Student Research Publication

and Discussion Platform

By Haoyu Wang

Student No. 690021357

I certify that all material in this dissertation which is not my work has been identified

Abstract

Research in the Higher Education sector has a large bearing on the success of universities and forms the basis for reputation and rankings which are key to attracting students. However, often when students engage in research as part of their studies it is very isolated and rarely recognized outside of internal assessments. This project proposes to develop a publication platform for student research that will provide a public handle for their research so there is better opportunities for students to share their research and interact with student research from the student community. This report will explore the importance of individual research projects for pedagogy and education, and how student projects can contribute to more knowledge being shared if articles are made publicly available. The report will also explore the impact of digital technologies in education, especially those led by open-access initiatives, to see how these technologies have supported changes and improvements in education. This report concludes with a project specification that describes my proposal for a new system to support publication and interactivity with student research and a framework for evaluating the project.

**1. Introduction**

There are currently 2,532,385 students in higher education [1] and the majority of these students will conduct a dissertation research project as the main contribution for their degree. For example, in Computer Science at the University of Exeter this research project translates to an expectation of 450 hours towards a dissertation project module [2]. Collectively this is an enormous capacity for research and sharing of knowledge although the outputs from the vast majority of student work remain within the academic assessment systems and are not publicly shared. The ability to share information has become easier than ever before, technology is influencing the way we learn, gradually transforming from in-person classrooms to online learning and this has been accelerated by the Covid pandemic in 2019. This paradigm shift in teaching is yet to be realised in the dissertation project modules to enable students to share their work.

Access to data stored online has grown to an astonishing 64.2 zettabytes(1000⁷ bytes in numbers) in 2020 approximately, since 2010 which had 2 zettabytes, that is an increase of almost 96% of data generated[3]. As such, discovering information has become relatively simpler, especially when it comes to research for project-based learning. Project-based learning is an instructional approach that contextualizes learning by presenting learners with problems to solve or products to develop [4]. Individuals or groups can acquire a deeper knowledge through exploration of challenges and problems. University dissertations are a key example of project-based learning. Most of the time, a problem is formed, where students will have to learn individually or collectively as a group to produce a result or conclusion of the area of study. Students spend a lot of time completing their dissertation but most of the time, this is done in isolation and will never be published or shared for others to learn from.

By providing a student research aggregation system, where students can submit research papers and review or interact with each other’s research , students will be able to learn, to criticise, to review, each other’s work and improve their own research skills. The aim of my project is to deliver a web platform, for submission of student research papers or dissertations and enable reviews and comments on the papers, which will improve the usefulness, interactivity, and sharing more knowledge in student research. In this report, I investigate how project-based learning and technology-enhanced learning can improve learning outcomes before evaluating similar projects and applications that already exist in the market. I conclude the report by providing a project specification for a new system that I will build to improve the learning outcomes from student research, suggesting the important criteria that will be used to evaluate the success of the system.

**2. Literature review**

2.1. The importance of technology enhanced(in) learning/research

Technology is continuously becoming more important in our lives, especially in education. From elementary school to doctor level study, technology is making our learning process a lot more convenient. Learning very much involves finding information and researching, which can be challenging for many of us, the time and energy consumed whilst reading through books, articles, searching for information in libraries can be mentally and physically exhausting. By gathering all data and information to one location in a network, it is much convenient and avoids a process involving searching in multiple locations and starting points [5]. Technology has changed the way we seek information, allowing us to digitally access content that is specialised, knowledge compact. There are estimated at least 1200 petabytes of data stored online just by the big four companies Google, Amazon, Microsoft, and Facebook [6].

