Summer 6-2019

Reviewable - Online review web application for the international English-language market

Aline da Silva Luciano
CCT College Dublin

Adeel Mateen
CCT College Dublin

Fábio Bernardo Silva
CCT College Dublin

APPLIED TECHNOLOGY GROUP PROJECT

•re•view•a•ble•

ONLINE REVIEW WEB APPLICATION FOR THE INTERNATIONAL ENGLISH LANGUAGE MARKET

Aline da Silva Luciano - 2016110
Adeel Mateen - 2016089
Fábio Bernardo Silva - 2016149

Supervisor: Greg South

B.Sc. INFORMATION TECHNOLOGY - COLLEGE OF COMPUTING TECHNOLOGY DUBLIN

ABSTRACT

This report presents the development of an online review web application for the International English Language Market. While in Ireland this industry contributes hugely to the Irish economy, the few regulations on the sector caused a wave of closures from 2014 to 2016.

Several specific aspects of this industry that have contributed to this situation, such as the fact that most hiring student are of non-EEA origin (which includes specific Immigration arrangements for this group) justifies the relevance of an online review tool.
This project discusses alternatives for establishing trust in the sector through validation, while presents concerning topics surrounding the project theme as well such as the General Data Protection Regulation.

Technical development aspects of the application are covered including the relevance of tools and technologies used as well as decisions in the business logic of the system and further refinement of the problem addressed through the use of interviews.

ACKNOWLEDGEMENTS

We would like to express our gratitude to our supervisor Greg South for all the valuable guidance and encouragement in the supervised sessions given throughout this project and for the all the extraordinary lectures delivered through the semesters in our journey at CCT. Thank you very much.

We would like to thank Amilcar Aponte for the help and suggestions during the development of this work and for all the technical support and patience since the labs on the second and third semester. We would also like to extend our thanks to Graham Glanville for the lectures and feedback on this Applied Technology Group Project, to the whole ICT faculty and the staff at CCT as well.

Our most honest thank you to Jéssica dos Santos and Claudia Isadora Fernandes for sharing a little of the beginning of their journey as International English students.

A special thank you for Regulo Antonio Sarmiento for the encouragement and the extremely valuable help with the technical bits in the application development.

We would like to thank our fellow students and colleagues at CCT, with special thanks to Gustavo Henrique and Thiago Silva, a part of CLICK on the second year, for believing in this project and for their valuable contribution to it back then. Also thanks to Luiza Antunes, Hiu Hong Kong and Leandro Crixi for the (sometimes long) days spent at CCT.

We could not have done this without all the love and support of our families and friends through this rollercoaster of a journey. We are extremely thankful for it. We would also like to thank Jamie Smail and Willians Pereira do Nascimento for the support, loving and caring.

CONTENTS

INTRODUCTION

Since its invention, the Internet has become an extremely powerful tool and has radically transformed society at a global level. With its rise, the Internet has also brought to society challenges concerning access, information, security, regulations and also the role of the state and companies in it.

In the areas of information and personal communications, connecting billions of individuals has deeply changed the way we communicate with one another. The growth of user generated content and the rise of social media platforms have empowered users and culminated in what we know today as Web 2.0 with lasting effects in the way that people get informed, communicate, shop and trade. That is not, however, without some trade-offs: things such as fake news, lack of trust and spread of hate speech are part of the current concerns of the digital world we live in today.

With the advent of online shopping, one type of user input has become a crucial tool in the new digital paradigm: the online review. This public form of consumer feedback has quickly become widespread and radically transformed things like online shopping, travelling abroad or even mundane activities like picking a restaurant to eat.

This project will show the development of an online review application focused on the international English language market. This sector as whole (as an extension of the education sector) can hugely benefit from public online customer reviews and this project will focus on the development of the tool from a technical perspective and will also address the decisions about the business logic and conceptual aspects with things like user verification and regulations surrounding data protection as well.

1. PROBLEM DESCRIPTION / INNOVATION AREA

It has been estimated by the British Council that over 1 billion people are English learners worldwide, amongst English as a Foreign Language Speakers and English as a Second Language Speakers (the latter meaning that English is being used everyday) (Beare, 2018). It is believed that English is currently taught in over 100 countries all around the globe (Nordquist, 2017).

The impressive figures show us how massive the International English Language market is. Ireland alone has the highest number of students compared to the population of the country and it is the fifth place globally in numbers of international students: around 125 thousand students from 101 different countries in 2016 (O'Halloran, 2018). This number represents an increase of 11% of student numbers in 2015 and it is estimated that the market is worth €762 million to the Irish economy.

English is, indeed a Global Language and many studies have shown that studying the language offers "benefits to individuals in areas such as communication, cognitive development, cultural development and job opportunities", just to name a few (British Council, 2013). However, taking the situation in Ireland as an example: despite having scored 5th place in the number of international students, it has been recognized that the International English Language Market, is very often "not structured in a way that reflected the immigrations and border control arrangements in the state" (O'Halloran, 2018).

After a two year wave of closures of English schools in the country from 2014 to 2016, there is still very little accreditation and measures in place to protect international students, who were the most affected in such closures (O'Donoghue, 2016).

Because of the nature of the industry, whose customers are likely to be living abroad when selecting and booking a seat in a course, students have to pay upfront fees to access courses, and in this way the country. Research becomes a crucial tool for selecting a reliable institution to trust your money to when you are paying for services abroad. The risk is much higher and everything counts to make an informed decision.

Another aspect of the problem presents once students are already in the programme at the institution they have chosen. Non-EEA (European Economic Area) students are obliged to register with the immigration authorities if enrolled in a course or programme longer than 90 days. As part as the student's obligation with the country their attendance to the course is directly linked to their visa status.

Therefore, if a student is unsatisfied with the course they are sitting (a common duration in Ireland, New Zealand and Australia is 25 weeks or 6 months) he or she can file a complaint to the institution or try and reach official regulating bodies (if existent). In Ireland, leaving the course affects their visa status and it means losing all their investment. Unsatisfied students end up feeling trapped in the school and cannot leave their course and have no one to complain to.

Social media channels, like Facebook, Instagram or Twitter, can be used for complaints as they often are used to. Facebook offers 'Recommendations' (the updated 'Ratings and Reviews'), a system where users can recommend products and services from companies on their Facebook page (Facebook, 2018). A user can say choose between recommending a place or not and add a text review. Facebook informs that the reviews must follow its Community Standards (use of language, privacy, etc) or they can be removed. A business can only report reviews that don't follow the Community Standards to be removed by Facebook.

One problem with social media reviews is that it becomes really easy for businesses to fake positive reviews to cover up negative ones and competitors might also leave negative reviews to affect other players in the industry, making the whole system not reliable, and biased.

To illustrate how powerful this bias can be, in 2017 a reporter from Vice magazine created a spoof restaurant that in seven months rose to the #1 restaurant in London out of over 18.000 other businesses on Tripadvisor, all through the power of fake positive reviews (Butler, 2017). Even tech giant Amazon has been accused of favouring their own products with their new review system, "giving Amazon a big advantage [...] over third-party merchants" (Bloomberg, 2018) showing how bias can also make things unfair.

Unlike the hospitality industry or other industries that already have reviewing systems in place to customers, prospective language students trying to assess the reputation of a language institution have the trouble to go through each institution's social media channels one by one. Their decision is then, based on information that can be biased and easily manipulated, for the better or the worse.

2. PROPOSED SOLUTION

The importance of the online review for today's business is crucial. Some studies have shown that over 85% consumers would trust online reviews as much as personal recommendations (BrightLocal, 2018).

There are already several online platforms that offer reviews and rating of businesses, products and services. Yelp for businesses in general, Amazon for products, TripAdvisor for hospitality and Angie's List for service providers, to just name a few. In Ireland, for example, there is a platform where tenants rate the houses they are living in and topics like "communication with the landlord". The platform was created to "help people make educated decisions on where they choose to call home" (DwellDown, 2018). The social media giant Facebook also plays a part in the review and rating world with its system and Google has also associated reviews with businesses in their systems across their maps and search results.

However, these platforms and systems are not free of problems. There is an increasing perception of the harms that biased and fake reviews can do to the overall purpose of such systems. Global consulting firm, Gartner, estimates that around 10 to 15% of all online reviews are positive reviews that were paid by the business to promote their offer (Bercovici, 2013). The online review is in a current crisis.

Checking the authenticity of the reviews through verification and validation helps to solve some of this problem, and protects both customers from biased positive reviews and businesses from not-verified negative reviews too (coming from competitors, for example).

A possible solution for the project problem, in the International English Language Market, is to validate student reviews in partnership with the institutions, through a verification process. To protect the transparency of the platform, once a review is received, the reviewed institution will be notified and will be able to approve or deny the review based on the student's identity alone, while the content of the review (positive or negative) will be kept confidential until the reviewer's identity is accepted and the review, then published.

Understanding that this puts a big decision power on what is published or not into the hands of English Schools, the ideal solution in this scenario should also include a means of verification for students whose identities were not confirmed by the English schools. The proposed solution would then notify the student whose identity was not verified by the school and give them the opportunity to provide those running the web application proof of enrolment and identity. The review of this student then, will be posted on the web app, but will be ranked as a different category of review: not reviewed by the institution.

Another possibility contemplated for the system would be allowing students to validate their review with a social media profile, such as facebook, linkedin, or their google account. This possibility wouldn't require any third-party validation with the English school and the reviewer will be notified that a picture and a link to their social media profile will be available to users in the web application. This review would be present in the system with the other reviews presented above and the social media validated review would fall on their own category of

review too. A mixed and more diverse approach to validation could be beneficial to the project. Another possibility discussed it would be having a verified / or unverified review.

The different validations of reviews is vital for the project value and the validity of the reviews on the web application. A review can be validated by the institution alone, by the platform alone, by both school and platform and finally by a social media log in. The position of the review in the system is connected to the ranking it received in terms of validation. A review validated by both the institution and the platform is better highlighted than a review only reviewed by the institution. A review only validated by the platform is placed third in the priority of the reviews from an institution and so on.

The ranking of reviews, as recommended by specialists adds another layer of information to help students to make informed decisions about International English Language Institutions.

3. PROJECT GOALS

The goal of this project is to develop a proof-of-concept of an online review web application to receive reviews of students of international English language schools.

3.1 PROJECT OBJECTIVES

- Develop and document a working prototype of a Single Page Web Application using Node.Js for the backend and React for the frontend, connecting with a Postgres database running on a docker container;

- Research and learn about the relevant topics that relate to the nature of the project such as the universe of online reviews, the recent General Data Protection Regulation and local bodies that regulate this industry in Ireland;

- Produce a plan (included in the Appendix), collaborate as a group, attend to the supervisor meetings and obtain Ethical Approval from the Faculty to do academic research and run interviews with potential users of the application;

4. THE AGILE PRACTICE

The Agile Manifesto (Beck K et al, 2001) is only 68 words long, but since it was first published in 2001, it has encapsulated the desire of software developers to build software in a different way, one that focuses on better collaboration and communication amongst stakeholder over the outdated development methods. The manifesto itself doesn't dictates any practices or methods, but rather principles:

> "Individuals and interactions over processes and tools
> Working software over comprehensive documentation
> Customer collaboration over contract negotiation
> Responding to change over following a plan"

Because the content of the manifesto is not really actionable, the Agile practice, makes use of methods and ideas to put the manifesto into action. Tools like personas, user stories, prototypes, timeboxed meetings, design sprints and methods like Scrum, Kanban or XP are used in the agile practice. The workload is divided in small manageable batches and tests are realised over the different iterations to make sure everyone involved is on the same page and that everyone is following the direction the project is going to.

This project in fact has a hybrid approach of both Agile practices with a waterfall software development life cycle. The team has incorporated Agile into the way of working together such as having timeboxed meetings to produce work and come up with solutions for problems and the iterative nature of the development and implementation of the making of diagrams, the recursive iterations of the database design and the development of the web application code.

After this section in the document, the following sections with the heading SDLC (Software Development Life Cycle) will document the main steps in the development of this proof-of concept: Requirements, Design and Development. Naturally, and as part of the Agile way of working, each step in the life cycle had their own iterations, redefinition of requirements, design and development of what is presented.

One of the Agile tools used in this project so far are personas and problem scenarios. Alex Cowan (2018), a lecturer at University of Virginia that has an Agile Development Specialisation on coursera.com, explains that "Personas are a humanised view of your customer" that will help to contextualise the potential users of the piece of software that is being built. More tools will be necessary as the development of the project advances and will be explained and included here.

4.1 PERSONAS AND PROBLEM SCENARIOS

Personas are used to create a humanised view of users or customers of a product or a service through a hypothesis. All persona data is fictional, but once defined, they can be then validated with the use of interviews and research with users. They are especially useful to understand what is valuable and important to the user (so a solution is not built for a problem that doesn't exist).

Personas are usually built by using a giving a name, and a description that encapsulates how that user behaves in the context of the project. Their problem scenario explain what in this context is a problem for them, and what current alternatives to the software is being built they are using right now.

For the online review platform there were identified three personas, whose needs (explained in the "problem scenario" area) differ. Pedro represents the prospective student that will use the platform to get informed **before** enrolling to an English school and the other two personas, Hiu and Marta, represent students **during and/or after** their educational experience. Hiu and Marta represent, respectively, a satisfied and an unsatisfied student. The full personas (and their problem scenarios and alternatives to problem) can be found in the Appendix.

4.2 USER STORIES

Three user stories that encapsulate the main uses of the application were derived from the personas. Using the structure, "As a", "I want" and "so that" the user stories below were defined.

As a **prospective student** I want **to know how schools are being evaluated before I enroll a course** so that **I can make an informed decision**;

As a **former student** I want **to share my experience with other students** so that **I help future students in their research process**;

As an **English school** I want **to see what students are talking about my school** so that **I can see where my weak spots are and improve my services**.

4.3 INTERVIEWS WITH POTENTIAL USERS

As part of the Agile plan for the project, Interviews were used to validate the user and problem spectrum of the project. After applying and obtaining approval from the faculty, the two interviews happened in the second phase of the development (January to May, 2019). The relating documentation such as the Interview Plan, Consent Form and Ethics Approval Application) is included in the appendix section of this project and the Ethics Approval received by Graham Glanville, Dean of School is in the Annex section in this document.

The team has decided to do qualitative (empirical) interviews instead of more quantitative questionnaire because we would like to focus more in depth in the quality of the answers rather than making generalisations from percentages (such as 80% of respondents agree on something). Also the universe of this research is quite broad, therefore tasks such as finding a sample that would represent the universe of prospective students looking for English course would be really challenging.

Following the supervisor's advice on 14/11/2018 and because of the sensitivity of the topic regarding existing businesses, we have decided to NOT interview students and former students from English schools in Dublin and would then focus on the "Pedro", the persona who represents someone looking for courses right now (and who hasn't had any experience or is / has been associated with any schools. Therefore, the interview questions given in the appendix for existing students, will no longer be used.

The following paragraphs will present the main findings of the research for Jéssica and Claudia. The full transcribed and translated interviews can be found in the Appendix.

Jéssica explains how difficult and risky hiring overseas courses online and how much suggestions and personal recommendations are important in this context: "... I don't know what to look for. It is a shot in the dark, suggestions really matter..." and told us how the comments play a big role in her research: "I wouldn't jump into a conclusion based on my judgement alone, I'd check comments first".

When asked where she would see those comments she says: "On facebook, on the school social media pages, facebook groups too...". When asked how she would judge if a school was good or not she responded: "In fact, the only way I found to measure this was looking for comments and testimonials from former students or someone who would know the school and could share their thoughts. Because the school itself can advertise they are excellent, or the agency even, but you can't trust this alone, people who have been to the school know better. I think it is the only reference one can have".

Asked about her opinion on how trustful online reviews can be, she responded: "First of all, I like to check if the person mentions certain attributes, like if they mention something about the teachers or the school's method for example and not just a rant. And secondly if there's more people that share those opinions too: there can be two completely different comments but they will share some things in common about a teacher, or something like this. So then I'd make an average of the positive versus the negative comments because there will always be negative comments".

This response gave the project the validation for the school page, where both qualitative data is given at the top (number of received reviews, number of reviews approved by school, number of students that recommend that school) and the more qualitative comment in each review that is given, presented at the bottom of the page. Jéssica's response also confirm the persona hypothesis for Pedro, the prospective student who is being very thorough in their research process.

The main findings from Claudia's interview reinforce how bias presents. When asked about her trust on the information found online, Claudia answered "Usually because the comments in an exchange agency's website are only positive you could think they are biased, but comments from people on Facebook are more honest". She expands it by saying: "I don't trust when I see that someone gives a place a 5 stars rating and doesn't explain why, it sounds fake to me", which confirms the need for the comment field that the web application has in the school review form.

From the interviews we also learned that a possible important feature for the future of the application would be implementing a library that would automatically translate the application and its content including each individual review, to assist people researching for English courses that don't yet have a great command of the language. Another point, after seeing the role of social media sites, was to include in the proposed solution social media integration that we then included to be a possibility of identity validation in the leaving of a review process and also integrate with more information from the schools, such as having an integration with the Google Maps API, to present the location of the school.

4. SDLC: PROJECT REQUIREMENTS / ANALYSIS

The main tangible deliverable of the project is an Online Review Web Application for the International English Language market. The list below describe requirements identified for the project. The following two sections of this document (Risk Analysis, Industry Bodies in Ireland and GDPR presents the result of a research done in order to further define the requirements for the design and development phase of the Life Cycle).

A lot of features and requirements specified had to be adjusted in the development of the proof-of-concept to the Minimum Viable Product (MVP). Therefore features, left out in the first version of development could be revisited and included in later releases.

4.1 STUDENT REVIEW

The student review is central to the value of the project, therefore, a questionnaire (a review form) is part of the core delivery of the project proposal. This questionnaire will cover the topics that students will be able to review their institutions by. A sample (draft) questionnaire has been included in the Appendix section of this document. This sample was based in established models of education surveys (like the K-12 used in the USA) from SurveyMonkey (2018).

It has been decided that the course fees will not be assessed due to the fluctuations in price and because each different student might be in a different term, course or duration. Even a perceived fee system (€, €€, €€€) is not interesting: the platform will focus on the quality of institutions, despite of price and also wants to remove itself from the enrolment process and does not want to give schools another channel to market their offers. Therefore the enrolment process will need to happen between the student and school or agency and the system will not take part in registration or sales (like some platforms, do, like skyscanner). It is not a price comparison system.

To improve the users' experience, the questionnaire for the review of the schools will prompt the student to grade the institution using a grading system, mainly made of quantitative topics and at the end give the student the chance to express their views regarding their experience by leaving a comment that will become public (qualitative data). It has been decided that we would use a 5-point Likert scale to evaluate the quantitative data points. According to the SurveyMonkey (2018), the Likert Scale has been quite popular as a "reliable way to measure opinions, perceptions and behaviours", adding more granularity to the feedback received than a binary yes/no kind of questions. The website indicates that their methodologists "recommend 5 scale points for a unipolar scale, and seven scale points if you need to use a bipolar scale" it has been also said that often respondents find it hard to define their own point of view on a scale with more than 7 points. The original questionnaire sample produced (provided in Appendix) had a 5 point rating that went from "Very satisfied"to "Very dissatisfied". Using the ratings from TrustPilot's website review system, we rephrased the questions and later changed ratings to: "Excellent, Good, Average, Poor and Bad".

In the process of leaving a review the identity of the reviewer is requested. The system will forward to the school profile the identity details provided by the reviewer as this is central to the review validation process which is done with the participation of the school.

The system will also provide the system with a very clear and defined conduct code or guidelines, so reviews with things like profanities and names will not be published on the platform.

A list of identified functional requirements used for the the software development side is given in the Appendix II.

The Review Process on the Platform

1. The student leaves a review in the website.

2. The school will be notified that they received a new review. They will not have access to the content of the review, they will only have the choice to accept or reject it based on the student's identity (name, email and date of birth).

3. Once the school accepts the review the student will be notified that their review was published and will be invited to provide proof of enrolment with the platform, meaning their review will be better ranked in the website.

4. If the school does not reply in 72 hours we invite the student to provide the platform a proof of enrollment. Once the documentation is verified the student review will be published in the website but without the school verification icon (at a lower rank).

4.2 RATING OF REVIEWS

Forbes' comment section highlights specific comments according to determined system, where "comments from trusted sources like staff writers and contributors are automatically visible to everyone. Comments from others still appear, but in a minimized form that readers can click to expand" (Bercovici, 2013). The Rating system for the proposed platform could work in a similar way. All the students could be divided in three groups (Gold, Silver and Bronze, for example) and the more verified the student is, the more their review will stand out in the website. For example:

- Student's identity confirmed by the school and by the platform: Gold Rating;
- Student's identity confirmed only by the school: Silver Rating;
- Student's identity confirmed only by the platform: Bronze Rating;
- Student social media log in (no verification, but social media profile is displayed).

4.3 RANKING OF INSTITUTIONS

The platform could also rank all the schools. The ranking could work based on positive and negative reviews in the website but it will also be taking into consideration the amount of times the school did not approve reviews by verified students. This way, the school will not be able to have control over reviews that will influence the website ranking , pressuring them to accept all their legitimate reviews coming from real students.

4.4 WEBSITE ARCHITECTURE (NAVIGATION) REQUIREMENTS

In terms of architecture of the website, all the schools in the system could be presented in a layout where each school is in a box or a card with its general rating and when the user clicks on it, it redirects to a page with the full review points and reviews given to that school with a button inviting current and former students of that school to leave a review. Additionally, the homepage would have an area with an overview of the project and an about and contact page.

4.5 TECHNOLOGY REQUIREMENTS

We had initially contemplated developing the prototype of this project written as a traditional multi-page application in PHP for the backend and pure HTML and CSS files for the frontend, running a local MySQL database in XAMPP, because those were the technologies we were comfortable with in our skills level. However some of those technologies (and their architectures) no longer reflect the way the web is evolving nowadays. According to Stack Overflow's yearly Developer Survey of 2018 (to which over 100.000 respondents sent their answers last year) shows a decline in the use of PHP and a rise in Node.js. (Stack Overflow, 2018).

The rise of Single Page Applications that are consumed in the client side and the way PHP's code relies heavily on the server for each individual request, make PHP not a good option for SPAs. PHP follows the "classical client-server model" making it "much slower as you navigate through a website in comparison to Node.js" (Neagoie, 2018).

Finally, the proof of concept prototype will be a Single Page Application, developed using Node.js and TypeScript for the backend to develop an RESTful JSON formatted API that will be consumed by the frontend of the project. This will connect to a Postgres database running locally in a docker container and it will implement JWT for the token-based authentication. The frontend will use React and JSX, styled with pure CSS3.

4.6 DATABASE REQUIREMENTS

The project is mainly dependent on data input by users and managed by schools and admin, thus making database a core component of our web application. Databases plays a vital role in storing, filtering and displaying of data. According to Chappel (2010) choosing a right database for your business depends on features required for your application. For heavy-duty database application like an e-commerce site or a multiuser database, it is vital to go for one of the most reliable database systems.

Further Chapple (2018) also suggested that before diving into writing a database system it is important to ensure that we have solid understanding of database requirements.

According to Peterson (2002) useful databases require thoughtful design. It is necessary to understand the business needs. This can be achieved by taking interviews and study the current system if available. The interviews we conducted for reviewable app to identify the current problem could also be used with the purpose of defining even further the database requirements. With the help of those interviews we were able to look at users needs and what minimum our web application should achieved.

Following are the requirements we have identified to fulfil our goal to achieve independent platform for verified reviews. A full list of database requirements is given in the Appendix section of the document.

- Reviewable web app allows user to submit reviews about English school they have studied or they are currently studying. Each user has an id, full name, DOB, email, school name, student id. User can post review as anonymous. Student id is optional. Email should be unique.

- User should have an option to post review as anonymous if he/she don't want his/her name to be displayed on web app.

- Each School has an id, name, address, email, contact person name and phone number, username and password. School id will be unique.

- Each school can view user details who have submitted the reviews. Review rating and Comments will be hidden

- Each school can only change verification status in the review table

- Each student can post one review on one school. School can have many reviews from different students.

- Review has review id, school id and student id, faculty rating, facility rating, staff rating, recommendation, review text, date, verification status and post status.

- reviewable review system has different admin users who will assess review content before posting it publicly. Admin users have id, name, email, username and password

- After review has been submitted it will sent to school for verification. If review is verified it will posted on to school review page as verified review. Else if school doesn’t verify nor do not respond 7 days it will posted as unverified. Verified status can only be authorized by school.

- Only Admin Users can post or delete any review.

- Web application will only show those review which are allowed by admin users

5. RISK ANALYSIS

5.1 LEGAL RISK

One of the main risks identified in the project is a legal one: "What if one of the schools try to sue the platform for defamation if someone unjustly leaves a poor review of their business?" No doubt it is an issue that many business owners deal with on a daily basis. They have received good or bad online reviews and they are all there for the world to see. Review websites are taking these experiences seriously nowadays, because these online reviews are the new era word-of-mouth advertising.

Customers' opinions are protected under the Freedom of Speech principle. But a business owner can find a review defaming if the review comes across as incorrect or fake. For example, if a student says that he didn't find the classes good, he cannot be sued. But, if a customer claims that the school is not licensed or that they are not teaching properly, a school could have a case. A fake review that hurts the business in an unfair way is not protected is by the right to free speech. (Akalp, N. 2016)

It is highly advised to reviewers to choose their words carefully before submitting any kind of opinion about a business, taking into account the truth and facts. A law that encompasses the sensitive topic of the project, The USA Communications Decency Act, prevents any lawsuits against websites for publishing third party content. That includes reviews and comments and the condition is as long as the platform does not alter the meaning of someone's original post, they're immune from any libel or defamation suit.

The platforms that receive comments from users could be liable by user generated content, depending on the law of each country. Companies like TripAdvisor have on their terms and conditions on their website (2018):

> "The TripAdvisor Companies take no responsibility and assume no liability for any Content posted, stored, transmitted or uploaded to the Services by you (in the case of your Content) or any third party (in the case of any and all Content more generally), or for any loss or damage thereto, nor are the TripAdvisor Companies liable for any mistakes, defamation, slander, libel, omissions, falsehoods, obscenity, pornography or profanity you may encounter. As a provider of interactive services, TripAdvisor is not liable for any statements, representations or any other Content provided by its users (including you as to your Content) in the websites or any other forum. [...]"

A secondary risk to the success of the project that the platform has is that it depends directly on the reviews of students. If the marketing efforts fail to communicate to students the purpose of the platform, or if students don't find it relevant at all, there is a risk there.

Finally, another risk would be in case the institutions team up and boycott the platform altogether and not take part on it, compromising the delivery of its mission.

5.2 TECHNICAL SECURITY RISK

Initially created to raise awareness and educate about the consequences of web application weaknesses, The Open Web Application Security Project - OWASP Top 10 has become an application security standard that includes recommendations and provides guidance to organisations and professionals.

The 2017 Top 10 Release was sourced from an industry survey with professionals and submissions by organisations that specialise in application security. This new report is a refactored version of the 2013 Top 10 including new security risks (or issues) that are meant to cover the constant change that the architecture and technology of applications are going through. The 2017 report highlights that Single Page Applications (SPAs) powered by JavaScript frameworks (which the report calls the primary language of the web) and the delivery of client-side functionality that was traditionally done by the server brings "its own security challenges" (The OWASP Foundation, 2019).

All security risks from this Top 10 were rated based on the organisation's own risk rating methodology. This methodology defines the standard risk model from the following equation: Risk = Likelihood * Impact (The OWASP Foundation, 2019).

This methodology has a 6 steps model that takes into account several variables to estimate risk. Once a security risk has been identified (step 1), then the likelihood of that security risk being exploited is assessed (step 2). Things like the skill level, motive, opportunity and size of the threat agent are ranked as well as vulnerability factors such as ease of discovery and of exploit, awareness and intrusion detection are assessed.

Factors that estimate impact (step 3) are then assessed. Technical impact factors are loss of confidentiality, integrity, availability and accountability and the business impact factors are the financial damage, reputation damage, non-compliance and privacy violation. Each individual factor are assessed and then calculated.

With that information, the model helps to determine the severity of the risk (step 4). Low likelihood and low impact risks have lower severity than high likelihood and high impact risks. The next step then (step 5), is to decide what to fix (first). Generally the most several risks identified in the previous steps should be fixed first, this model provides a framework that helps professionals and organisations to identify, rate and prioritise action. The final recommendation (step 6) suggests that this model should be customised to suit every different organisations' needs.

Using this methodology, the 2017 Top 10 is then, ordered according to the weaknesses than could introduce the most significant risk to an application. The 2017 report lists at the 10 Web Application Security Risks: Injection, Broken Authentication, Sensitive Data Exposure, XML External Entities (XEE), Broken Access Control, Security Misconfiguration, Cross Site Scripting (XSS), Insecure Deserialisation, Using components with known vulnerabilities and finally Insufficient Logging and Monitoring.

Present in the 2013 Top 10 and still the first risk in the 2017 Top 10 report, we decided to explore further the risks, scenarios, and how to prevent and Injection attack.

Vectors

In the specific case of this web application there motive for the exploitation of a vulnerability is not connected to a financial rewards, however there could be a potential motive coming from an affected institution (an English school) to attack the application. OWASP (2017) Risk Rating methodology suggests the use of the worst-case agent to assess risk, therefore the skill level, size of this group and opportunity all represent a very high risk alone.

The report then ranks the Exploitability of this type of attack of degree 3 (higher risk). Injection flaws allow an attacker to send hostile data an interpreter in the system through an injection vector. The reports explains that basically any source of data can be an injection vector: “environment variables, parameters, external and internal web services and all types of users” (The OWASP Foundation, 2017).

Security Weaknesses

The prevalence rating of Injection flaws is of 2 (out of 3) according to the report, meaning it is common, specially in legacy code. Such flaws are often found in database queries, XML parsers, SMTP headers, expression languages and ORM queries, to name a few.

