model-View-Controller) software design pattern (figure 2), using **models** to define and manage collections of data, **views** to generate and display the information of the system as pages within the application and **controllers** to allow interaction from the user to the models, then updating or selecting the requested view. The MVC makes it relatively easy to distinguish front-end and back-end development, with views pertaining to the former and models and controllers the latter.

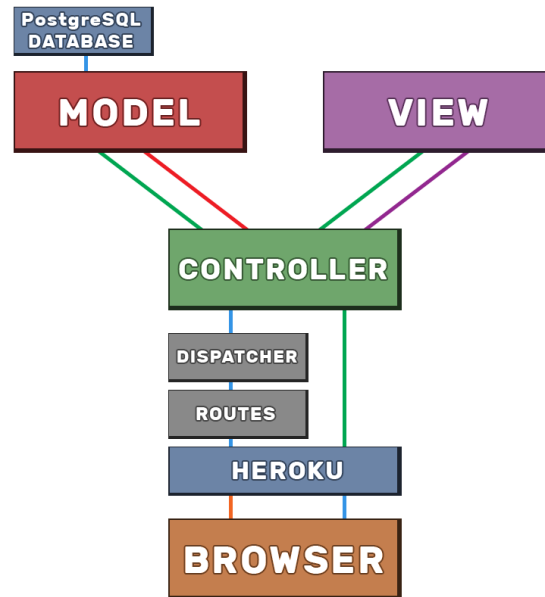


Figure 2: Overview of the Rails MVC in a Heroku production environment.

2.4.1 Back-End

The majority of development so far this term pertains to the back-end, implementing the models, views and controllers necessary for the application to operate at a purely functional level. Detailed below, the system model (figure 3) gives a clear overview of the models a system like *ePerlego* requires, presenting the relationships, both mandatory and optional, between data models within the system. Currently, the **School** & **User** models have been fully implemented, along with their associated controllers and views, and the **Department** & **Class** models are under development.

2.4.2 Database

The system uses a PostgreSQL database in production, as required by Heroku (the chosen deployment platform), but relies on SQLite3 in the development environment, with the system model (figure 3) reflecting the database schema, outlining its tables, records and corresponding dependencies. It will be constructed gradually through the course of

development, using database migrations to enable reversible changes and the adaptation of data as system requirements evolve.

If time permits, the system will be extended to incorporate some degree of MIS (Managed Information System) integration, allowing a school's existing data stores to be simply and painlessly transferred to *ePerlego*, significantly reducing the work required to fully establish a new school and all its corresponding records within the database.