Technology has also made communication much easier in every aspect of our lives, as well as learning. As Garrison et al.[7] suggested, interactive and collaborative learning experience is vastly improved with the developments in communication technologies compared to previous ways of education. Research[7], suggested that for online learning to be successful, a well-structured and developed supportive learning community is necessary. Using the Internet, it allows interaction for online community, teachers and students interacting in a post, reflecting, and commenting on the key ideas to improve learning and therefore increase a sense of presence from entities involved in the process[8]. A study done by Deng and Yuen[9], suggested a framework for the educational use for blogs, in three major areas, including writing, reading, and commenting on posts. They mentioned that posting online allows for individuals to express feelings that they perhaps wouldn’t have done in a classroom where they may feel shy. There is less interpersonal judgement in an online community, which can help individuals to express and learn through the process. Proven by a study done by Ducate & Lomicka[26], which found that self-expression in blog make learner more technically and linguistically competent and confident. Online learning can be extremely helpful for students, positive increase in learning outcomes can be represented in this research done by Yang[10], experimentation is concluded by subjective and objective based learning outcomes using regression analysis. They have discovered that online presence factor could account for 18.1% of the objective learning outcomes of the online course. Moreover, teaching presence factor could account for 10.2% of the objective learning outcomes, whereas social and cognitive presence could account for 15.8% and 19.7% of the objective learning outcomes. Furthermore, in research by Yang[10], they discovered that teaching, social, and cognitive presences all have a significant result, accounting for 38.5%, 52.6% and 70% of the subjective learning outcomes of the online course. All these data support the idea of online learning having a positive effect on student learning outcomes.

2.2. benefits of online learning and project-based learning

Learning can be done in different ways, and one of the most useful ways of learning is project-based learning. There are many ways of defining project-based learning, but definition by Moss & Van Duzer[4] describe it as ‘an instructional approach that contextualises learning by presenting learners with problems to solve or products to develop’. In this paper by Bell[11], it is suggested that the idea of ‘learning by doing’ benefits the students as a self-driven approach to education, learning responsibly, independently, and disciplinary benefits the person not just in academics but life outside of education. With the ability to stay focused on task, keep self-monitoring and meet the goal will achieve great ambitions in life. One study done by Barron et al. [12] discovered the benefit that students not only understood what they were trying to learn, they have also appeared to direct their learning from this knowledge. Students were able to generate their own questions to guide their scientific enquiries. This is an extremely useful skill to have especially in project base learning, by doing research on your own, students are more likely to have a better self-understanding of the topic, therefore produce better quality research results. By building a collection of individual research that has been done by project-based learning, students can make full use of it, and create even better results on their own projects.

2.3. benefits of open access for journals etc.

Information is everywhere online, but sometimes it isn’t available for everyone. Without the visibility of the work, learning becomes restricted. Open access to literatures means the removal of barriers (include price barriers) from accessing scholarly work[13]. By providing access to research, it will accelerate discovery and provide knowledge to all in the community. Open access leads to increase in visibility, usage, and distribution of scholarly products, this also leads to more citations which can have a positive impact on others. “One of the main values of open access is that they can be used worldwide independently of the system of education and national curricula frameworks”[14][15]Anyone will be able to read and acquire knowledge from anywhere, at any time from others, which can further increase the intellectual value of the community and accelerate growth. Open access has allowed multiplication of data to be used for analysis on the impact of scientific publications, leading the way for new research for academic communications[16]. Another main advantage of open access is the saving on financial cost[17], in this case, benefit of using open access is the availability of data. An example described in[18] , when patients are recruited for a medical research study, necessary skills and equipment are required to analyse the patient’s health and cognitive state, the cost that is needed to carry out the research is only accumulated once thanks to open access, making the sharing of this data particularly important and valuable for further research. It also contributes to the fairness of the society where individuals or parties that do not have the financial resources, human resources, or material resources to gain knowledge.

**3. Similar existing systems**

There are current applications online that contains similar functionalities towards my project. In this section, I will evaluate some of the existing examples, focusing on some of the functional features that may be of help for my project.

3.1. Open Journal System

Open Journal System(OJS) is an open-source solution to submit, edit, manage and publish scholarly journals online[19]. Once downloaded, you can set up your own server, which can be easily operated by authors, reviewers, editors, or publishers. One of the main advantages of OJS is the streamlining of workflow[20] from submission to publishing, it is designed for reducing the time and effort for journal managers without them having to create a platform from scratch. There are 4 stages for workflow: submission, review, copyediting and production, as shown in workflow figure below. This whole system makes facilitating online article submissions very easy. Another key advantage of OJS is in the formal curation of research articles, and management of the peer review process and editorial process. However, OJS journals tend to be most suited to long form technical publications rather than a lightweight system for sharing information and promoting engagement.