The detectability of this weakness is of level 3 because those flaws are quite easy to be found when examining code. Attackers could also use tools that make it easier to spot those flaws.

Impacts

Injection attacks’ technical impact is of level three with potential loss of confidentiality, data integrity, availability and accountability. Worst cases may result in data disclosure, denial of access and even complete takeover.

The business impact of an injection attack in the areas of financial and reputation damage, non-compliance and privacy violation, are of the highest kind in an injection attack. For this web application, there could be potential reputation damage and privacy violation for its users (students and former students) and schools.

Following the Risk Rating methodology, the next step then is to determine what needs to be fixed. This way, the main vulnerabilities to an Injection Attack that demand action are given below.

A web application is vulnerable if any of the following factors are true:

- User input is not sanitised;
- Context-aware escaping is not used and calls can be made directly in the interpreter;
- Hostile data can be used directly or concatenated in Object-Relational Mapping, database queries, commands or stored procedures;
- Source code is not reviewed;

- There is no automated testing in place;
- Tools to identify injection flaws are not used.

The given steps would need to be incorporated into a release of the application, to diminish the vulnerabilities and potential for attack.

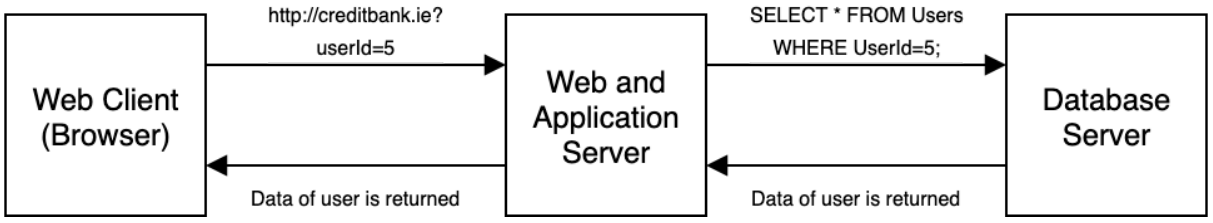
One example of a very simple scenario would be an SQL injection. This kind of attack happens when a web application asks for user input and a threat agent inserts malicious code in their input that will change the meaning of the original piece of code, or in this case, the SQL statement.

Take for example the following code snippet:

```
userInput = getString("userIdField");
query = "SELECT * FROM Users WHERE UserId = " + userInput;
```

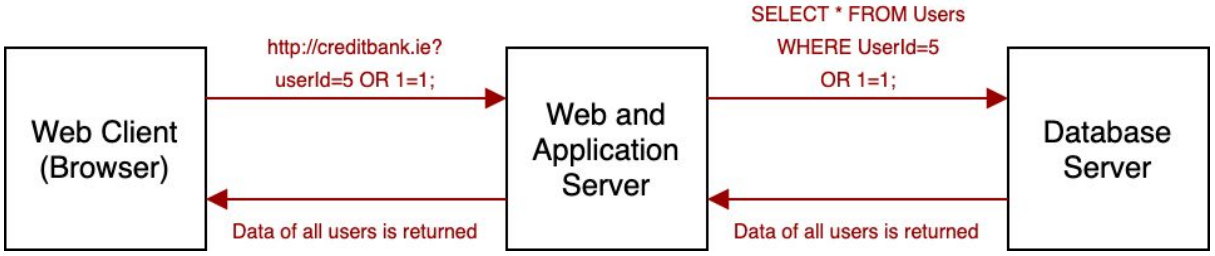
This query is intended to select all users where their id in the database matches with the user input received from the userIdField.

A normal harmless input would make the query look like this:
SELECT * FROM Users WHERE UserID = 5;



However, by simply adding OR 1=1 at the end of their input, an attacker will alter the meaning of the query that will now return all users from the Users table because of the use of 1=1, that is always true combined with the OR operator.

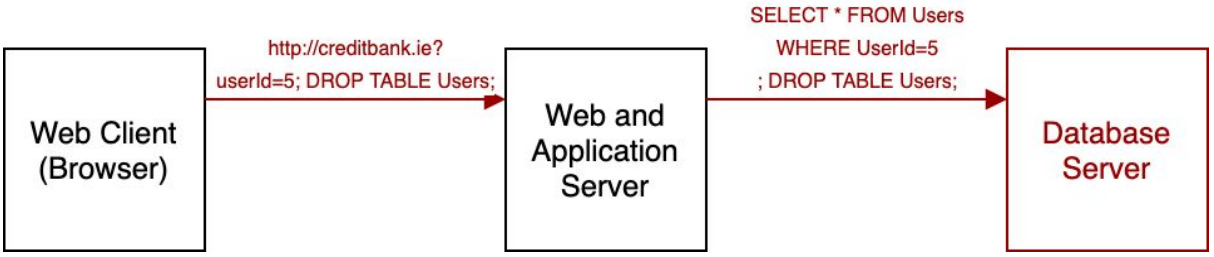
The query, run by the application, now looks like this:
SELECT * FROM Users WHERE UserID = 5 OR 1=1;



This would return all users from the Users table to the attacker.

Another type of SQL injection is possible because of the way most database support batched statements, where two or more statements can grouped together, separated by semicolons. An attacker could maliciously add at the end of their input a semicolon and start a new statement altogether. This kind of attack could permanently destroy data from an organisation;

A malicious query would look like this:
SELECT * FROM Users WHERE UserID = 5; DROP TABLE Users;



For the first SQL injection attack shown in the scenario above, a very simple measure could be done to reduce the harm of such attack. The database administrator could simply make use of the LIMIT clause in the queries in order to prevent the mass disclosure of data should an attack happen.

A strong recommendation from OWASP (2017) is input validation, more specifically, whitelist kind of validation. The Cheat Sheet series from OWASP explains that “it is a common mistake blacklist validation in order to try to detect possibly dangerous characters”(OWASP, 2019). The organisation argues that not only blacklisting is not appropriate for legitimate situations (i.e. the special character apostrophe in “O’Brien” is really part of a name input) and rather defends that whitelist validation is key. In whitelist validation, everything that is authorised as input is clearly defined and by extension, everything that shouldn’t be allowed as well. The developers then should be able to define a “very strong validation pattern” for validating the user input. (OWASP, 2019).

And finally, a very strong recommendation from OWASP to mitigate injection attacks require “keeping data separate from commands and queries” (OWASP, 2017). According to the organisation, the preferred method to do so is to use a safe API to avoid the direct use of the interpreter, to provide a parameterised interface or use Object Relational Mapping (ORM) tools. W3Schools explain that SQL parameters are added at running time in a controlled manner to the SQL query, so the SQL engine checks that the parameters are correct for each column. The passed parameters are then treated literally and not as part of the SQL to be executed (W3Schools, 2019).

6. BODIES GOVERNING ENGLISH LANGUAGE EDUCATION (ELE) SCHOOLS IN IRELAND

In Ireland the International English Schools Market is regulated by these three main bodies (ACELS, ICOS and MEI), with distinct work and responsibilities in the industry. The platform could serve to the interests of these agencies in their mission of assuring the quality of the players in the industry. Therefore, the proof-on-concept could be endorsed by one of those bodies so the schools would feel more inclined to take part in it as well. On an ideal scenario, the platform could be fully included into their accreditation process as well.

6.1 ACELS: ACCREDITATION AND COORDINATION OF LANGUAGE SERVICES

Established in 1969, ACELS is responsible for the development and management a recognition scheme for English language teaching organisations (ELTOs) nationally and used to be a function of the Quality and Qualifications Ireland (QQI).

New schools receive two inspection visits, 10 months apart. If ACELS is satisfied after the second inspection, the school is officially recognised. ACELS will inspect existing schools at least once every three years to make sure that they are adhering to the regulations. While this is normal practice, it has the authority to visit or inspect a school at all reasonable times. According to ACELS website, since a 2015 court ruling, the scheme is no longer permitted to recognise any providers wishing to gain ACELS recognition, but providers already holding a recognition will continue to be monitored by the scheme.

6.2 ICOS: IRISH COUNCIL FOR INTERNATIONAL STUDENTS

Founded in 1970, ICOS ensures that international education policy and practice is quality-driven and remains firmly focused on the educational and social needs of all students. It promotes the rights and welfare of international students who choose Ireland as study destination and supports staff working in English language teaching organisations.

The council offers support and advice on a diversity of issues that international students will encounter from funding, healthcare and social welfare to information on Irish food and weather.

6.3 MEI: MARKETING ENGLISH IN IRELAND

MEI is an industry body, which represents the majority of recognised ELE schools in Ireland. All members of MEI can be defined by the following categories, each of which has a sub-committee made up from members of the association:

- Quality and standards;
- Education and Training;
- Government Liaison;
- Marketing;
- Technology

To become a member of MEI a school must undergo rigorous testing and inspections, and must adhere to a strict protocols that calls on them to maintain the highest standards of professionalism due diligence and care.

7. GDPR

The General Data Protection Regulation (2008) regulates how data about individuals in the EU are processed by companies, organisations and even other individuals, meaning that when an individual processes data that is not for a personal activity in their own home (for example, processing data professionally) GDPR applies.

Because of the nature of the project deals with processing data of individuals in the EU, GDPR rules apply. We have outlined the two topics that concerns to this project the most: processing data and receiving consent to do so. The two topics will be addressed in the following sections.

7.1 PERSONAL DATA COLLECTION AND PROCESSING

As part of our project we will be asking users to input their personal details to submit their review. These details will not only identify the school that review is for but their details will also be used for verification purpose from the specific school which they reviewed. According to the European Commission (2018) data collection and processing is at the heart of the GDPR, but there's no definitive list of what is or isn't personal data, so it all comes down to properly interpreting the GDPR definition as described in Article 4(1):

> "Personal data means any information relating to an identified or identifiable natural person ('data subject'); an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person"

Personal data only includes information relating to natural persons who:

- Can be identified or who are identifiable, directly from the information in question;

  Or

- Can be indirectly identified from that information in combination with other information.

An individual is 'identified' or 'identifiable' if you can distinguish them from other individuals. A name is perhaps the most common means of identifying someone. However whether any potential identifier actually identifies an individual depends on the context. A combination of identifiers may be needed to identify an individual.The GDPR provides a non-exhaustive list of identifiers, including: name, identification number, location data and an online identifier, for example.

Special Category Data or Sensitive Data

Personal data may also include special categories of personal data or criminal conviction and offences data. These are considered to be more sensitive and you may only process them in more limited circumstances.

Special category data is mostly comparable to the concept of sensitive personal data under the 1998 Act. The requirement to identify a specific condition for processing this type of data is also very similar.

One change is that the GDPR includes genetic data and some biometric data in the definition. Another is that it does not include personal data relating to criminal offences and convictions, as there are separate and specific safeguards for this type of data in Article 10.

The conditions for processing special category data under the GDPR in the UK are broadly similar to the Schedule 3 conditions under the 1998 Act for the processing of sensitive personal data.

This is because special category data is more sensitive, and so needs more protection. A list of sensitive data is given below:

- Race or ethnic origin;
- Political opinions;
- Religion or philosophical beliefs
- Trade-union membership;
- Genetic and biometric data (even where used for ID purposes);
- Health related data;
- Sex life or sexual orientation.

In particular, this type of data could create more significant risks to a person's fundamental rights and freedoms. For example, by putting them at risk of unlawful discrimination.

7.2 GDPR CONSENT

The platform operation required students' personal information such as full name, date of birth and email for example to be shared with English schools to verify their identity. According the European Commission (2018), under the GDPR law, when personal information collected is shared it is necessary for this data to be lawfully processed.

According to the Article 6 of GDPR one of the ways to use the data lawfully is to get Consent. Consent is said to lawful when the individual has given clear consent for you to process their personal data for a specific purpose. By making customers feel in control of the data a organisation uses about them, they are more likely to have higher levels of trust in that organisation, being beneficial to businesses as well.

In the case of this project, a mandatory consent checkbox or similar is to be checked before a student submits any review about any college, similar to online shopping websites which will ask customer to agree to terms and condition before they proceed to checkout (as seen in the sample below). The content policy (code of conduct) and the data sharing consent can be found in the Appendix.

▢ I have read and accept the terms and conditions and privacy policy.*

Every review which is submitted must accept the platform's terms and conditions and privacy policy by giving Click the consent voluntarily to process their data for the verification purpose. The platform must also give the right to users to withdraw their details and review from the system if they change their mind for any reason at any time.

Consent Key Features

The European Commission (2018) states that under GDPR consent should meet following requirements:

- It must be freely given;
- Organisations must be able to demonstrate that a subject provided consent;
- Individuals should have the right to withdraw consent at any time.

Definite Consent

The GDPR explains that consent should be given by a clear affirmative act, such as by a written statement, either by electronic means, or an oral statement. There should be no ambiguity when asking for consent, it should always be clear-cut.

Validating Consent

Clear-cut consent alone is not sufficient. In Art. 7(1) of the GDPR, it is required that the data controller must be able to show or prove consent. Article 7(1) states, “The controller shall be able to demonstrate that the data subject has consented to the processing of his or her personal data.” Which makes it necessary for the businesses to maintain consent records that can be produced wherever needed to show that the individual has consented, as well as how it was taken such as through a data capture form, and when the consent took place for example with an online time stamp.

Withdrawable Consent

The GDPR has made provisions for customers who change their minds and want to withdraw their consent at a later date. Article 7(4) of GDPR states “an individual shall have the right to withdraw his or her consent at any time. It shall be as easy to withdraw consent as to give consent”. If an individual wishes to withdraw consent, they must be able to do so whenever they like, and the business must conclude any processing activities it conducted based on that consent.

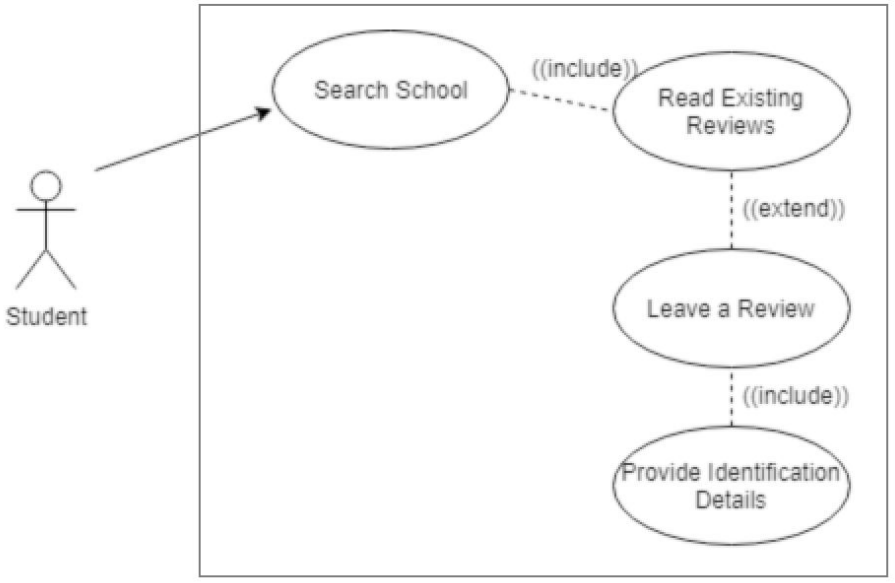
8. SDLC: DESIGN

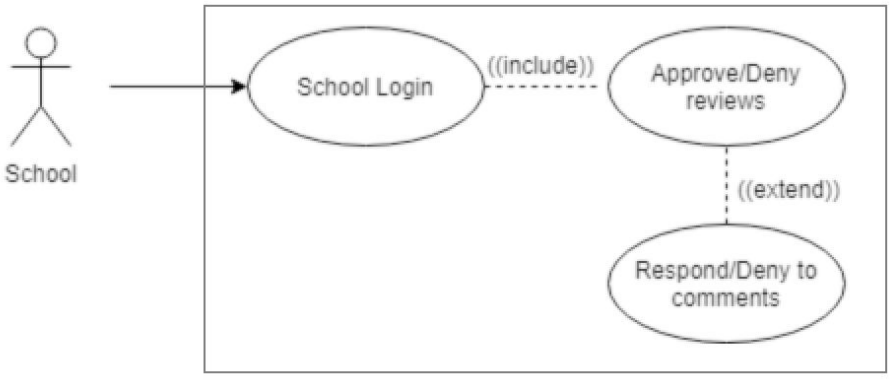
8.1 USE CASE DIAGRAM

The use case diagram documents what the system does from the user's point of view, describing the main functionalities and the interaction that the user has with the system, not going further on it with technical details.

The user is defined as an actor that represents the entity that will interact with the system, in this case will be a student that will “search a school” or “leave a comment”. This diagram gives a narrative document that describe the sequence of events of an actor that use a system to complete a procedure.

According to Britton (2004), a use case diagram models the problem domain graphically in four concepts: the use case, the actor, the relationship link, and the boundary: A use case represent processes; the actor easy to identify, as a administrator, receptionist; the relationship link a line linking an actor to an use case; the boundary is a line drawn round the use case to separate them from the actors and to delineate the area of interest.





8.2 SEQUENCE DIAGRAM

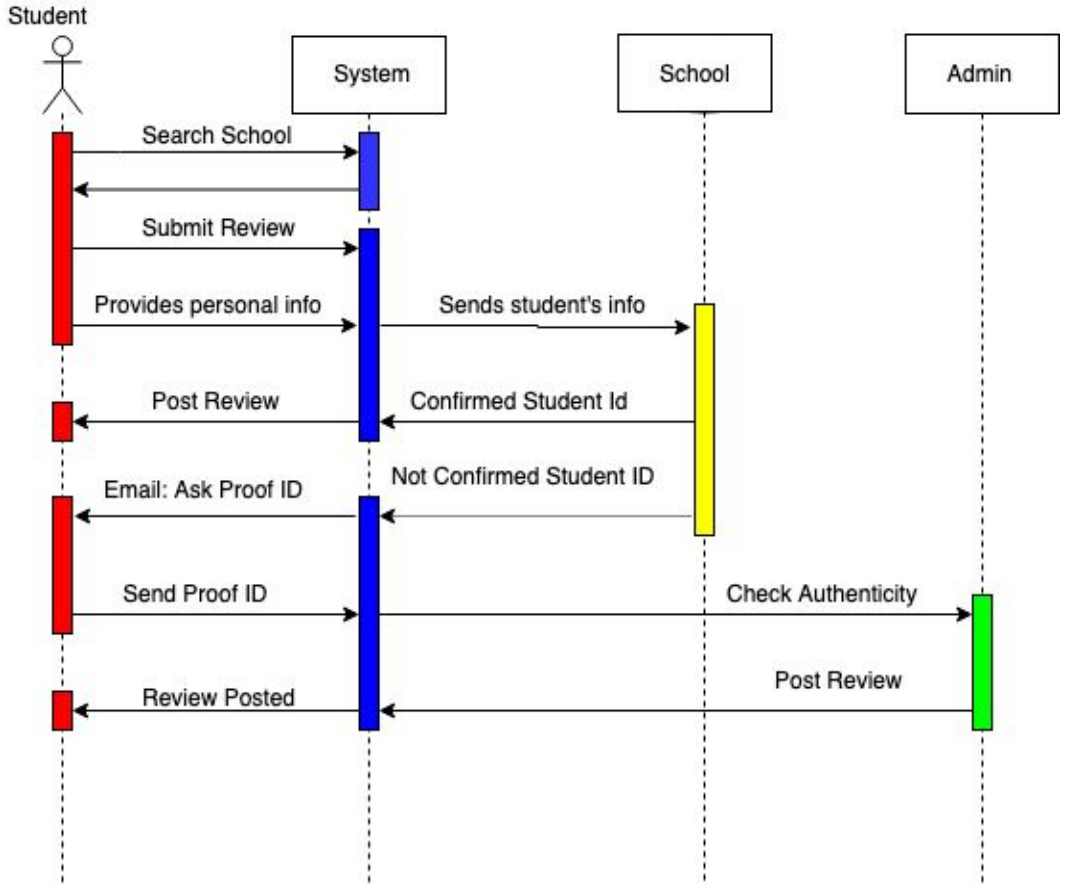
Also known as an interaction diagram, the sequence diagram describes how and which order objects work together to understand the necessities of a new system and document its processes.

Sequence Diagrams are interaction diagrams that detail how operations are carried out. They capture the interaction between objects in the context of a collaboration. Sequence Diagrams are time focus and they show the order of the interaction visually by using the vertical axis of the diagram to represent time what messages are sent and when (Visual Paradigm, 2019).

The benefits of designing this diagram is to template the logic of the process, functions and operations, how components interact with each other to conclude an operation and also for planning and comprehend each part of functionality in future scenarios.

By modelling the flow of logic in the system in a visual manner, it enables to both document and validate the logic and also be used for analysis and design purposes.

Here the diagram illustrates the main operations in the system and how they are processed by each actor: student, the system itself, the English school and the admin / moderator (to whom the application would be built for, i.e. MEI or ACELS, a governmental body that regulates the market and runs the platform).

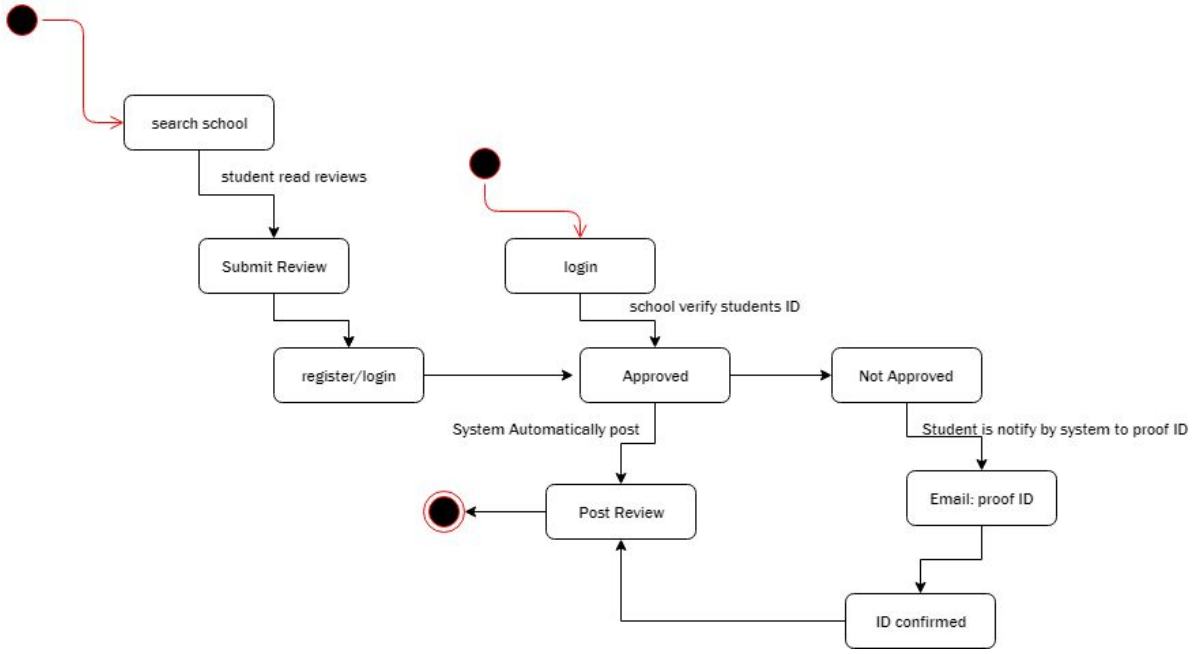


8.3 STATE DIAGRAM

An object has a behavior and a state, the state being the activity being processed. The state diagram shows possible states of the object and the transactions responsible by the changes of this object. According to Britton (2004):

> "The state of the object here refers to the situation it is in while satisfying some condition (such as a bank account having some money) or waiting for an event (such as someone trying to withdraw or deposit money). An event is something that happens which has significance for the systems and affects an object is in a particular state by looking at the values of some of its attributes and its links to other objects."

The diagram below shows the state of the review in the system before being posted.



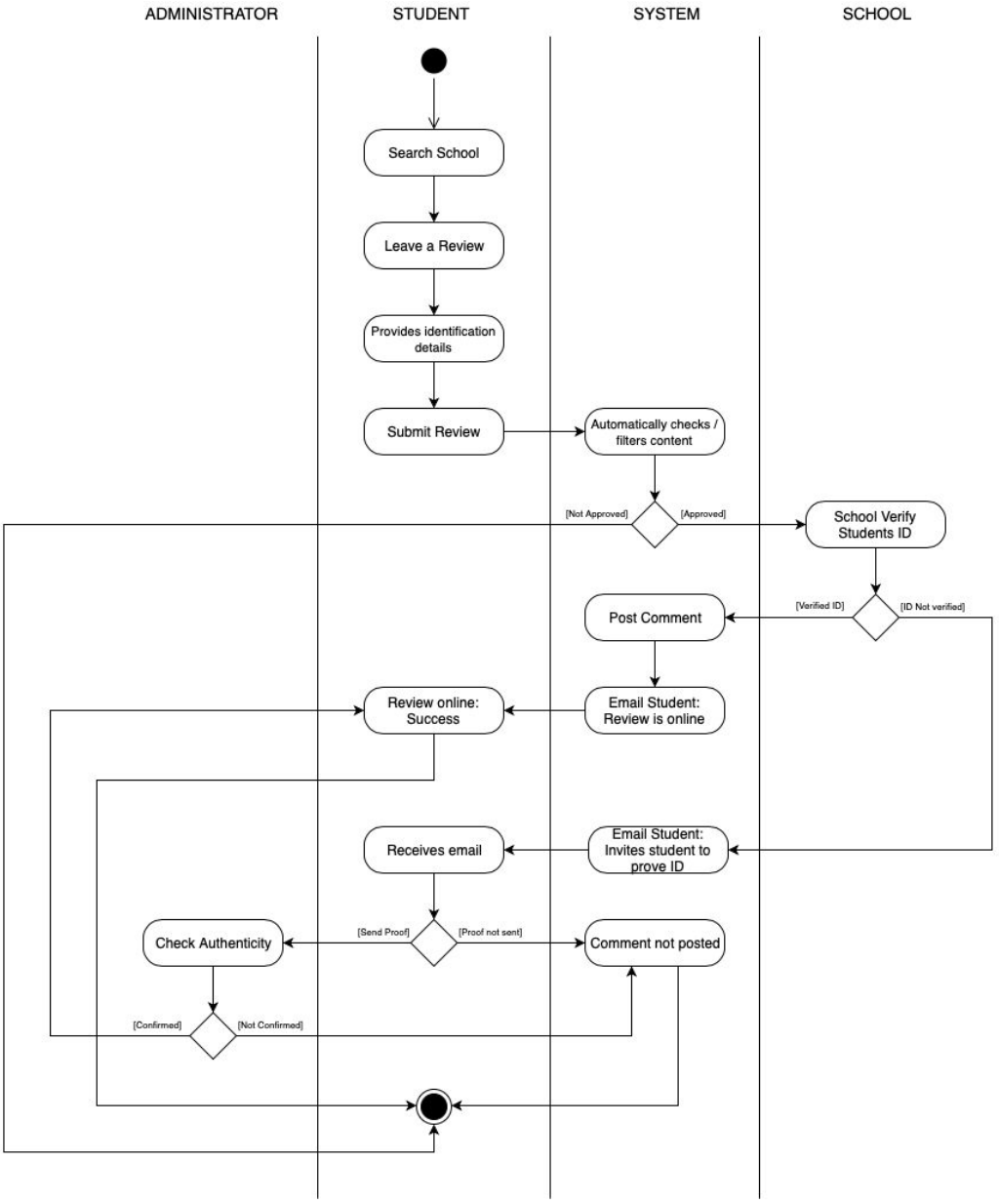
8.4 ACTIVITY DIAGRAM

The activity diagram shows graphically the functionality of a system, how the execution of different parts work.

Activity diagrams can be used to represent sequence, selection, iteration (structures that are found nearly all programs) and they can also illustrate where different activities can be carried out in parallel (Britton, 2004)

The main achievement of this diagram is to specify the system's behavior in the functional aspect, with the functionalities of the system. It presents itself similarly to a flowchart tool that is used in business.

This diagram has a very close level of abstraction about how the business side of the system will work, as it is ideal to specify all tools and will be understood for professionals and users.

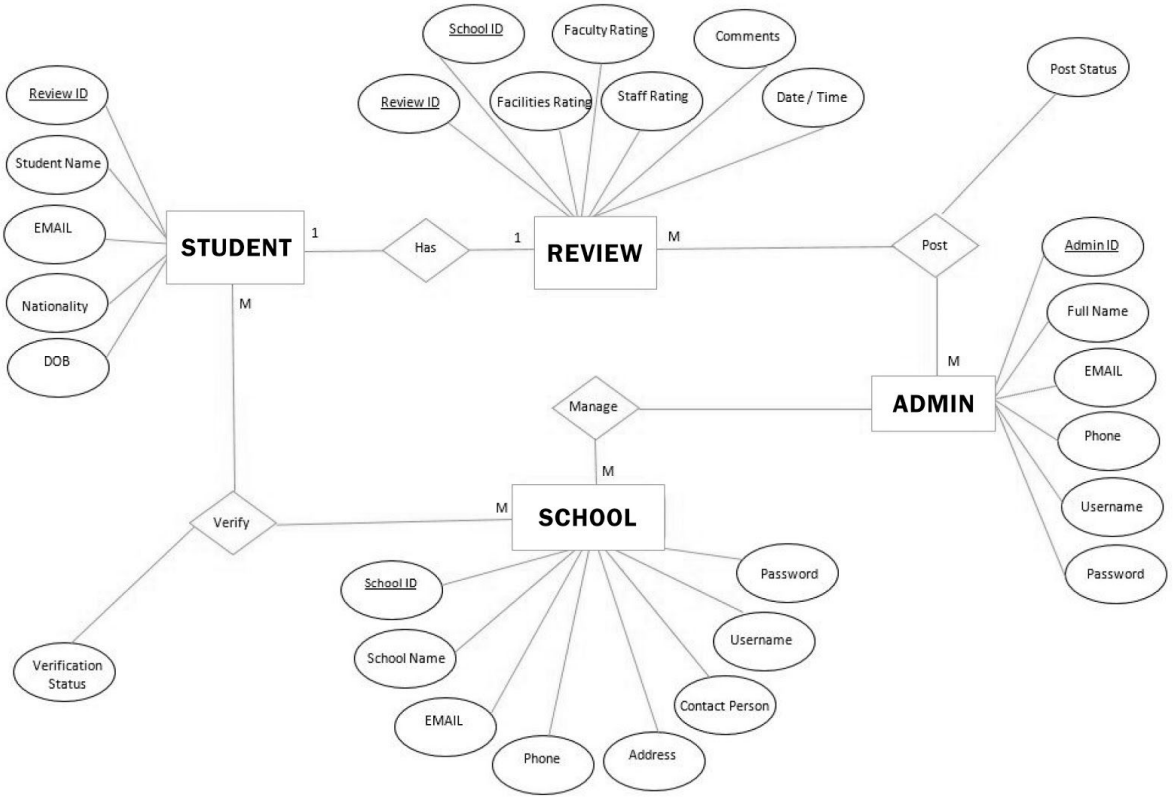


8.5 ENTITY RELATIONSHIP DIAGRAM (ERD)

Price (2018) emphasizes the importance ERD diagram in modern era to visualise entity relationships. In Databases ERD diagram provides a visual representation of the design. It is the key for valuable database design as it compares to information stored in text documents and spreadsheets.ERD diagrams are flexible, easy and simple to understand.