2.4.3 System Model

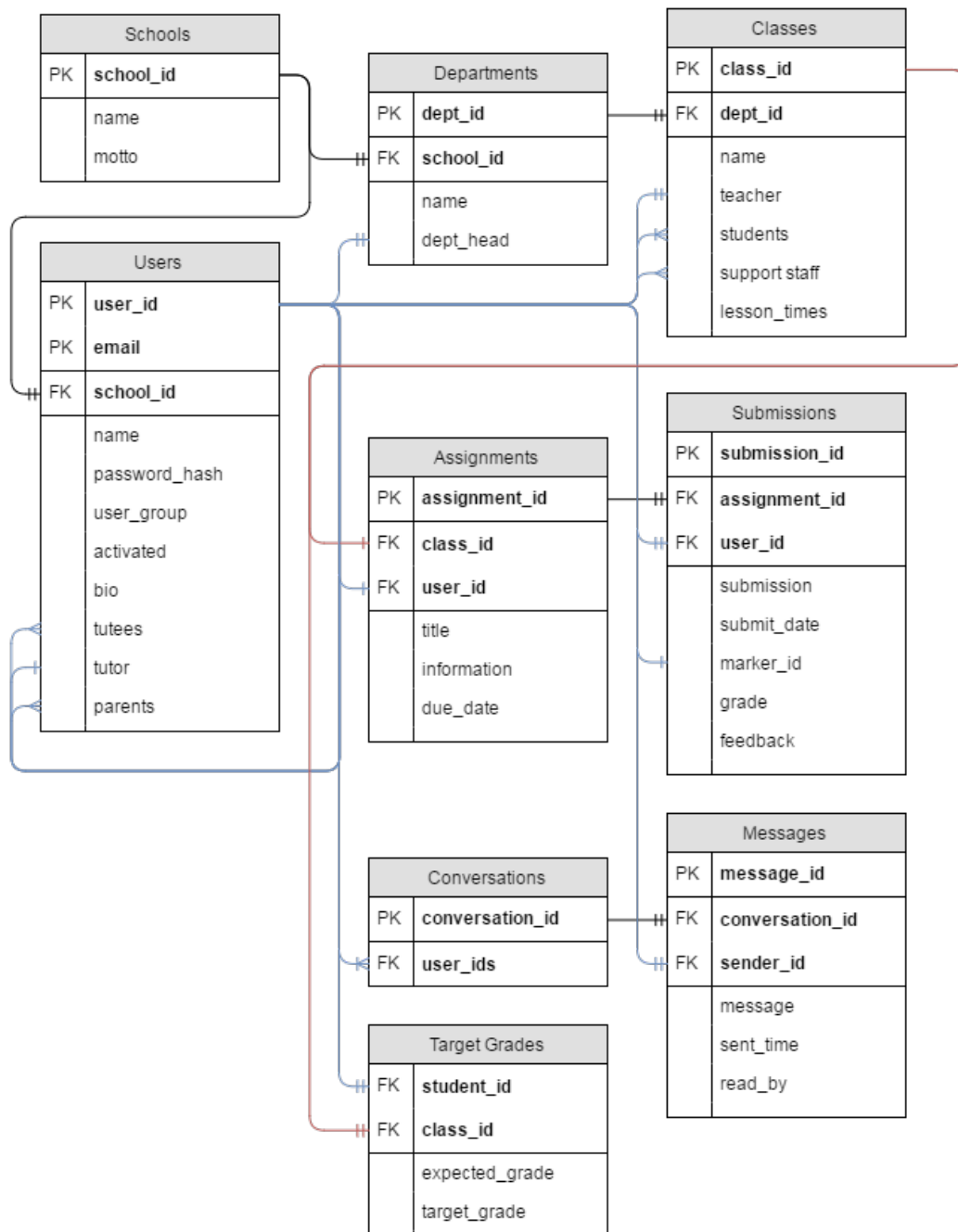


Figure 3: System model, detailing database schema and inter-model relationships.

2.4.4 Security

In terms of system security, Rails has been developed to counter a number of vulnerabilities automatically, with all user-input and database-output safely escaped to prevent XSS (cross-site scripting) attacks and SQL injection. Strong parameter checks within the model definitions help to ensure that only the correct fields may be updated in a request, helping to ensure malicious users cannot alter records in the database outside of their permissible access.

Before-filters in the controllers help to ensure pages are only accessed by the correct user - for example, a malicious user will not be able to update another user's information unless they are logged in as that user. In most cases, the before-filters are used to ensure users are logged into the system and are only able to view information pertaining to their own school.

Bcrypt is used to hash passwords prior to their storage in the database, ensuring security of sensitive information within the database.

2.4.5 User Interface

Currently, the system UI is quite basic, (figure 5) with very little custom styling having been defined. Bootstrap is being used, not only to enable mobile responsiveness to easily be added further into development, but also for early builds of the application to incorporate basic styling for ease of use and testing. This is in-line with the development of the MVP, which relates more to demoable functionality than the final look and feel of the product.

It is intended that the UI will be stylised with a clean and unique design later into development, notably using feedback from user tests to sculpt the UX (User Experience) to a highly usable and intuitive standard. The interface will draw inspiration from a number of existing social media platforms and VLEs, affording an experience which feels familiar and intuitive to the user, in spite of surface-level design differences.

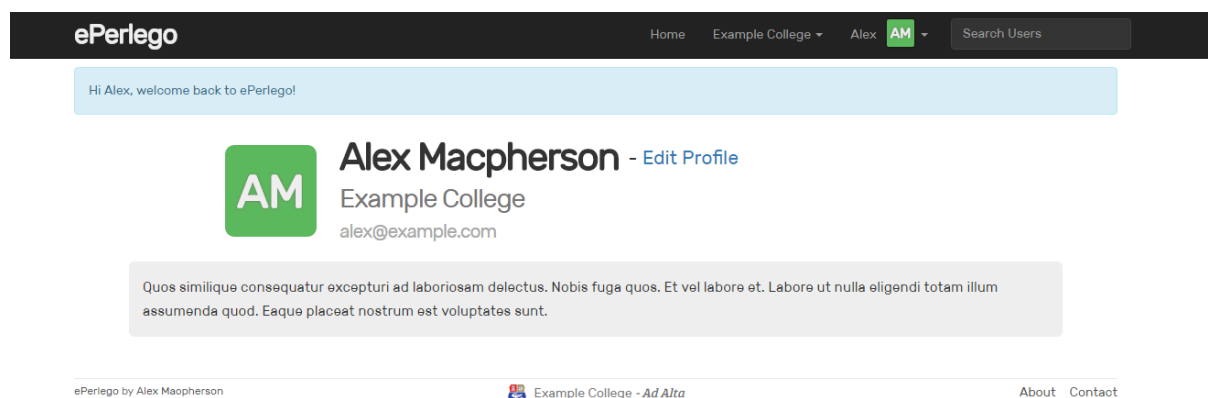


Figure 4: *User Profile* page, as shown immediately following login.