图示

描述已自动生成

Figure 1: workflow chart (source: <https://typeset.io/resources/why-use-ojs-for-journal-publishing-management/> )

My project will be designed to host somewhat similar content in that the research papers will be long form reports. Users will also be able to submit articles relatively quickly and easily although they’ll be instantly made available to all other users and will not have a strict peer review system in place compared to OJS. It will instead include a voting system, which any other user can contribute to including supervisors and professors. Votes by supervisors and professors will hold a bigger weight compared to other student votes, the higher votes that each articles have, the better the article will be. This way, it eliminates the complication of peer review and promotes a more lightweight engagement in others’ work. It also promotes critical analysis skill for users. Higher voted articles and papers will get recognized more, which can be used for reference by other students to improve their knowledge.

3.2. Reddit

Reddit is an American social media aggregation and discussion platform, users can share any sort of information to anyone else, ranging from news, to travel, to cooking, to anything. Users can upvote or downvote, which contributes to the visibility of the post, they can also comment on posts, as shown in figure 2. The difference between Reddit and publication system like OJS is that the platform is widely available to anyone on the internet. There is no need to create your own application as it is already provided, and anyone can post anything with no limitations. The benefit of using Reddit is the wide range of information shared by the 430 million users worldwide[21], to keep up to date with the current events and trends. A great feature that Reddit has is subreddits, where posts can be categorized into different sub-sections for the convenience of different interest in people. But Reddit is not specialized for one specific task, unlike my project which focuses on research articles.

图形用户界面, 文本, 应用程序, 电子邮件

描述已自动生成

Figure 2, Reddit front page

For my project, I will be adopting similar methods. Submission by users will be shared to every user on the main feed, but different categories will be available to be selected and narrowed down for individual interest. Articles may include a like and dislike system for readers, which can indicate how good an article is as a reference for other readers, the higher the likes, the better quality of the article. Comments can also be added by users to criticize the article.

3.3. 4chan

4chan is an image-based board where anyone can post comments and share images with anyone else. Boards are divided into different topics, ranging from videogames, photography, to music or culture, as shown in figure 3. One of the unusual features of this website is the fact that users do not need to register or create an account before joining the community. This makes viewing contents very convenient; but it also means that no one holds credibility to anything that is said. The liberation of submitting content is the main benefit of this application. On the other hand, this can be a major problem because unprofessional contents may be uploaded with no drawbacks.

电脑萤幕的截图

描述已自动生成

Figure 3, 4chan Front page(<https://www.4channel.org/> )

4chan allows for attachments with the submission, this is something I will be adopting in my project, due to the fact that my project will have articles included, it will be a lot more convenient for users. My project will most certainly have user login, everyone will hold credibility for their own submitted articles or papers, which can be used for reference in other’s work.

**4. Project specification**

After analysing similar systems, I will introduce my own project specification with some explanation of some requirements for my project in this section. Overall, I am planning on creating this project for students, staff, and members within universities. This is important because university life is very much influenced by social support, self-beliefs and comfort to the environment which correlates to academic persistency. In a study done by Gloria, A. M., & Robinson Kurpius, S. E.[22], each of the factors, social support, self-beliefs, and comfort was investigated, they discovered that by adding social support and university comfort, the change on non-persistence decisions changed by 21% and 11% respectively[22]. These data indicates that both the social support and university comfort predict academic non-persistence, where social support accounts for a larger portion of the variance. Web application involves the relationship between frontend components, such as user interface, and backend components that happens behind the scenes, such as server or database and the way they interact with each other. By providing a good structure for both sides, it provides better web experience for user, which can also attract more users.

4.1. Frontend development

Frontend is the part of website which user interacts directly. In this section, some functions for frontend development will be explained, by dividing into user functionalities, and main system functionalities.