Visualizing the design always helps to rectify and develop the design, therefore the ERD acts like the plan for the database and it makes possible to make precise design that demonstrates the requirements of the project.

ERD is the key to design database even though there are some Limitations of the ERD like Limited constraint representation, limited relationship representation, no representation of data manipulation and loss of information. The ERD of the application is presented below:



8.6 DATABASE DATA TYPES

Users Table
INT(11) Selected for Both User ID and School ID as both are primary keys. User ID is auto incremented while School ID is foreign key from schools table

VARCHAR(15) Used Nationality as it requires less characters

VARCHAR(40) Used in email and Full Name column to give enough characters to write their details

DATE Used in DOB column as we only require to store Date

ENUM Used in both Status column as it has selected data input options, it will also assist all database users to read and store data

Null values are selected for all columns except User ID and School ID as these values will be entered from reviews table after Users finish the ratings. Then Users will be ask to update their personal Details for verification purpose. Default Values are for both status column as status will be updated by Schools or admin.

Reviews Table
INT(11) Selected for Both User ID and School ID, as both are foreign keys

TINYINT(1) Used for all three Rating columns as Rating range is from 1 to 5

TINYTEXT Used for comments column, as tiny text can have 255 characters this is sufficient for small comments

ENUM Used in both PostNameAs and recommendation as it has only two data input options, it will also assist all database users to read and store data

TIMESTAMP It is used to store current time when review has been made.

This table has no null or default values as the review page has all fields as mandatory

Schools Table
INT(11) Selected for School ID as this is primary key and auto incremented

VARCHAR(15) Used for Email and Phone Number as it requires less characters

VARCHAR(50) Used for Contact Person Name, School Name and School email column to give enough characters to fill in details

VARCHAR(500) Used for storing address of the school as it require more characters

BLOB Used to store password for sign in account for schools. BLOB is used to provide data security as characters will not be displayed if anyhow security is breached.

This table has no null or default values as the review page has all fields as mandatory

Admin Table
INT(11) Selected for UserID as this is primary key and auto incremented

VARCHAR(15) Used for username as it requires less characters

VARCHAR(30) Used for admin Full Name column as name might require more characters.

VARCHAR(50) Used for admin email column to give enough characters to fill in details

BLOB Used to store password for sign in account for admin. BLOB is used to provide data security as characters will not be displayed if in case security is breached

This table has no null or default values as the review page has all fields as mandatory

8.7 NAMING

According to qualtrics, great and successful naming offers key advantages in business such as "promoting the product" and "increasing brand awareness" (Qualtrics, 2019). The experience management company recommends extensive qualitative research for coming up with great names and gives their suggestions on what pitfalls to avoid when selecting a good name: It has to be easy to remember, memorable, with positive associations, easy to pronounce and easy to understand.

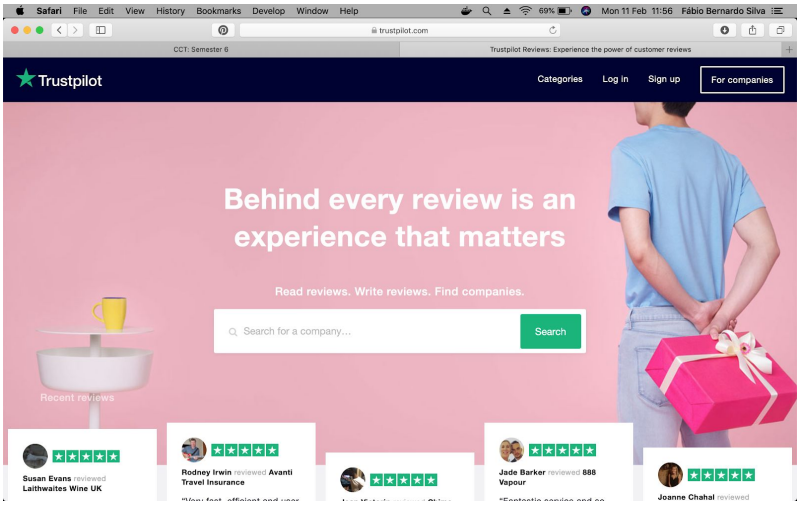
The adjective reviewable (as in *subject to review*) was selected for the application name as it would relate directly to the main functionality of the system (read and leave reviews). Should the application expands to include educational institutions, like universities, the name would still be suitable. Domain names that include a secondary word such as *reviewableenglish* or *reviewableeducation* also read it in a way that is grammatically correct.

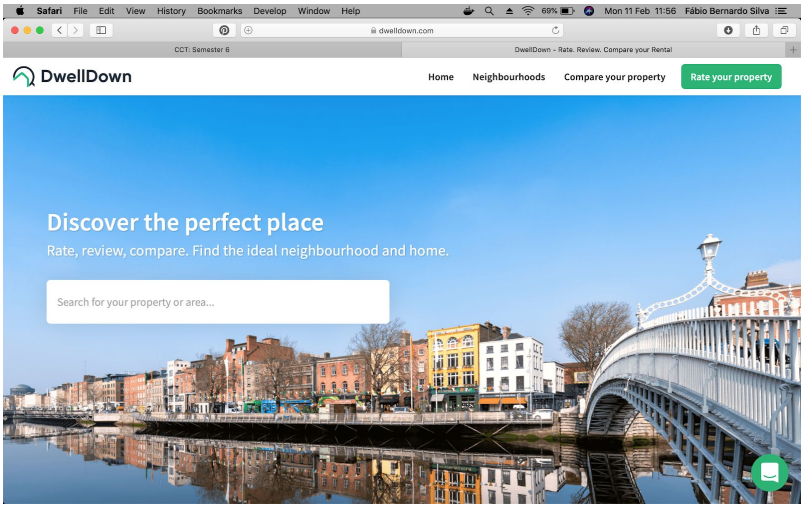
8.8 BRANDING

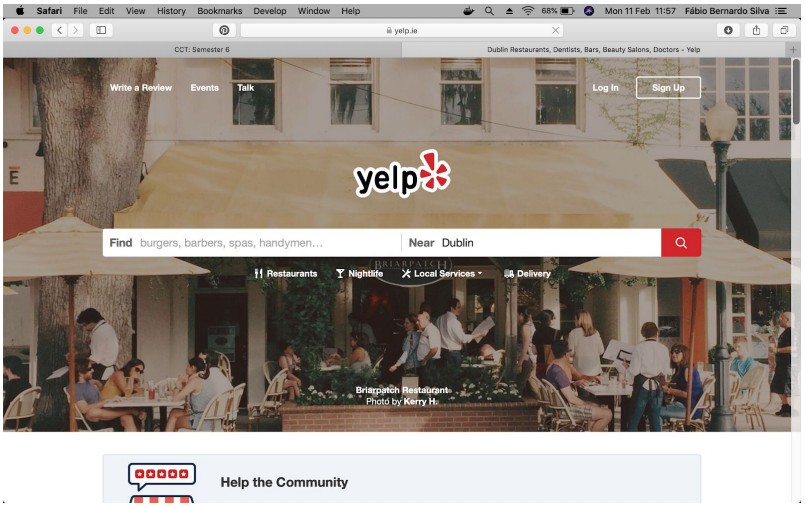
The branding was developed taking into consideration the 5-point Likert scale used to review schools in the system where each dot breaks the word into its syllables. The colour scheme will be used throughout the user interface as a visual aid of the rating with the purpose of being user-friendly, easy and intuitive to use. A Demo of the webfont Mirador (Bieder, 2019), was installed on the frontend of the application, using the @font-face CSS resource.

8.9 WIREFRAMES

To produce the wireframes for the web application, we collected references of similar review websites, and based the design of the homepage on this three that were selected: TrustPilot, DwellDown and Yelp.







The wireframes were created using Balsamiq, an industry wireframing tool used in UX / UI design. The full wireframes for all pages in the student use case are given as an appendix in this document.

9. SDLC: DEVELOPMENT / IMPLEMENTATION

9.1 TECHNOLOGIES USED

The following are the main technologies (libraries, languages, frameworks) used to build the proof-of-concept of the web application.

Nodes.js: Is a platform to build high performance scalable web applications using JavaScript. It was built over V8 engine created by Google and used in Chrome. Node.js also provides a rich library of various JavaScript modules which simplifies the development of web applications using Node.js to a great extent (TutorialsPoint, 2019).

The events loop from Node.js is prepared to receives many requests, like fetching information in the database or reading file in a server. Node works by processing many requests, instead of waiting to return the first to go to the next. When one of the requests is returned, an event is triggered and the corresponding callback function is called as the requests are placed in a queue to be executed as soon as possible.

Express.js: It is a web framework for Node.js that let you structure a web application to handle multiple different HTTP requests at a specific URI. It is a minimal, open source and flexible Node.js web app framework designed to make developing websites, web apps and APIs much easier. It provides various features that make web application development fast and easy which would otherwise take more time using only Node.js (TutorialsTeacher, 2019).

Express.js and Node.js gave JavaScript newfound backend functionality, allowing developers to build software with JavaScript on the server side. Together they make it possible to build a entire site with JavaScript. Using this framework a programmer can develop server-side applications with Node.js and then publish those Node.js as websites with Express.js.

Node just for itself is not intended to build websites, but Express framework is able to layer in built-in structure and functions needed to actually build a site. That is great to give developers extra, built in web application features and Express API without overriding the already robust, feature-packed Node.js platform.

API: Application Programming Interface, it is a manner of integrating systems, allowing benefits with data security to facilitate the exchange between information in different programming languages.

An API is created when a company has the intention that others creators of software develop products associated with their services. There are many of them that make code available and instructions to be used in other websites in a convenient way to the users. A good example about API is Google Maps. Using the original code from Google Maps, many others websites or app use data from google maps adapting the best manner using this service.

> When you use an application on your mobile phone, the application connects to the Internet and sends data to a server. The server then retrieves that data, interprets it, performs the necessary actions and sends it back to your phone. The application then interprets that data and presents you with the information you wanted in a readable way. This is what an API is - all of this happens via API. (Mulesoft, 2019)

A private API is a Interface to used by developers working within that application. The advantage of internal APIs can significantly reduce the development time and resources needed to integrate internal systems, build new systems that maximize productivity and create customer-facing apps, that expand market reach and add value to existing offers.

JSON: JavaScript Objection Notation, basically is a light-weight format to exchange information/data between server and web application, as an alternative to XML. In addition it is much more simple to read. It is often used when data is sent from a server to a web page.

When exchanging data between a browser and a server, the data can only be text. This mentionate text is JSON that can be converted any JavaScript object into JSON and send it to the server. We can also convert any JSON received from the server into JavaScript objects. The manner that is possible work with data as JavaScript object, with no complicated parsing and translations.

React: is defined by creators as an open source library, for helping developers build user interfaces namely to applications of Single Page applications. Its main achievement is being fast, scalable and the fact that it can be used with other libraries or frameworks of JavaScript like Angular. It was first deployed on facebook's feed in 2011 (Szulik, 2018). The library is used to handle the view layer in web and mobile applications and allows the creation of reusable UI components. It enables developers to create web applications where they can modify elements or the data displayed, without reloading the page. A good example is the number of the likes on facebook that can increase or decrease without the need to refresh the page.

TypeScript: contains all of the functionalities of JavaScript, but TypeScript on the other hand, uses static typing. Variables can be given a type when they are declared. TypeScript will check types at compile time, and throw an error if the variable is ever given a value of a different type. TypeScript is JavaScript plus some additional features.

Typescript and React are a great combination (Kamani 2018). Typescript allows developers to define strict types for your React components, their props and states, as well as event handlers. One of the main advantages is that the compiler (and IDE, if configured correctly) can validate all of the necessary properties provided to a component. It can also check that they have the correct type. This replaces the need for a run-time validation as provided by the prop-types library.

Docker: It is an open source platform developed by Google to facilitate the creation and management of isolated environment using containers. Containers allow to package a application or a whole environment, such as libraries and other dependencies making portable to any other host that has Docker installed (OpenSource, 2019). The benefits is reducing time to implement an infrastructure or even a application, because there is no need to environment adjustments to work, it means that the environment is always the same.

9.2 DATABASE TABLE STRUCTURE (IMPLEMENTATION)

Users

Table Name: users Schema: r2

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
userId	INT(11)	✓	✓							
schoolId	INT(11)	✓	✓							
UserFullName	VARCHAR(40)									NULL
userEmail	VARCHAR(40)									NULL
userDOB	DATE									NULL
userNationality	VARCHAR(15)									NULL
verificationStatus	ENUM('Verified', 'PVerified', 'NotVerified')		✓							'NotVerified'
postStatus	ENUM('Posted','NotPosted')		✓							'NotPosted'

Reviews

Table Name: reviews Schema: r2

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
userId	INT(11)	✓	✓					✓		
schoolId	INT(11)	✓	✓							
facultyRating	TINYINT(1)		✓							
facilityRating	TINYINT(1)		✓							
staffRating	TINYINT(1)		✓							
comments	TINYTEXT		✓							
recommendation	ENUM('Yes', 'No')		✓							
postReviewAs	ENUM('MyName', 'An...		✓							
reviewDateTime	TIMESTAMP		✓							CURRENT_TIMESTAMP ON...

Schools

Table Name: schools Schema: r2

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
schoolId	INT(11)	✓	✓					✓		
schoolName	VARCHAR(50)		✓							
schoolAddress	VARCHAR(500)		✓							
schoolEmail	VARCHAR(50)		✓							
contactPersonName	VARCHAR(50)		✓							
schoolPhone	VARCHAR(15)		✓							
schoolUsername	VARCHAR(15)		✓							
schoolPassword	BLOB		✓							

Admin

Table Name: admin Schema: r2

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
id	INT(11)	✓	✓					✓		
emailId	VARCHAR(50)	✓	✓	✓						
adminFullNname	VARCHAR(30)		✓							
username	VARCHAR(15)		✓							
password	BLOB		✓							

9.3 STORED PROCEDURES

To store or retrieve Data from Database we can either use in line SQL queries or by using stored procedures. Patton (2005) discussed in detail about the merits of stored procedures versus placing SQL directly in the code.

Many applications make use of inline SQL statements that are created in the web application and then passed to the database. For example search boxes on an e-commerce site where a user can enter a product name to search for that product. This can also be replaced by stored procedures. Hence decision has to be made of interacting with the backend database via stored procedures or by including the SQL in your application code.

Stored procedure are only created and stored once and can be called any number of times in the program. Stored procedures allow the application developer to concentrate on the code instead of SQL, as stored procedures can be modified independently of the program source code.

On contrary inline SQL statements are at high risk from SQL injection attacks which can enable a hacker to compromise and wipe out your database.

Stored procedures allow to perform an operation that requires hundreds of lines of T-SQL code through a single statement that executes the code in a procedure, rather than by sending hundreds of lines of code over the network

Following are some of the key advantages of stored procedures which should be taken under consideration

- They allow modular programming;
- They allow faster execution;
- They can reduce network traffic;
- They can be used as a security mechanism;
- It isolates the code that is needed to reflect changes to the database structure thus making maintenance quicker;
- Procedures can be reused from different web pages / forms / classes;
- Procedures can be reused by more than one application;
- Code reuse means quicker development time;
- Code reuse means quicker debugging and maintenance time.

As discussed above stored procedures contributes in increasing efficiency, better performance and enhancing security of database. Stored procedures were created for the proof of concept for the following operations:

- Insert data into Review table;
- Insert data into Users table;
- Insert new school into the School table;
- Display school by school Id;

- Get the total number of school verified reviews;
- Get the total number of platform verified reviews;
- Get the total number of school recommendations;
- Get Overall school ranking by Highest Rankings;
- Count school reviews;
- Get school details;
- Get the total number platform verified reviews by school;
- Get the total number of school verified reviews by school;
- Get the total number of reviews by school name;
- Get a student by school.

Find the full stored procedures in the appendix of this document.

9.4 TRIGGERS

According to Champbell (2014), Triggers can be either very good or very dangerous. Dangerous as they are tricky to debug, but powerful because no update to a table with a trigger can easily escape the trigger.

They are useful for making sure certain events always happen when data is inserted or updated - e.g. set complex default values of fields, inserting logging records into other tables.

Triggers are especially useful for one particular situation and that is for implementing instead of logic. For example as in our web application we require user to give ratings in the range from 1 to 5 to schools. For this check constraint purpose trigger is created for database table to just accept values from 1 to 5, any another value will not be accepted and error will be given by trigger.

Following are the triggers we have created for our web application:

- Check if the rating is valid (from 1 to 5);
- Insert data into Users table after student submit Review Details;
- Delete user Data from Reviews Table if User Personal Data in User Table is Empty.

Find the full triggers in the appendix of this document.

9.5 DATABASE TESTING

According to (Tzemach, 2016) Database testing is used to test the main aspects of the integration between our web application and the chosen database platform. The main aspects that validated through our test was as following:

- Synchronization between the database and the values displayed in our client/web.
- Query results, views, stored procedures Etc.
- Data manipulation (Update, Delete, insert Etc.).
- Database performance.
- Data maintenance.
- Table's structure.
- Data recovery.
- Data integrity.

Following are the Checklist of Test that have been conducted to verify if Database is in Working Order.

Data integrity tests

- All columns are set with the relevant data type (Bigint, int, string Etc.)
- All data is logically organized in the relevant DB tables.
- Each data item is located under the relevant column.
- Each table contains the relevant data.
- Invalid database values cannot be inserted.
- Verified data encryption (if any).

Data field tests

- Tables are created with logical structure (Primary, foreign keys.)
- Validate that "Allow Null" condition is set when you need to allow it.
- Validate that mandatory fields are created, this issue is very important when you work with multiple tables that depends on each other.

Procedures tests

- Data the affected by the procedure is changed as expected.
- All procedures are triggered when they supposed to run.
- All the conditions receive an appropriate date inputs.
- All procedures are created with the relevant code.
- Appropriate error handling for a failed procedure?
- Validate the procedure's parameters (types, names, etc.).
- Test the SP while executing the code manually.

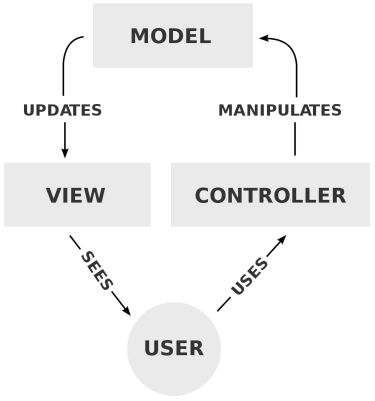
- Validate all procedures names

Database and software integration (Client, web Etc.)

- Validate that the user data is saved when the user “Submit” the changes.
- Try to insert “NULL” values on fields that don't suppose to receive it.
- User receives the current result when pulling data.
- Empty spaces are not committed to the database.
- Values displayed based on the database data.
- Test done to insert values that exceed the field boundaries.
- Test Done to Insert invalid date format on Date and time fields.
- Data integrity is not affected when the “Apply” or “Submit transactions are failing during the process.

9.6 MODEL - VIEW - CONTROLLER (MVC)

The overall architecture of this application is structure in what is called MVC (Model - View - Controller). It is a pattern of separates a system into three main logical components (separation of concerns), where each component is responsible to handle a specific aspect of the application. MVC is “one of the most widespread and influential patterns in software architecture” (Zhu, 2018).



There are different ways of implementing this pattern, and pattern has evolved with the history of the development of software and of the internet, but basically it goes like this:

The model represents real-life things, it has the biggest connection with the business logic. In the reviewable app, the model represents the database that holds data about Reviews and Schools.

The view is all the pieces of code that make the application look nice and defines what the user sees and how the user interacts with it. It displays information that fetches from the model and also presents buttons and links that the user can click and interact to perform actions.

Called “the brains of application” (Codecademy, 2019), the controller, finally, is the part responsible for handling the user requests and deciding what to do with it. and in some different implementations, it even bridges the communication of the Model and The View.

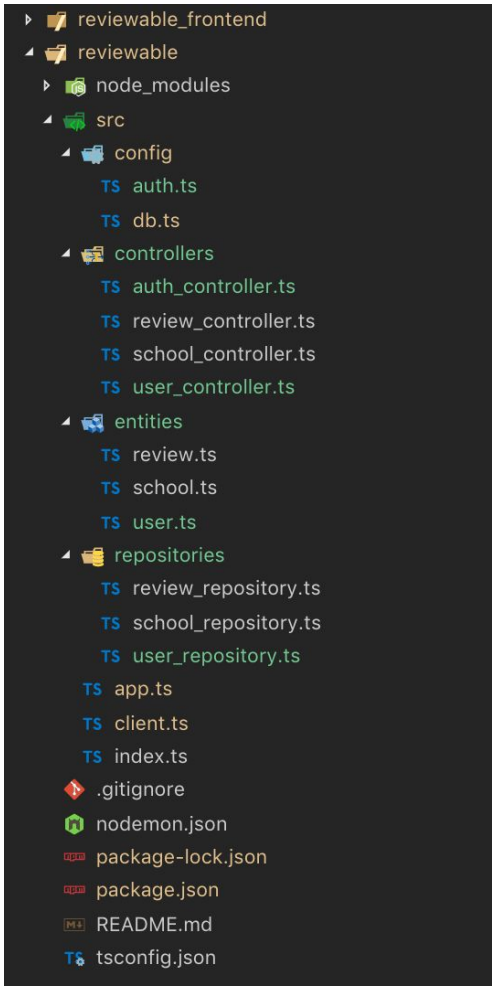
9.7 BACKEND DEVELOPMENT

The main steps in setting up the backend involved installing Node.Js with Typescript, and installing and setting up the Express server (to create the API of the project) and installing Docker and Postgres for the database.

TypeORM was installed to operate the mapping to the Postgres database. This way the creation of relations is done by the application.

Joi is installed to validate input and JWT (JSON Web Token) was installed to provide the authentication of logins and protect endpoints. Important to note that JWT implementation requires SSL encryption, otherwise the token can be sniffed through the network.

Following the MVC Pattern for Node the project, Entities are created to define the database relations and Repositories connects and access that data. Both of them represent the M in the pattern (Model). It represents the data. Controllers are created to moderate the access to the date and to mediate how that data is processed and delivered to the view. The view is represented by the frontend project (React), that uses the endpoints provided by the controller to style and display the information and receive the requests from the user. Find the folder structure of the backend project below (available on GitHub):



9.8 THE RESULT: REVIEWABLE'S API

The API entry point and endpoints to controllers (schools, reviews and users, for example) are declared here:

```
// Declare the main path
app.get('/api/v1/', (req, res) => {
    res.send('Hello world, welcome to the reviewable API!');
});

// Declare controllers
const schoolsController = getSchoolController();
const reviewsController = getReviewController();
const authController = getAuthController();
const userController = getUserController();

app.use("/api/v1/auth", authController);
app.use("/api/v1/reviews", reviewsController);
app.use("/api/v1/schools", schoolsController);
app.use("/api/v1/users", userController);
```

This is the application API entry point consumed on the browser:

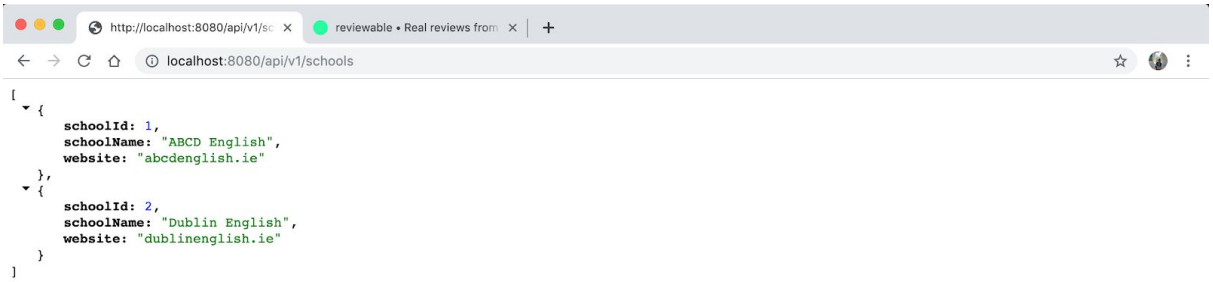
The following function uses a fetch call to retrieve all schools. It takes no parameters in the request body and uses the HTTP method GET. This is the declaration in the school controller:

```
// Returns all schools
router.get("/", (req, res) => {
    (async () => {
        const schools = await schoolRepository.find();
        res.json(schools);
    })();
});
```

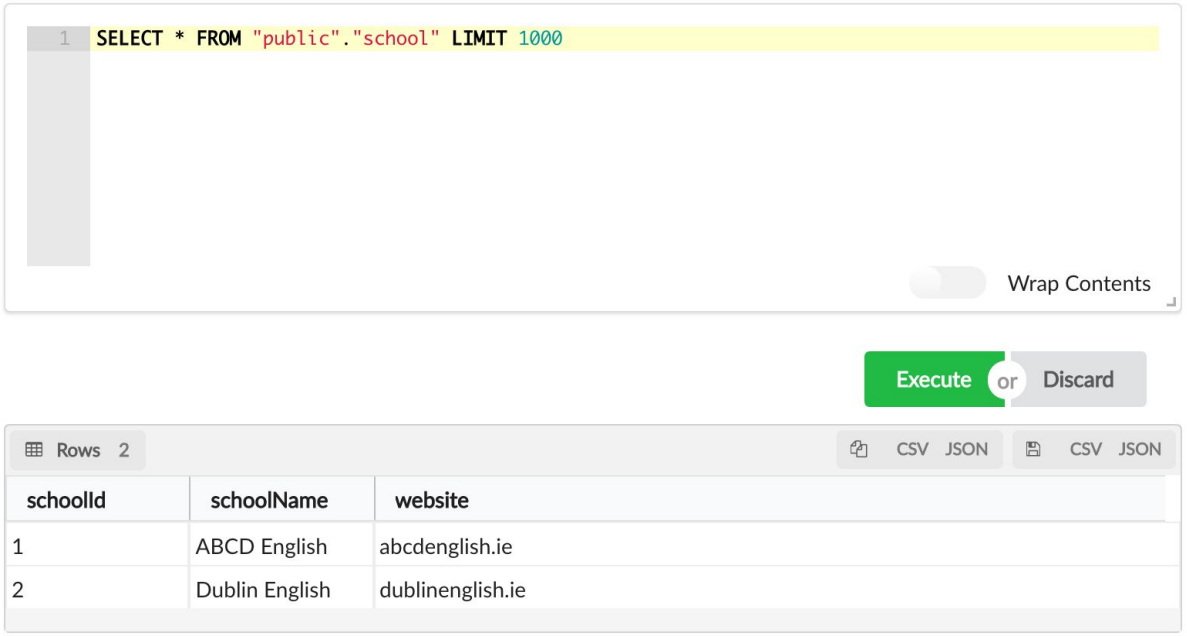
This is the function for the client call:

```
// Public
// GET
// Retrieve all schools
async function getAllSchools() {
    const response = await fetch("/schools");
    const json = await response.json();
    return json;
};
```

This way, by accessing the address localhost:8080/api/v1/schools the fetch call returns all schools from the database in JSON format. Accessing the address in the web browser is the same as calling the function getAllSchools(). The frontend will make these calls to consume data from the API and display to the user.