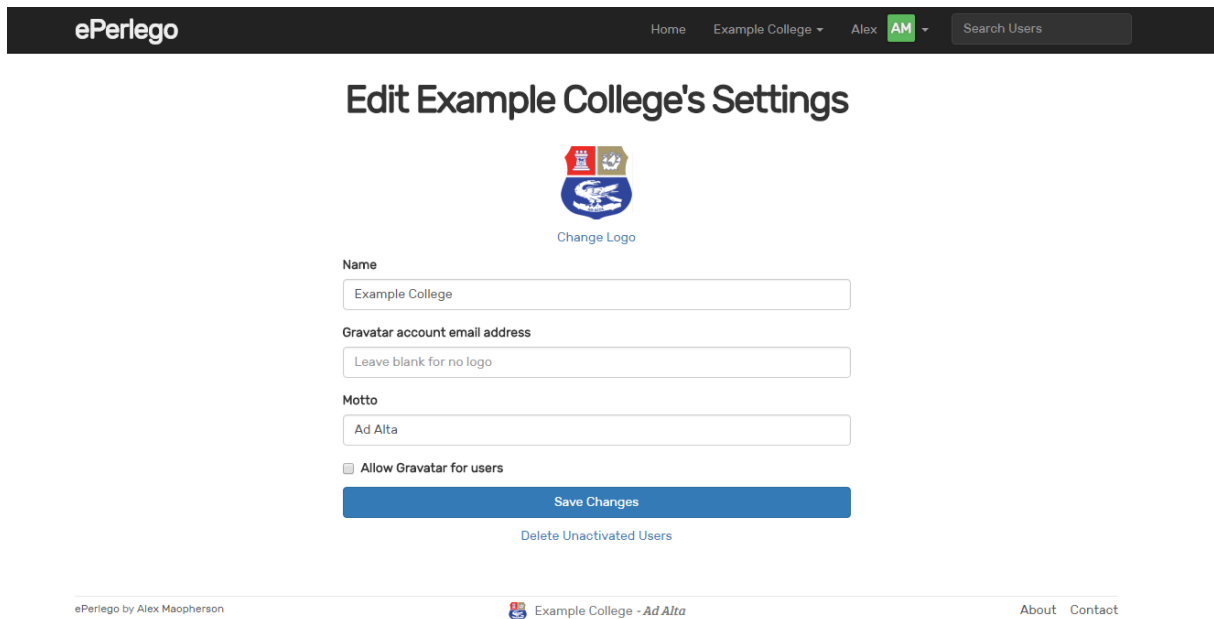


Figure 5: *Edit School Settings* page. *ePerlego* enables schools to allow Gravatar for custom user avatars.

2.4.6 Minimum Viable Product (MVP)

Although completion of the MVP has been delayed by initial setbacks, it remains well within acceptable bounds for fulfilment and is on track to be accomplished in early December.

2.5 Testing

2.5.1 Test-Driven Development (TDD)

Differing from that stated in the project specification (See Appendix 1, Section 4), *ePerlego* follows a TDD software development methodology. Following similar development cycles to RAD (Rapid Application Development) - the originally specified methodology - which allow for the adaptability and flexibility of requirements, TDD differs in that it uses these requirements to generate specific test cases prior to coding any new functionality. The new features must then pass the predefined test cases before they are committed to a new system version. TDD helps to ensure features which are broken or written with bugs do not enter live builds of the system, as well as enforcing that functionality added to the system are not superfluous and are relevant to its requirements. Ruby on Rails makes this a relatively simple process, allowing unit tests to be written and run very succinctly within a test environment.

2.5.2 User Testing

So far, only basic and informal user testing from the developer's peers has been undertaken, testing early functionality for flaws and improvements. This is in-line with the

timeline defined in the Project Specification (See Appendix 1, Section 5.5), with the majority of user testing scheduled to take place throughout the second term.

Noteworthy feedback from prior user tests:

- Requirement for more than the previously defined user-types (*Student, Teacher, Parent, Governor*) - new user-types include *Administration Staff, Support Staff & Managing Staff* (ie. Headmasters and Deputies).
- Need for bulk addition/deletion of users by schools; current system is highly superfluous and laborious, submitting a single form per user - some schools have thousands of users!

2.6 Version Control & Deployment

As per the outline of the specification, Git has been used as a VCS (Version Control System), enabling a version roll-back in the instance the current development build becomes irreparable, and also preventing errors arising from unstable version development. Having an online repository of code significantly lowers the risk of data loss should the developer's laptop cease to function.