4.1.1. Users

As my project is aimed at a university community, my users will include current students, professors, alumni, and administrators who all have a login to get access.

* All users will be able to vote and comment in a section for each article
* Professors or higher academics will have a more significant input and weight on judging them.
* Presentation and navigation need to be simple and direct, with the need to accommodate the functional aspect of the web application.

These factors are important because interface is what users will be interacting with the most, therefore a major part of user experience will be based on this area.

4.1.2. Main features

I will be implementing the web page using HTML, which provides the structure of the page, and CSS, which manages the visual and aural layout. The main elements are:

* The main feed: where all the academic papers will be posted to, for users to read through
* Viewing research: Files can be downloaded or can be opened as a full text on the webpage
* Area of interest filters: all submissions will be categorised by research field, there will be a section where users can select their area of interest and view research for that field
* Upvote and comments: A space for user interactions that will enable ranking for the articles. Professor votes and comments will have a bigger weight than students. By having a comment section, it invites students to practise more critical analysis, which can be useful when producing their own work.

4.2. Backend development

Frontend will not function without developing the backend system for it. In this section, I will be looking at some backend functional requirements, important segments include the database, to store essential data; selecting the programming language; understanding APIs and servers.

4.2.1. Database

Database is an essential part of web application. There are several types of database management systems such as hierarchical, network, relational, object-oriented, and also NoSQL database. For my database, I will be using a relational database called MySQL due to some of the main benefits it brings. It stores almost all client data information in a system and organise it into an organised form. It is a database where data is mapped to multiple tables, all linked to each other significantly which provides a secure and reliable system, protecting sensitive data such as encrypted password from hackers. It has a high scalability to facilitate increasing amount of data being added to it. MySQL has its own storage architecture, being able to handle any communications from client or application, making it cheaper and more reliable.

4.2.2. Programming language

For my project, I have chosen to program the backend in python. Python is an interpreted general purpose programming language, it is very simple and easy to use, including very extensive libraries to help make coding easier. Python also provides Django, which is a python-based web framework for simpler web development, that may be of use in my project.

4.2.3. APIs

API stands for Application Programming Interface, it is a medium for communication between two computer software, server provides API, client takes it. API takes a request from the client which sends it to the server, and server sends back a response. This communication is done via some demands, such as GET, POST, DELETE… etc. This is majorly important since it enables data transfer between database and backend, for clients on the frontend of the web, linking all three major parts and making a website work. I will be implementing RESTful APIs as it can be developed using any programming language. But RESTful APIs have some constrains that makes it useful[23].

* Uniform interface, same piece of data requested belongs to one URI
* Client server decoupling, client and server application must be completely independent of each other
* Statelessness, each request needs to include all the information necessary for processing
* Cacheability, resources should be cacheable on both server and client side, with the goal of improve performance for client side, while increasing scalability on server side
* Layered system architecture, calls and responses go through different layers
* Code on demand, static resources can often contain executable code, these should only run on demand

With these features, it brings the benefit of scalability, by having the seperation between client and server. It also provides flexibility and portability because of the statelessness feature, it is possible to perform migration. With the seperation of client and server, it makes it easy for developments to take place independently[24].

4.2.4. Server

Web applications needs to be ran on a server, which is essentially a space provided by large service providers to store website’s information[25]. This is important because a web application needs to be running at all times with no interruption. There are several different types of server hosting, such as shared hosting, where different users share the same server environment; VPS hosting, stands for virtual private server, which allows users to use multiple different servers but acting as one; cloud hosting, which allows users to store data on multiple servers that is connected via a network[25]. Reasons why we need hosting for websites are significant, factors such as power outage, internet speed, maintenance, or unstable IP address, can all cause the website to go down. However, by using large hosting companies, all these problems will be solved, as they have the resources to do so. Using cloud hosting is extremely beneficial. It is a fraction of the cost if users were to build their own server since hardware for storage is extremely expensive. One of the main benefits is the scalability of using cloud, with large space provided, users have the ability to increase or decrease in data resources on demand. Maintenance for the cloud will be controlled by server companies with extremely high speed which is convenient for users as well.