This is just a demonstration that this is the same data in the database, just formatted in JSON format. A SELECT query is used below to return all records:



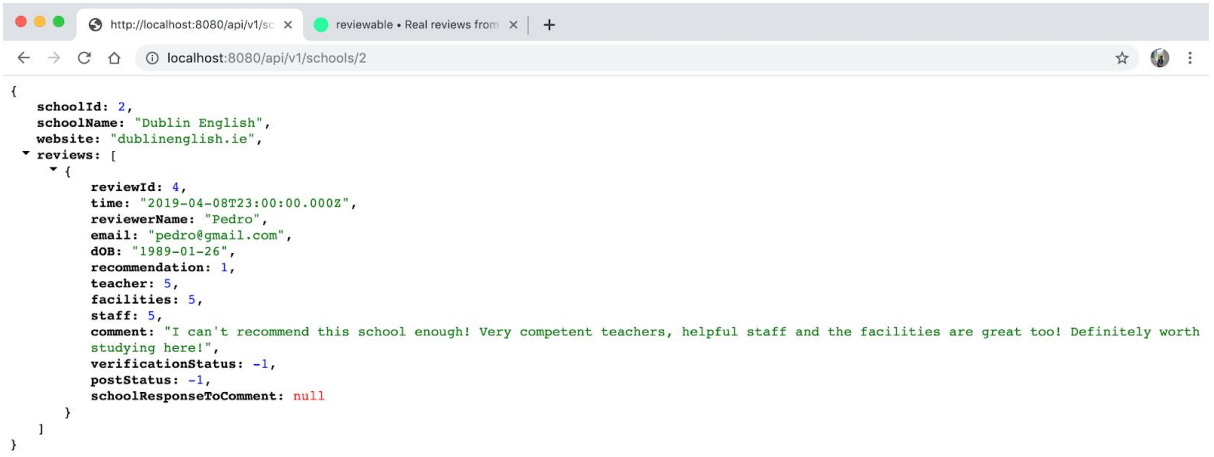
Another function is declared, similar to the previous one where it take an Id parameter (passed on through the browser). The function declaration in the controller:

```
// Returns school by Id
router.get("/:schoolId", (req, res) => {

    (async () => {
        const schoolIdString = req.params.schoolId as string;
        const schoolIdNumber = parseInt(schoolIdString);
        if (isNaN(schoolIdNumber)) {
            res.status(400).send("School ID must be a number!")
        } else {
            const school = await schoolRepository.findOne(schoolIdNumber, { relations: ["reviews"] });
            res.json(school);
        }
    })();

});
```

The client function getSchoolById takes a number as a parameter:

```
// Public
// GET
// Retrieve school by Id
async function getSchoolById(id: number) {
    const response = await fetch(`/schools/${id}`);
    const json = response.json();
    return json;
};
```

This shows how an endpoint can be written to receive parameters to return a specific object (in this case a school which id is 2 (localhost:8080/api/v1/schools/2, and then it returns all reviews received as well. This is specified in both the school and review entities and controllers in the system, that there is a one-to-many relationship between the relations. The outcome:



Following the example above, the following routes were identified and declared in the backend of the application. These will be consumed by the frontend to display information to the user (using the HTTP method GET) but also create and edit information too (with methods such as POST, PATCH, PUT and DELETE).

9.9 ROUTING

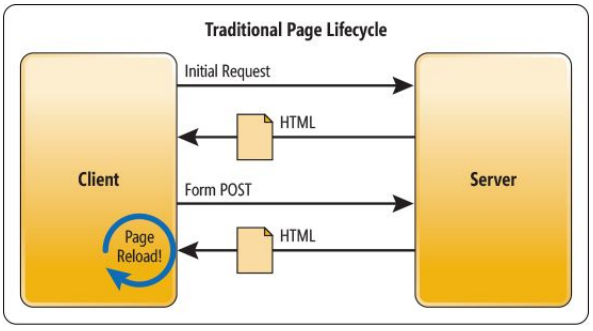
Access	HTTP method	URI	Request body	Operation
Admin	GET	/schools	Empty	Read all schools
Public	GET	/schools/1	Empty	Read school Id = 1
-	GET	/review/1	Empty	Read review Id = 1
Admin	POST	/schools	A school instance	Creates a new school
Public	POST	/reviews	A review instance	Creates a new review
Admin	PUT	/schools/1	A school instance	Replaces school Id = 1
Admin	PATCH	/school/1	Key-value pair	Updates fields in school Id = 1
Admin	DELETE	/schools/1	Empty	Deletes school Id = 1
Admin	DELETE	/review/1	Empty	Deletes review Id = 1

9.10 FRONTEND: SINGLE PAGE APPLICATIONS

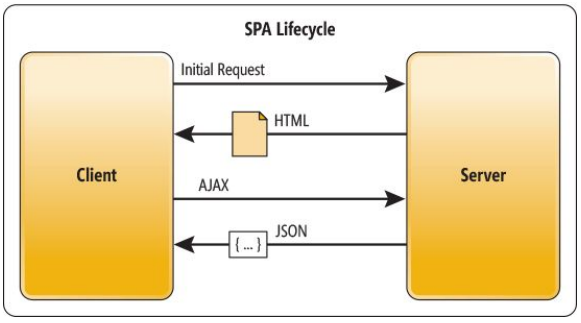
The architectural pattern for this application will used what is being called Single Page Application (SPA). Popularised by Javascript frameworks, like React, Single Page Applications "is a website that re-renders its content in response to navigation actions (i.e. clicking a link) without making a to the server to fetch a HTML file" (Sherman, 2018).

Opposed to multi-page applications (the traditional architecture in the web where the browser fetches a new HTML file in the server for every single interaction), SPAs became a lightweight way to deliver content faster. The HTML fetching calls, managing state of variables, rendering of pages are all done on the client side (browser) running in the built-in Javascript in the browsers. "The whole application code such as HTML and CSS is loaded only once" and the Javascript in the browser will re-render content and fetch data (usually JSON from an API) (Copes, 2018).

Examples of the use of this technology include technology giants Google and Facebook (React is in fact a framework developed by Facebook) in their products like Gmail, Google Maps, Google Drive and Facebook. (Copes, 2018).



As explained by (Wasson, 2013) diagram above describes the traditional MPA whenever the server is called by the application, the server sends a new HTML page. This triggers a page refresh in the browser. This is the traditional page lifecycle of a traditional PHP application.



However as shown above in case of Single Page application all interaction with the server happens through AJAX calls after the page is loaded. All calls return data usually in JSON format. In SPA app update the page dynamically without reloading with the help of JSON data.

There are different implementations of SPAs, such as Internal state and Location-based. The first one manages all the state internally, so there's only one entry point. Interactions and

navigations within the app do not change the location in the URL / URI. If you send someone the link of a page you went into an Internal State application (which is the same as the entry link as this never changes), the person who received your link would start at the entry point of the application.

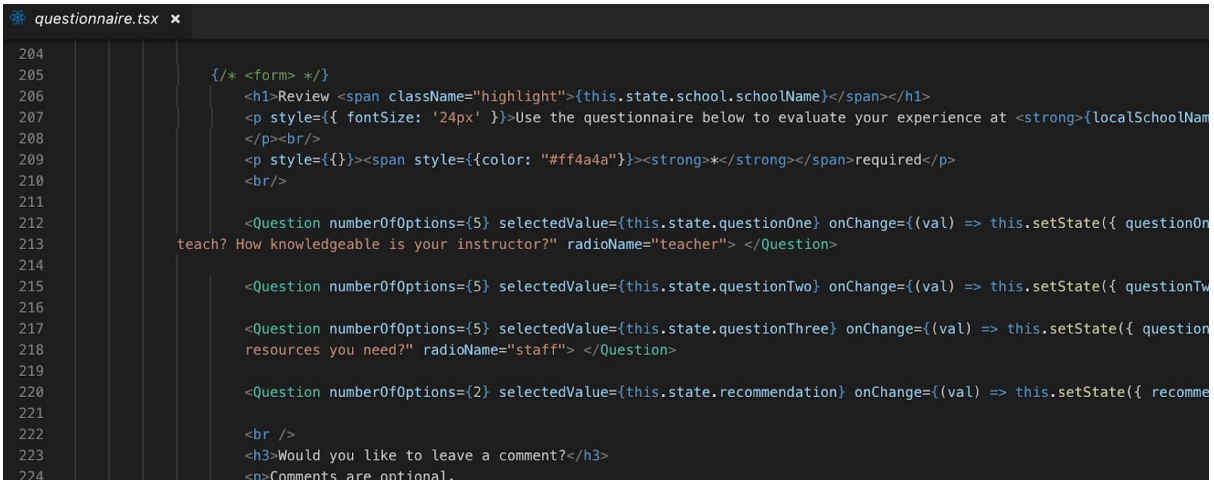
Now with Location-based type of applications, the location (in the URL / URI bar) will always be updated to match the point of the application you were). This is the architecture that the app will be built.

9.11 FRONTEND DEVELOPMENT

The development of the frontend involved installing React with Typescript and then start to build components. The first component built was the Header and then the Footer immediately after, because those are simpler components that do not manage state (don't change throughout the application flow) it was more approachable to start there.

The next step was creating the review form / questionnaire component, and manage and capture state (the choices in the radio buttons, and received comments). The following step was to make sure and implement and style the page and work with its responsiveness, that was a work that was carried out with the other component until the end.

The questionnaire component was then broken down, when following good architectural practices, a child component Question was created. This component (Question) is reused three times (the questions about the teacher, facilities and staff), and then repurposed for the recommendation question (yes/no). The screenshot below shows the Question component being used three 4 times, for the 4 radio button questions in the questionnaire. Note the syntax in React JSX/TSX (Typescript), the component <Question> is used like a html tag with angle brackets before and after it, with the initialisation of its props, such as number of options={5}.



The definition of the Question component is shown below. Worth noting that the Question component (being a child component) is stateless (it has Props, but no State) following good practice in React that says that Parent components should be stateful components and children stateless

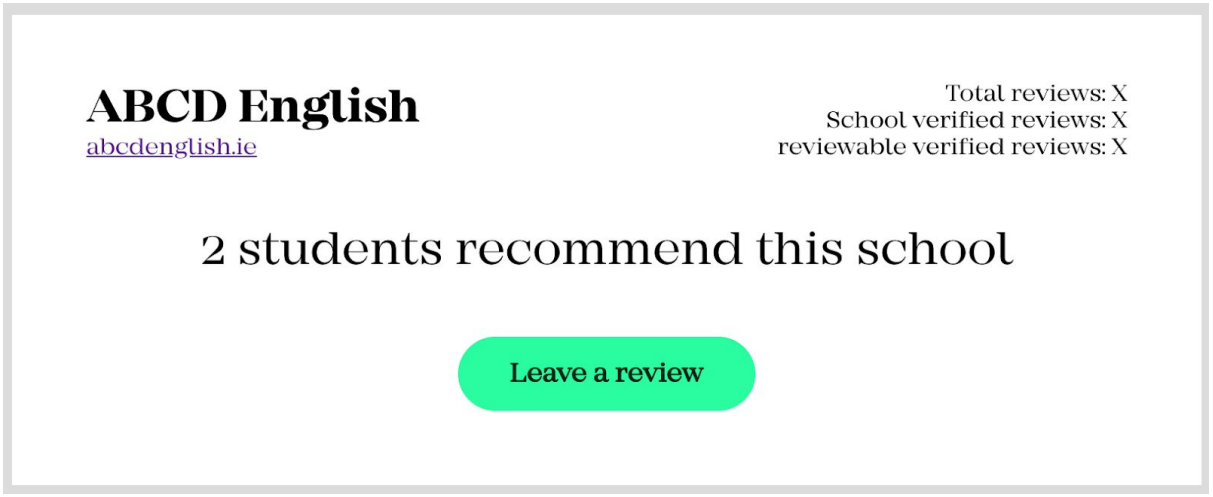
question.tsx

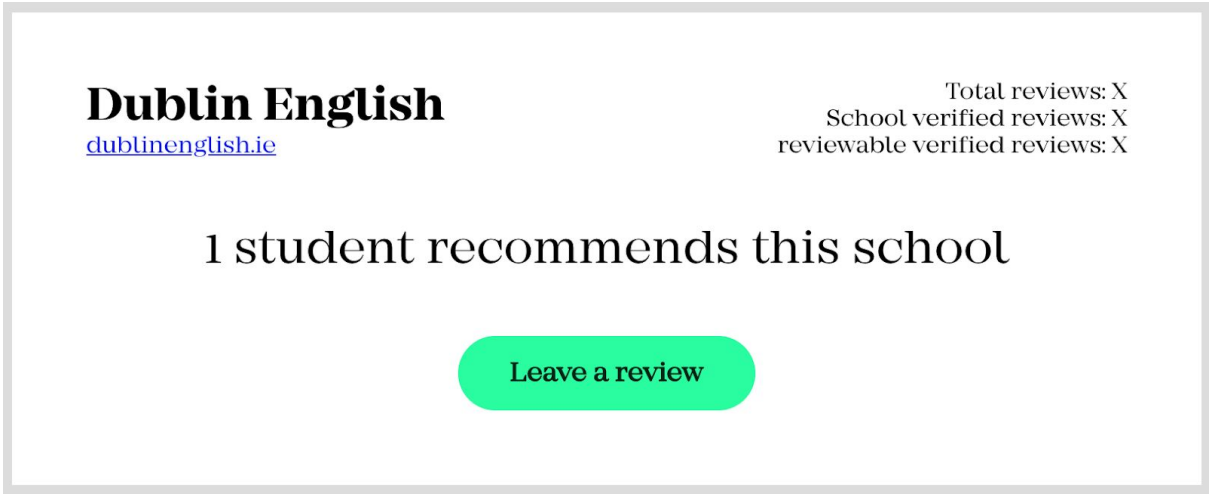
```tsx
import React from "react";

interface QuestionProps {
    school: string,
    questionTitle: string,
    questionDescription?: string,
    radioName: string,
    selectedValue: number,
    onChange: (selectedValue: number) => void,
    numberOfOptions: number

}
interface QuestionState {
}

export class Question extends React.Component<QuestionProps, QuestionState>{
    constructor(props: QuestionProps) {
        super(props);
    }

    public getValue(value: number) {
        this.props.onChange(value);
    }

    render() {
        if(this.props.numberOfOptions === 5){
```

At this stage I managed to connect to the API (backend of the project and database). After that was done, it was necessary to perform all the fetch calls to gather the data from the API to be displayed. This is done by using a proxy that forwards the calls to the appropriate por (8080 for the backend API).

I then styled the schools page and created the review component. I worked with conditional rendering in react, to change the colours of the received scores and change grammar of the displayed page according to database results. While I couldn't manage to do the routing, and then finally managed to produce a working search bar, that gets live data from the API (the alternative in case I didn't manage would be a dropdown menu with the options).

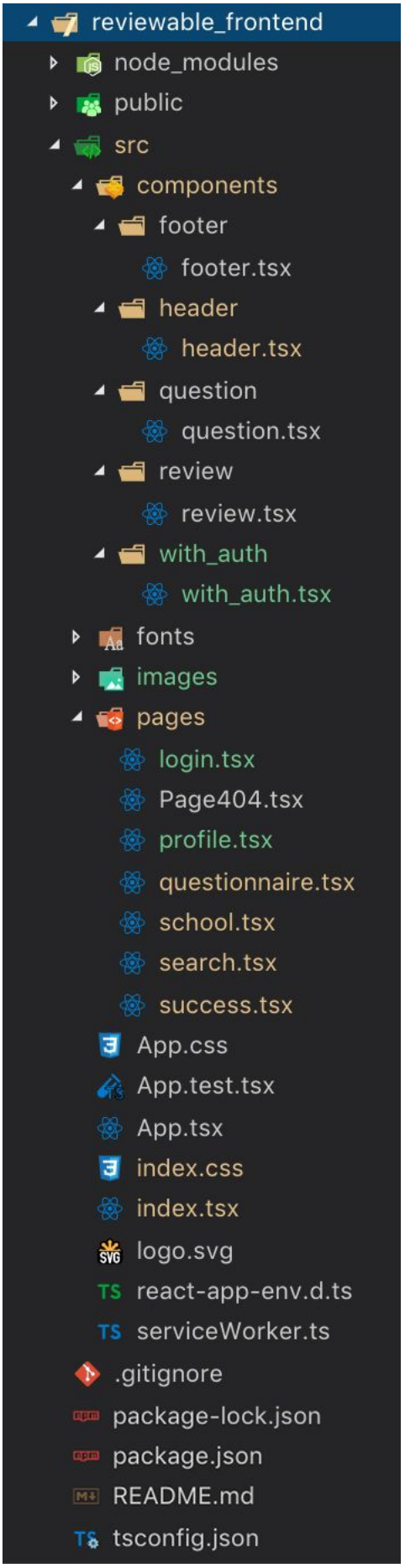
```tsx
{/*
    CONDITIONAL RENDERING: 1 Student / 0 or 2+ students
*/}
<p>{recommendationCount} {recommendationCount === 1 ? "student recommends" : "students recommend"} this school</p>
```





At this stage the rendering of error messages to the user submitting review was created and one of the final jobs was routing that was completed to 100%, altogether with fine adjustments and tweaks in details (checkbox working, for example).

The folder structure of the frontend project (also available on GitHub) is given on the next page:

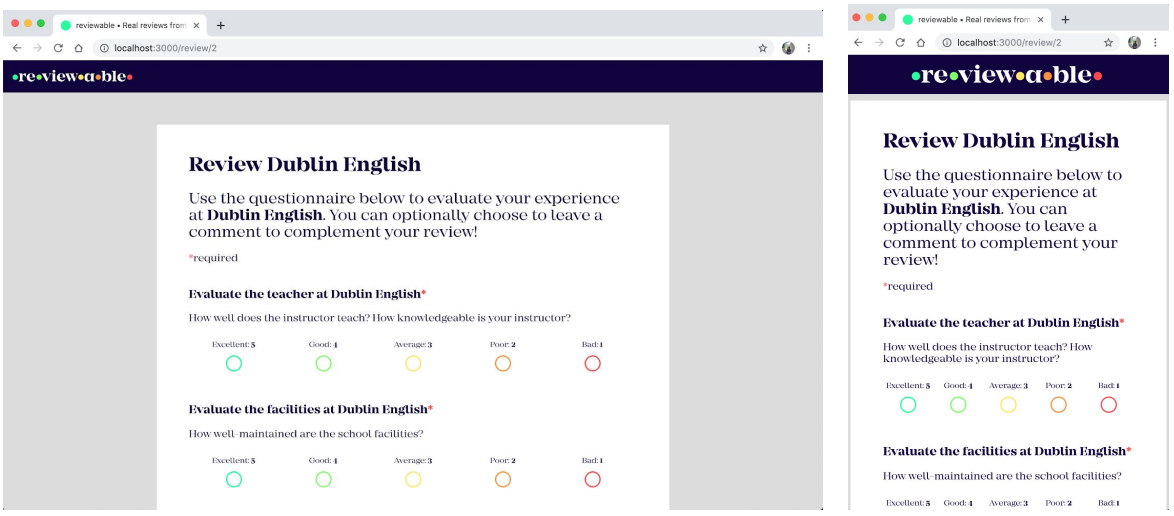

reviewable_frontend
node_modules
public
src
components
footer
footer.tsx
header
header.tsx
question
question.tsx
review
review.tsx
with_auth
with_auth.tsx
fonts
images
pages
login.tsx
Page404.tsx
profile.tsx
questionnaire.tsx
school.tsx
search.tsx
success.tsx
App.css
App.test.tsx
App.tsx
index.css
index.tsx
logo.svg
react-app-env.d.ts
serviceWorker.ts
.gitignore
package-lock.json
package.json
README.md
tsconfig.json

9.13 RESPONSIVENESS

On the way of development of the frontend of the application, it was attempted to make the application as responsive as possible. With the growth of mobile devices to access the internet, the content on those websites need to adjust to the screen size. Peter LePage from Google Developers Web (2019), says that responsive apps “responds to the needs of users and the devices they are using”. This way the contents respond to the size of the device being used. The Google Developers Web page on the subject gives a dive in for those trying to make their website or application responsive.

In order to achieving responsiveness a CSS3 feature called Media Query is key. With media queries, developers and designers can define “breakpoints” and specify conditional changes to their CSS. Already in 2010, Ethan Marcotte (who Google Developers Web claim to have defined the term “Responsiveness”) explains: “If the device passes the test put forth by our media query, the relevant CSS is applied to our markup. Media queries are, in short, conditional comments” (Marcotte, 2010).

In the web application a main breakpoint was define and then the CSS was defined to respond to these breakpoint across the whole application. Take for example the questionnaire page of the application, using the browser Chrome, when the browser is sized to the fullscreen on a laptop the user sees the first CSS, once resized to smaller than the define breakpoint, the another CSS is used, where the logo and the header bar is bigger and centralised, and the gray margins are reduced to improve the user experience on a smaller screen device.



This technique can be used to deliver a full new stylesheet or even different media, or images (a smaller device screen would render a smaller image than compared a laptop or a desktop monitor, saving resources).

9.14 PROGRESSIVE WEB APP (PWA)

Expanding on the user experience aspects of Responsive Apps (and Single Page Applications, where the loading of content is faster than the traditional Multiple Page Application), Progressive applications represent the next step in the development of the reviewable app.

PWA is a methodology of development that makes the experience of using a web page *feel* as of a native app on the device (whether on a laptop or on a phone). A PWA will run in any device or circumstances even without wifi connection (once the application has been downloaded while online). It can be considered a hybrid between a app and a website or the evolution of the web. Girish (2017), explains:

> "…a Progressive Web App is a progression or the next step for a Responsive web app. That is, if you have a website (web page/web app) that is mobile responsive then you leverage the new features supported by modern browsers to make it a Progressive Web App. These features include using service workers, web app manifests, push notifications, offline support etc."

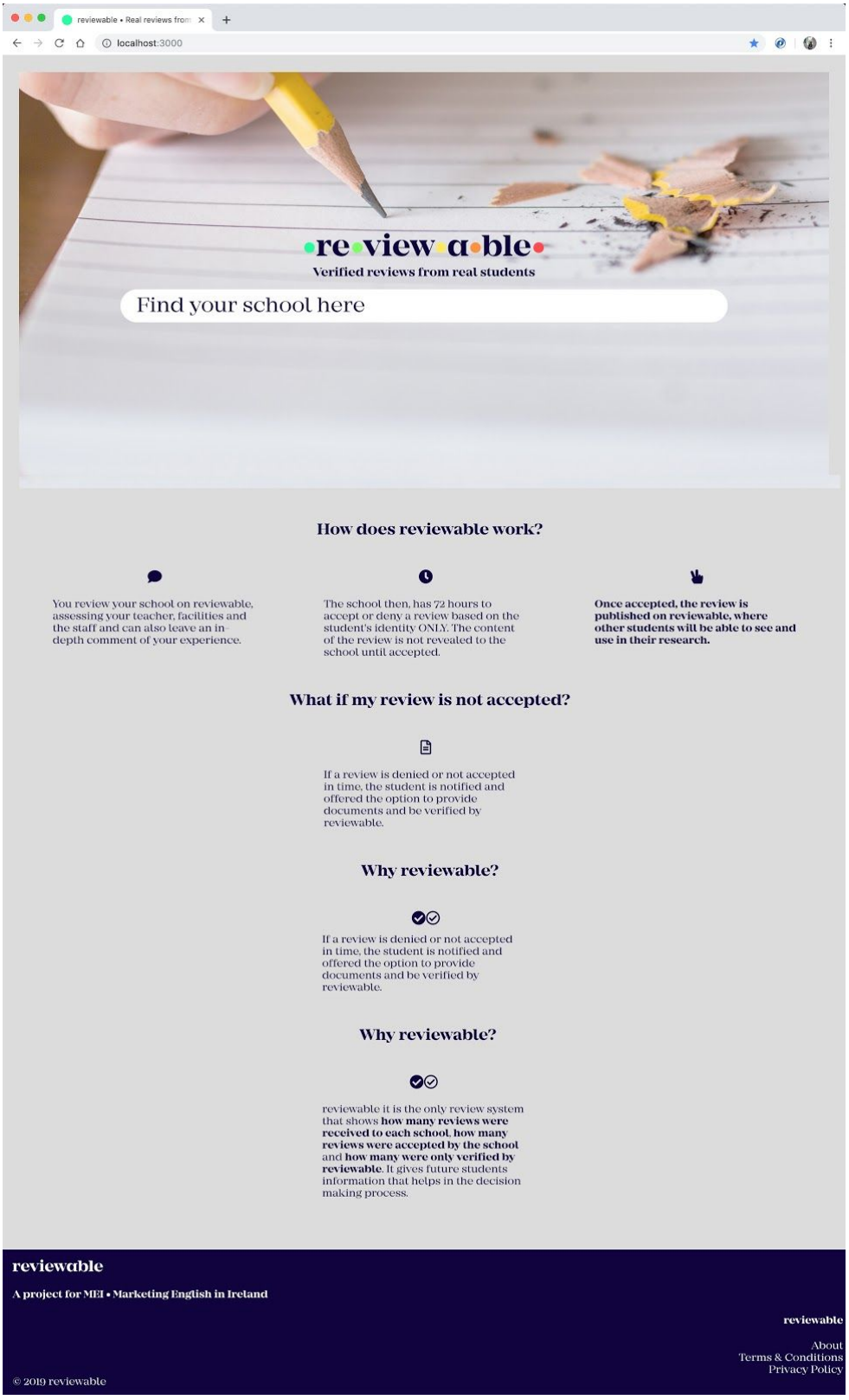
Google has a Progressive Web App Checklist, that lists criteria an application has to meet to be considered as such. According to Google (2019), an PWA is: Reliable, Fast and Engaging. The full checklist lists things such as performance, caching, indexability and many other aspects. One aspect in the user experience section of the checklist says: "Site is responsive across phone, tablet and desktop screen sizes". In the security aspect, the checklist recommends the use of HTTPS (a need already identified in the development of the backend for the secure use of JSON Web Token).

Cheaper and faster to develop and keep than a native app and offering a satisfactory experience and multi-platform, PWAs are here to stay.

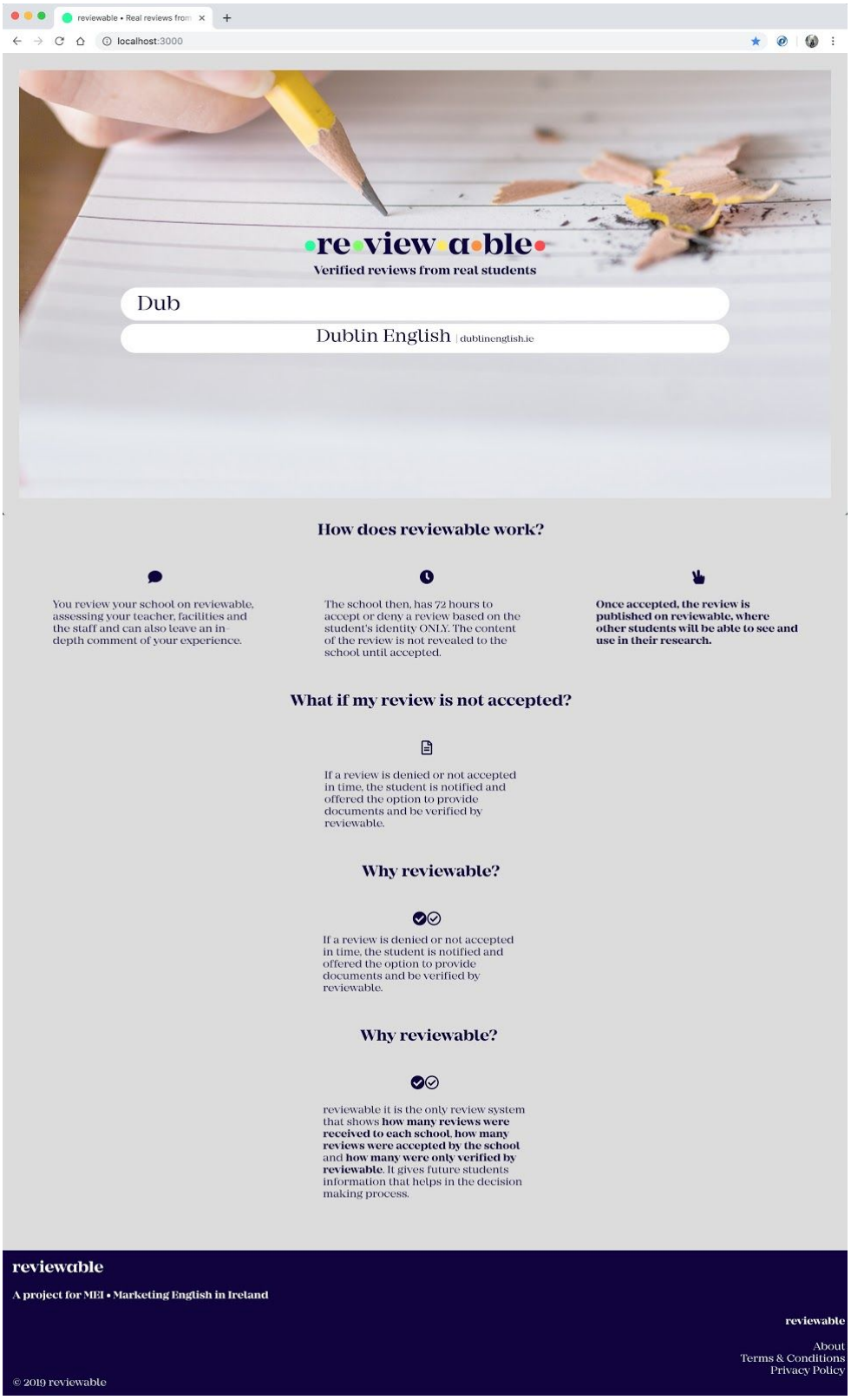
10. RESULT: THE REVIEWABLE WEB APPLICATION

The result is the web application presented in the screens below. Over this semester of development we were finalise the proof of concept of the Student use case (where a student searches for a school, reads the reviews and leaves a comment). The screens are full height screenshots (without scrolling) screens of what the application looks on a laptop.
A walkthrough is presented in the next few pages.