On the subject of deployment, it quickly became apparent that hosting a system developed in Rails on a GoDaddy server, as was planned (See Appendix 1, Section 6), is an extremely difficult and convoluted feat. Following a discussion with the academic supervisor of the project, which detailed Heroku and AWS (Amazon Web Services) as ideal deployment platforms, Heroku was selected for its generous affordances to *'free tier users'* - as an unfunded student project, this was important - and its simple CLI (Command Line Integration), making it a very easy platform to deploy to through Git.

On the local development machine, RubyMine can easily instantiate a local server, allowing for quick and seamless viewing of the development branch in real time. Branches are only pushed to the production environment (Heroku) if they are confirmed to be stable, meaning the live version is generally a number of versions behind that which is being developed.

2.7 Ethical Consent

With user testing due to commence fully next term, it was important to submit a request for ethical consent to the BSREC (Biomedical and Scientific Research Ethics Committee) as early as possible. Though the proposal and protocol took longer to create than intended, being a much more extensive document than initially realised, the request has been submitted following the approval of the academic supervisor and the secondary marker.

3 Project Management

3.1 Time Management

Regular meetings, every Monday afternoon, with the project's academic supervisor have helped to keep progression largely on track. It had been intended for Wednesday every week to be the '*project development day*', as, in most cases, there were no further commitments or activities to attend at university. For the most part, this was successful, allowing a significant portion of time each week to be devoted to research, learning and, more recently, development. Where time and deadlines permit, additional evenings and weekends were also set aside for development to progress and difficulties to be overcome within acceptable bounds - when learning Rails took longer than anticipated, for example - though, as the term nears its end and deadlines begin to loom, this has become increasingly difficult to maintain. Nonetheless, time has been well-managed this term, and will continue to be through the course of the next term. It is intended for significant portions of the Christmas break to be set aside for project work also, allowing development to get back on track prior to the start of the second term.

3.2 Evaluation of Progress

Though the system is not at the point in development it was intended to have reached by this point in time, with the MVP planned for completion by November 20th, progress has maintained a steady pace through the term, with difficulties and unexpected workloads handled effectively, albeit causing some minor delay. With the Christmas break already defined as a catch-up period, set aside to allow development to reach the required point for user testing to begin in the second term following the completion of the MVP, as outlined by the specification (See Appendix 1, Section 5.5), it can be confidently asserted that the system progression is on track.

3.3 Difficulties Encountered

Though few difficulties and hindrances have been met, those experienced have significantly delayed the tasks to which they pertain:

1. At the start of term, learning Ruby and Rails took far longer than anticipated, not solely for the sheer amount of content to learn for both the language and the framework. Rails, in particular, requires a very different process of coding to frameworks utilised prior to this project, with a sound understanding of how the MVC functions within the context of a web-application taking some time to form. Though the principle changes enforced by Ruby on Rails (*Don't Repeat Yourself* and *Convention over Coding*) will significantly aid development in the long term, the process of recalibration to code in this manner put a significant delay on all subsequent tasks, with implementation commencing over two weeks later than planned.
2. The documents required to attain ethical consent (See Appendix 2) were also far more extensive than originally realised, taking a significant amount of time to create

to the necessary standard and to ensure the user testing of the project is to be undertaken in an ethically sound manner.

In spite of the delays effected by the above, development remains on track within the acceptable bounds, with completion of the MVP intended for early December.

3.4 Revised Risk Assessment

Since writing the project specification, the identified risks have changed somewhat; these changes are shown in the below matrix. Each risk is accompanied by its respective severity and likelihood of occurrence, as well as the mitigating action to be taken should it transpire, allowing development to continue largely unhindered.

Risk	Severity	Likelihood	Mitigating Action
Developer falls ill.	Low	10%	Continue any work possible without further risk to health.
MVP has not been delivered on time.	Moderate	100%	Devote significant period of time over Christmas break to deliver ASAP.
BSREC ethical approval is not returned by January, delaying user-testing.	Moderate	5%	Complete initial user tests on peers until approval is granted.
Ethical consent rejected by BSREC.	High	1%	Complete user testing on similarly-aged peers rather than children - less effective, but still user testing.
Heroku deployment platform unavailable during testing period.	High	0.01%	Migrate deployment platform to AWS.

3.5 Upcoming Schedule

Currently, the immediate focus of development is completing the implementation of the back-end in order to deliver the MVP as soon as possible. With the term drawing to a close and the Christmas break rapidly approaching, it can be confidently asserted that the MVP will be delivered by January at the very latest, allowing user testing and system evolution to proceed as planned through the second term (See Appendix 1, Section 5.7). Of note is that the project's ethical consent is still pending approval; should this not be received by January, user testing will be unavoidably delayed, though actions will be taken to mitigate against this, as detailed above.