**5. Evaluation Criteria**

The project will be evaluated using two approaches:

1. User stories generated from stakeholders
2. Test deployment with real-world users
   1. Quantitative survey
   2. Qualitative focus group (User experience (UX) study)

5.1 User stories

Scenario 1: Mary is a university student who is just about to start her last year study is required to produce a dissertation as her final year project. She is planning to produce a research looking at deep learning. She would like to find some existing examples that will help her get an understanding of the objective. She also needs to find research resources for it.

By creating this web application, I can help her do just what she needs. Similar projects will have been submitted by previous students who have done this area. This student can go on the website, select the area of interest which may be computing, or she can search for the key word ‘deep learning’ and read through the submitted work on the system.

Scenario 2: Steve is a university professor for Computer Science, he has done a lot of research in his area of expertise, artificial intelligence. Most of the research are of extremely high value but he hasn’t had an opportunity for them to be published. He would like to see what other academics think about his work.

My project can let Steve achieve his task. He can submit the research on the website for others within the university community. Academics in the same area, other professors or doctors can comment on the good and bad about his research. Steve can also get some humble opinions from some students and see what they think about the research.

5.2 Test deployment with real-world users focus group

The design of my project is to help academics improve their knowledge and research quality by providing a platform that will make this process easier. I will be attempting to use workshop type approach for users to experiment the finished project because it is essential for application to be tested in real world scenario.

* Users will provide feedbacks on design of the website, whether the website was easy to use, or easy to navigate.
* The functionality of the filter section will be tested by users as well, whether the filter section provides the correct files, can users find the research they need easily.
* It is also important by using real world experiment to understand the extent to which users can be benefited by other academic’s submission, and how much do other pupil’s work affect their own
* To what extent does the comment section help in identifying the quality of the research paper

It is essential that these key areas from real world users are provided, to ensure that all functions are sound.

Summary:

The evaluation is important for getting an overall understanding of user experience, if all the functional requirements are met. It paves the way to improve my project, to determine whether my project is accomplishing what I am trying to achieve, and the impact of it on the learning community.

**6. Conclusion**

University students are often required to produce a sound piece of research-based work or dissertation, which have a valuable academic measure towards the educational community. However, it is most likely to be neglected and remain in the educational system for grading purposes but would have been of enormous help if the knowledge were to be shared with the community. My aim of the project is to produce a web-based aggregation platform, where students can share their valuable work within the university community, for others to learn from. This paper looked at a few benefits that technology brought us, how it has made our learning process a lot easier than before. The effect of project/research-based learning was also reviewed, as this is the main idea of a student dissertation or thesis. The reasons why open access to articles would be beneficial were investigated. This paper also reviewed some of the similar existing systems for article publishing and how they differ from my project but have inspired some ideas.

Throughout the paper, reasons for some functional implementations were described to improve my project, leading to the establishment of my project specification. Some frontend and backend requirements were described, with the project being built on cloud server, it brings benefits including scalability, better performance, easier maintenance, and extremely low cost. MySQL database stores data in an organised form, providing security, along with high scalability, which accommodate for flexible data storage. Frontend requirement is provided for users to have a better experience of using the application.

Reference:

1. who’s studying in HE? 2021

<https://www.hesa.ac.uk/data-and-analysis/students/whos-in-he> (accessed 17/11/2021)

2. Individual literature review and project for Computer Science at University of Exeter,

<https://intranet.exeter.ac.uk/emps/studentinfo/subjects/computerscience/modules/2021/index.php/?moduleCode=ECM3401> (accessed 18/11/2021)

3. Arne Holst, Volume of data/information created, captured, copied, and consumed worldwide from 2010 to 2025, 2021

<https://www.statista.com/statistics/871513/worldwide-data-created/> (accessed 18/11/2021)

4. Moss & Van Duzer, Project-Based Learning for Adult English Language Learners, Washington DC: National Center for ESL Literacy Education, 1998