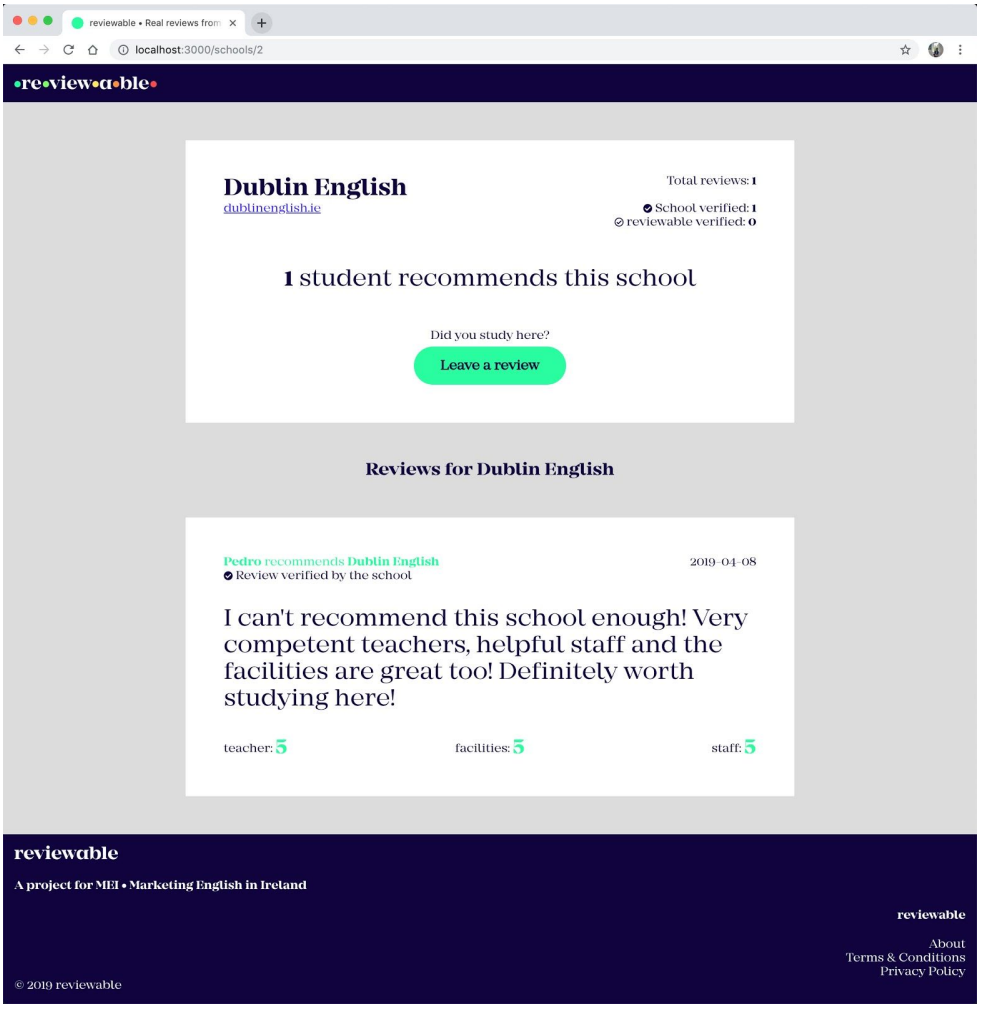
The welcome page presents the user with a clear UI presenting the logo, tagline and the search bar of the project with the Call to Action “Find your school here” following the wireframes produced in the design step of the development. More information about the system and a footer are presented underneath the bar.



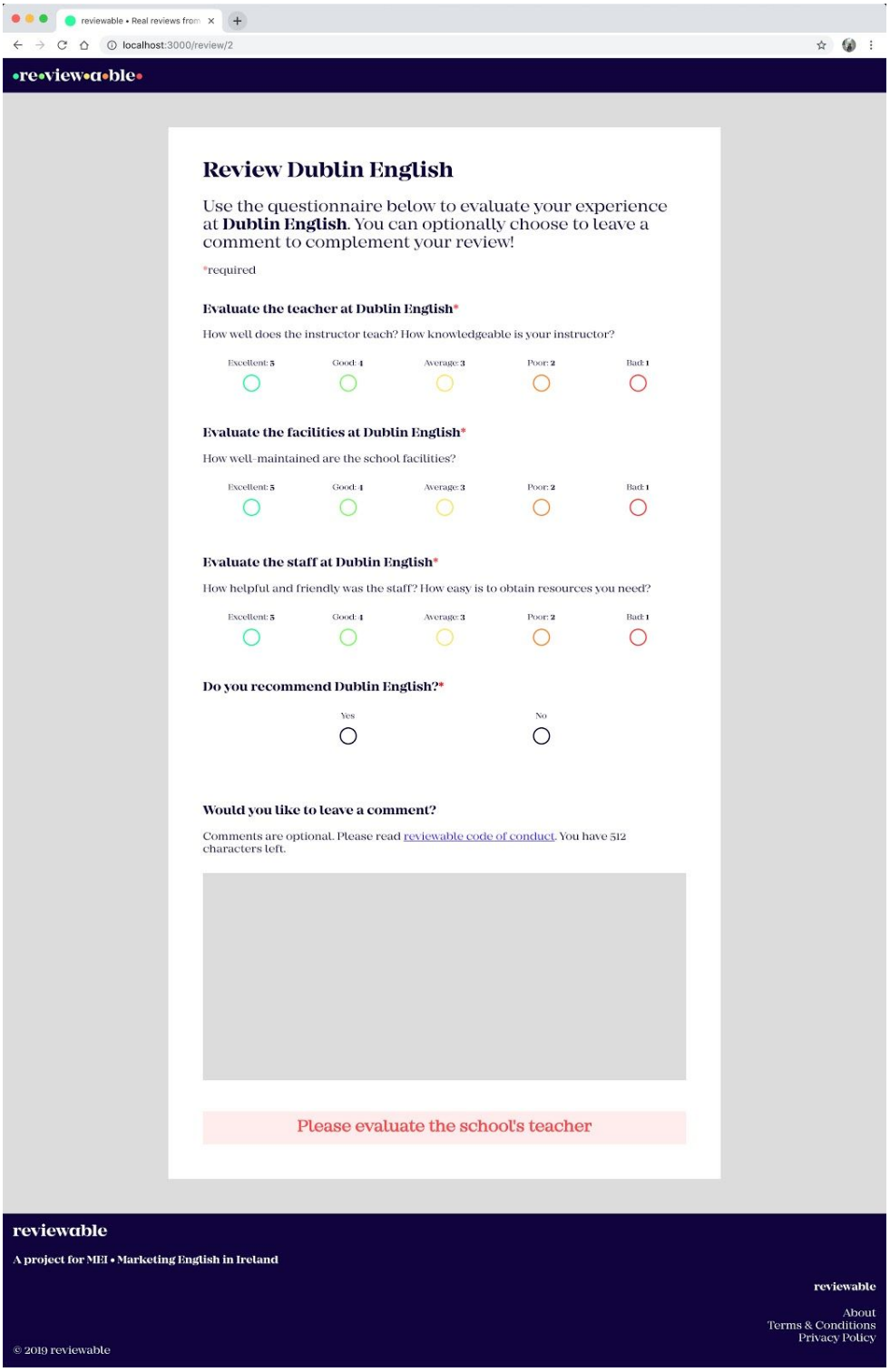
The search bar returns full results (School objects, with name and website) immediately as the user types each key (note that there's no "search" button). This is done by capturing the state of the input field using the onKeyUp event handler. The user then can click on a result and it redirected to the school page in the system.



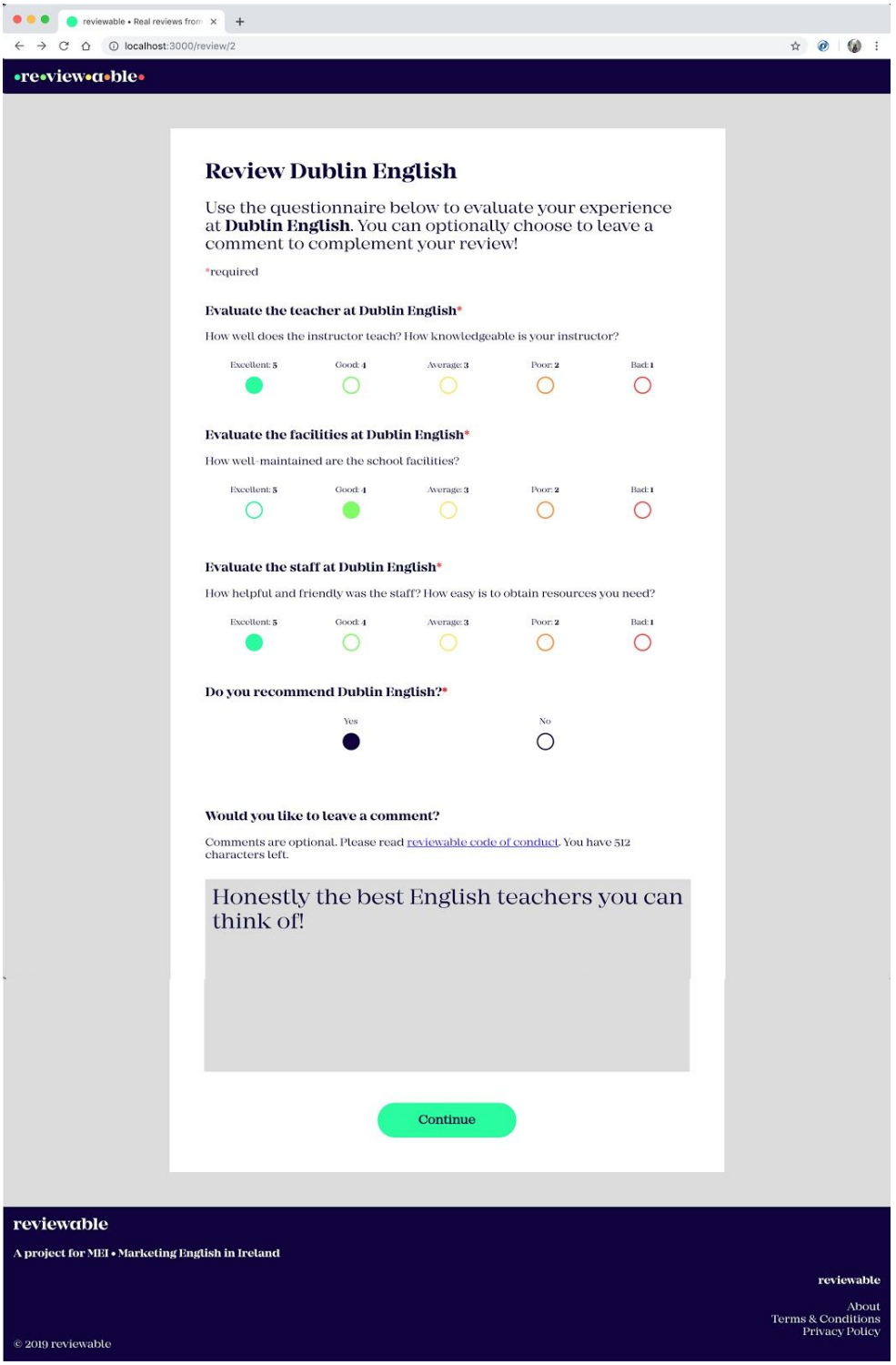
On the school page the user sees a Header for the first time and a card with the school statistics in the system (total number of reviews, total number of recommendations, etc). The school card represents quantitative information while the review card(s) underneath represent the qualitative information of the review, with the commented presented in big letters. Information about the school is presented by the components props and state and conditional rendering is used to change the grammar in sections of the school card and the colours of the feedback on the review card. Notice the URI with the school ID. The user then, is asked if he has studied at this school and is invited to leave a review by clicking in the "Leave a review" button.



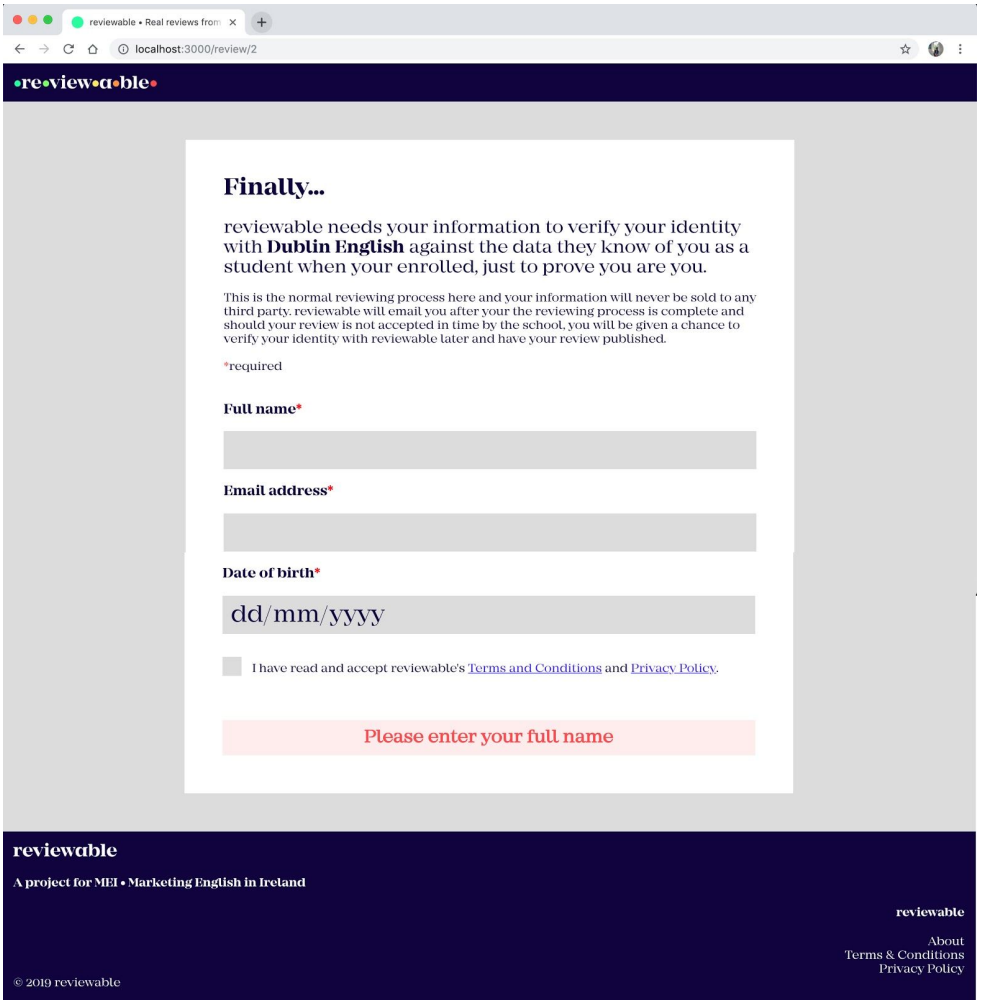
On the questionnaire page (or review form page) the user can leave a review in the system, information about the school (school name) is displayed throughout the form and in each child component Question (about teacher, facilities, staff and recommendation) through props and state again. Notice that at the bottom, the user can't proceed to the next stage of leaving a review if they haven't completed the required questions (radio buttons). Leaving a comment is optional.



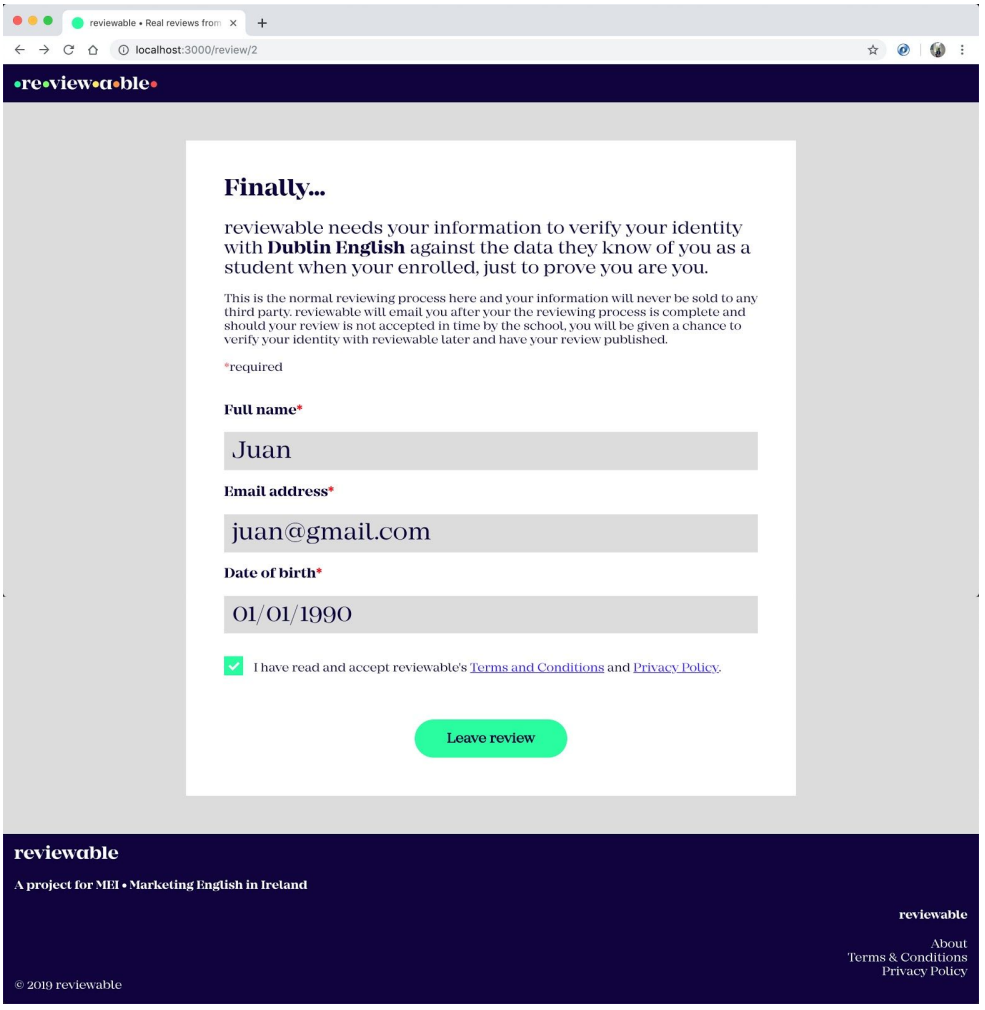
Once all the required information is selected, the “Continue” button at the bottom is presented to the user. Please notice the URI won’t change once the user proceeds.



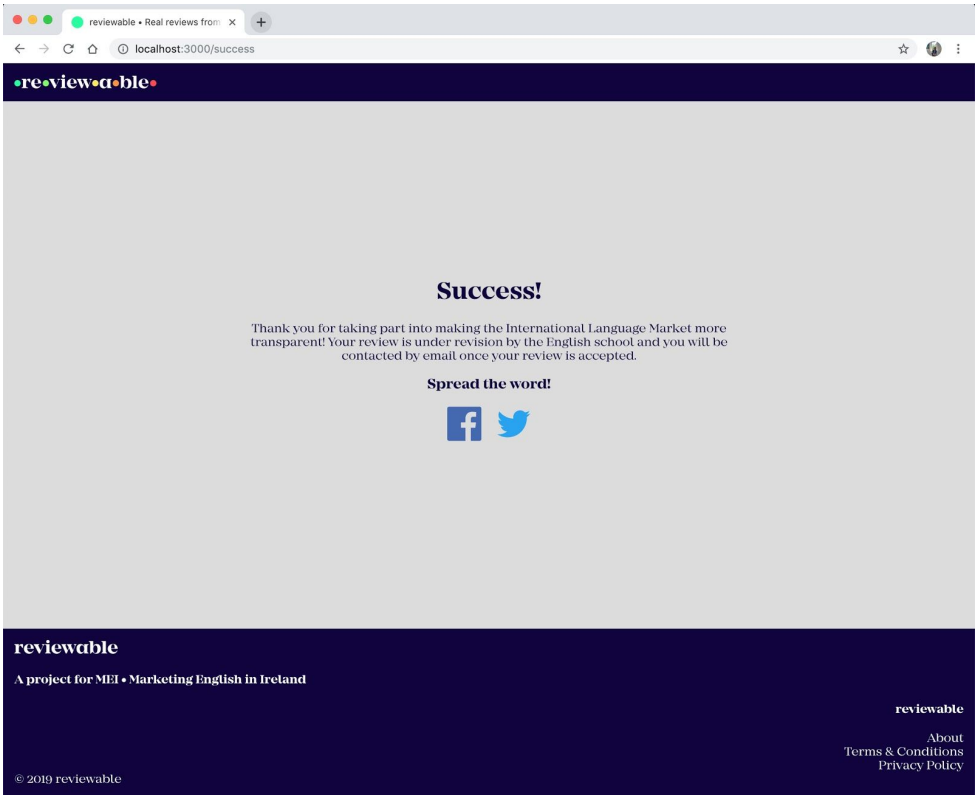
Although it may look and feel like a page has been changed it is the same page (and component), as you can see from the URI on the browser. The user then needs to provide personal information that will be used to validate their review. Once again the user can't finalise this process until the required information is completed. In this case, there are more criteria to be met: Full name cannot be empty, email address cannot be left empty and it needs to be a valid address with @domain.com, the date of birth can't be empty as well and it will only accept numbers and finally the check box of acception the T&Cs needs be checked. All these three fields were given HTML attributes according to their type, so it prompts changes in behaviour in different browsers including remembering the name based on the Address Book in safari, making different suggestions on a mobile keyboard for the email field (including @ and .com) and finally the dOB field prompts a native datepicker from each browser including mobile, without importing several libraries as this is managed by each browser.



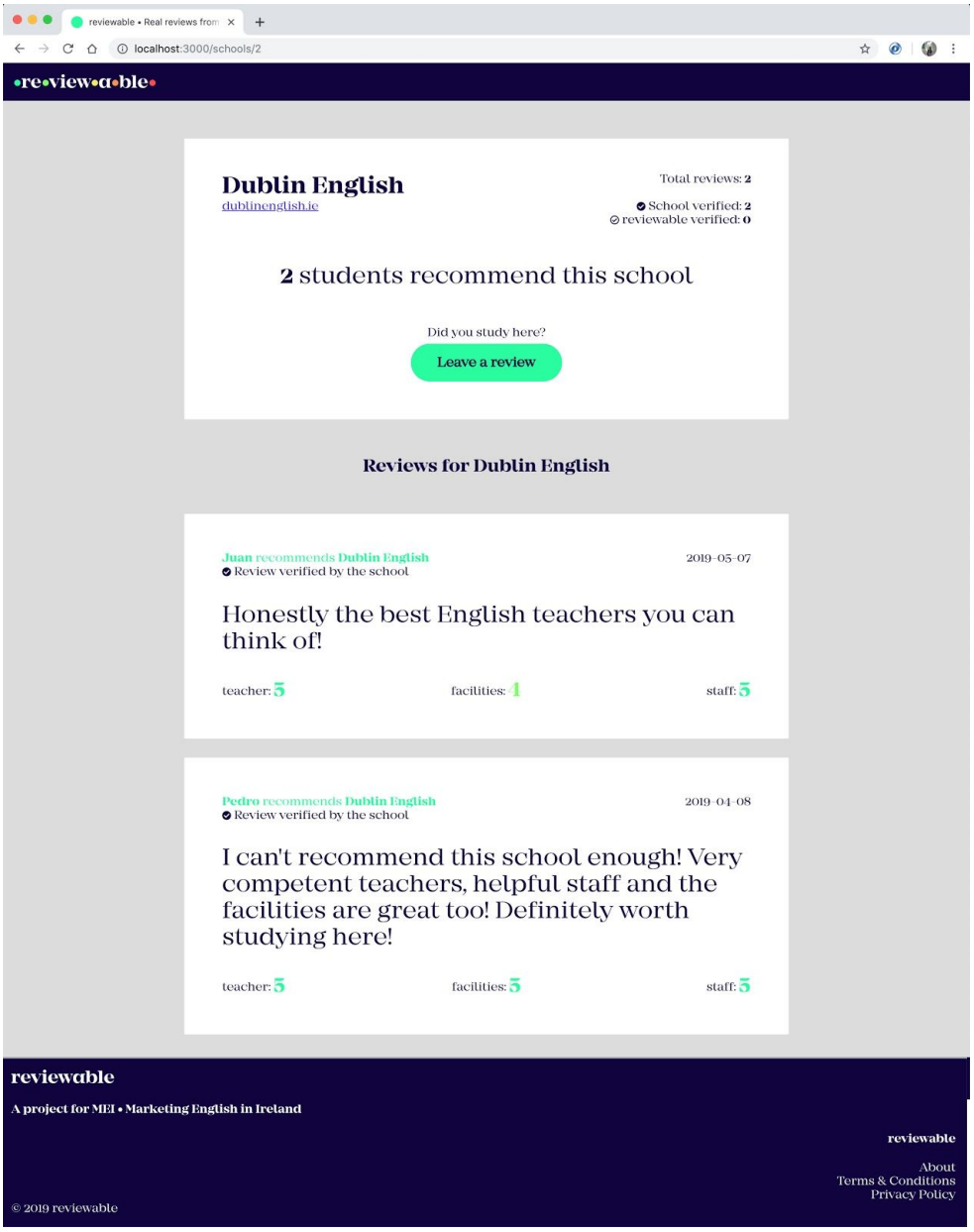
Finally once all the information has been completed and validated and the checkbox is ticked, the “Leave a Review” button is presented below.



If everything goes right, the review is received and the user is redirected to the success page, where they are informed what the next steps are and spread the word about the project.



Finally, the review this user has left comes live on the school page with the appropriate rendering of their grades and total stats as well.



CONCLUSION AND FURTHER WORK

This project showed the main steps in the development of an online review web application for the Internal English Language Market. It explored possibilities of establishing trust through added validation in an online world with fake news, bias and lack of trust. Research with potential users of this application shone a light on the difficulties of researching, trusting, hiring courses and paying fees online for courses abroad.

While many business aspects of the application would still need further defining and detailing the next technical steps in the development would include the development of the school and admin/moderator use cases. Further steps would be the full implementation of a SSL certificate / HTTPS to make the use of JWT for the login secure, as the recommended implementation. Buying a domain and finally releasing it online would also the further steps as well as the full implementation of the database system as well. As included in the requirements section, a social media login such as facebook or linkedin could also be successfully used to bring some level of trust to the application and be an alternative method of leaving a review (removed from the school validation, but giving the school a chance of responding to them as well). Many many features could also be included such as comparing schools in the system, find the best (or worst) ranking schools, filter reviews and many many more.

On the business aspect of things, as the development process went, we started to believe that while it is necessary some degree of indepence for the application success, it would be important to be accredited or even run and managed by one of the existing bodies presented (MEI, ACELS, ICOS) as these are the main rulers of this sector in Ireland. Their power and influence could be used to make sure schools are also on board with it and a review system could legally be used as part of their inspection of the schools as well. A body like these could run and validate received reviews and implement further validation steps too. This would be hugely beneficial do this sector in Ireland, making the country as step ahead of other countries that have also a huge demand of International Language students. This would also make sense as the application is a non-profit system, therefore not many monetisation options could be used (such as school ads or serving the schools in the first place as it is used to serve students first).

REFERENCES

Beare K. (2018). How many people learn English? Available at: https://www.thoughtco.com/how-many-people-learn-english-globally-1210367 [Accessed on 11th December 2018].

Nordquist R. (2017). English as a Global Language. Available at: https://www.thoughtco.com/english-as-a-global-language-1692652 [Accessed on 11th December 2018].

O'Halloran M. (2018). Ireland tops table for English-language students. Available at: https://www.irishtimes.com/news/education/ireland-tops-table-for-english-language-students-1.3388773&sa=D&ust=1523289116421000&usg=AFQjCNGXO58Zi3hozH_2ZTthULar9JC8iA [Accessed on 11th December 2018].

British Council (2013). English Effect. Available at: https://www.britishcouncil.org/sites/default/files/english-effect-report-v2.pdf [Accessed on 11th December 2018].

O'Donoghue P. (2016). No sign of crucial rules for English language schools two years after wave of closures. Available at: https://fora.ie/english-language-schools-ireland-accreditation-3141655-Dec2016/ [Accessed on 11th December 2018].

Facebook (2018). Ratings & Reviews. Available at: https://www.facebook.com/help/434605260012677 [Accessed on 11th December 2018].

Facebook (2018). Recommendations. Available at: https://www.facebook.com/business/recommendations [Accessed on 11th December 2018].

Soper S. (2018). Amazon Doles Out Freebies to Juice Sales of Its Own Brands. Available at: https://www.bloomberg.com/news/articles/2018-10-16/amazon-doles-out-freebies-to-juice-sales-of-its-own-brands [Accessed on 11th December 2018].

Butler O. (2017). I Made My Shed the Top Rated Restaurant On TripAdvisor. Available at: https://www.vice.com/en_uk/article/434gqw/i-made-my-shed-the-top-rated-restaurant-on-tripadvisor [Accessed on 11th December 2018].

BrightLocal (2018). Local Consumer Review Survey. Available at: https://www.brightlocal.com/learn/local-consumer-review-survey/ [Accessed on 11th December 2018].

DwellDown (2017). About. Available at: https://dwelldown.com/about [Accessed on 11th December 2018].

Bercovici J. (2013). How Amazon Should Fix Its Reviews Problem. Available at: https://www.forbes.com/sites/jeffbercovici/2013/01/25/how-amazon-should-fix-its-reviews-problem/#788041b2bb00 [Accessed on 11th December 2018].

Beck K, Beedle M, Van Bennekum A, et al (2001). Manifesto for Agile Software Development. Available at: https://agilemanifesto.org/ [Accessed on 11th December 2018].

Cowan A. (2018). Agile - Just the Basics. Available at: https://www.alexandercowan.com/agile-just-basics/#User_Stories_and_Personas [Accessed on 11th December 2018].

SurveyMonkey (2018). Use Education Surveys to Gain Academic Insights. Available at: https://www.surveymonkey.com/mp/lp/education-surveys/?utm_expid=.E5EjEEtQTBmRN455yp8BbQ.1&utm_referrer= [Accessed on 11th December 2018].

SurveyMonkey (2018). What is a Likert Scale? Available at: https://www.surveymonkey.com/mp/likert-scale/ [Accessed on 11th December 2018].

Stack Overflow(2019). Developer Survey Results 2018. Available at: https://insights.stackoverflow.com/survey/2018; [Accessed on 05th May 2019].

Neagoie, A.(2018). Want to be a Developer? Available at: https://medium.com/zerotomastery/want-to-be-a-web-developer-learn-node-js-not-php-dc298154fafd; [Accessed on 05th May 2019].

Chapple, M. (2018) Creating Databases and Tables in SQL Available at: https://www.lifewire.com/creating-databases-and-tables-in-sql-1019781 [Accessed on 10th March 2019].

Peterson, J. (2002) Absolute Beginner's Guide to Database Design Available at: http://www.informit.com/articles/article.aspx?p=26849 [Accessed on 18th February 2019].

Akalp N. (2016). Can You Sue Over a Bad Review? Available at: https://www.freshbooks.com/blog/can-you-sue-over-a-bad-review?t=ymlciw9neapo3ms1r [Accessed on 11th December 2018].

TripAdvisor (2018). Terms of Use. Available at: https://tripadvisor.mediaroom.com/uk-terms-of-use [Accessed on 11th December 2018].

OWASP (2017). Top 10 2017 - The Ten Most Critical Web Application Security Risks. Available at: https://www.owasp.org/images/7/72/OWASP_Top_10-2017_%28en%29.pdf.pdf. [Accessed on 22nd April 2019].

OWASP (2019). OWASP Risk Rating Methodology. Available at: https://www.owasp.org/index.php/OWASP_Risk_Rating_Methodology [Accessed on 22nd April 2019].

Wichers D. (2019). Input Validation Cheat Sheet Series. Available at: https://github.com/OWASP/CheatSheetSeries/blob/master/cheatsheets/Input_Validation_Cheat_Sheet.md [Accessed on 23rd April 2019].

W3Schools (2019). SQL Injection. Available at: https://www.w3schools.com/sql/sql_injection.asp [Accessed on 23rd April 2019].

University of Colorado Boulder (2017). Security Awareness - Hardening your computer. Available at: https://oit.colorado.edu/it-security/security-awareness/hardening-your-computer [Accessed on 23rd April 2019].

IT Security Concepts (2013). SQL Injection. Available at: https://compsecurityconcepts.wordpress.com/tag/consequences-of-sql-injection/ [Accessed on 22nd April 2019].

Acels (2018) About Us. Available at: https://www.acels.ie [Accessed on 11th december 2018].

Icos (2018) About ICOS. Available at: https://www.internationalstudents.ie/about-icos [Accessed on 11th december 2018].

MEI (2018) About MEI. Available at: https://mei.ie/about-us/about-mei [Accessed on 11th december 2018].

European Commission (2018). 2018 Reform of Data Protection Rules. Available at: https://ec.europa.eu/commission/priorities/justice-and-fundamental-rights/data-protection/2018-reform-eu-data-protection-rules_en [Accessed on 11th December 2018].

Britton, C. and Doake ,J. (2004). “A Student Guide to Object-Oriented Development”, Elsevier, p. 40 - 183 - 202

Visual Paradigm (2019). What is Sequence Diagram? Available at: https://www.visual-paradigm.com/guide/uml-unified-modeling-language/what-is-sequence-diagram/; [Accessed on 04th May 2019].

J. Price, N. (2018) What Is Entity Relationship Diagramming and Why Is It Important? Available at: https://insights.diligent.com/entity-relationship-diagramming/what-is-entity-relationship-diagramming-and-why-is-it-important/; [Accessed on 20th February 2019].

Qualtrics(2019). Guide to Product Naming. Available at: https://www.qualtrics.com/experience-management/product/product-naming/; [Accessed on 05th May 2019].

Bieder, R. (2019). Mirador. Available at: https://www.renebieder.com/retail-fonts/mirador; [Accessed on 06th May 2019].

TutorialsPoint (2019). Node.js - Introduction. Available at https://www.tutorialspoint.com/nodejs/nodejs_introduction.htm; [Accessed on 04th May 2019].

Nodejs (2019). Node.js. Available at: https://nodejs.org/api/synopsis.html; [Accessed on 08th April 2019].

W3Schools(2019). Node.js Introduction. Available at: https://www.w3schools.com/nodejs/; [Accessed 08th April 2019].

TutorialsTeacher (2019). Express.js. Available at: https://www.tutorialsteacher.com/nodejs/expressjs; [Accessed on 09th April 2019].

Viva L. (2017). The Beginner's guide: Understanding Node.js & Express.js. Available at: https://medium.com/@LindaVivah/the-beginners-guide-understanding-node-js-express-js-fundamentals-e15493462be1; [Accessed on 09th April 2019].

Mulesoft (2019). What is a API? Available at: https://www.mulesoft.com/resources/api/what-is-an-api; [Accessed on 09th April 2019].

Levin G. (2017). Internal vs External APIs Available at: https://dzone.com/articles/internal-vs-external-apis-1; [Accessed on16th April 2019].

W3Schools (2019). What is Json? Available at: https://www.w3schools.com/whatis/whatis_json.asp; [Accessed on 09th April 2019].

W3Schools (2019). Json - Introduction. Available at: https://www.w3schools.com/js/js_json_intro.asp; [Accessed on 09th April 2019].

Szulik, K.(2018). Who Supports React? That depends on what you mean. https://blog.tidelift.com/who-supports-react-that-depends-on-what-you-mean; [Accessed on 07th May 2019).

O'Reilly (2019). What is React? Available at: https://www.oreilly.com/library/view/what-react-is/9781491996744/ch01.html; [Accessed on 09th April 2019].

Quora (2019). What is TypeScript?. Available at: https://www.quora.com/What-is-TypeScript; [Accessed on 11th April 2019].

Lease D. (2018). TypeScript: What is it & When is it useful? Available at: https://medium.com/front-end-weekly/typescript-what-is-it-when-is-it-useful-c4c41b5c4ae7; [Accessed on 11th April 2019].

Diggins C. (2018). Best Practices for using TypeScript with React. Available at: https://medium.freecodecamp.org/effective-use-of-typescript-with-react-3a1389b6072a; [Accessed on 16th April 2019].

Kamani S. (2018). Using React with TypeScript. Available at: https://www.sohamkamani.com/blog/react/2018-08-22-using-react-with-typescript/; [Accessed on 16th April 2019].

OpenSource (2019). What is Docker? Available at: https://opensource.com/resources/what-docker; [Accessed on 02nd April 2019].

Chapple, M. (2018) Creating Database Software Options. Available at: https://www.lifewire.com/database-software-options-1019604; [Accessed on 10th February 2019].

Willems, K. (2019) SQL Tutorial: How To Write Better Queries. Available at: https://www.datacamp.com/community/tutorials/sql-tutorial-query; [Accessed on 15th March 2019].

Wenzel, K. (2017) Seven SQL Server Data Types you Must Know. Available at: https://www.essentialsql.com/commonly-used-sql-server-data-types; [Accessed on 25th March 2019].

Patton, T.(2005) Determine when to use stored procedures vs. SQL in the code. Available at: https://www.techrepublic.com/article/determine-when-to-use-stored-procedures-vs-sql-in-the-code/; [Accessed on 5th April 2019].

K. Campbell, M. (2014) Reasons to Avoid Triggers. Available at: https://www.itprotoday.com/development-techniques-and-management/reasons-avoid-triggers [Accessed on 18th Apr 2019].

Ahmed, T. (2015) Advantages and disadvantages of triggers in SQL. Available at: http://advancephp.com/advantages-and-disadvantages-of-triggers-in-sql/; [Accessed on 19th April 2019].

Tzemach, D. (2016) Checklist for Database testing. Available at: http://www.machtested.com/2014/12/checklist-for-database-testing.html; [Accessed on 26th April 2019].

Zhu, R.(2018). From MVC to Modern Web Frameworks. Available at: https://hackernoon.com/from-mvc-to-modern-web-frameworks-8067ec9dee65; [Accessed on 05th May 2019].

Code Academy(2019). MVC: Model, View, Controller. Available at: https://www.codecademy.com/articles/mvc; [Accessed on 05th May 2019].

Sherman, P. (2018). How Single-Pages Applications Work. Available at: https://blog.pshrmn.com/entry/how-single-page-applications-work/; [Accessed on 05th May 2019].

Copes, F. (2018). What is a Single-Page Application. Available at: https://flaviocopes.com/single-page-application/; [Accessed on 05th May 2019].

Wasson, M.(2013). ASP.NET - Single Page Applications: Build Modern, Responsive Web Apps with ASP.NET. Available at: https://msdn.microsoft.com/en-us/magazine/dn463786.aspx; [Accessed on 05th May 2019].

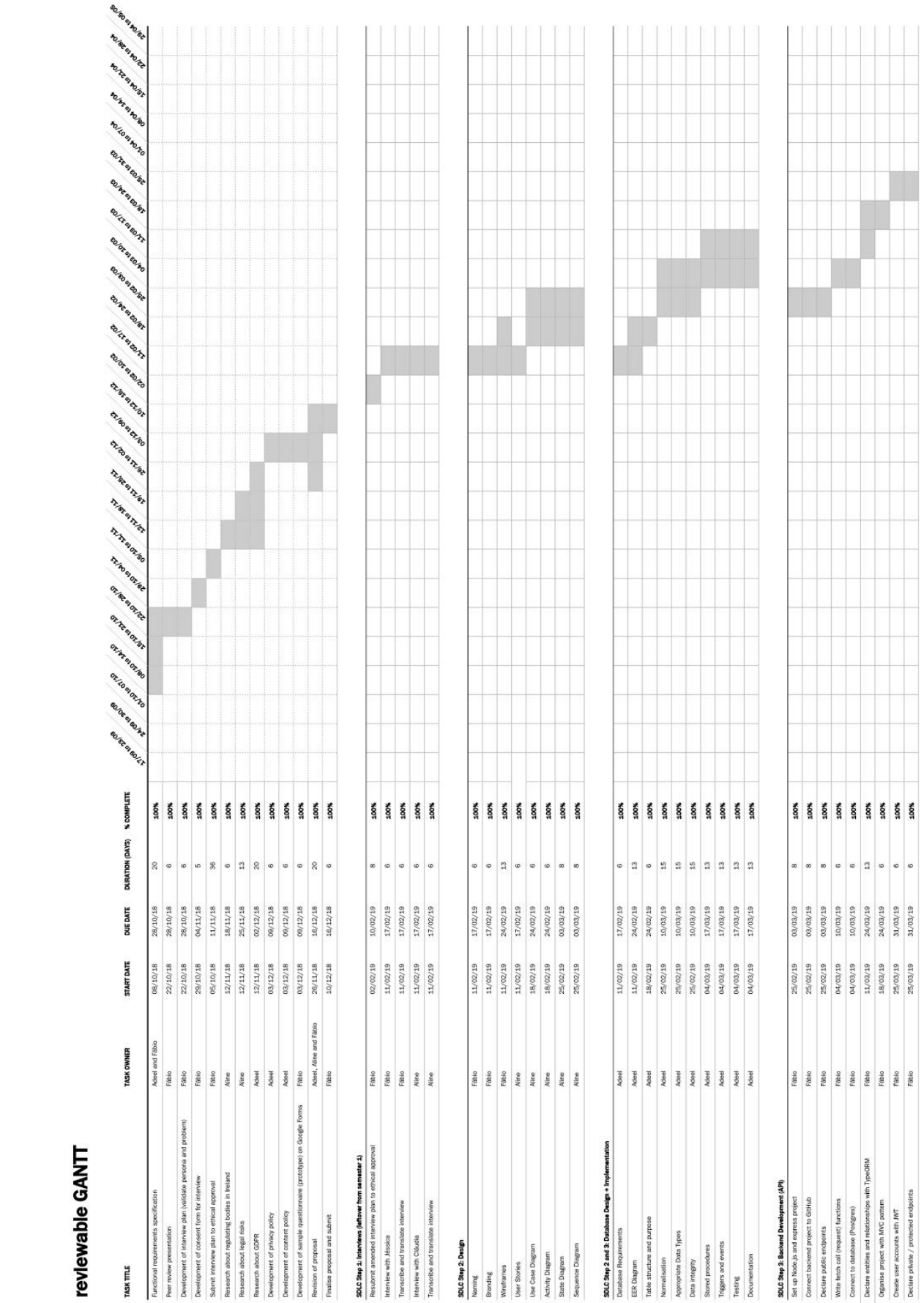
LePage, P. (2019). Responsive Web Design Basics. Available at: https://developers.google.com/web/fundamentals/design-and-ux/responsive/; [Accessed on 05th May 2019).

Marcotte, E. (2010). Responsive Web Design. Available at: http://alistapart.com/article/responsive-web-design/; [Accessed on 05th May 2019].

Girish, R. (2017). Progressive Web App Vs Responsive Web App. Available at: https://techathlon.com/?s=progressive+responsive&x=0&y=0; [Accessed on 05th May 2019).

Google (2019). Progressive Web App. Available at: https://developers.google.com/web/progressive-web-apps/; [Accessed on 05th May 2019).

APPENDIX I - GANTT CHART (PROJECT PLAN)



revIewable GANTT

TASK TITLE	TASK OWNER	START DATE	DUE DATE	DURATION (DAYS)	% COMPLETE
Write fetch call (request) functions for private endpoints	Fábio	25/03/19	07/04/19	12	100%
SDLC Step 3: Frontend Development					
Set up React project	Fábio	18/03/19	24/03/19	6	100%
Connect frontend project to Github	Fábio	18/03/19	24/03/19	6	100%
Write Header + Footer Component	Fábio	18/03/19	24/03/19	6	100%
Write Parent Questionnaire Component (page)	Fábio	18/03/19	31/03/19	13	100%
Produce reusable child component: Question	Fábio	25/03/19	07/04/19	12	100%
Connect (fetch data) from API	Fábio	01/04/19	07/04/19	6	100%
Write Parent school component (page)	Fábio	01/04/19	14/04/19	13	100%
Write Child component Review	Fábio	08/04/19	14/04/19	6	100%
Write validation of user input	Fábio	15/04/19	21/04/19	6	100%
Write SearchBar component	Fábio	15/04/19	28/04/19	13	100%
React Routing	Fábio	15/04/19	28/04/19	13	100%
CSS Styling + condtional rendering	Fábio	25/03/19	28/04/19	33	100%
Media Queries and Responsiveness	Fábio	01/04/19	28/04/19	27	100%
Documenting					
Technologies	Aline	15/04/19	28/04/19	13	100%
Model - View - Controller (MVC)	Fábio	15/04/19	28/04/19	13	100%
Backend Development	Fábio	15/04/19	28/04/19	13	100%
Single Page Applications	Aline and Fábio	15/04/19	28/04/19	13	100%
Frontend Development	Fábio	15/04/19	28/04/19	13	100%
Responsiveness	Fábio	15/04/19	28/04/19	13	100%
Progressive Web Applications (PWA)	Aline and Fábio	15/04/19	28/04/19	13	100%
Revision	Adeel, Aline and Fábio	15/04/19	05/05/19	20	100%
Format Final Document and Submit	Fábio	29/04/19	05/05/19	6	100%

APPENDIX II - AGILE PERSONAS

PEDRO, THE FUTURE STUDENT

Pedro is 25 and is a Business Graduate and works as an assistant in an office in São Paulo, Brazil. He wants to improve his English level and has decided to go abroad on a course. Pedro is now looking for an English school to enroll in Dublin. He has saved for this course and wants to get the best for his money. He has heard opinions and recommendations of schools from two friends but both of their schools do not operate any longer and he is feeling determined to get the best value from his budget, and most importantly, not waste it on a bad school (Pedro has heard about a really bad experience a friend of his once had). Pedro likes to be informed and is into technology. He has joined facebook groups to help with his research and he feels really strongly about coming on his own without the help of an agency. He has a spreadsheet where he is comparing all the schools.

PEDRO'S PROBLEM SCENARIO

- It can be difficult to compare the schools on an objective way, most good schools seem similar in quality;
- Not knowing anyone in Dublin at the moment to enquire about recommendations;
- Facebook groups are a territory for agents and school employees working on commission trying to push their schools;

PEDRO'S ALTERNATIVE TO PROBLEM

- Organising the whole research himself, with spreadsheets about each school that he has found from ILEP list on the Immigration website;
- Trying and contacting people in groups and asking their personal experience and opinion;
- Pedro is determined to decide it on his own terms and is avoiding any advice coming from the schools.

HIU KONG, THE SATISFIED FORMER STUDENT

Hiu is 24 and has now just been offered a seat in a PostGrad course in UCD. She arrived in 2016 in Ireland from South Korea to improve her English and then pursue her degree. She was very fortunate to find the right English school that met her needs. Before arriving, she was not sure about the quality of her school as her skills in English weren't as good as now. Fortunately the school she went to was outstandingly excellent and Hiu feels really grateful for her experience. During her days at the school, she often would make posts on instagram at the class with her colleagues that became close friends and Hiu has also become friends with her teachers on facebook. Hiu is very proactive and believes that by sharing her experience she could help future prospect students from her home country, as she had no authentic resource to enquire about the school before coming, and she knows that it can be a very risky decision to make, as she has heard from people and friends with negative experiences. Her cousin is coming soon to Dublin and Hiu told her everything about the school that she was in and advised her cousin to be careful with the cheaper schools.

HIU'S PROBLEM SCENARIO

- Hiu would like to help and inform other people about the great experience she has had and believes her school deserves better recognition;
- She knows she was lucky and she wishes that more people coming from her home country (were there aren't many resources about English schools) can get a better chance to go to an excellent school like she did.

HIU'S ALTERNATIVE TO PROBLEM

- At the end of the course Hiu filled out the school's quality assessment questionnaire that is sent to every student at the end of their term;
- Hiu uses her own social media channels to connect and inform other people of her very positive experience, she made a post once her course was finished, thanking friends, teachers and the staff.

MARTA, THE UNSATISFIED FORMED STUDENT

Marta is 27, from Ciudad de México, and has just completed an English course in Dublin. She intended to improve her skills in order to apply to a Post Graduate / Master's degree abroad in her field. Marta has seen a couple of opportunities and scholarships but that requires a level 6.5 on her IELTS. She was always a good student through her whole life and she always studies on her own at home so she can improve on her weak spots in the language. She is quite unsatisfied with her experience in the school: during the 6 months in her course she didn't feel the teachers care about her progress and also felt the advanced group was below her level. She tried and contacted the director and has filled out a complaint form in the school but has never heard from them, which left her more aggravated about it. She seeked advice from the regulating agencies but she was informed that there wasn't much they could do for her and because her course fee is non refundable Marta, can't simply leave, because of her Student visa in the country. Marta gave a bad review of the school on facebook and whenever someone asks for a recommendation of school, she would says "anywhere but there". She wishes more people would be aware that the school she has chosen is not a good one.

MARTA'S PROBLEM SCENARIO

- Marta believed all schools were somehow the same and thought she could trust the ILEP list as equitable to quality institutions;
- She feels there is literally no one she could complain to to make people more aware;
- She wishes more people knew that her school is not a reputable one.

MARTA'S ALTERNATIVE TO PROBLEM

- She could have compared better the two schools she had in mind before picking the one she enrolled;
- She did write this long email to ICOS and reported the school to them, and she was in touch with someone from the organization, but was informed they couldn't do much because they were approved to operate.

She considered making a couple of posters and stickers outside the location of the school to warn future students and after she finished her course she gave the school a bad rating on their facebook page and went on a couple of facebook groups and shared her experience there.

APPENDIX III - INTERVIEW PLAN

CLICK INTERVIEW PLAN FOR A PROSPECTIVE STUDENT (SUBMITTED FOR ETHICS APPROVAL)

This research is part of the Final Project for the Degree in Information Technology at CCT Dublin. It focuses on understanding how people do their research when looking for English courses abroad and what influences on their decision making and any problems they might have. The data collected will be useful to check and understand the motivations and challenges a user could have to help to build a online review platform for the International English Market.

SCREENING

Used to determine if a subject is relevant and adequate to the interview or not

- Someone looking for courses right now;
- Someone who ideally is coming to Dublin on their own without the services of an agency.

INTERVIEW QUESTIONS

Avoid YES / NO kind of questions, if used follow it with a WHAT / HOW / WHY question

1. PERSONA HYPOTHESIS

Qualitative questions that confirm and validate the potential user of the platform.

1.1 Tell me about your process and your story researching English schools.

1.2 How do (did) you do it?

2. PROBLEM HYPOTHESIS

Qualitative questions that confirm and validate the problem for the user

2.1 Where did you find information about the schools?

2.2 What makes you decide one school over another when comparing schools that have a similar price range?

2.3 Do you have any difficulties in your process of research? If yes, **what** is?

2.4 How important is the quality of the schools in your research? **How** do you assess it?

2.5 How do you decide if a personal opinion, review or recommendation online can be trusted?

2.6 If all schools all were the exact same price **what** would you do to decide which one to go to? **Why?**

CLICK INTERVIEW PLAN FOR A SATISFIED FORMER STUDENT (NOT USED)

This research is part of the Final Project for the Degree in Information Technology at CCT Dublin. It focuses on understanding how people do their research when looking for English courses abroad and what influences on their decision making and any problems they might have. The data collected will be useful to check and understand the motivations and challenges a user could have to help to build a online review platform for the International English Market.

SCREENING

Used to determine if a subject is relevant and adequate to the interview or not

- Someone who has only been to one course / institution in Dublin.

INTERVIEW QUESTIONS

Avoid YES / NO kind of questions, if used follow it with a WHAT / HOW / WHY question

1. PERSONA HYPOTHESIS

Qualitative questions that confirm and validate the potential user of the platform.

1.1 Do you think enough people know the English school you picked is a good school? **Why**?
1.2 Did you know your school was good beforehand? **How**?
1.3 Do you recommend your English School to friends and family? If yes, **Why**?

2. PROBLEM HYPOTHESIS

Qualitative questions that confirm and validate the problem for the user

2.1 Tell me about your experience. **What** was positive about your time in your English school?
2.2 Has anyone come to you and asked for a recommendations? Did you recommend your school? Tell us about it. **How** was it?
2.3 Do you interact with your school on facebook / email / instagram / social media channels? **Why**?
2.4 Have you ever checked the reputation of your school on facebook for example? Did you review them there? **Why**?

CLICK INTERVIEW PLAN FOR AN UNSATISFIED FORMED STUDENT (NOT USED)

This research is part of the Final Project for the Degree in Information Technology at CCT Dublin. It focuses on understanding how people do their research when looking for English courses abroad and what influences on their decision making and any problems they might have. The data collected will be useful to check and understand the motivations and challenges a user could have to help to build a online review platform for the International English Market.

SCREENING

Used to determine if a subject is relevant and adequate to the interview or not

- Someone who has only been to one course / institution in Dublin;

INTERVIEW QUESTIONS

Avoid YES / NO kind of questions, if used follow it with a WHAT / HOW / WHY question

1. PERSONA HYPOTHESIS

Qualitative questions that confirm and validate the potential user of the platform.

1.1 Tell me about **what** was your experience like in your English School.
1.2 Did you try to do anything when those situations start to happen? **What** exactly?
1.3 Have you seeked external help? **How** was it?

2. MARTA PROBLEM HYPOTHESIS

Qualitative questions that confirm and validate the problem for the user

2.1 Do you think the reputation of your school represents the quality of their services? **Why**?
2.2 How did you find this school? Has anyone personally recommended it to you?
2.3 What was particularly difficult when that situation happened to you? Did you know anyone else that felt the same way?

APPENDIX IV - INFORMED CONSENT FORM FOR INTERVIEWS

COLLEGE COMPUTING TECHNOLOGY DUBLIN
CLICK PROJECT INFORMED CONSENT FORM

LEAD RESEARCHERS: Adeel Mateen, Aline da Silva Luciano e Fábio Bernardo Silva

BACKGROUND OF RESEARCH: The aim of this research is to investigate and validate potential users for the development of a web application and validate the problem scenario of the project proposal. Future studies might include the investigation and validation of the proposed solution to the problem and strategies employed to achieve the desired results, such as usability tests.

PROCEDURES OF THIS STUDY: The participant in this study will be invited to answer questions regarding their experience relating to the International English Language Market in Dublin. The interview will be recorded

PUBLICATION: The results of this research will be shared with the research team, including, but not limited to the faculty and students in CCT College. The identity of the respondent will be kept confidential.

Individual results may be aggregated anonymously and research reported on aggregate results.

DECLARATION:

- I am 18 years or older and am competent to provide consent;
- I have read, or had read to me, a document providing information about this research and this consent form. I have had the opportunity to ask questions and all my questions have been answered to my satisfaction and understand the description of the research that is being provided to me;
- I agree that my data is used for scientific purposes and I have no objection that my data is published in scientific publications in a way that does not reveal my identity;
- I understand that I may stop electronic recordings at any time, and that I may at any time, even subsequent to my participation have such recordings destroyed (except in situations such as above);
- I understand that, subject to the constraints above, no recordings will be replayed in any public forum or made available to any audience other than the current researchers/research team;
- I freely and voluntarily agree to be part of this research study, though without prejudice to my legal and ethical rights;
- I understand that I may refuse to answer any question and that I may withdraw at any time without penalty;
- I understand that my participation is fully anonymous and that no personal details about me will be recorded;
- I have received a copy of this agreement.

PARTICIPANT'S NAME:
PARTICIPANT'S SIGNATURE:
DATE:

STATEMENT OF INVESTIGATOR'S RESPONSIBILITY: I have explained the nature and purpose of this research study, the procedures to be undertaken and any risks that may be involved. I have offered to answer any questions and fully answered such questions. I believe that the participant understands my explanation and has freely given informed consent.

RESEARCHERS CONTACT DETAILS: Adeel Mateen adeelmateenirl@gmail.com
Aline da Silva Luciano alinesluciano@gmail.com
Fábio Bernardo Silva fabiobernardosilva@gmail.com

INVESTIGATOR'S SIGNATURE:
DATE:

APPENDIX V - ETHICS APPROVAL APPLICATION

COLLEGE OF COMPUTER TECHNOLOGY (CCT)
COMPUTER SCIENCE AND IT FACULTY

APPLICATION FOR ETHICS APPROVAL FOR PRELIMINARY RESEARCH ON COMPUTER SCIENCE AND IT BASED PROGRAMMES.

The college must ensure that any research activity does not cause harm to those you, as researcher, are interacting with. Examples of such possible harm are: exploitation, physical harm, emotional harm, intrusion in privacy and betrayal of trust.

Application for ethics approval of your research project will be sought at the point at which the research is agreed with a principal supervisor at CCT, or from an external educational body. However, it is recognised that early exploratory work is an essential part of your studies and this too must comply with the CCT's ethics regulations.

This application form enables the Ethics Committee at CCT to monitor your preliminary research so that it complies with CCT's ethical protocols.

Your application for ethical approval should be completed as early as is practicable and submitted to the Dean of School, Graham Glanville at graham.glanville@cct.ie.

It is important to note that you should not proceed with your research without clearance from CCT.

1. INTRODUCTORY DETAILS

Name of researchers:
Aline da Silva Luciano, Adeel Mateen and Fábio Bernardo Silva

Student numbers:
2016110, 2016089, 2016149

Researchers' email addresses:
alinesluciano@gmail.com, adeelmateenirl@gmail.com and fabiobernardosilva@gmail.com

Name of academic supervisor:
Greg South

Research title:
Persona and Problem validation for Online Review Platform for the International English Language Market

Brief description of the study including data gathering methods:
This research is part of the Final Project for the Degree in Information Technology at CCT Dublin. It focuses on understanding how people do their research when looking for English courses abroad and what influences on their decision making and any problems they might have. The data collected will be useful to check and understand the motivations and challenges a user could have to help to build a online review platform for the International English Market. The data will be collected through an open interview with questions that avoid yes/no answers done through Skype. The audio will be recorded and then transcribed (and translated if necessary).

2. THE NATURE OF YOUR INTERACTION WITH OTHERS

Participants:
Two participants: Jéssica dos Santos and Cláudia Isadora Fernandes

Please explain the employment/personal relationship with those:
Personal Friends / colleagues

How will you approach the people involved in your research? What permissions will you seek prior to commencing your research?
We will conduct a Skype interview (the 2 participants are in Brazil at the moment). We developed a consent form (that is also attached to the ethical approval) that will make clear the kinds of permission we need from them. But will also explain it again before we start the interview questions. We have already contacted them informally and let them know we could only conduct the interview after the Ethical Approval has been given.

The participants have been targeted because they match with the two screening points of the interview plan (someone who is looking for courses right now and is planning without the help of an agency).
The proposed interviews will take from 15 minutes to 30 minutes maximum and will be recorded with a digital recorder (phones) next to the laptop, and then transcribed and translated, if necessary.

The interview will be securely stored in a cloud account (Google Drive) and it will be kept for 1 year, when the recording will be destroyed.

3. DO YOU INTEND TO ALLOW ACCESS TO YOUR WORK IN PROGRESS TO ANYONE OTHER THAN CCT OR THE PARTICIPANTS INVOLVED IN THE RESEARCH?

Yes. We could share with them, in they are interested, the personas and problems that we have developed as hypothesis before the interview, and then tweak accordingly after the interviews are processed. Participants will be emailed the transcribed interviews to see if there's anything they would like to change. We also contemplate to do further testing with the working prototype and would invited them to take part if interested.

4. INFORMED CONSENT

The research project should be explained to all parties immediately involved in the research as fully as possible in a way that is easily understood.

Do you agree to obtain informed consent? Yes. We will request them to have the document filled in and signed before we start the interview. The consent form is attached to the bottom of this document.

Researcher's declaration

I confirm that I have liaised with my supervisory team to complete this form.

Researchers:

Aline da Silva Luciano, Adeel Mateen and Fábio Bernardo Silva

Date

11th December 2018

On behalf of the Ethics Committee

Date

APPENDIX VI - INTERVIEW WITH JÉSSICA DOS SANTOS

TRANSCRIBED AND TRANSLATED INTERVIEW WITH JÉSSICA DOS SANTOS

15/02/2019

Fábio: Tell me how was your process and your story researching the English schools you were considering. How was it?

Jéssica: So, actually, at least to me that doesn't know anything about the place and doesn't have any reference I got attached to the information I would find in travel agencies. So I'd visit agencies and then I decided the destination. So the agency would refer to the schools they would work with and then I decided to research the schools on Google to know it better. So then, my research method was more or less getting info from agencies, sometimes friends or even Google and I'd get quotes from agencies.

Fábio: When you got quotes from the agencies, would you go to the schools websites too?

Jéssica: I'd Google the school name to see the place, pictures, but I didn't get to contact any school directly. I'd check comments on their website to check basic information, because actually I feel I don't have a lot to know because I don't know what to look for. It is a shot in the dark, suggestions really matter, I'd visit their website to check things were true.

Fábio: Understood! When you saw schools that you received from agencies and you went on their website, do you remember comparing and judging schools like: "this one is clearly better than that other school"?

Jéssica: Actually I compared based on what people's comments, but not based on my own judgement because I felt I didn't know any schools

Fábio: Okay

Jéssica: So I wouldn't jump into a conclusion based on my judgement alone, I'd check comments first.

Fábio: Do you remember where you'd see these comments?

Jéssica: On facebook, on the school social media pages, facebook groups too…

Fábio: Do you remember any situation you've read from any comments that stands out right now?

Jéssica: I saw a bit of drama sometimes about accomodation. But that's all really…

Fábio: Yeah I get it. Did you have any difficulty when you were comparing the schools? Anything you felt it was extra difficult or thought like "if only this was different"?

Jéssica: The one thing I found it very difficult was to capture the sense of location on where the schools are in relation to the city, it is quite difficult to understand it if you haven't been to the city yet: I don't have any reference of how that school is located.

Fábio: Okay, good! So moving on: how important is the quality of the schools for you in your research, and how do you 'evaluate' the quality of a school?

Jéssica: It is the most important, right? If the school is horrible it would matter a lot on my development, I think it could take longer for me to learn in a bad school. Quality is crucial.

Fábio: So how do you judge is a school is good or not, then?

Jéssica: In fact, the only way I found to measure this was looking for testimonials from former students or someone who would know the school and could share their thoughts. Because the school itself can advertise they are excellent, or the agency even, but you can't trust this alone, people who have been to the school know better. I think it is the only reference one can have.

Fábio: Great! And finally, how do you know you can trust other people's opinions online? How do you know a review is truthful or not?

Jéssica: First of all, I like to check if the person mentions certain attributes, like if they mention something about the teachers or the school's method for example and not just a rant. And secondly if there's more people that share those opinions too: there can be two completely different comments but they will share some things in common about a teacher, or something like this. So then I'd make an average of the positive versus the negative comments because there will always be negative comments.

Fábio: Perfect! The last one: If every single school had the exact same price what would you do to decide which one to go to? Why?

Jéssica: What would I do? I don't know if there is that kind of thing in Dublin, but here I went for a free class in my last English course. I know it doesn't quite work because that's abroad but like when joining a gym I would go for a month to 'try it'. Anything I could do with a shorter term commitment would be super helpful. If that was possible. Otherwise we get back to the suggestions and referrals by friends and acquaintances I think…

Fábio: Thank you so much for helping I will email you the transcripts and the further results once we have then!

APPENDIX VII - INTERVIEW WITH CLAUDIA ISADORA FERNANDES

TRANSCRIBED AND TRANSLATED INTERVIEW WITH CLAUDIA ISADORA FERNANDES

27/02/2019

Aline: Tell me how about your process finding an English School. What are you looking for in a English School?

Claudia: I am searching through exchange agencies and what I am looking for in the school is the number of Brazilians, the number of hours studied, the overall price and if the school also offers another activities such as yoga classes or acting classes something more than the regular English classes.

Aline: When you quoted in these agencies did you visited some website from the schools that they recommended?

Claudia: Some schools I checked online their location, if it is close to the city center or close to public transport, but usually I trust the information given by the agency.

Aline: Do you remember comparing one school with another, for example if one school is better than the other?

Claudia: Whenever I check the price and I see that is very low I wonder why is so cheap.

Aline: Did you search for comments about the schools?

Claudia: I didn't find anything to be honest. Because on the agencies there is no comments of the schools specifically, only positive comments about the agency.

Aline: On the agency's website?

Claudia: yes but there is only very general informations about the schools.

Aline: Did you try to find another source for information or comments in another sites such as Google or Facebook?

Claudia: Yes I did. I can't remember exactly the name of the schools but I also found a lot of information about how is the life in Ireland.

Aline: I understand. Do you trust in these information and these comments you found online?

Claudia: Usually because the comments in the agency's website are only positive you could think they are biased, but comments from people on Facebook are more honest.

Aline: Do you remember any comment that you read that stood out or anything that stayed with you?

Claudia: No, nothing.

Aline: When you did your research did you find any difficulties?

Claudia: I noticed there's no thing like a one website you go to and you find everything you need.

Aline: How important is the quality of the school for you and how do you evaluate this quality?

Claudia: For me is important if the school care about the student, not interested only in your money. Is important the quality of the teachers but also if the schools gives you support in another things too.

Aline: How do you know if someone else's opinion online can be trusted?

Claudia: I don't trust when I see that someone gives a place a 5 stars rating and doesn't explain why, it sounds fake to me.

Aline: If all schools had the exact same price what would you do to make you choice?

Claudia: I would choose some school that is close to public transport, doesn't have too many Brazilians and that offered extracurricular activities.

APPENDIX VIII - SAMPLE QUESTIONNAIRE (DRAFT)

CLICK SAMPLE QUESTIONNAIRE

This is a sample questionnaire for reviewing [Name of school]l. Questions marked with an asterisk* are mandatory. (Descriptive text)

EVALUATE YOUR ENGLISH TEACHER AT [NAME OF SCHOOL]*

How satisfied are you with your teacher? When evaluate take into account things like: How well does the instructor teach? How knowledgeable is your instructor? How clearly does he/she explain the course material? How concerned he/she was that students were learning the material? How organised and prepared he/she is for the classes? How well does your instructor answer students' questions?

Very satisfied	Satisfied	Neither satisfied or dissatisfied	Dissatisfied	Very dissatisfied
▢	▢	▢	▢	▢

EVALUATE THE FACILITIES AT [NAME OF SCHOOL]*

How well-maintained are the facilities at [Name of School]?

Very well-maintained	Well-maintained	Somewhat well-maintained	Not so well-maintained	Not at all well maintained
▢	▢	▢	▢	▢

EVALUATE THE STAFF AT [NAME OF SCHOOL]*

How helpful and friendly was the staff? How easy is to obtain resources you need?

Extremely helpful and friendly	Very helpful and friendly	Somewhat helpful and friendly	Not so helpful and friendly	Not at all helpful and friendly
▢	▢	▢	▢	▢

HOW LIKELY IS THAT YOU WOULD RECOMMEND [NAME OF SCHOOL]*

Extremely likely	Very likely	Somewhat likely	Not so likely	Not at all likely
▢	▢	▢	▢	▢

WOULD YOU LIKE TO LEAVE A COMMENT?

Comments are optional. Please read the code of conduct. You have 512 characters.

APPENDIX IX - FUNCTIONAL REQUIREMENTS

FUNCTIONAL REQUIREMENTS FOR DEVELOPMENT

We need to validate the student's identity with the schools somehow;

Minimum data required from student to be verified by school: *FULL NAME, EMAIL, DATE OF BIRTH*, post *ANONYMOUS* or not (checkbox). Optional data: *STUDENT ID;*

Identity questions and review questions will need room for a descriptive auxiliary text. Something like: *STUDENT ID / "Please inform if you have a student ID or student number that you know it could be used by the school to facilitate when verifying your identity";*

Keep personal data collected from students the simplest as possible, as it is very unlikely that anyone would like to fill in a very comprehensive form just to leave a review;

Personal data to be asked AFTER reviewing questions on the school;

Use of a 5 point Likert scale instead of a 10 point one has better results;

Keep review process short and easy, maximum 5 questions with 5 point scale and an optional comment at the end;

I have read and accept the Terms and Conditions text;

Restrict the comment section by a limit of characters and inform user;

A search bar is necessary to look up for schools;

The reviewing process CAN'T demand the user to be logged in or create an account;

We need to list and define things like: terms and conditions of the platform, code of conduct for leaving comments, GDPR, no spam, no sharing data with third party, etc;

Review form must highlight mandatory questions not answered (red highlight) and help user to fill in form.

APPENDIX X - DATABASE REQUIREMENTS

Click review system allows user to give reviews about English school they have studied or they are currently studying. Each Review submitted has Review ID, first name, lastname, DOB, email, nationality, and school name. Email will be unique for all students;

Each user can post one review on one school. School can have many reviews from different students;

Review submitted also contains Faculty Rating, Facility Rating, Staff Rating, Comments, DATETIME;

Review also has Verification status and Post status;

Reviews posted are either verified by schools and by online platform;

Reviews posted are managed by admin users;

Each School has a unique id, name, address, email, contact person name and phone number, username and password;

Each user can post one review on one school. School can have many reviews from different students;

Review has review id, school name, student email, and student name, review text, date, verification status and post status;

User can choose to post review as ANONYMOUS if they wish;

Click review system has different admin users who will assess review content before posting it on web app. Admin users have id, name, email, username and password;

After review has been submitted it will sent to school for verification. If review is verified it will posted on to school main page as verified review. Else if school doesn’t verify or do not respond 3 working days it will posted as unverified. Verified status can only be authorized by school;

It is only Admin Users who can post or delete any review;

Web application will only show those review which are allowed by admin users.

APPENDIX XI - CLICK CONTENT POLICY

CLICK CONTENT POLICY (CODE OF CONDUCT)

We always appreciate hearing about your study experiences and value your contributions to our site! But we also want to make sure that this is a safe and trustworthy space. To help us achieve this goal, and to ensure your content is published as quickly as possible, please ensure to follow our Content Policy:

Respectful

To continue a safe, family-friendly environment, Click will not allow profanity or vulgarities on our site. We will not approve or publish any content that contains sexually explicit comments, hate speech, prejudiced language, threats, or personal insults. Any content that defines or portrays first-hand participation in or advocates for illegal activities will be removed. Content containing graphic descriptions of death, injuries or violent criminal acts will not be posted.

First Hand

Click wants to hear about your experience. This means no second-hand information, rumours, or quotations from other sources. Please, only provide reviews based on substantial experiences you have had and assured to include sufficient detail in your review that other students will find your advice supportive.

Give us your best, most accurate review and comments, just make sure your content is yours! Do not include quoted material from other sources. Any content plagiarized from other websites, reviewers, emails, or printed materials will be removed.

Non-promotional

Content should be non-commercial for all reasons and we reserve the right to reject any reviews that violate this policy. Click does not allow reviews that contain links or content solely included for promotional purposes.

Pertinent

Please ensure content is relevant and helpful. Click does not allow content that promotes fanaticism for individuals or groups of people based on their race, gender, religion, gender identity, sexual orientation or nationality. Content boosting a boycott or smear campaign for any business will be removed. Keep in mind they are reading your review to understand what an experience with the business might be like. For this reason, please don't include any personal opinions about politics, ethics, religion or wider social issues.

Privacy

Click respects your privacy and the privacy of the businesses. We want to know about your experience but please keep personal or exclusive information to yourself. Content containing any type of personal information can be removed. This includes both the reviewer's information and the information of others. Please do not disclose door codes or passwords or any kind of secret information.

Easy to Read

Make your content helpful and make it easy by using the correct alphabet for your language and avoiding machine translations that make your review hard to read.

Unbiased

Reviews are most supportive when they provide unbiased advice. Click doesn't allow individuals or entities post reviews of their business or competing establishments. Reviews submitted in an attempt to blackmail a listing will not be published. If you suspect a review is fake or doesn't meet Click content policy, you can use the “Report Problem with Review” feature located at the bottom of each review.

Listed by Click

Content must relate directly to the school to which it is submitted, so please ensure you are adding your comments to the correct listing on Click Review. If you post content to a specific listing on our site it must be for an school that meets our listing requirement.

APPENDIX XII - GDPR DATA SHARING CONSENT

DATA SHARING CONSENT

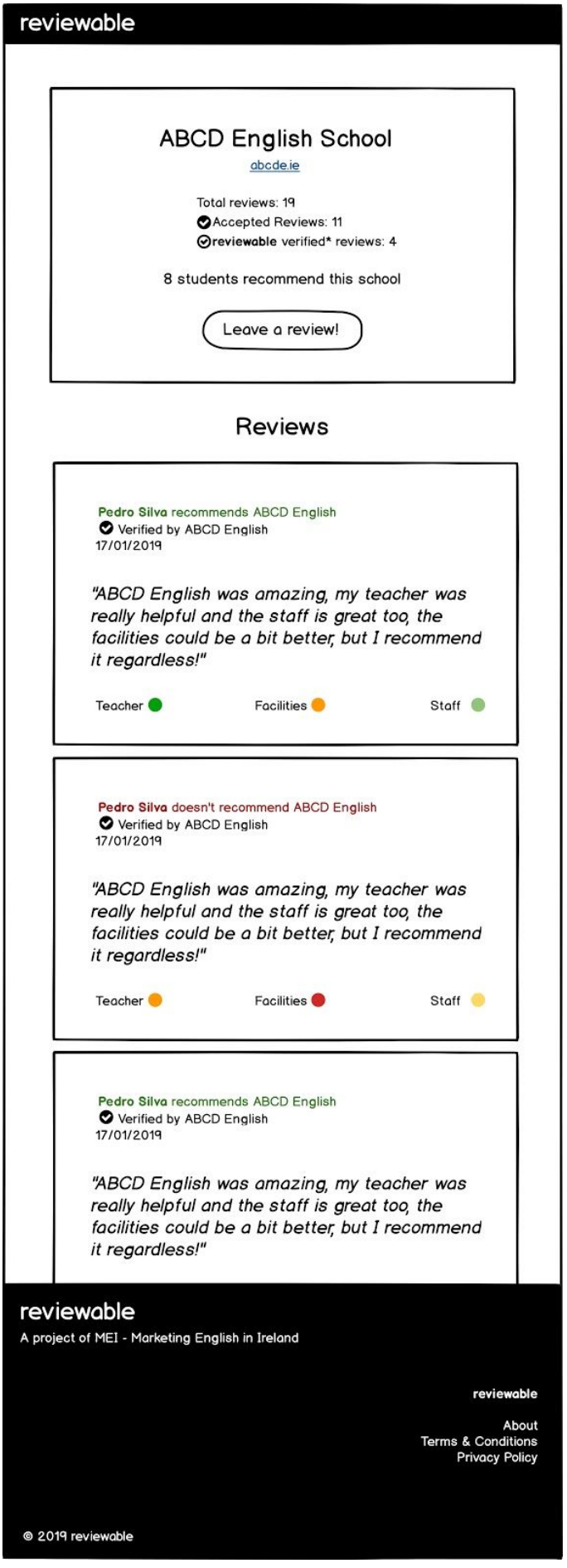
I give my permission for Click to share my personal information with another organisation in connection to review verification. I understand that Click may hold and share my information such as my rights under the Data Protection Act of GDPR will not be affected.

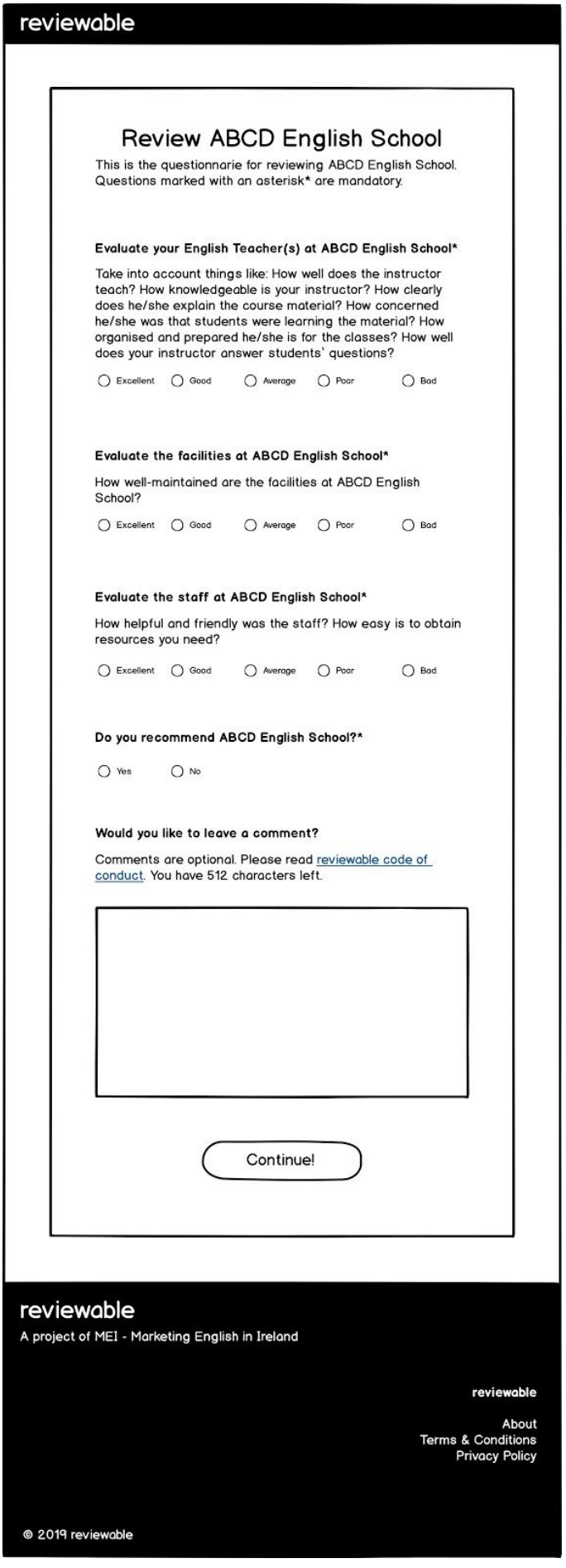
STATEMENT OF CONSENT

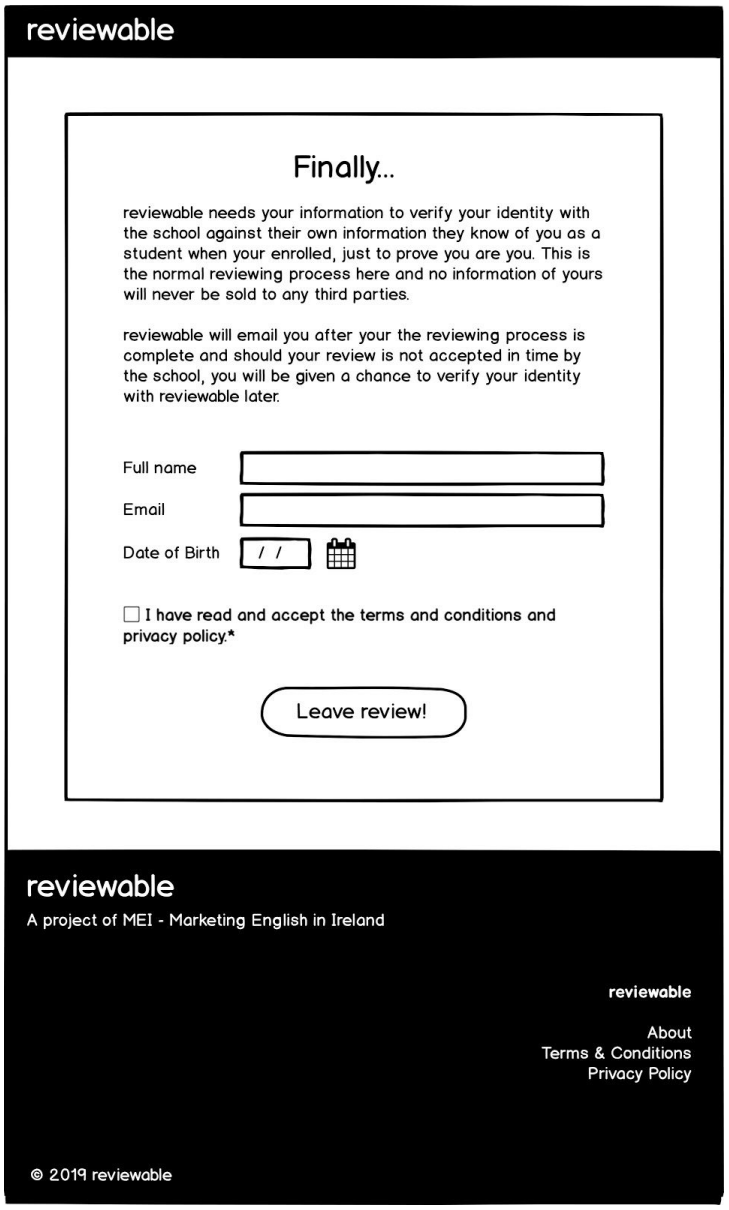
- I understand that personal information is held about me;
- I have had the opportunity to take the option of sharing or not sharing information about me;
- I understand that Categories of personal information include: Full Name, Email, Date of birth, Schools attended;
- I agree that personal information about me may be shared with the school being reviewed for the purpose of the verification of my identity;
- I agree my consent to share personal information is entirely **voluntary;**
- I understand that I may **withdraw** my consent at any time.

▢ I have read and agreed to the above and to my information being shared and gathered between services*

APPENDIX XIII - WIREFRAMES


reviewable
ABCD English School
abcde.ie
Total reviews: 19
Accepted Reviews: 11
reviewable verified* reviews: 4
8 students recommend this school
Leave a review!
Reviews
Pedro Silva recommends ABCD English
Verified by ABCD English
17/01/2019
"ABCD English was amazing, my teacher was really helpful and the staff is great too, the facilities could be a bit better, but I recommend it regardless!"
Teacher
Facilities
Staff
Pedro Silva doesn't recommend ABCD English
Verified by ABCD English
17/01/2019
"ABCD English was amazing, my teacher was really helpful and the staff is great too, the facilities could be a bit better, but I recommend it regardless!"
Teacher
Facilities
Staff
Pedro Silva recommends ABCD English
Verified by ABCD English
17/01/2019
"ABCD English was amazing, my teacher was really helpful and the staff is great too, the facilities could be a bit better, but I recommend it regardless!"
reviewable
A project of MEI - Marketing English in Ireland
reviewable
About
Terms & Conditions
Privacy Policy
© 2019 reviewable


reviewable
Review ABCD English School
This is the questionnarie for reviewing ABCD English School.
Questions marked with an asterisk* are mandatory.
Evaluate your English Teacher(s) at ABCD English School*
Take into account things like: How well does the instructor teach? How knowledgeable is your instructor? How clearly does he/she explain the course material? How concerned he/she was that students were learning the material? How organised and prepared he/she is for the classes? How well does your instructor answer students` questions?
Excellent Good Average Poor Bad
Evaluate the facilities at ABCD English School*
How well-maintained are the facilities at ABCD English School?
Excellent Good Average Poor Bad
Evaluate the staff at ABCD English School*
How helpful and friendly was the staff? How easy is to obtain resources you need?
Excellent Good Average Poor Bad
Do you recommend ABCD English School?*
Yes No
Would you like to leave a comment?
Comments are optional. Please read reviewable code of conduct. You have 512 characters left.
Continue!
reviewable
A project of MEI - Marketing English in Ireland
reviewable
About
Terms & Conditions
Privacy Policy
© 2019 reviewable


reviewable
Finally...
reviewable needs your information to verify your identity with the school against their own information they know of you as a student when your enrolled, just to prove you are you. This is the normal reviewing process here and no information of yours will never be sold to any third parties.
reviewable will email you after your the reviewing process is complete and should your review is not accepted in time by the school, you will be given a chance to verify your identity with reviewable later.
Full name
Email
Date of Birth
/ /
I have read and accept the terms and conditions and privacy policy.*
Leave review!
reviewable
A project of MEI - Marketing English in Ireland
reviewable
About
Terms & Conditions
Privacy Policy
© 2019 reviewable


reviewable
Success!
Thank you for taking part into making the International Language Market more transparent! Your review is under revision by ABCD English School and you will be contacted by email once your review is accepted.
Spread the word!
reviewable
A project of MEI - Marketing English in Ireland
reviewable
About
Terms & Conditions
Privacy Policy
© 2019 reviewable

APPENDIX XIV - STORED PROCEDURES

To insert Data into Review Table

```
CREATE PROCEDURE insert_reviews(
IN `sID` INT,
IN `facrating` INT,
IN `facirating` INT,
IN `staffrating` INT,
IN `comments` VARCHAR(50),
IN `Recommendation` ENUM('Yes','No'),
IN `PostReviewAs` ENUM('MyName','Anonymous') )
BEGIN
insert into reviews
set
facultyRating = facrating,
facilityRating =facirating,
staffRating = staffrating,
comments =comments,
recommendation=Recommendation,
postReviewAs=PostReviewAs,
reviewDateTime=current_timestamp,
schoolId=sID;
END
```

To update Data into Users Table

```
CREATE PROCEDURE update_users(
IN userFullName VARCHAR(40),
IN userEmail VARCHAR(40),
IN userDOB DATE,
IN userNationality VARCHAR(15))
BEGIN
DECLARE uID INT;
DECLARE sID INT;
SET  uID= (SELECT MAX(userId) FROM reviews);
SET sID= (SELECT schoolId FROM reviews WHERE  userId=(SELECT MAX(userId) FROM reviews));
UPDATE users
set
userFullName=userFullName,
userEmail=userEmail,
userDOB=userDOB,
userNationality=userNationality
WHERE userId=uID AND schoolId=sID;
END//
```

To Insert New School into Schools Table

```
CREATE PROCEDURE insert_schools(
IN schoolName VARCHAR(50),
IN schoolAddress VARCHAR(500),
IN schoolEmail VARCHAR(50),
IN contactPersonName VARCHAR(50),
IN schoolPhone VARCHAR(15),
IN schoolUsername VARCHAR(15),
IN schoolPassword BLOB
)
BEGIN
insert into schools
set
schoolName=schoolName,
schoolAddress=schoolAddress,
schoolEmail=schoolEmail,
```

```
contactPersonName=contactPersonName,
schoolPhone=schoolPhone,
schoolUsername=schoolUsername,
schoolPassword=schoolPassword;
END//
```

To Display reviews by school Id

```
CREATE PROCEDURE `reviewsBySchool`(IN `sID` int)
BEGIN
SELECT users.UserFullName, reviews.facultyRating, reviews.facilityRating, reviews.staffRating, reviews.comments,
Reviews.recommendation, reviews.postReviewAs, reviews.reviewDateTime FROM (reviews left JOIN schools ON reviews.schoolId
= schools.schoolId)
left JOIN users on users.userId = reviews.userId
WHERE reviews.schoolId= sID AND users.schoolId=sID;
END//
```

To Get Total Number of School Verified Reviews

```
CREATE PROCEDURE sver(IN SID int)
BEGIN
select count(verificationStatus) AS VerfiedBySchool from users where schoolId=SID AND verificationStatus="Verified";
END//
```

To Get Total Number of Platform Verified Reviews

```
CREATE PROCEDURE pver(IN SID int)
BEGIN
select count(verificationStatus) AS VerfiedByPlatform from users where
schoolId=SID AND verificationStatus="PVerified";
END//
```

To Get Total Number of School Recommendation

```
CREATE PROCEDURE recom(IN SID int)
BEGIN
select count(recommendation) AS TotalRecoomendation from reviews where schoolId=SID AND recommendation="Yes";
END//
```

Get Overall School Ranking by Highest Ratings

Get Complete School Ratings

```
CREATE PROCEDURE `completeSchoolRatings`()
BEGIN
select s.schoolName AS SchoolName, round(avg(r.staffRating),2) AS StaffRating,round(avg(r.facultyRating),2) AS FacultyRating,
round(avg(r.facilityRating),2)AS FacilityRating,
(ROUND(((ROUND(AVG(r.staffRating),2))+ROUND(AVG(r.facultyRating),2)+
(ROUND(AVG(r.facilityRating),2)))/3,2)) as OverAll_SchoolRating
from reviews r inner join schools s where r.schoolId=s.schoolId group BY r.schoolId ORDER BY OverAll_SchoolRating DESC;
END//
```

Count School Reviews

```
CREATE `countAllSchoolReviews`()
BEGIN
SELECT s.schoolName, count(ss.schoolId) As TotalReviews_Submitted FROM reviews ss INNER JOIN schools s
WHERE s.schoolId=ss.schoolId group by ss.schoolId ORDER BY TotalReviews_Submitted desc;
END //
```

Get School Details

```
CREATE PROCEDURE `get_school_details`(IN `SID` int)
BEGIN
SELECT schoolName, schoolWebsite, schoolAddress, schoolCity,schoolEmail, schoolPhone from schools where schoolId=SID;
END//
```

Platform Verified reviews by School

```
CREATE `platformVerified`(IN `SID` int)
BEGIN
```

```
select count(verificationStatus) AS VerfiedByPlatform from users where schoolId=SID AND verificationStatus="PVerified";
END//
```

School Verified Reviews by School

```
CREATE `schoolVerified`(IN `SID` int)
BEGIN
select count(verificationStatus) AS VerfiedBySchool from users where schoolId=SID AND verificationStatus="Verified";
END
```

To get Total Number of Reviews by SchoolName

```
CREATE PROCEDURE total_reviews(IN SID int
BEGIN
select count(schoolId) AS TotalReviews from reviews where schoolId=SID;
end //
```

To get User by School

```
CREATE `userBySchool`(IN `sID` int)
BEGIN
SELECT userFullname, userEmail , userDOB, userNationality, verificationStatus from users where schoolId=sID;
END//
```

APPENDIX XV - TRIGGERS

Check if the Rating is Valid for Data Insert

```
CREATE PROCEDURE check_rating(IN rating1  INT, IN rating2 INT, IN rating3 INT)
BEGIN
IF rating1 >5 or rating1 < 1 THEN
SIGNAL SQLSTATE '45000'
SET MESSAGE_TEXT = 'Faculty Rating is not Valid';
END IF;
IF rating2 >5 or rating2 < 1 THEN
SIGNAL SQLSTATE '45001'
SET MESSAGE_TEXT = 'Staff Rating is not Valid';
END IF;
IF rating3 >5 or rating3 < 1 THEN
SIGNAL SQLSTATE '45002'
SET MESSAGE_TEXT = 'Facility Rating is not Valid';
END IF;
END $

CREATE TRIGGER ratingBeforeInsert BEFORE INSERT ON reviews
FOR EACH ROW
BEGIN CALL check_rating(new.facultyRating,new.staffRating, new.facilityRating);
END$

CREATE TRIGGER ratingBeforeupdate BEFORE update ON reviews
FOR EACH ROW
BEGIN CALL check_rating(new.facultyRating,new.staffRating, new.facilityRating);
END $
```

INSERT Data into User Table after Student submit the Review Details

```
CREATE TRIGGER `userInsert` AFTER INSERT ON `reviews` FOR EACH ROW BEGIN
insert into users (schoolId, userId)
values(new.schoolId, new.userID);
END
```

Delete user Data from Reviews Table if User Personal Data in User Table is Empty

```
CREATE deleteuser AFTER DELETE ON `users` FOR EACH ROW BEGIN
delete from reviews where userID=old.userId;
END
```

APPENDIX XVI - ILEP LIST

NAME OF SCHOOL	ADDRESS	CONTACT EMAIL	CONTACT PHONE	CONTACT NAME	AWARDING BODY	DURATION	HOURS PER WEEK
Academic Bridge Ltd	33 Gardiner Place, Dublin 1	info@abcollege.ie	01-8788616	James Hendicott, Ricardo Kindler, Anne McAvin	British Council and Cambridge English	25 weeks	15 hours
ACET	16 St. Patrick's Place, Wellington House, Wellington Road, Cork	info@acetireland.ie	021-4551661	Joelle Coade / Laura Dwyer-Canton	CELA	25 week minimum	20 hours
Active Language Learning	78-79 Upper George's Street, Dun Laoghaire, Co. Dublin	info@all.ie	01-2843420	Kay Mahon / Carol Cregg	CELA	25 weeks	20 hours
Alpha College of English	4 North Great George's Street, Dublin 1	admin@alphacollege.com	01-8747024	Marie Shortt	ACELS	25 weeks	20 hours
Apollo Language Centre	5 Lad Lane, Dublin 2	steven@apollolanguagecentre.com	01-4305437	Steven O'Dwyer	IELT	25 Weeks	15 hours
Arena School of English	67 Harcourt Street, Dublin 2	info@arenaschool.com	01-4789202	Patrick Delaney	ACELS / QQI	25 weeks	15 hours
ATC Language and Travel	Dunluice House, Strand Road, Bray, Co. Wicklow	info@atcireland.ie	01-2845512	Nadine Early	ACELS	33 weeks	20
Atlantic Language Galway, Atlantic Language Dubl	Fairgreen House, Fairgreen Road, Galway	info@atlantic.ac	091-566053	John Daly	ACELS	25 weeks	15
Atlantic School of English and Active Leisure	Cooradarrigan, Schull, Co. Cork	info@atlantic-english.com	028-28943	Barabara Connelly	CELA	25 weeks	15 mornings only. 25 including afternoons
Atlas Language School	Portobello House, 34A South Richmond Street, Dublin 2	alan@atlaslanguageschool.com	01-4782845	Alan Brennan	ACELS / QQI	25 weeks	18.33 hours
Avanti Language Institute	1A South Main Street, Naas. Co. Kildare	info@avantilanguage.com	045-881661	Shane McCann	ACELS	26 weeks	20 hours
Babel Academy of English (Ireland)	10 Merrion Square, Dublin 2.	info@babelacademy.ie	01 5477 665	Roisin Keane	IELT/ACELS	25 weeks	15 hours
Berlitz Dublin	5 Merrion Street Lower, Dublin 2	director@berlitz-dublin.ie	01-6449742	Cass Beecham	CELA	25 weeks (minimum)	15 hours
Birchwater Education	Riverstone Clocktower, Hartstonge Gate, Henry Street, Limerick	info@bwe.ie	087 0956310	Ian Gallagher	Trinity College London	25 weeks	15 hours
Castel Education	Innovation Works 1, Unit 10, Kerry Technology Park, Dromthacker, Tralee, Co. Kerry	info@casteleducation.com	066-7129720	Joe McGarry	CELA / British Council and IDP IELTS Australia	33 weeks	20
Castleforbes College Ltd.	1 Belvedere Court, 77 Upper Gardiner Street, Dublin	info@castleforbescollege.com	01-8746148	Adrian Kilgallon	ACELS	25 weeks	15 hours
Celtic School of English	3 Greenview Terrace, Tralee, Co. Kerry	anne@celticschoolofenglish.com; info@celticschoolofenglish.co	066-718008	Anne O'Keeffe	CELA	25 weeks	17
Centre of English Studies	31 Dame Street, Dublin 2	dos@ces-schools.com; Sam@ces-schools.com	01-6714233	Peter Loftus	IELTS / British Council	32 weeks	20
Chapterhouse Dublin	29 / 30 Usher Quay, Dublin 8	director@chapterhouse.education	01-5586416	Jonathan Duignan	ACELS	25 weeks	15 hours
Citas College Dublin	Unit C3, The Millhouse, The Steelworks, Foley Street, Dublin 1	enamul@citas.ie	01-8782212	Enamul Kabir	Pearson	25 weeks	15 hours
Cork English Academy	Clarkes Bridge House, Hanover Street, Cork	info@corkenglishacademy.com	021-4276012	Catherine O'Connor	ACELS	25 weeks	20 hours
Cork English College	St. Patrick's Bridge, Cork City	info@corkenglishcollege.ie	021-4551522	Triona McCarthy	CELA	25 weeks	20 hours
Cork English World	Crawford Park, Bishop Street, Cork	msheehan@cew.ie	021-4320005	Majellia Sheehan Harris	British Council / CELA / IDP Australia	25 weeks	15
Delfin English School	2 Parnell Square East, Dublin 1	info@delfin.ie	01-8722037	Ciaran Murphy	CELA	25 weeks	15 hours
Direct English	No. 9 Patrick's Hill, Cork	info@directenglishireland.ie	021 2411131 / 021239479(	Afreen Baig	ACELS	25 weeks	15 hours
Donegal English Language School	West End, Budoran, Co. Donegal	info@donegallanguageschool.com	071-9841288	Gina Witherow	Cambridge	25 weeks	15 hours
Dorset College	8 Belvedere Place, Dublin 1	hugh.hughes@dorset-college.ie	01-8306129	Hugh Hughes	ACELS	25 weeks	15 hours
Dublin Business School	13 / 14 Aungier Street, Dublin 2	lori.johnston@dbs.ie	01-4177500	Lori Johnston	ACELS	25 weeks	23 hours
Dublin Centre of Education	31-32 North Cumberland Street, Dublin 1	info@dcedu.ie; dos@dcedu.ie	01-5381502	Carla Kerr, Ahmed Omer	IELT	25 Weeks	15 hours
Dublin City University Language Services	Dublin City University, Glasnevin, Dublin 9	english@dcu.ie	01-7008443	Laura Gormley	ACELS	25 weeks	18.33 hours
Dublin College of Advanced Studies (DCAS)	98 Capel Street, Dublin 1 / Ulysses House, 23-24 Foley Street, Dublin 1	info@dcas.ie	01-8783377	Paul Nicolle	Test of Interactive English (TIE)	27 weeks	15 hours
Dublin Cultural Institute Limited	34A Bachelors Walk, Dublin 1	info@dublinci.com	01-8728470	Felicity Duncan	ACELS	25 weeks	15 hours
Dublin International Foundation College	Griffith College Campus, South Circular Road, Dublin 8	Eimear@difcdublin.ie; Cliona@difcdublin.ie	01-2745782	Eimear Morhan	British Council	25 weeks	20 hours
EC Dublin	4 Kenilworth Square, Dublin 6	GillianDavidson@ecenglish.com	01-4971499	Gillian Davidson	CELA / British Council	25-34 weeks	20 hours
EF International Language Schools Ltd	29 / 30 Fitzwilliam Square, Dublin 2	warren.reid@ef.com	01-6114220	Warren Reid	ACELS	35 weeks	21 hours 20 mins
ELI Dublin	7 Herbert Place, Grand Canal Dock, D02 EH93, Dublin 2	peter@elidublin.com	01 5598717	Peter Hutchinson	Trinity College London	25 weeks	15 hours
ELTA	160 Capel Street, Dublin	hello@elta.ie	01-6799715	Monique Walsh	CELA	25 weeks	15 hours
Emerald Cultural Institute	3 Larchfield Road, Goatstown, Dublin 14	emerald@eci.ie	01-4973361	Mauro Biondi	ACELS	25-35 weeks	20 hours
English Language Centre Ireland	3A / 3B Market Court, Main Street, Bray, Co. Wicklow	dkinch@elcischool.com	01-2745782	Declan Kinch	CELA	25 weeks	15 hours
English Language Ireland	The Schoolhouse, 46 Idrone Park, O'Brien Road, Carlow, Co. Carlow	info@englishlanguage.ie	059-9140227	Terry Coffey	British Council	25+ weeks	25
English Studio	Abbey House, Jervis Street, Dublin 1	info@englishstudio.com	01-5143789	Louise Guyett	ACELS	26 weeks	15hours
Englishour	3 Abbey Street Lower, Dublin 1	info@englishour.ie	01-8786333	Darren Orr	TIE	25 weeks	15
Erin School of English	19-22 Dame Street, Dublin 2	info@erin-school.com	01-8783684	Svetlana Vladovich	CELA	25 weeks	15
Europa Ingles	Lakeview House, Drumcoura Lake Resort, Ballinamore, Co. Leitrim	terry@europaingles.com	071 9645721	Terence Moohan	Trinity College London	26 weeks	15 hours
Everest Language School	15 Westmoreland Street, Dublin 2	info@EverestLanguageSchool.com	01-5594919	Anne-Marie Connolly	Cambridge ESOL	25 weeks	20 hours
Frances King School of English (Ireland) Ltd	26 Merrion Square, Dublin 2	neil.holohan@francesking.com	01-4866000	Neil Holohan	ACELS	25 weeks	16 hours 40 mins
Galway Cultural Institute	GCI House, Salthill, Galway	Celestinel@gci.ie	091-863100	Celestine Rowland	CELA	25 weeks (+holidays)	15 hours
Galway Language Centre	The Bridge Mills, Bridge Street, Galway	info@galwaylanguage.com	091-566468	Patrick Creed	ACELS	25 weeks	15 hours
Grafton College of Management Sciences	Harbour House, Portobello Dublin 8	nicholaskelly@graftoncollege.ie	01-8726597	Nicholas Kelly	ACELS	25 weeks	15 hours
Griffith College Cork	Wellington Road, Cork	richard.mchugh@griffith.ie	01-4150400	Richard McHugh	ACELS	25 weeks	15 hours
Griffith College Dublin	South Circular Road, Dublin 8	richard.mchugh@griffith.ie	01-4150400	Richard McHugh	ACELS	25 weeks	15 hours
Griffith College Limerick	O'Connell Avenue, Limerick City, Limerick	richard.mchugh@griffith.ie	01-4150400	Richard McHugh	ACELS	25 weeks	15 hours
Horner School of English	40 Fitzwilliam Street Upper, Dublin 2	david@hornerschool.com	01-6622911	David Horner	ACELS	25 weeks	16.66
IBAT College Dublin	16-19 Wellington Quay, Temple Bar, Dublin 2	enquiry@ibat.ie	01-8075055	Shane Ormsby	ACELS	25 weeks	15 hours
ICOT (International College of Technology)	28 Westmoreland Street, Dublin 2 / 11 Drinan Street, Co. Cork	info@icot.ie	01-6718450	Donagh McAuley	TIE	25 weeks	15 hours
International House Dublin	Block B, the Steelworks, Foley Street, Dublin 1	info@ihdublin.com	01-6355850	Carmel Hickey	ACELS	25 weeks	20
International House Galway	Innovation Centre, Galway Mayo Institute of Technology, Dublin Road, Galway	info@ihgalway.ie	091-381110	Mary Grennan	Trinity College London	25 weeks	15 hours
Irish College of English	6 Church Road, Malahide, Co. Dublin	info@iceireland.com	01-8453477	Susan McElhinney	ACELS / TIE	25 weeks	15 hours
ISI Dublin	4 Meetinghouse Lane, Mary's Abbey Dublin 7 (Main centre and headquarters) / 39 Parnell Square West, Dubl	info@isi-ireland.ie	01-8727888	Brian Burns	Trinity College London	26 weeks	15 hours
Kaplan International English	Presbytery Building, 7 Exchange Street Lower, Temple Bar, Dublin 8	dublin@kaplan.com	01-6727122	Sarah Brown	British Council / CELA / IDP	25 weeks	15
Killarney School of English	Muckross Road, Killarney, Co. Kerry	info@ksoe.com	064-6636630	Nicola Bradwell	CELA	25 weeks	15 hours
Liffey College	1/4 Swift's Alley, Francis Street, Dublin 8	info@liffeycollege.ie	01-4444447	Haseeb Ahmed, Cormac McLoughlin	Cambridge	25 weeks	15 hours
Mary Immaculate College	South Circular Road, Limerick	holly.cowman@mic.ul.ie	061-774787	Holly Cowman	University of Limerick	25 weeks	20 hours
N.E.D. Training Centre	40 Lower Dominick Street, Dublin 1 / Chapel House, Chapel Court, Cathedral Place, Co. Limerick	info@ned.ie	01-8783047	David Russell	TIE / IELT	25 weeks	15 hours
National University of Ireland, Galway	University Road, Galway	eganml@nuigalway.ie	091 495177	Maeve Egan	NUIG	25 weeks	16 hours
Native Speaker Ltd	Innovation Centre, IT Sligo Campus, Ballinode, Co. Sligo	info@nativespeaker.ie	071-9147728	John Joe Callaghan	CELA	25 weeks	15
NCG Dublin	1 Clarinda park North, Dun Laoghaire, Co. Dublin	gtarr@newcollegegroup.com	01-2301100	Gabriella Tarr	British Council / CELA / IDP Australia	25 weeks	15 hours
OHC	Zhivago Building, 73 Capel Street, Dublin 1	info@elaireland.com	01-8044116	Georgina Collier	ACELS / CELA	25 weeks	15
Oscars International	33 / 34 Dame Street, Dublin 2	info@malvernhouse.ie	01-6975525	Aidan O'Shea	British Council / IDP	25 weeks	15 hours
Pace Language Institute	30 Dublin Road, Bray, Co. Wicklow	info@paceinstitute.ie	01-2760922	Evin Delaney	CELA	25 weeks	15

Parlez Pronto Language School	9 St. Patrick's Hill, Cork	parlezp@iol.ie	021-2394790	Afreen Baig	CELA	25 weeks	15 hours
Rightword Language Institute	89 O'Connell Street, Limerick City, Limerick	hello@rightwordinstitute.com	061-512126	Andrew Sweeney	British Council	25 Weeks	15 hours
SEDA College	68-72 Capel Street, Dublin 1	directorofstudies@seda.ie	01-4734915	Síbéal Turraoin	TIE	25 weeks	15 hours
St. Angela's College Sligo	Lough Gill, Sligo, Co. Sligo	nplunkett@stangelas.nuigalway.ie	071 9135623	Niamh Plunkett	British Council	30 weeks	15 hours
Student Campus	17-19 Patrick Street, Limerick, V94PX46	info@studentcampus.ie	061-414732	Meldan Murphy	Interactive English Language Test Ltd	25 weeks	15 hours
Swan Training Institute	9-11 Grafton Street, Dublin 1	oliver@selt.ie	01-6775252	Oliver Lyons	ACELS	25+ weeks	20-26 hours
The Asana School of English	Quay Street, Cahersiveen, Co. Kerry	info@asanaireland.com	087 7671327	Colm Breathnach	ACELS	25 weeks	20 hours
The International School of English	26 Harcourt Street, Dublin 2	dos@ise.ireland.ie	01-6219039	Marianne Bird	Trinity College London	25 weeks	15 hours
The Linguaviva Centre	45 Lower Leeson Street, Dublin 2	info@linguaviva.com	01-6783984	Paul Barton	Cambridge ESOL	25 weeks	16.66 hours
The Slaney Language Centre Ltd	Kinshella Castle, Slaney Manor, Ferrycarrig, Wexford	info@slaneylanguage.com; info@wexford-language.com	053-9120881	Lisa Bartsch	ACELS	25 weeks	15 hours
Travelling Languages	60-63 Dawson, Dublin 2	info@travellinglanguages.com	01-4434544	Rosanna Fiorenza / Salvatore Fanara	ACELS	25-28 weeks	15 hours
UCC Language Centre	University College Cork, Ground Floor, Orahilly Building, UCC, Cork	info@langcent.ucc.ie	021-4902043	Anita Carroll	British Council, IDP, Cambridge English Language Assessme	25+ weeks	20+ hours
UCD Applied Language Centre	Daedalus Building, Belfield, Dublin 4	alcenglish@ucd.ie	01-7167900	Dorota Wegrzyn	British Council / CELA / IDP Australia	25 weeks	24 hours
Ulearn English School Dublin	89 Harcourt Street, Dublin 2	info@ulearnschool.com	01-4751222	Neil McMahon	CELA	25 weeks	15 hours
University of Limerick Language Centre	University of Limerick, Castletroy, Co. Limerick	language.centre@ul.ie	061 202777, 061 233237	Debbie Thompson	Cambridge English Langauge Assessment (CELA)	25 weeks	20-25 hours
Waterford English Language Centres Ltd	Washington Lodge, Sweetbriar Park, Newtown, Waterford	joe@welc.ie	051-877288	Joe Brennan	IELTS / British Council / IDP	25 weeks	15 hours

APPENDIX XVII - INDIVIDUAL REPORT: ADEEL MATEEN

I did research on online review platforms currently running online. Based on research online rating system and its rating structure was proposed. I Also helped other group members in finalizing their project goals, objectives, requirements and referencing. Also research was done on Single Page Application life cycle

To support the solution we proposed is practical, I additionally worked on GDPR law for personal data protection, as it is necessary part of project to understand the law. Research was carried out on recording and processing personal data lawfully. Documents like G**DPR Law**, **Consent form**, **Content Policy**, **Personal Data collection** and **Review Guidelines** was prepared in compliance with GDPR.

As Our project require database to store and retrieve information, in technical part of our web application complete planning and designing of database task was given to me by our internal group supervisor I did thorough research on databases to design and create database according to the requirements our web application. Based on my research I completed following tasks:

- **Database Requirement**
- **ERD Diagram**
- **Table structure and purpose**
- **Appropriate data types**
- **Using SQL facilities to protect data integrity**
- **Creating SQL procedures,triggers and event**
- **Testing**
- **Documentation**

Section 8/9 and Appendix of Final Extended Proposal contains Evidence of both Practical and research work done with details, screenshots, diagrams and references.

In my opinion for me most challenging part was to make sure that whatever technology or method we are going to adopt should be compatible with both our backed end database and frontend web application. After careful consultation to keep our web app integrated with new technology we decided very late to go for typescript instead of PHP which was real a challenge for the whole team, as we were learning and implementing typescript at the same time with no prior knowledge.

If there was more time I would like to do detail survey and find out what other things we can integrate with our web application to make it more useful. For example Like English language what other Education programs or courses students are facing difficulty to find out about. That might take our web app to whole different level.

Overall the web application we created is useful but as there is always room for improvement I believe Smartphone application is the demand on this new era. I believe the next step I would have taken is to develop android application.

APPENDIX XVIII - INDIVIDUAL REPORT: ALINE DA SILVA LUCIANO

This semester I had the opportunity of participating in the Project's Documentation.

We followed the Venture Design Template we created the personas and scenarios where they are looking for a platform to share her experience about the English Language Schools, three people/students that are potential users of our application. I created the scenario for "Hiu Kong", a student that is satisfied with the English course and wants to share her experience with people that are also looking for English courses but she can't find a platform to do it. And I also developed a Problem Scenarios and alternatives to the problem for Pedro, that is a Persona that is looking for a English course right now.

To bring Pedro to real life and validate it, we decided interview two prospective students, because we would like to know if this application could be useful to foreign students. Fabio and I created the interview questions where the students could give their opinion and explain how they researched about English schools and what they thought about the opinions and comments about schools online. I interviewed Claudia and found out which tools she is using to find a good English course. Claudia gave her opinion about how hard is this research.

As part of The Agile Practice to encapsulate the main use of application I created three users stories that were derived from personas created on last semester.

I also made a research about Bodies Governing English Language Education (ELE) Schools in Ireland, such as the necessary accreditations to keep them working and why they need to have this regulation.

One of my tasks was researching and developing the Diagrams that are being used. I researched about the Use Case, Sequence, State and Activity diagrams and designed them showing how that our platform works through the student point of view and how the application will work considering the inside of the system as well. The only diagram that I did not develop was the Database ERD Diagram.

While part of my group was developing our application and database, I could research about the technologies that were been used on our system, and then define and explain how each one works and compare some of them when used together, such as Node.js, Express.js, API, Json, React, TypeScript and Docker.

I was in charge of keeping the records of all the meetings that has been done weekly in this semester and write down everything discussed.

I was also assigned with the task of organising the references that are on the documentation. A task that I realised how helpful working together as a team is.

Developing this project I could realise that is helpful working together as a team. We shared the tasks and could work in what we felt more comfortable, but always helping each other if someone is having problems with something.

APPENDIX XIX - INDIVIDUAL REPORT: FÁBIO BERNARDO SILVA

I have set up accounts for the group on slack.com, asana.com and basecamp to improve communication and productivity. And right at the first semester started a course on coursera.com on Agile and suggested the Venture Design Framework template to structure and plan our work such as development of personas, problem scenarios, interviews and so on and have promoted things like time boxed meetings as well. I developed the persona, problem scenario and alternatives for Pedro, the prospective student and have wrote with Aline the interview questions for the three personas, including those that were not used and consent form (based on a consent form from Trinity College Dublin), and then prepared the documentation for applying to the Ethical Approval with the Faculty. I applied and received the approval for the group. I interview Jéssica, transcribed and translated the interview too.

I wrote the Introduction, Problem Description and Proposed Solution sections of this document and have researched the topics that are cited in those sections. I worked with Adeel in the second year on the problem and solution specification of this project, defining the main project goals. I also wrote about Agile, worked on the requirements specification in special the technical requirements as well. I assisted on the production of diagrams, worked on the naming and branding of the application and researched wireframes to later produce the wireframes that were used in the development of the application. I wrote the sample questionnaire (review form) of the application, and most of the copy (text) present on the application. I wrote about Legal and Technical Security Risk. I wrote about the MVC (and organised the source code following this pattern) and wrote about the Backend of the project and about the API and produced the table with the specific routes/endpoints of the application. I wrote about the FrontEnd of the application, including writing about the Single Page Applications, Conditional Rendering and Responsive Design. I researched and wrote about Progressive Web Applications. Produced the screenshots of the snippets of the source code and of the walkthrough of the application, I finally wrote the Abstract, Acknowledgements and Conclusion of the Final Document as well.

I prepared the citations and referencing in most parts I wrote and made sure the citing and referencing by the other group members were correct and following the Harvard convention. I have also put the final document together, looking after the structural order, and have uploaded, formatted and ordered the extensive list of appendices as well. I generated and formatted the Table of Contents, formatted the final report and submitted the document as well. I prepared, voiced over and uploaded the screencast video, connected the front and backend of the project to github and submitted the source code as well.

In the technical side of things I set up and developed the whole backend and frontend project, including but not limited to the installation of Docker, Node.JS, React, Typescript and several libraries used in the project (full project tasks on the GANTT diagram, Appendix I). I did a couple of courses on Node and React, and prepared the responsiveness and design of the final outcome too. I met with Remo and Amilcar after classes for assistance as well.

What I found the most challenging was the management side of a group project of this size. Managing information and communicate is essential to manage change and the rapid decisions and adaptations we have to incorporate into the project as the days go and to make sure everyone is at the same page - including the supervisor. It was quite difficult for me to fully conceptualise details and define business aspects of the project as it grew more and more complex, prioritising was also tough. Producing a plan while learning the technologies in the IWA module and defining what is the minimum viable product was quite challenging as well. Node and React (and several other technologies used) have their own challenges and they were quite tricky at (many) times.

APPENDIX XX - GROUP MEETINGS LOG (JOURNAL)

23/04/2019: Adeel, Aline, Fabio, Greg
Meeting with Greg to show the improvement of the back-end and front-end;
Talked about database that was upload on BaseCamp;
Queries about delivery and presentation of the project.

15/04/2019: Adeel, Aline. Fabio
Discuss about Database and how that it will work on the website;
Front-end and Back-end progressing;
Deputy searches about the technologies that are been used in all project.

02/04/2019: Addel, Aline, Fabio and Greg
Meeting with Greg to show the improvement of the project and show Diagrams

01/04/2019: Adeel, Aline, Fabio
Discussed about all the documents that was upload about database and diagrams and the evolution of the back-end and front-end

25/03/2019: Addel, Aline, Fabio
Talked about database, back-end progressing and Diagrams progressing: changes that need to be done

13/03/2019
Progress Presentation
Graham suggested / advised to contact MEI / ACELS

11/03/2019: Addel, Aline, Fabio and Greg
Meeting with Greg: Showed him about what we are working in: Diagrams, database and Back end

26/02/2019: Aline, Fabio, Greg
Meeting with Greg: It was presentes how is frontend of the project and developing backend, what each person of the group is working,

25/02/2019: Aline, Fabio
Developing backend of the website;
Working in documentation: Activity diagram and use case diagram.

18/02/2019: Adeel, Aline, Fabio
Discuss when will be delivered each task and which has been done;
Start to use GANTT.

12/02/2019: Adeel, Aline, Fabio
Meeting with Greg to notify him about the tasks that will be developed during this semester;

Discussed about the groupmark elements and what we have to improve, date for presentation;

11/02/2019: Adeel, Aline, Fabio
Discuss strategies keep developing the project;
Share all tasks with each person on the group to develop the website and documentation: develop database, diagrams, tables, requirements, system design, interviews, wireframes,

11/12/2018: Adeel, Aline
(meeting with supervisor Greg)
Discuss about last changes before submitting Chapter 1 (Project)

03/12/2018: Adeel, Aline, Fábio
Discuss about terms and conditions;
Last changes about GDPR;
Discuss about liability of the platform about comments from the customers of services offered from companies;

19/11/2018: Adeel, Aline, Fábio
(meeting with supervisor Greg)
Discuss about Survey;
Research about GDPR;

08/11/2018: Adeel, Aline, Fábio
Discuss about the meeting with Greg;
Start to search about agencies that validate english courses;
Search about rules and laws that regulate websites that are filled with comments from the customers of services offered from companies;
Read and understand about GDPR and how it is gonna affect in our project;

07/11/2018: Fábio (Adeel fell of Bicycle and Aline was away - meeting with supervisor Greg) We have been advised to maybe focus on the persona Pedro, as he has never had an experience and is not associated with any schools. The supervisor complimented the research and appreciates the website DwellDown (include it somewhere). He said we need to learn as much as we can about regulating bodies here and laws that regulate online review websites. I told we would submit an interview for approval and asked about the process to get it approved, he said we have to ask Graham if it is necessary to submit through supervisor or not.

READING WEEK

24/10/2018: Aline, Fábio
Presentation of concept to the class

23/10/2018: Adeel, Aline, Fábio
(meeting with the supervisor Greg)
The supervisor has raised concerns with GDPR and we have informed him about the Agile framework too.

22/10/2018: Adeel, Aline, Fabio
We specified further some technical requirements (check boxes, drop down menus, etc)
Read about GDPR / Facebook, Google, Apple data usage (agreeing to Terms and Conditions)
Website reference// UNIGO.COM ratings for a scholarship
We started to define interview questions and screening questions
Validation process needs more work and definition (email/ Year of conclusion/ etc)

15/10/2018: Adeel, Fabio, Aline
We talked about the Agile framework (Venture Design Process) to start the project.
Developed three personas: Pedro (future student), Hiu (satisfied former student), Marta (unsatisfied former student);
Do rating (number system) for people that does not speak english to be helpful understand the comments or connect with google translate to translate the comments automatically;
Follow the steps described in Venture Design Process to develop the project;
Focus: Personas, problem scenarios and alternatives nowadays;

08/10/2018: Fabio, Aline
We talked briefly about methodologies (agile x more traditional development methods).
We talked about building the platform for universities too and discussed it would add unnecessary complexity at this stage. In group we decided to only go with English schools for now because it is makes the universe of the problem more manageable. Also, to keep it simple, we decided we would avoid adding another level of complexity by including reviews of courses in a school, so a student is entitled to review their school based on their experience (not review one course in one school).
Talked about wireframes and personas and sprints (challenge / task of the week)

03/10/2018: Fabio, Aline, Adeel
We discussed about the scope of the project (English schools or to extend it to universities too). Fabio started a coursera specialisation on Agile development and methodologies (like Scrum), so we can run and organise the project by it.

We agreed to all list requirements for the project, anything we can think of.

ANNEX I - RESEARCH APPROVAL LETTER (GRAHAM GLANVILLE)

cct | College Dublin
Computing • IT • Business

6th February 2019

RESEARCH APPROVAL LETTER

To Whom It May Concern

This letter is to confirm that the BSc in IT (Level 7, Year 3) candidates below have received academic ethical permission to conduct the following research with permission from CCT College Dublin (CCT), Dublin 2, Ireland.

Candidates	Aline da Silva Luciano – Student No. 2016110 (Year 3) Adeel Mateen – Student No. 2016089 (Year 3) Fabio Bernardo Silva – Student No. 2016149 (Year 3)
Faculty:	Information Technology / Computer Science
Research Title:	Click (Educational Application)
Research Description:	"Persona and Problem validation for Online Review Platform for the International English Language Market.". The purpose of this research is to validate that the fictional personas created to contextualise the potential users of the project and the hypothetical problem that the project is trying to solve really exists. That will be done through a qualitative gathering of data through an open interview. The questions are designed to avoid yes / no answers and will be recorded.
Data Collection:	February 2019 to May 2019 (Interview (Skype))

The data collected above cannot be used for any future projects other than what is specified above. Data collected is for academic purposes and cannot be used in any attempt to commercialise this project.

If you require any further information, please do not hesitate to contact me.

Graham Glanville
Ethics Board Chair (Dean of School)

Email: graham.glanville@cct.ie