4 References

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5 Appendices

5.1 Project Specification

Please refer to *A Social VLE to Promote Student Performance: Specification*.

5.2 Ethical Consent Protocol/Proposal

A Social VLE to Promote Student Performance: Protocol/Proposal

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1 Lay Summary

This project entails the development and user test driven evolution of a web-based VLE (Virtual Learning Environment) software, serving primarily as a student performance tracking tool to promote achievement and parental involvement in schools, employing strong UI (User Interface) design and thorough but intuitive data representation techniques to aid targeted learning across a multitude of modules. The software will incorporate a number of other features, including direct messaging between teachers, students and parents, timetables and event calendars, and homework tracking and submission, ultimately aiming to provide an unparalleled academic companion tool of significant educational benefit, applying feedback from user tests to ensure such.

2 Background

Through numerous studies, it has been consistently found that parental involvement in a student's education significantly improves their performance at school[1][2], yet the modern school system seldom invites such further than termly parent-teacher meetings and student report cards. Further to this, report cards rarely go into more detail than an 'expected' and an 'on-target-for' grade[3], poorly representing the many multi-faceted subjects pupils study. Where a report may state a student is achieving an average grade in Computing, for example, they may actually be scoring highly in more-practical programming modules but struggling with those that are more theoretical. This highlights the importance of data representation with regard to student performance through the course of their modules, allowing more targeted learning and focused revision to aid and improve their studies. Currently, this seldom extends further than a student manually tracking how well they perform across numerous tests and pieces of homework[4] - information which is very easily misplaced or forgotten. Though numerous virtual learning tools exist to this end, few manage to wholly encapsulate the range of other requirements posed by all members of the school body - from students to parents, teachers to governors - in a manner best applicable to each party.

3 Technical Objectives

The application itself has a number of technical objectives it will aim to meet; those which are critical to development are considered primary objectives, where secondary objectives reflect areas which will be expanded upon should time allow.

3.1 Primary Objectives

- A browser-based web-application, compliant to all standards defined by HTML5 and CSS3. The application will support Chrome v49+, Safari v9+, IE v11+, Firefox v38+. Older browser versions may work but support will not be guaranteed.
- Intuitive and clean UI design for ease of navigation through the application and simple interfacing between parents, pupils and teachers.

- Easily understood representation of large datasets, reflecting a student's performance in a given module over time.
- Data will have numerous possible mappings, allowing different views of the same set of points (for example, one view of a single student's scores mapped against their expected grades, and another of the scores of all students in a class mapped against one another).
- Class timetable and event calendar for students and teachers.
- Homework setting, tracking, submitting and grading tool, allowing students and teachers to easily see what work is outstanding.
- Direct & instant messaging between students/parents and teachers, with all parties having their own profile pages, listing contact details and other necessary information.

3.2 Secondary Objectives

- The web-app will incorporate responsive web design, supporting mobile browsers by decomposing gracefully with size.
- Timetable and calendar will be exportable to PDF and to mobile calendar apps (eg. Google Calendar).
- Whole school overview, mapping large amounts of data at once in a fast and clear manner (for example, the spread of results across a whole student body over a number of years).
- The interface will incorporate additional functionality to improve accessibility for users of all abilities.

4 Research Objectives

- Research undertaken during development will generate user feedback from members of the target audience for current software versions.
- Feedback will focus on the benefits of new features and methods of data representation, highlighting how they can be improved.
- User-testing will allow the system to evolve through the latter stages of development, resulting in a system which is as useful and applicable to its future users as possible.
- User testing sessions are intended to be carried out with the release of each system version - generally between one and three weeks apart.

5 Software Development Methodology

The development of this application can be divided into a number of smaller subsections, covered in more detail below, each of which will employ a UTD/RAD (User-Test Driven/Rapid Application Development)[5] methodology. Unlike a waterfall model, which requires strictly defined plans for implementation prior to coding, RAD allows for the adaptability and flexibility of specified requirements. This is particularly important for the UI and data representation portions of this project, which may be significantly altered late in development according to user testing and feedback (UTD). RAD accommodates this by using prototyping in addition to design specifications, allowing frequent user involvement to better refine the application throughout its development.

6 Research Methodology

As per the UTD (User-Test Driven) development methodology, research and feedback gathered throughout the project will be largely qualitative, retrospectively assessing how features of the current system version perform and how they might be improved, as well as how data pertaining to a student's/class's performance may be better represented to improve its utility to the intended user.