5. Parastatidis S., Viegas, E., Hey, T. Viewpoint A smart cyberinfrastructure for research. Communications of the ACM, 52(12), 33–37, 2009

6. Gareth Mitchell 2021, how much data is on the internet?

<https://www.sciencefocus.com/future-technology/how-much-data-is-on-the-internet/> (accessed 18/11/2021)

7. D.R. Garrison and Z. Akyol, The Internet and Higher Education, 17, pp. 84-89, 2014

8. Jie Chi Yang, Benazir Quadir, Nian-Shing Chen, Qiang Miao, Effects of online presence on learning performance in a blog-based online course, The Internet and Higher Education, Volume 30, Pages 11-20, 2016

9. Deng, L. & Yuen, A. Towards a framework for educational affordances of blogs. Computers & Education, Volume 56, Number 2, February 2011

10. Jie Chi Yang, Benazir Quadir, Nian-Shing Chen, Qiang Miao, Effects of online presence on learning performance in a blog-based online course, The Internet and Higher Education, Volume 30, 2016, Pages 11-20, 2016

11. Stephanie Bell Project-Based Learning for the 21st Century: Skills for the Future, The Clearing House: A Journal of Educational Strategies, Issues and Ideas, 83:2, 39-43, 2010

12. Brigid J.S. Barron , Daniel L. Schwartz , Nancy J. Vye , Allison Moore , Anthony Petrosino , Linda Zech & John D. Bransford, Doing with Understanding: Lessons from Research on Problem- and Project-Based Learning, Journal of the Learning Sciences, 7:3-4, 271-311, 1998

13. Eysenbach G, Citation Advantage of Open Access Articles. PLoS Biol 4(5): e157, 2006

14. Grodecka, K. & Sliwowski, K. Open Educational Resources Mythbusting Guide, 2014

15. Krelja Kurelovic, Elena, International Journal of Research in Education and Science, Advantages and Limitations of Usage of Open Educational Resources in Small Countries, v2 n1 p136-142, 2016

16. Bernal, I. Open access and the changing landscape of research impact indicators: new roles for repositories, Publications, Multidisciplinary Digital Publishing Institute, Vol. 1, No. 2, pp. 56-77 2013

17. Guo, Q., Hall, G., McKinnon, M., Thabane, L., Goeree, R., and Pullenayegum, E. (2012). Setting sample size using cost efficiency in fMRI studies

18. Brakewood, B., and Poldrack, R. A. (2013). The ethics of secondary data analysis: considering the application of Belmont principles to the sharing of neuroimaging data. NeuroImage 82, 671–676.

19. About Open Journal System,

<https://openjournalsystems.com/ojs-3-user-guide/> (accessed 19/11/2021)

20. Dagmara Sidyk & Roksana Zdunek, an introduction to open journal system

<https://cejc.ptks.pl/Blog/An-Introduction-to-Open-Journal-Systems> (accessed 19/11/2021)

21. Brian Dean, Reddit User and Growth Stats, 2021,

<https://backlinko.com/reddit-users> (accessed 20/11/2021)

22. Gloria, A. M., & Robinson Kurpius, S. E. (2001). Influences of self-beliefs, social support, and comfort in the university environment on the academic non-persistence decisions of American Indian undergraduates. Cultural Diversity and Ethnic Minority Psychology, 7(1), 88–102.

23. REST APIs, IBM cloud education, 2021,

<https://www.ibm.com/uk-en/cloud/learn/rest-apis> (accessed 21/11/2021)

24. Advantages of Restful API, 2021,

<https://www.chakray.com/advantages-of-rest-api/> (accessed 21/11/2021)

25. Kevin Wood, Web hosting basics: how web hosting works, 2018

<https://www.hostgator.com/blog/web-hosting-basics-how-web-hosting-works> (accessed 22/11/2021)

26. Ducate, L. C., & Lomicka, L. L. (2008). Adventures in the blogosphere: from blog readers to blog writers. Computer Assisted Language Learning, 21(1), 9–28.