User testing will consist mostly of Observational Evaluation, where a test subject will be given a predetermined list of tasks to complete while using the system as the researcher observes quietly, asking questions and, if necessary, prompting the user on how to continue. This will allow the gauging of how usable the system is and how intuitive it is for new users, noting areas which seem difficult or unintuitive as sources of error which may be rectified in later software versions. A sample outline of an Observational Evaluation test can be found below.[11.1] Testing will also incorporate the TAP (Think Aloud Protocol), where users vocalise their thought processes whilst interacting with the system to better understand what difficulties they may face. Short surveys will also be undertaken upon completion of the Observational Evaluation tests, allowing users to outline their thoughts and suggestions for the system as well as noting how likely they would be to use the system on a day-to-day basis as an academic companion tool.

Each system version will be tested on a number of identified user-groups from the target audience:

- Students (GCSE) - 10* per version
- Students (A-Level) - 10* per version
- Teachers - 5* per version
- Parents - 5* per version

(*User-group sizes are intended values and may change subject to availability. Sample sizes reflect a need to identify key areas of error or fault without testing superfluously.)

Participants will be selected at random from participating schools and are not intended to test more than one version of the system, allowing each study to reflect the impressions of new users. Each participant will be required to sign a consent form (or, in the case of students, have the form signed by a parent/guardian) prior to their involvement and are welcome to withdraw from the testing process at any point, should they wish.

7 Ethical Considerations

As a software intended for schools, the majority of user-tests require the involvement of young students and children. As per university regulations, measures must be taken to ensure all research undertaken is done so in an ethical manner, with the nature of the study reflecting this.

7.1 Informed Consent

A PIL (Participant Information Leaflet) will be supplied to all potential test-users to be read prior to giving consent. A copy of this can be found below[11.3], and details in short what the system is being built to achieve, how user-testing will improve the overall usability and utility of the tool and what participants will be expected to perform during the study. Upon reading this, participants will be required to sign a consent form[11.4] - or, in the case of younger students and children, have it signed by a responsible parent/guardian - to confirm their willingness to participate in the testing.

7.2 Participant Confidentiality

Participant information will be entirely confidential during the study, with no sensitive disclosures required. Users will not be entering any personal information during the Observational Evaluation and will instead be interacting with the UI (User Interface) using sample information, which will be supplied.

Anonymous surveys are to be completed following the Observational Evaluation detailing the participants thoughts on the areas of the system tested, noting features which felt defective or illogical as well as suggestions for improvements. The survey will ask for the age group of the user if they are a student (GCSE/A-Level) to allow more targeted features and fixes. No other personal information will be taken, but the record of the Observational Evaluation and the surveys will be filed as a single test record. A sample survey can be found below.[11.2]

7.3 Data Security

Though no personal information is taken or stored from the study, measures will be taken to ensure any data gathered during tests will be handled in accordance with the Data Protection Act (1998).[6] Physical copies of surveys will be kept in a locked drawer at the Department of Computer Science, University of Warwick, and no electronic copies will be made. Test records will be kept for no longer than 20 weeks, being destroyed upon the termination of the project (on or by May 1st 2017).

7.4 Right of Withdrawal

All participants have the right to withdraw from the study at any point during the tests and their records will be voided upon doing so and destroyed at the earliest opportunity. Once the tests are complete, however, participants will be unable to withdraw the data gathered in their study due to its anonymity - this will be made clear in the PIL (Participant Information Leaflet).

7.5 Benefits & Risks

Schools participating in the study should expect to be contacted upon completion of the final report and system version, allowing them to see how their role in user-testing the software directly impacted the design and development, should they so wish. In the instance the project extends beyond the current scope, these schools will also likely be the first point of contact for any future testing and release of the system, allowing them to utilise it at its full extent.

The research and development of this project incur no noteworthy risks to participants.

8 Financing

The project and all entailing research will be entirely self-financed, with the University of Warwick as the sponsoring organisation.

9 Dissemination and Implementation

As previously discussed, all user feedback and impressions from Observational Evaluation and survey data will be used to further develop different facets of the system to improve usability and utility to all future users.

10 References

- [1] S. R. Hara and D. J. Burke, "Parent involvement: The key to improved student achievement," *The School Community Journal*, vol. 8, no. 9-19, 1998.
- [2] N. E. Hill and S. A. Craft, "Parent-school involvement and school performance: Mediated pathways among socioeconomically comparable african american and euro-american families," *Journal of Educational Psychology*, vol. 95, no. 74-83, 2003.
- [3] *Understanding Grades/Levels and Reports*. William Farr C of E Comprehensive School. <http://www.williamfarr.lincs.sch.uk/information/understanding-gradeslevels-and-reports>.
- [4] *How do students find out how well they are doing?* St Saviour's & St Olave's School. <http://www2.sso.southwark.sch.uk/page/?pid=209>.

- [5] J. Martin, *Rapid Application Development*. Macmillan, 1991.
- [6] *Data Protection Act 1998*. Office of Public Sector Information.
<http://www.legislation.gov.uk/ukpga/1998/29/contents>.

10 Appendices

10.1 Sample Observational Evaluation Outline

Don't forget to **think aloud** while completing each of the following tasks, vocalising your thoughts and what you expect to happen as you use the system. Take your time, this isn't a race. If at any point you get stuck, please notify the researcher to be prompted on how to continue.

1. Login to the system using the username: testuser001, and the password: passWord01.
2. Navigate to "Profile" and update your bio.
3. Navigate to "Homework" and identify what your upcoming deadlines are.
4. Find the feedback from the latest "Chemistry Class Test" and mark it as "Read".
5. Navigate to your "Chemistry" module page and note how well you performed in your last class test compared to those prior.
6. Change the view to see how well you performed compared to the rest of your class. What ways would you find most useful to view this information?
7. Find the profile of your "Chemistry Teacher" and send them a message.
8. Navigate to your timetable and see what lesson you have next.
9. Change the view to see what lessons you have next week.
10. Search for your "Chemistry Teacher" and see if they have replied to your message.
11. Finally, logout of the system.

Thank you for participating in this Observational Evaluation - it would be much appreciated if you would now complete a short survey detailing your thoughts, suggestions and feedback on the system you have just sampled.

10.2 Sample Survey

Thank you for taking the time to complete this short survey. **Please mark below whether you are a Student, Teacher or Parent.**

- Student (GCSE) -
- Student (A-Level) -
- Teacher -
- Parent -

What were your overall impressions of the system?

Were there any areas you felt could be improved?

How did the test results graphs make you feel? Did you feel like you were underachieving or performing at the right level?

Do you have any suggestions for additional features you would like to see in a system of this type?

If your school had access to the system, how likely would you be to use it?

- I would use it a lot. -
- I would use it from time to time. -
- I wouldn't use it very often. -
- I wouldn't use it at all. -

Why?

Are there any further comments you wish to make?

Thank you very much for completing this survey and the prior Observational Evaluation, your feedback is greatly appreciated and will help to mould future versions of the system as its development continues. If you are interested in the result of your feedback, your school will be notified upon completion of the project at the beginning of May and will be able to provide you with the final report documenting the development and evolution of the system.

Thank you again for taking the time to participate in this study.

10.3 Participant Information Leaflet

A Social VLE to Promote Student Performance: Participant Information Leaflet

Researcher: Alex Macpherson, Academic Supervisor: Adam Chester

Introduction

You are invited to take part in a study. Before you decide, you need to understand why the study is being done and what it would involve for you. Please take the time to read the following information carefully. Talk to others about the study if you wish.

(Part I tells you the purpose of the study and what will happen to you if you take part. Part II gives you more detailed information about the conduct of the study).

Please ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

Part I

What is the study about?

Over the past few months, we have been developing a web-based academic companion tool (a social virtual learning environment), hosting a number of features including student performance tracking through the course of their modules to allow more targeted revision, homework calendars and submission, lesson and event timetables and much more. You will be tasked with using the system, testing a number of its features and giving us feedback on how helpful and intuitive it is. Our aim is to provide a tool of unparalleled educational benefit, and your feedback will help us to refine and improve the software to make the tool more useful for you, its future users.

Do I have to take part?

It is entirely up to you to decide. We will describe the study and go through this information sheet, which we will give you to keep. If you choose to participate, we will ask you to sign a consent form to confirm that you have agreed to take part (if part of this study is an online or postal question-

naire/survey, by returning a completed questionnaire/survey, you are giving your consent for the information that you have supplied to be used in this study and formal signed consent will not be collected where postal or online questionnaires/surveys are concerned). You will be free to withdraw at any time, without giving a reason and this will not affect you or your circumstances in any way.

What will happen to me if I take part?

During the study, you will be given a list of tasks to complete whilst using the system - things like logging in, navigating to certain pages, submitting homework, checking your results, and so on - as you are observed by the researcher. You will be asked to *'think aloud'*, vocalising your thoughts, what you are expecting to see happen, what parts of the system you find illogical or unusual, as well as any feedback you may have during your time using the system. Upon completion of the aforementioned tasks, you will be asked to complete a short survey to outline your feelings towards certain features and any further comments or remarks you may have.

What are the possible disadvantages, side effects, risks, and/or discomforts of taking part in this study?

As a part of the system is designed to display a student's performance in a module, a number of metrics will be trialled to show this information. It is possible some of these may invoke a strongly negative perception of performance which you may find distressing. Please be aware that the data is fictitious and it is important for us to sample these methods to find not only which ways to show the information are most helpful to you, but also which make you feel most positive. Our aim is to nurture and guide improvement and focused learning, not to simply highlight a weakness in a degrading manner, so your feedback in this field is of utmost importance!

What are the possible benefits of taking part in this study?

Your involvement in this study is paramount to the ongoing development and improvement of the system. We aim to employ all the feedback you give us to make the tool as useful and feature-rich as possible, meeting our aim of providing an academic companion tool of unparalleled educational benefit.

Expenses and payments

Participation in the study is unpaid and no expenses will be covered.

What will happen when the study ends?

On or before the 1st May 2017 when the study concludes, your school will be notified with a copy of the final report, which will detail the contributions you have made to the evolution of the system. Should you wish to read this, please contact the necessary correspondence within your school body.

Will my taking part be kept confidential?

Yes. We will follow strict ethical and legal practice and all information about you will be handled in confidence. Further details are included in Part II.

What if there is a problem?

Any complaint about the way you have been dealt with during the study or any possible harm that you might suffer will be addressed. Detailed information is given in Part II.

This concludes Part I.

If the information in Part I has interested you and you are considering participation, please read the additional information in Part II before making any decision.

Part II

Who is organising and funding the study?

This study, and the entirety of the development project, is an unfunded student project, sponsored by the University of Warwick. It has been organised by Alex Macpherson and is supervised by Adam Chester.

What will happen if I dont want to carry on being part of the study?

Participation in this study is entirely voluntary. Refusal to participate will not affect you in any way. If you decide to take part in the study, you will need to sign a consent form, which states that you have given your consent to participate.

If you agree to participate, you may nevertheless withdraw from the study at any time without affecting you in any way.

You have the right to withdraw from the study completely and decline any further contact by study staff after you withdraw.

Withdrawal from the study will not affect your place on your course or your grades in any way.

What if there is a problem?

This study is covered by the University of Warwicks insurance and indemnity cover. If you have an issue, please contact the Chief Investigator of the study:

Alex Macpherson

A.Macpherson@Warwick.ac.uk

+44 7508 119965

Who should I contact if I wish to make a complaint?

Any complaint about the way you have been dealt with during the study or any possible harm you might have suffered will be addressed. Please address your complaint to the person below, who is a senior University of Warwick official entirely independent of this study:

Director of Delivery Assurance

Registrar's Office

University House

University of Warwick

Coventry
CV4 8UW
Complaints@Warwick.ac.uk
024 7657 4774

Will my taking part be kept confidential?

All surveys and notes taken during observational evaluation are anonymous, requiring only the user-group you fall under - parent, teacher or student (GCSE or A-Level). Although no further personal information is taken or stored from the study, measures will be taken to ensure any data gathered during tests will be handled in accordance with the Data Protection Act (1998). Physical copies of surveys will be kept in a locked drawer at the Department of Computer Science, University of Warwick, and no electronic copies will be made. Test records will be kept for no longer than 20 weeks, being destroyed upon the termination of the project (on or by May 1st 2017).

What will happen to the results of the study?

Your involvement in this study is paramount to the ongoing development and improvement of the system, as we aim to employ all the feedback you give us to make the tool as useful and feature-rich as possible, meeting our aim of providing an academic companion tool of unparalleled educational benefit.

On or before the 1st May 2017 when the study concludes, your school will be notified with a copy of the final report, which will detail the contributions you have made to the evolution of the system. Should you wish to read this, please contact the necessary correspondence within your school body. software improvement, school contacted on completion

Who has reviewed the study?

This study has been reviewed and given favourable opinion by the University of Warwicks Biomedical and Scientific Research Ethics Committee (BSREC): (Insert your BSREC number here (given to you when your study is approved) and include the date on your approval letter from BSREC.)

What if I want more information about the study?

If you have any questions about any aspect of the study, or your participation in it, not answered by this participant information leaflet, please contact:

Alex Macpherson

Chief Investigator

A.Macpherson@Warwick.ac.uk

+44 7508 119965

Adam Chester

Academic Supervisor

A.P.Chester@Warwick.ac.uk

024 7652 8043

Thank you for taking the time to read this participant information leaflet. If you still wish to participate in the study, please fill in the associated consent form.

10.4 Consent Form

A Social VLE to Promote Student Performance: Consent Form

Researcher: Alex Macpherson, Academic Supervisor: Adam Chester

1. I confirm that I have read, in full, the supplied information leaflet, dated 26/10/2016, for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason.
3. I understand that if I withdraw after the completion of the Observational Analysis and anonymous survey, my test records will not be destroyed, being unidentifiable due to the anonymity.
4. I understand that relevant sections of my data collected during the study may be looked at by individuals from The University of Warwick, or from regulatory authorities, where it is relevant to my taking part in this study. I give permission for these individuals to have access to my records.
5. I agree to take part in the above study.

Participant Name:

Date:

Signature:

Parent/Guardian permission is required in the case of young children and students participating in the study.

Parent/Guardian Name:

Date:

Signature: