Activity A(ii)

Produce a detailed proposal for a digital solution that you would develop to meet the needs of:

- The client (GibJohn Tutoring)
- Existing and potential users

your proposal should provide a rationale for the solution that you are proposing and include:

- The business context
- The functional and non-functional requirements of the solution
- Decomposition of the problems that will need to be solved to implement the functional and non-functional requirements.
- The key performance indicators (KPIs) and user acceptance criteria for the proposed solution.

A justification of:

- How the recommended solution meets the needs of the clients and users
- How potential risks will be mitigated
- How the relevant regulatory guidelines and legal requirements, in relation to software development and the education sector, will be addressed.

Description of the proposed solution

With education being such an important factor in today's current climate it is essential that the services that are provided meet relevant requirements and educate to an ideal standard. GibJohn Tutoring is an online application that provides its users with face-to-face tutoring and online resources with relevant support. GibJohn have asked me to develop a digital solution on addition to their current application that will:

- Provide interactive teaching and learning resources in a wider range of subjects
- Provide access to digital content to encourage wider learning
- Support assessment and monitoring of learner progress

GibJohn carried out some market research on possible features that could be implemented into the digital solution. The suggestions include:

- Collaborative teaching and learning tools
- Accessibility features to support a wide range of users
- A learning reward system
- Gamified learning

GibJohn would like to monitor learner progress and provide assessment as there were certain issues pressing both the tutors and learners on their current system:

- Students unsure where they last left off on their online learning and often skipping relevant content.
- Students completing homework without reading through the online resources.
- Teachers and learners not believing the learners and their progress on certain topics.
- Wasted time figuring out where to begin (learners and tutors).
- No overview or statistic of the learner's progress recorded whatsoever. Tutor/teacher cannot tell.
- Learners and tutors aware of other competitive sites offering this functionality and more – possibility of losing customers.
- GibJohn receiving possible negative reviews.
- Learners fall behind on their studies.
- Tutors don't carry out their jobs entirely (become lazy).
- Tutors cannot develop goals or progress points for their learners.
- No form of examination on the current site.
- Little / no motivation for learners as they get no feedback.

If the digital solution was to receive the functionality of recording and monitoring student progress, with assessment it would enable:

- Learners to take the time to read through the resources.
- Enables teacher to monitor learner progress.
- Increases learner's engagement and interaction.
- Provides informative feedback for both learner and tutor on learner's progress.
- Tutor can set goals and progress points based off assessment results.
- Less time wasted working out what point the learner is at with the module or unit.
- Increased learner motivation to progress well – they can see how their results are going up etc.
- GibJohn keeping up with the competitive market.

The project is going to use both a logical, systematic and computational approach to be built and designed. The application will need to continuously monitor and assess student progress, encourage wider learning and be digitally interactive in terms of its questions and activities.

Business Context

Audience – The Target audience for the GibJohn Tutoring platform/digital application would for all age groups however users between primary school age and college age e.g. – ages 4 up to the age of 18 would most likely be the more predominant users overall. All ethnicities, genders, most disabilities and cultured would have access to the digital solution. Ultimately the company -GibJohn - wants individuals to use their applications and services so they can

stay on top of other web competitors and gain more users (expanding their user base). You also have to factor in that there may be Exam boards and other external companies that will want to be included so the age range ultimately goes from any age of 4 upwards.

Business Environment

General factors – These are factors that exist in general society and need to be implemented into businesses in order to stay in line with relevant guidelines. These factors include:

- Health and safety at work act 1974. (Health and Safety at Work etc Act 1974 – legislation explained, 2022).
- The computer misuse act 1990. (Computer Misuse Act 1990, 2022)
- Copyright and patents act 1988. (Copyright, Designs and Patents Act 1988, 2022)
- Data protection act 1998. (Data Protection Act 1998 - A Summary of the 8 Guiding Principles, 2022)
- Ensure the entirety of user and business data are kept and used in accordance with– (Data protection GDPR, 2022) - Most recent data protection act.
- Acceptable use policy (all users). (What is acceptable use policy (AUP)? - Definition from WhatIs.com, 2022)
- Be accessible to various individuals with certain restrictions/limitations.
- Be open to all nationalities, diversities, cultures and skin tones.
- User support and guidance whilst using the application.
- Adequate permissions and group policies for different access level users (User Access rights).

Providing the business stays in line with these legal, technical and health guidelines GibJohn will not need to be concerned about legal or financial action against them.

External factors – These are factors that affect the business directly, and with this being a technical / digital business there are a select few that come into play. GibJohn cannot operate fully or at all if they have these factors at any time:

- Loss of internet connectivity / and or connection.
- Loss of power (Can use Emergency power supplies, however this is a limited amount of power and will run out at some point. Does reduce downtime – if any.)
- Broken or loss of Digital hardware e.g. – servers, switches, routers, etc.
- Lack of users (too few to make the application worth being available).
- Abundance of users (too many that the system is unable to function under all the stress).
- Digital attacks (DDOs and DOS attacks, network attacks, malware, man in the middle attacks, etc).

All these factors will affect GibJohn business to operate even the slightest. They will cause downtime if the right precautions and action plans are not implemented, and this costs the company time, money and customers which are their 3 most important factors (business fundamentals).

Digital support in businesses

GibJohn Tutoring is already a digital business and ahead of certain other digital and non-digital businesses, in terms of its current and future functionality. It's well ahead of non-digital tutoring businesses since it has everything stored, processed and used digitally. This is easier for Tutors and Learners; however, this is providing they have a digital device which they can access GibJohn Tutoring from.

When you have an online presence, users who use your site and services can leave reviews on applications like Trustpilot and google reviews. This then influences potential users in one way or another if they would like to use GibJohn tutoring. There should also be a forum, where if users feel the need to ask questions regarding the use of GibJohn tutoring they can get feedback from all the users and GibJohn's staff.

GibJohn could also promote their application via social media and other services and by paying a small fee a company that would promote GibJohn via advertisements to a wide range of individuals using the social platforms. This then draws users to GibJohn and increases their user base.

Project Feasibility

Project feasibility is likelihood of an idea to become a success. GibJohn will need to evaluate a list of factors and consider them. Some include:

- Availability – when will services be available for users to access and interact with – e.g., 9 -5 or 24/7?
- Time – time to make it all happen (development and implementation of the digital solution, factor in maintenance and scheduled downtime etc).
- Economics – is it economically viable, in other words is the digital solution going to generate more income than all costs to start up?
- Market demands – is the current market in need of this type of service?
- New technologies – are the new technologies something GibJohn should be using – this could help them out in the modern market as users like up to date technology…
- Staffing – is there enough staff to get to the overall outcome and keep the digital application up and running?

- Legal / ethical / regulatory guidelines. – is GibJohn following all relevant guidelines, when and if applicable to their business.

Change Management

GibJohn along with various other companies will need to make sure they have adequate plans and processes in place to deal with change and ensure that they can adapt correctly and move forward in a way that has little to no drawbacks and downtime.

Characteristics of end users

When designing and creating new digital content and services GibJohn will need to think about end user needs and the things that may need to be added to meet the needs of certain users.

There is such a range of things to take into consideration all the way from the educational standpoint of a user all the way to physical limitations and disabilities for users trying to interact and use a digital system. There will only be a certain number of things you can accommodate for, and anything extra will be an issue that the user needs to figure out, as bad that sounds. The digital solution will have basic accessibility things implemented like tech to speech, changeable colour schemes, ease of access, clear and effective navigation etc.

User Characteristics to take into consideration:

- Age.
- Gender.
- Culture.
- Education level.
- Physical attributes / limitations.

Risks

Being a digital business, there are many eventualities and aspects that can go wrong at any moment and affect the overall business as a whole and GibJohn need to be aware of the issues that are present and are able to affect them. Categories of risk include the following:

- Economic risk
- Compliance risk
- Security and fraud risk
- Financial risk
- Reputational risk

- Operational risk
- Competition risk

Economic risk: This is a risk that affects a business cash flow. The business market is constantly changing and developing with newer and newer technologies that influence the market in both positive and negative ways. GibJohn need to be ready for unexpected market turns and keep a good amount of economic savings to keep them afloat if their business goes down financially and there is no flow of money for a certain amount of time. GibJohn should also have relevant overdrafts in control and not get into too much debt otherwise this could negatively impact the business if it suddenly stopped generating an income.

Compliance risk:

Businesses are required to comply with multiple laws, legislation and regulations. The biggest and most recent one is GDPR which is an updated data protection act. As GibJohn tutoring is a digital platform, it needs to meet some other laws as well, such as:

- Health and safety at work act 1974. (Health and Safety at Work etc Act 1974 – legislation explained, 2022).
- The computer misuse act 1990. (Computer Misuse Act 1990, 2022)
- Copyright and patents act 1988. (Copyright, Designs and Patents Act 1988, 2022)
- Data protection act 1998. (Data Protection Act 1998 - A Summary of the 8 Guiding Principles, 2022)
- Ensure the entirety of user and business data are kept and used in accordance with– (Data protection GDPR, 2022) - Most recent data protection act.
- Acceptable use policy (all users). (What is acceptable use policy (AUP)? - Definition from WhatIs.com, 2022)

There are other regulations that come into play from an environmental, occupational and health point of view. The sector that regulates all of these is called the Safety and health administration (OSHA), environmental.

If these are not complied with the GibJohn will face financial and legal action which will damage its reputation and possibly incriminate certain individuals for not following a basic and easy regulation.

Security and Fraud risk: GibJohn Tutoring needs to ensure al data is kept confidentially (Data protection GDPR, 2022). Otherwise, there is always the chance that digital companies can have data breached and network attacks which looks very bad on the companies front and damages their reputability. GibJohn Tutoring will have sensitive user information stored and will need to make security measures paramount. To manage this GibJohn Tutoring will need to have the relevant security practices in place, some including fraud detection tools, NIDS – network intrusion detection system, firewalls, password protected stages, virtual private networks, specialist employee training, file encryption and specialist staff training against all types of social engineering.

Reputation risk: Businesses reputations entirely influence the user base and the businesses total income overall. Users have the option to review the company on their user experience whilst using their services. Revies can be left via sources like Trustpilot and google reviews. The business can then choose to respond to user reviews and show that they are proactive and always looking to improve the experience for their users. Most people do a google of the business before considering using them and a quick glance at the out of 5 stars reviews can ultimately decide if they go for that business or another. GibJohn will need to work hard to ensure they get good reviews.

Operational risks

GibJohn Tutoring will need to be aware of external risks that could affect the functionality of their business. There are external factors like: a hurricane, server outage, power cut, etc. A method GibJohn Tutoring could implement is have a hot site with all their current systems, hardware + software + network architecture all fully operational and ready to move to at a moment's notice. This is how you reduce downtime (basically none with a hot site). GibJohn can then change the geological setup of their hardware if there is a severe environmental emergency – e.g., hurricane, volcanic eruption, tidal wave etc.

For storing user data, GibJohn could use RAID to strip user data between disks so that it is available in numerous locations. RAID also uses parity which allows data to be between numerous disks also.

The KPI's

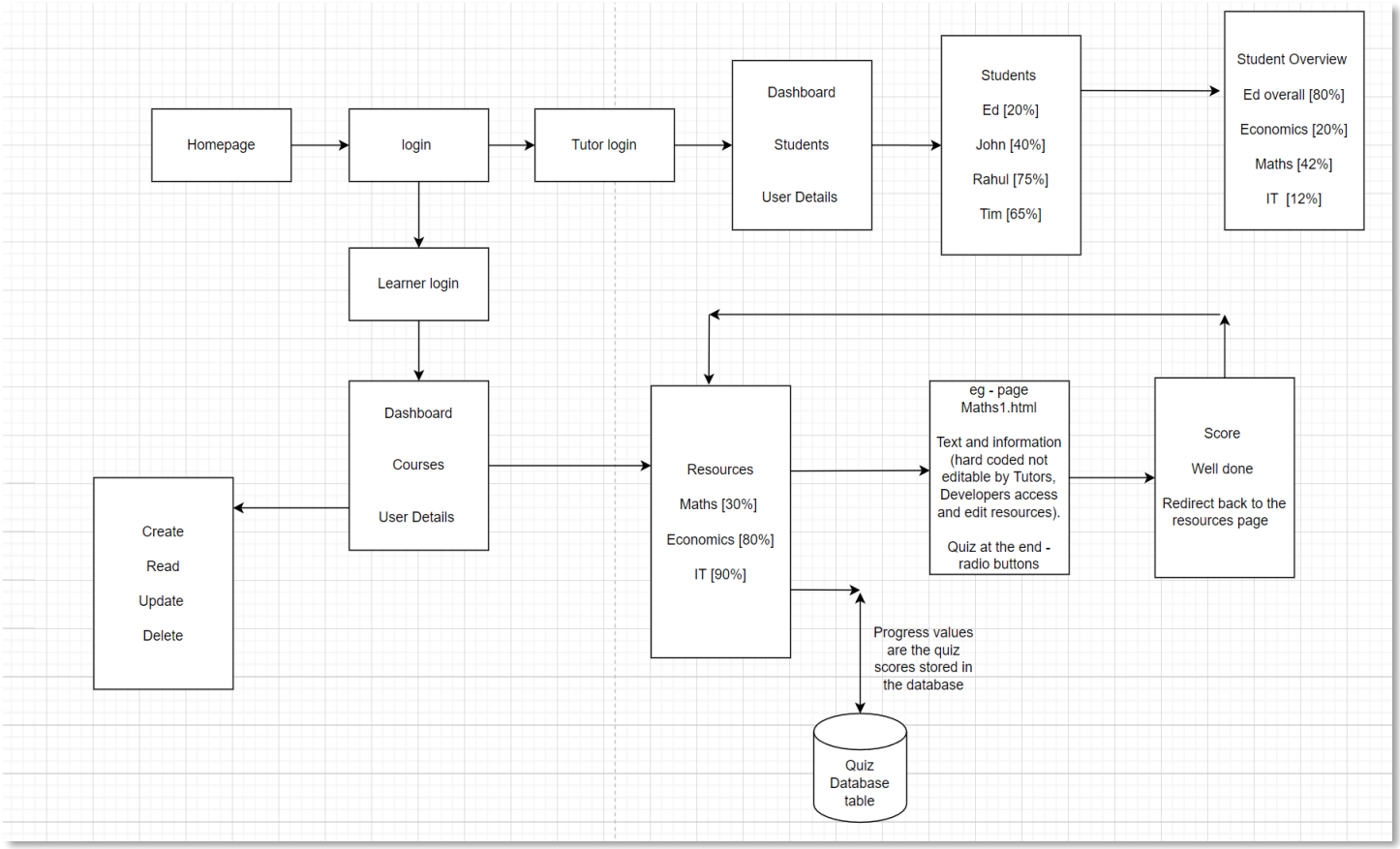
The key performance indicators and user acceptance criteria for the proposed GibJohn Tutoring offers face-to-face tutoring sessions between Learners and Tutors, access to online learning resources and support to develop subject understanding in different areas. GibJohn Tutoring would like a digital solution that provides informative teaching and learning resources in a range of subjects, access to digital content that encourages a wider learning and support assessment with monitoring of learner progress. GibJohn Tutoring's specific requirements are that the proposed solution:

- Must be compatible with smartphones, tablets, laptops and desktops. All accessible internet devices.
- Must allow users to take assessments and have their progress/score recorded.
- Must have functionality where both learner and tutor can see the learners progress.
- Must provide all users with a dashboard and relevant page links to the individual user account.
- Must allow users to register for an account and or login.
- Maintain a suitable website speed for each user.

- Maintain a good general capacity (storage, processing power, etc.) - don't overload the hardware facilities – ensure they have the relevant capacity.

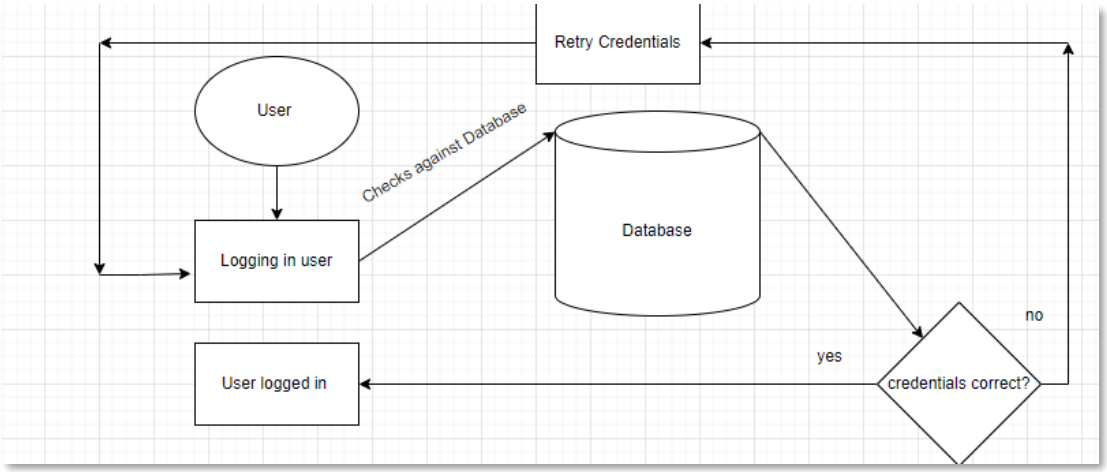
Site Map

I have developed a basic prototype site map of the website including certain data processes, and all proposed webpages with a basic description of each written on the diagram.



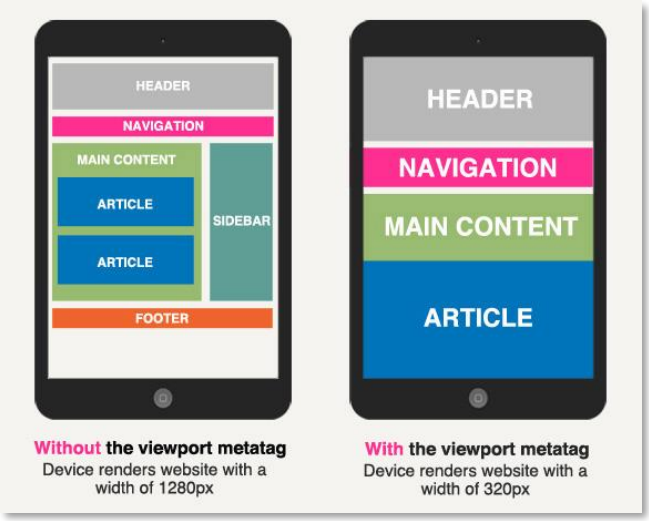
The website will have 14/15 webpages and will be able to be accessed via all internet enabled devices, where that be mobile phones, tablets, laptops, desktops etc.

I also made a very basic and brainstormed login system protype which will most likely not be the final method however it illustrates the basic logic of a login system.



The websites functionality will at a baseline meet the requirements specification and non-functional requirements will be used to create the various system operations and behaviours, as these are entirely self-devised and not clearly specified in the requirements specification, so we have a lot of choice and option.

I will be using for the backend design: php, MSQL, phpMyAdmin and the XAMPP control panel to host the webserver with all its interlinking tools and applications that work together very well. XAMPP includes a range of software types, and when it's all up and running the applications work seamlessly together at any one time. SQL is widely used in industry worldwide, so it's got very few issues and complications with it – there are plenty of modules and resources online that others have created to make the process of coding much simpler. To design the front end of the website I will be using HTML, CSS, JavaScript/jQuery and Bootstrap to provide a clean and easy to use graphical user interface. Bootstrap will allow me to use predefined sections of code and classes to style objects in a very aesthetic and user-friendly way. Bootstrap is also very useful as it accommodates responsive layout which is perfect for viewing the website on a mobile device (or similar) – it will tailor its size and shape to fit the size of the user's screen in a clean and well laid out way.



Functional Requirements

- Must provide interactive teaching and learning resources in a range of subjects.
- Must provide digital content to encourage wider learning.
- Must provide support assessment and monitoring of learner progress.
- External Interface
- User and form-based authentication (username/email and password).
- Be accessible to a wide range of users.
- Provide different accounts with varying access levels – Tutors and Learners.
- Store and access data in line with current guidelines and regulations.
-

Non-Functional Requirements

- Provide accessibility features to support a wide range of users.
- Make the learning gamified.
- Have a reward system for the learners on the website.
- Have a fast and responsive site (loading times, utilisation and ping etc).
- Ensure good readability on all types of devices.
- Ensure the site can be maintained easily.
- General Usability

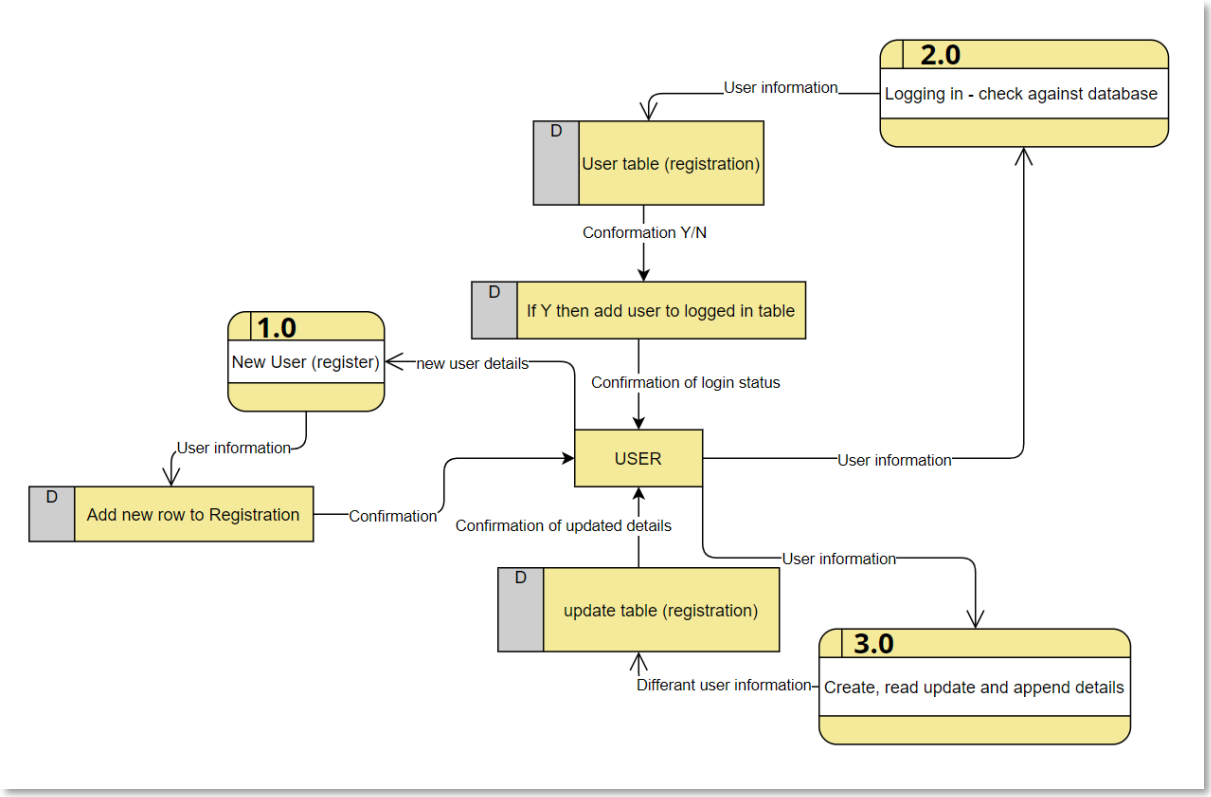
Links to

- Task / module related resources e.g. – BBC Bitesize, w3Schools.
- External sites to continue researching a topic.
- Embedded or external videos on educational topics.
- Chat forums or topic forums
- Advice and support for the website.

Accessibility issues

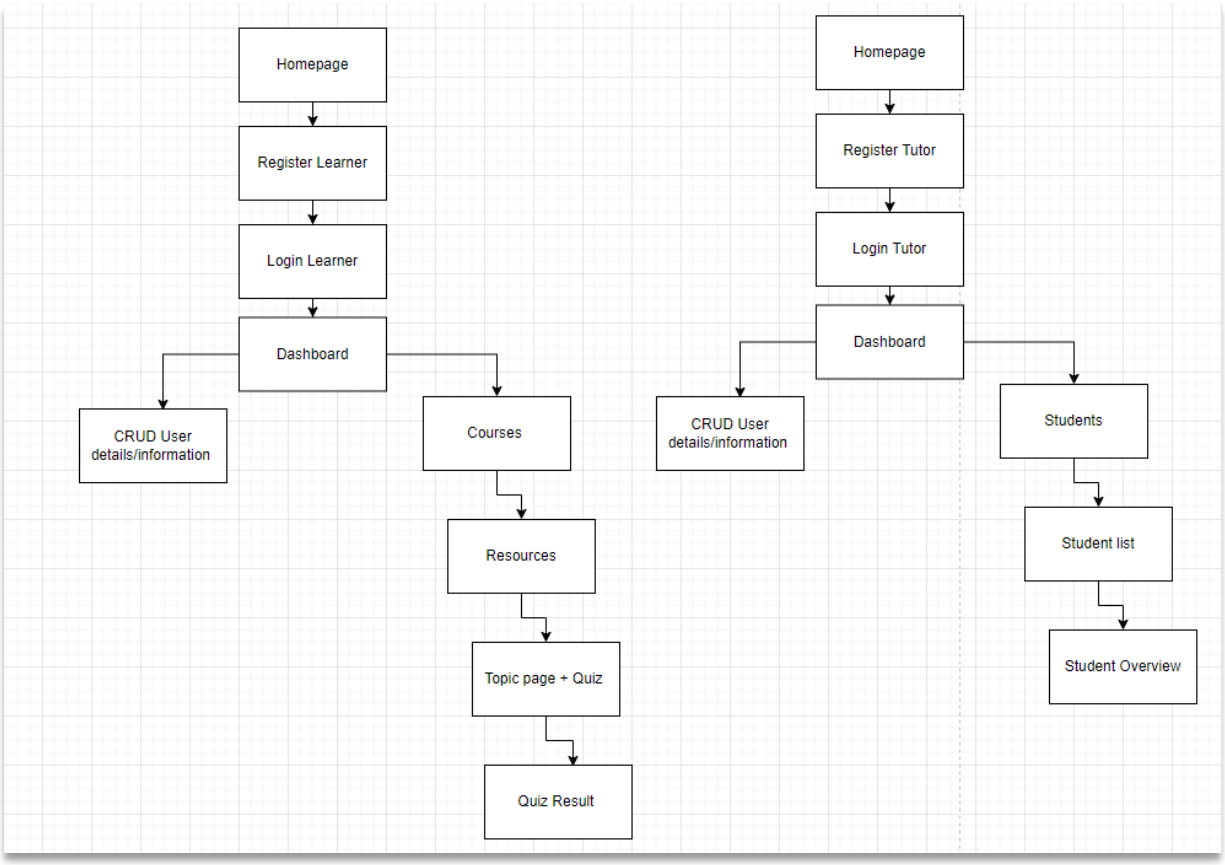
- Default mouse and keyboard.
- Colour contrast – colour schemes, types of backgrounds.
- Fonts (Dyslexia)
- Forms and their structure/layout.
- Alternative text for images and other objects if they fail to load so users can understand what they would be expecting to see.
- Colour-blindness.
- Clear headings for each section on the website.
- Download and upload points.

Data flow diagram (basic registration + login system + editing user details)

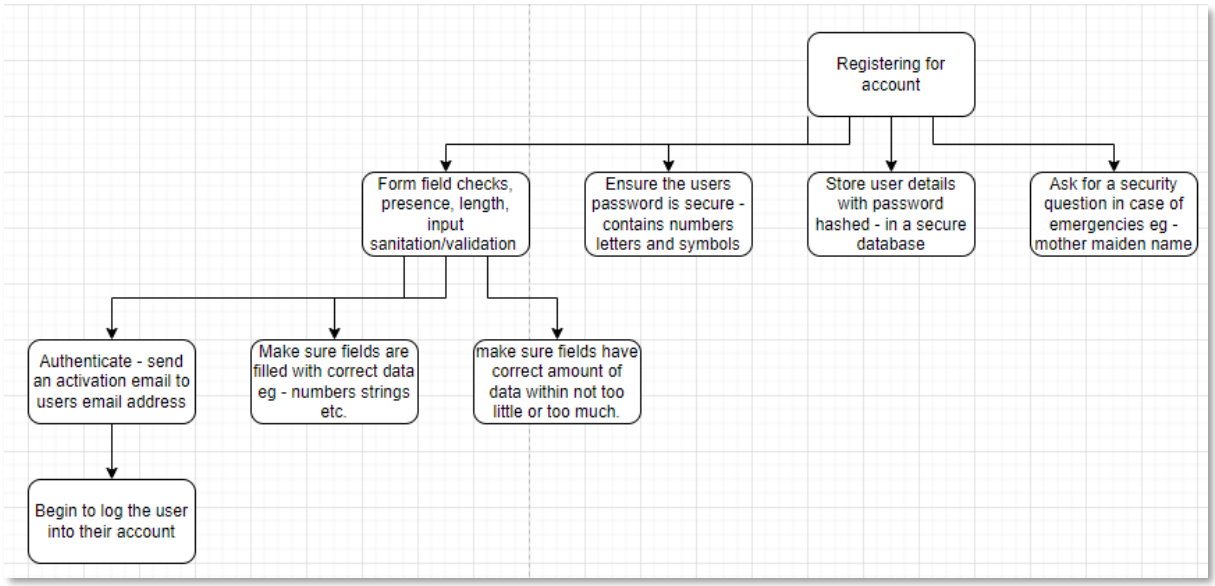


This is a dataflow diagram, and it shows the movement of data throughout the registration, login and editing current user data (CRUD) phases of the digital solution. This means the user can view and change their user information as they please.

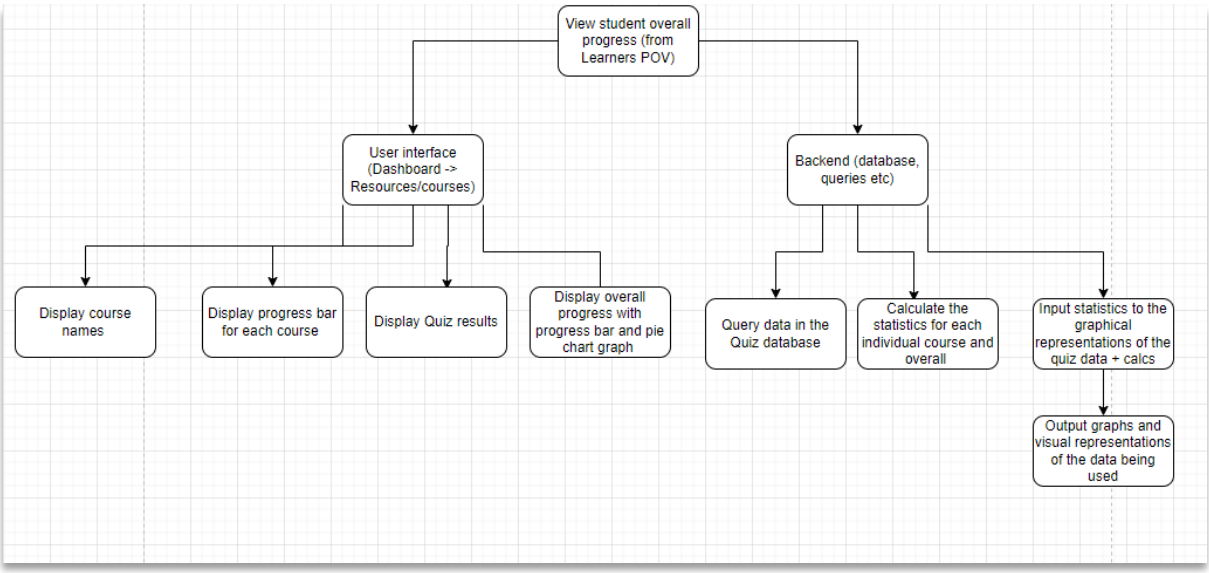
Hierarchy diagrams



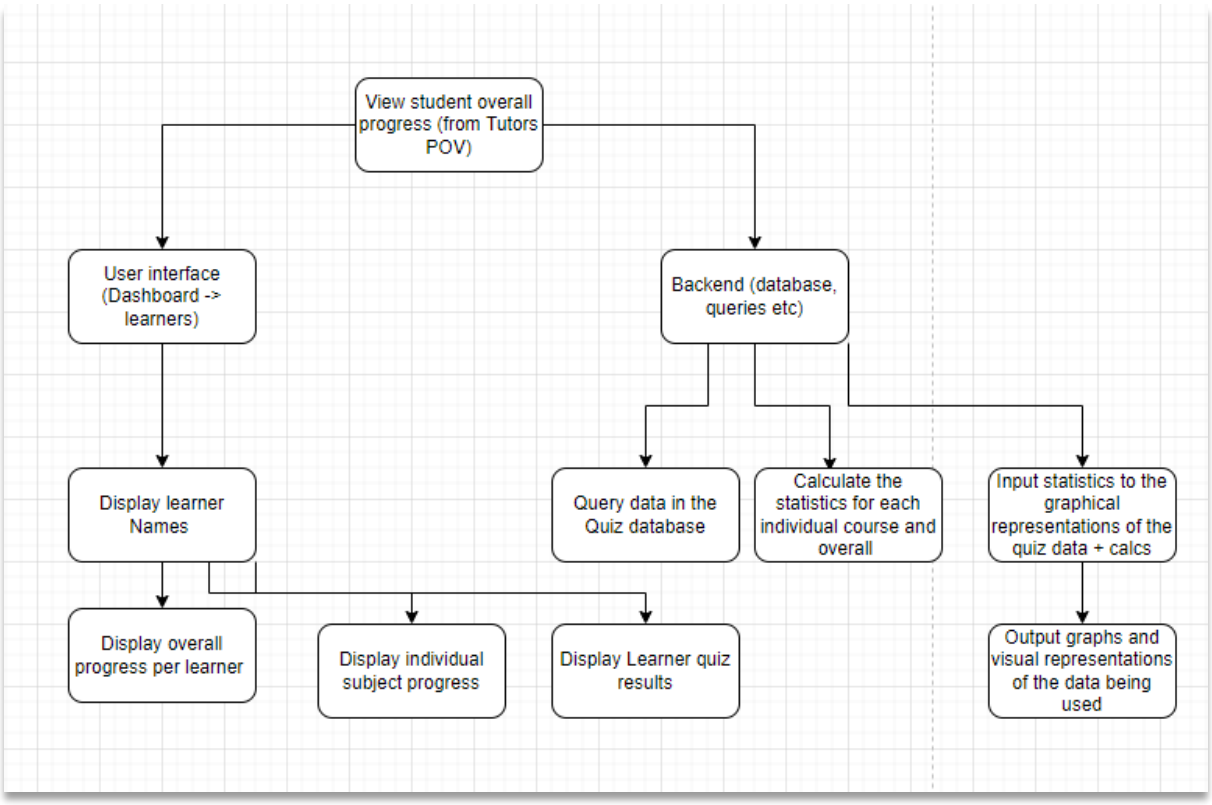
This screenshot shows the general hierarchy of both the Learner and Tutor navigation through all the pages of the website.



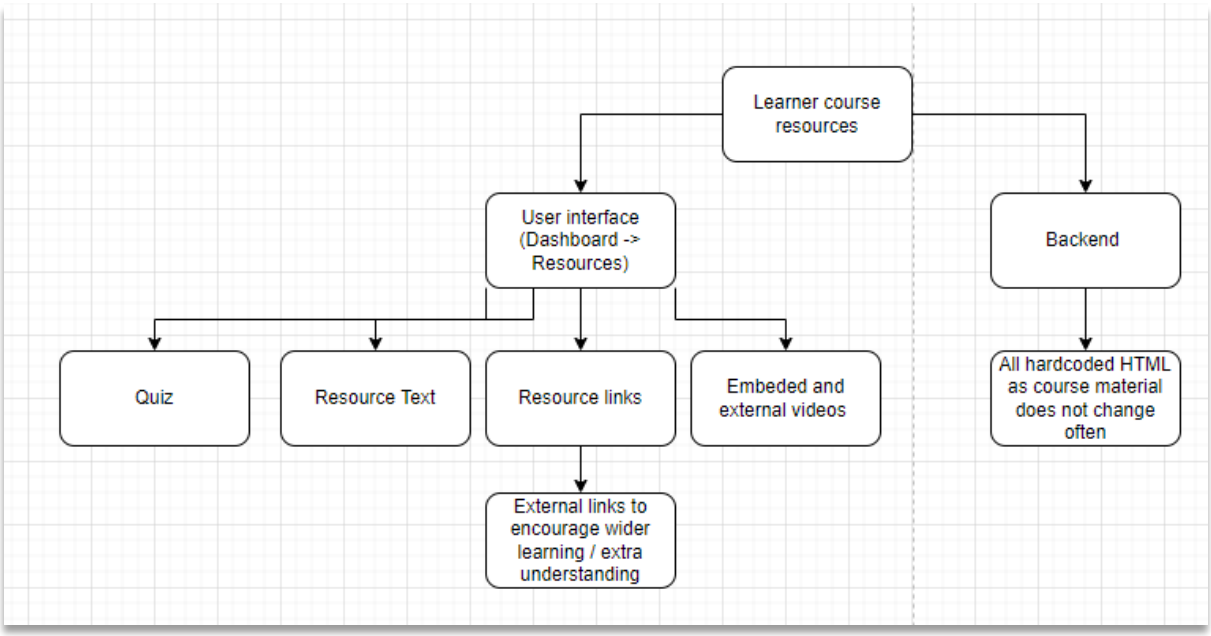
This screenshot shows the hierarchy of a user registering for an account. There will be 2 register forms on the website – one for Learners and another for Tutors.



This screenshot shows the learners view of their progress and quiz results for each section and overall, from their current and past modules. This also illustrates the background processes for the output of graphical statistics in the form of progress bars and pie charts.



This screenshot shows the Tutors view of all the student's data including names, current progress, overall progress, quiz results and the background processes involved in generating the graphical outcomes of the statistics (progress bars and pie chart). This is a more interesting way for the Tutor to view students' data and gives them a quick/easy indicator to students' progress.



This screenshot shows that the learner resources will include text, links and videos about the course the learner has selected, with additional links to external sites for wider learning and a better understanding of the subject. I have kept it simple, and all content is hardcoded by the developers. This dramatically reduces any errors occurring and tutors needing extra training as the developers can make changes when necessary and not make silly mistakes. Also, where tutors and learners will change the course content will remain the same for some years generally and when new material comes out the developers can then amend the hard coded old content with ease. This means content doesn't need to be edited regularly. This was the case in my industry placement at the NHS. All online quizzes and tests were added by the software development team and the doctors and nurses just gave the development team a spec sheet and it was very easy to upload and implement on to the system. This simplifies a lot of things, no need to implement database tables and queries when the content can be hard coded. This method works as it is used in industry currently.

My proposed solution should provide GibJohn Tutoring with a digital solution that will add on to their current web application. My digital solution will include features such as more interactive questions, continuous progression monitoring, assessment, and links to encourage a wider learning.

Stakeholders + UI and UX

I have researched on 2 websites Maths's watch and Khan Academy in Task A(I) and evaluated the quality of user interface and experience implemented on those websites. To see this check Task A(I) in the appendices. This links to Shneiderman's 8 golden rules (Shneiderman's Eight Golden Rules Will Help You Design Better Interfaces, 2022) and

Nielsen's 10 heuristics (10 Usability Heuristics for User Interface Design, 2022). The references table is available below this document

The stakeholders of GibJohn requested that the digital solutions interface was as simplistic, clear and easily readable. The consensus was to keep colour/contrast schemes for the digital solution basic yet aesthetically pleasing for users throughout the entirety of the system. There were also requests for plenty of whitespace to make important interface aspects more noticeable and give the user an experience of a well laid out interface that is not crammed with numerous blocks of text or images (quality over quantity). There was also mention of keeping things like headers, navigation bars and footers the same across the entirety of the solution. In order to achieve this, I'm going to implement templating (with Blade) which will include the same digital layout with content being the only changing thing between different pages. Error messages and issues that the digital solution may produce will need to have a clear description letting the user know how they can rectify the issue - always keep the user informed of the current system status. This links in with the target audience between the ages of 4 - 18 (in education) however there are also going to be Tutors, possibly parents and the exam boards using GibJohn Tutoring so this presents a huge range of users. So, in order to accommodate such a range, like I said above, I will be going for a simplistic and yet aesthetically pleasing interface design. I will be using text and fonts that are universal and readable. I will keep in mind that there will be younger ages interacting with the website at times and things need to be coloured/named/laid out in ways in which they can understand.

Learners:

- Register for account and login
- View dashboard
- Edit user information
- View courses
- View individual courses and unit progress (graphical and statistical)
- Read through course content
- Complete quizzes

Tutors:

- Register for account and login
- View individual dashboard
- View and monitor students
- View and monitor individual students and their progress both graphically and statistically.
- ***Possibly*** be able to assign specific students to courses.

The user of GibJohn tutoring will be presented with a dashboard and depending on their user access level, they will have different specialist options for instance - Tutor (list of learners). However, all users on their dashboard will have a section in which they can CRUD (Jayaram and →, 2022) their user details. GibJohn will be following up-to-date legislations and data protection acts (Data protection GDPR, 2022) to keep in line with the

law and keep out of financial, legal, and reputation action. It also ensures user details confidentiality and puts users at ease knowing their data is secure. To provide this I will be hashing passwords once entered the credential forms and using a php function MySQL real escape string which stops SQL commands being sent and ran at the database via the form fields. This prevents things like tables being dropped, or entire database deletion which very easily protects the database.

In both the login and register form there will be basic validation and input sanitation which will help the user to fill the fields with the correct data and prevent the form being submitted with incorrect data. To ensure users can tell there is an error, I will code the text box areas to turn red until the field is filled in correctly. Examples would be an email address; you need to have an '@' symbol once but no more – a phone number would not allow letters only numbers, etc. This protects against all types of users genuine and malicious.

User Requirements

GibJohn has created a contract with my software development company in order to add features onto their pre-existing system. They require:

- To provide interactive teaching and learning resources in a range of subjects.
- Provide access to digital content to encourage wider learning.
- Support assessment and monitoring of learner progress.

The target audience is of all ages 4 and upwards, including all genders races and cultures. The digital solution will be able to be accessed via most internet accessible devices including computers, mobile phones, tablets, laptops, etc. All devices with different operating systems and internal components will not be affected. If the device can bring up a website and allow the user to interact with it, then that is all that is needed.

Good user interface and experience will be factored in to ensure the user has a smooth and pleasant experience whilst using the site. All legal moral and ethical legislations that are relevant will be applied to the website, so GibJohn do not find themselves in legal / financial trouble. All user data will be handled accordingly - (Data protection GDPR, 2022).

Each learner will be able to view their current progress through a subject and check their quiz results from previous attempted quizzes. And each tutor can view student progress at all levels also. All user accounts have the functionality to change and update their user details once they have made their accounts.

And all links to further learning resources will be used and presented in ways that meet intellectual property (Intellectual Property Office, 2022) and other relevant licencing legislations.

Functional Requirements

Number	Features	Priority	Justification
1	Must provide interactive teaching and learning resources in a range of subjects.	HIGH	This is one of the main requirements specified on the requirements spec in the Brief.
2	Must provide digital content to encourage wider learning.	HIGH	This is one of the main requirements specified on the requirements spec in the Brief.
3	Must provide support assessment and monitoring of learner progress.	HIGH	This is one of the main requirements specified on the requirements spec in the Brief.
4	Must have an external user interface.	HIGH	Without an interface user cannot interact with the website. It would be useless otherwise.
5	User and form-based authentication (username/email and password).	HIGH	This is needed to keep the data within the database secure and the correct type of data. Also keeps users from accessing accounts that are not theirs.
6	Provide accounts with varying access levels.	HIGH	Learners and Tutors should have different views and options to select. It would not be appropriate for example - a learner to have access to a tutor's dashboard and see other students' details

			(breaches confidentiality etc).
7	Store and access data in line with current guidelines and regulations.	VERY HIGH	As well as having a functioning application there is also a massive need to keep all user data secure, within the realms of its own country of origin and only accessed by those authorised. Almost more needed that a couple of the application requirements.
8	Provide access to extra educational resources and further information of topics.	MEDIUM	Is specified in the requirements briefly so should be added but in comparison to others it is lower down the list. It will help learners who want extra resources upon what the site already offers.
9	Ensure the technologies used are modern and up to date (Newley emerging technologies)	LOW	Will keep users interested if integrating up-to-date technologies in the application, however, is not a specific requirement.
10	Have a reward system for users on the website.	Medium	Encourages learners to complete quizzes and progress through topics more so that without a reward system.
11	Make the learning gamified	Medium	This is a point that was researched by GibJohn – could make it more fun for learners however it

			depends at what level they are working at and target audience etc.

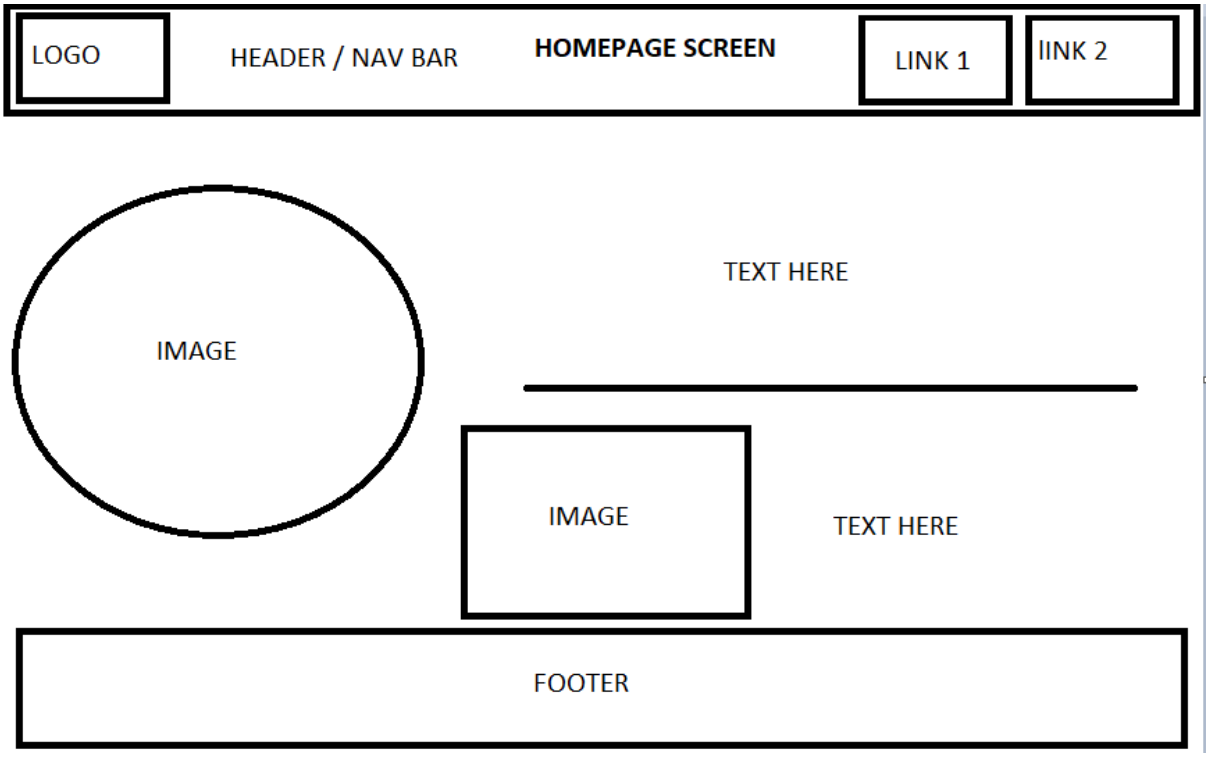
Non-Functional Requirements

Number	Features	Priority	Justification
1	Provide accessibility features to support a wide range of users.	HIGH	This means that the users who require accessibility shortcuts and features will be able to navigate and use the website – providing the feature has been added.
2	Be Accessible to a wide range of users (everyone)	HIGH	The website needs to be accessible to a wide range of users otherwise it is not fair on those who cannot access it. It also puts GibJohn lower down in the competition as other websites may

			be more accessible for more users.
4	Have a fast and responsive site.	HIGH	Means user have less delay whilst using the website – they are not waiting for the site to function.
5	Ensure good readability on all types of devices	MEDIUM	Makes sure the users can accurately see the site and its contents via all types of devices.
6	Ensure the site can be maintained easily	MEDIUM	Ensures that the site can be changed/updated easily (preferably) however this was not specified by GibJohn.

Task 1 Activity B the Designs

Homepage



Interface:

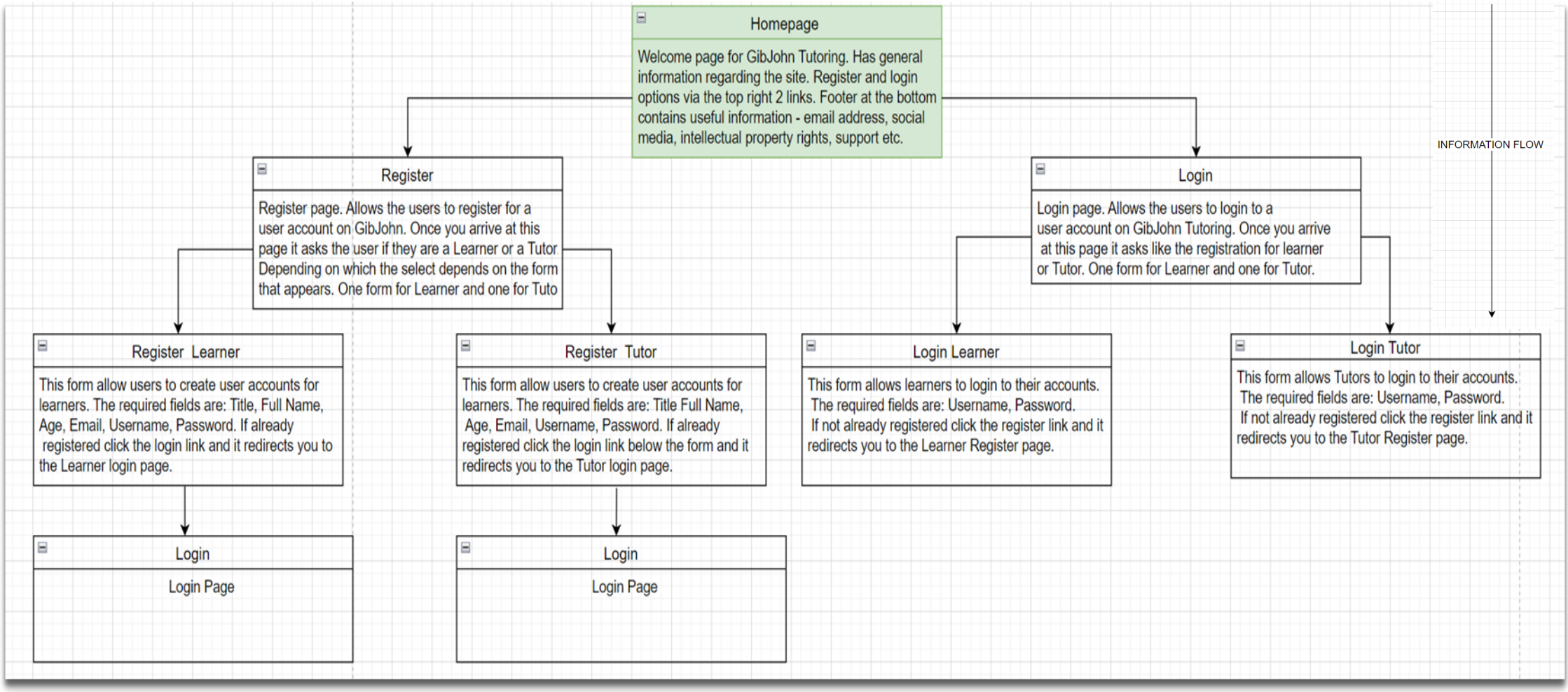
- Images and text in the content of the page.
- On the navigation bar have a GibJohn Logo in the top left corner. Navigation bar is sticky – when scrolling down and up page it stays in top section of the screen.
- Links to pages of the site to the right of the navigation bar (Login and Register).
- Footer at the bottom containing all company information and social media links and contact information about GibJohn.
- F pattern user interface.

Page elements:

- Logo and navigation bar with webpage links (Login and Register).
- Images and text to make up the contents of the homepage.
- Links in footer to Facebook, Instagram, Twitter, Snapchat. Also, GibJohn company information withing the footer.

Buttons:

- Login and Register.
- Social media options and links in the footer


Homepage
Welcome page for GibJohn Tutoring. Has general information regarding the site. Register and login options via the top right 2 links. Footer at the bottom contains useful information - email address, social media, intellectual property rights, support etc.
INFORMATION FLOW
Register
Register page. Allows the users to register for a user account on GibJohn. Once you arrive at this page it asks the user if they are a Learner or a Tutor Depending on which the select depends on the form that appears. One form for Learner and one for Tuto
Login
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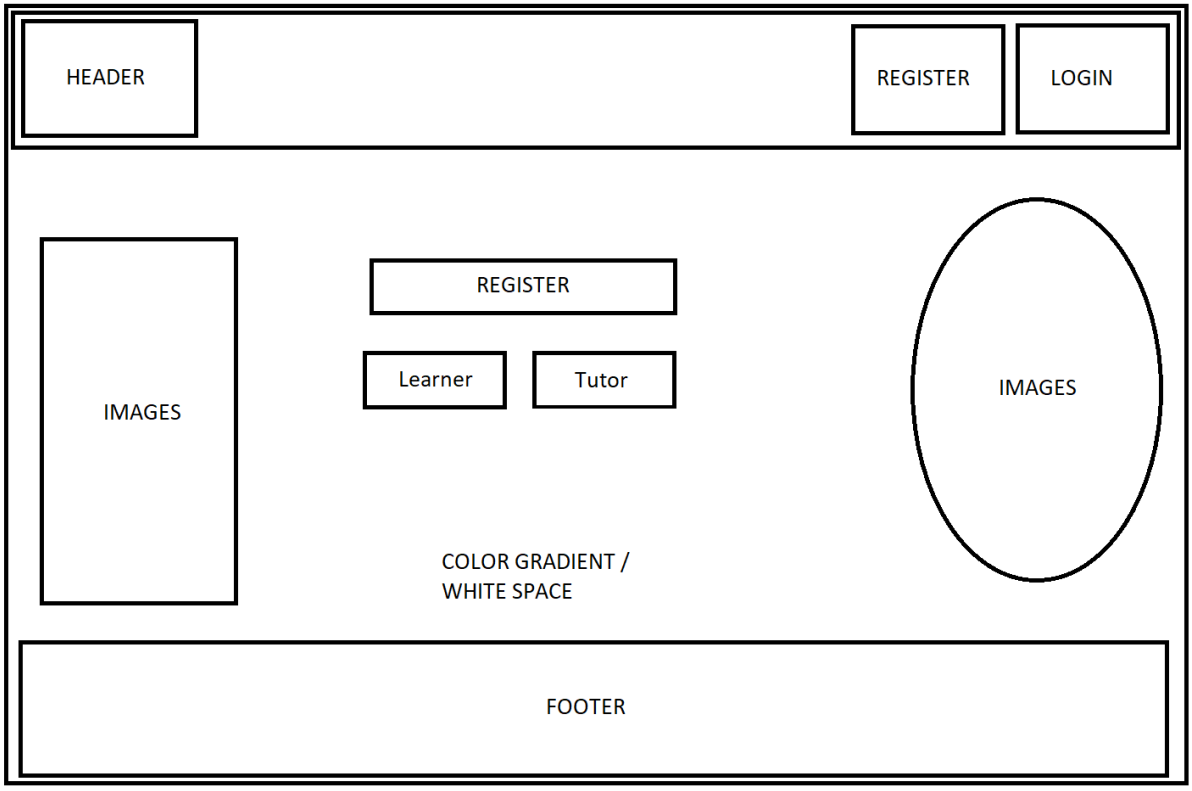
Register Learner
This form allow users to create user accounts for learners. The required fields are: Title, Full Name, Age, Email, Username, Password. If already registered click the login link and it redirects you to the Learner login page.
Register Tutor
This form allow users to create user accounts for learners. The required fields are: Title Full Name, Age, Email, Username, Password. If already registered click the login link below the form and it redirects you to the Tutor login page.
Login Learner
This form allows learners to login to their accounts. The required fields are: Username, Password. If not already registered click the register link and it redirects you to the Learner Register page.
Login Tutor
This form allows Tutors to login to their accounts. The required fields are: Username, Password. If not already registered click the register link and it redirects you to the Tutor Register page.
Login
Login Page
Login
Login Page

Register page



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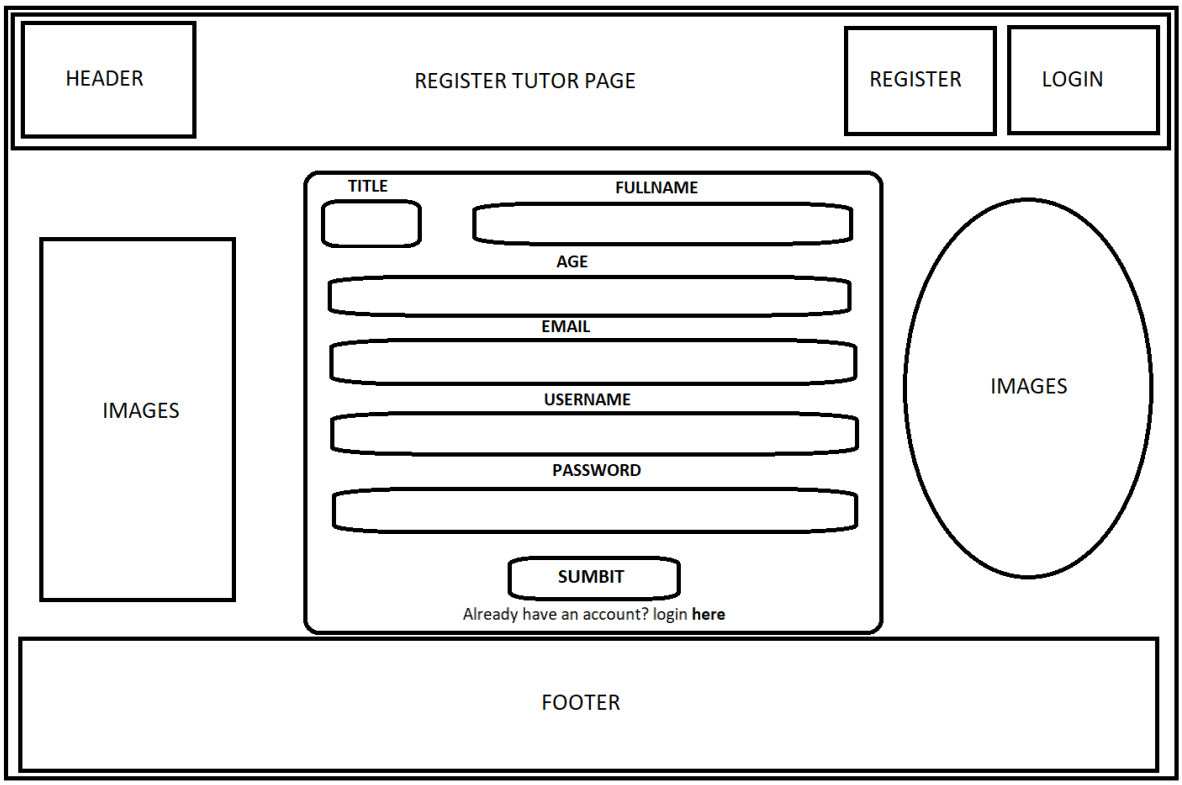
- Footer at the bottom containing all company information and social media links and contact information about GibJohn.
- Z pattern user interface for this page.

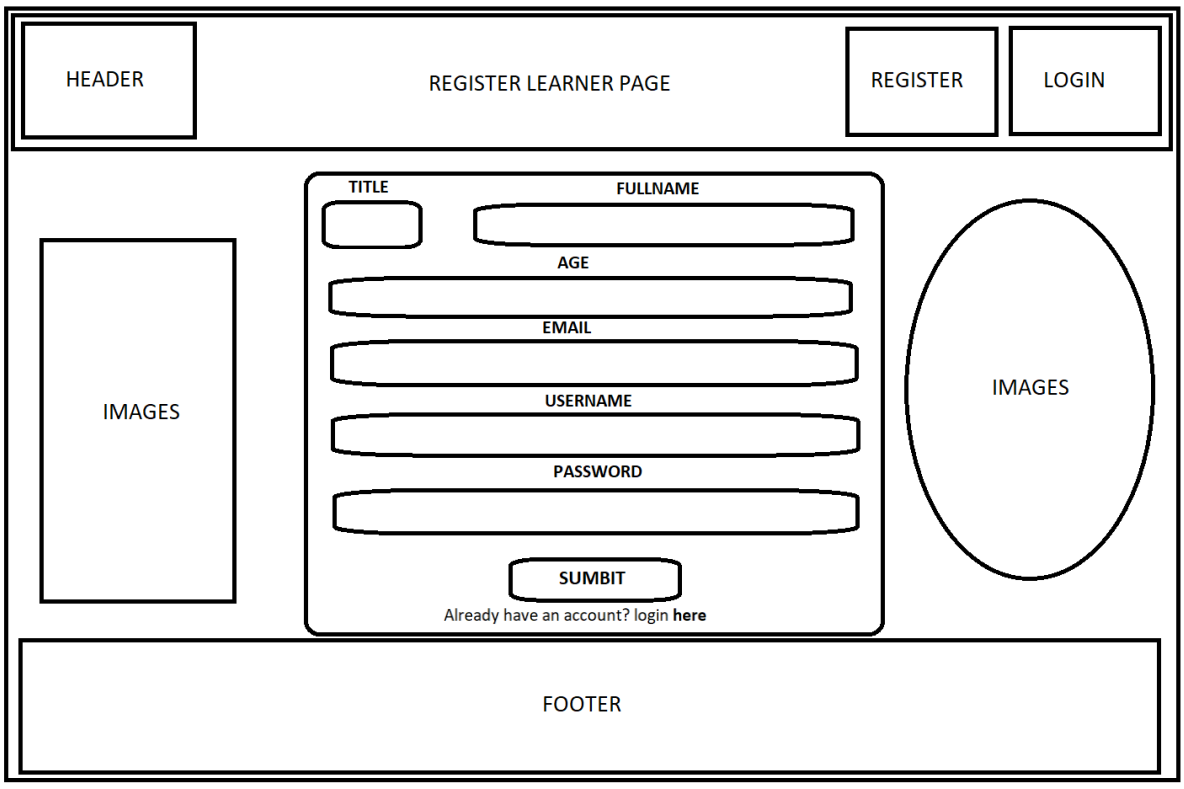
Page elements:

- Logo and navigation bar with webpage links (Login and Register).
- Images and text to make up the contents of the homepage.
- Links in footer to Facebook, Instagram, Twitter, Snapchat. Also, GibJohn company information withing the footer.
- Buttons for learner and tutor which redirect to different webpages and forms (highlight when hovered over).
- 2 buttons underneath a central text heading.

Buttons:

- Login and Register.
- Learner and Tutor – redirects to different register pages/forms.
- Social media options and links in the footer.


HEADER
REGISTER TUTOR PAGE
REGISTER
LOGIN
TITLE
FULLNAME
AGE
EMAIL
USERNAME
PASSWORD
SUMBIT
Already have an account? login here
IMAGES
IMAGES
FOOTER


HEADER
REGISTER LEARNER PAGE
REGISTER
LOGIN
TITLE
FULLNAME
AGE
EMAIL
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Already have an account? login here
IMAGES
IMAGES
FOOTER

Interface:

- Images, text and whitespace in the content of the page.
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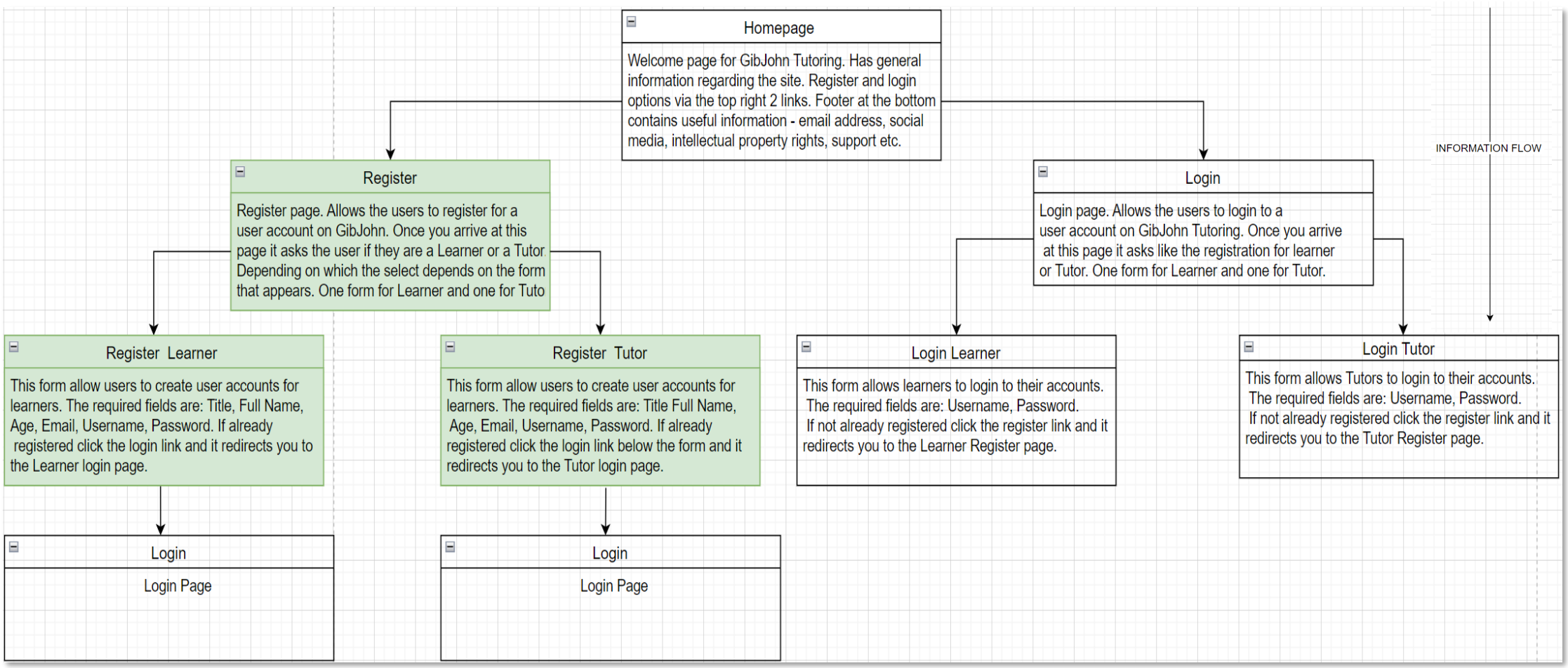
- F pattern user interface for this page.

Page elements:

- Logo and navigation bar with webpage links (Login and Register).
- Images and text to make up the contents of the homepage.
- Links in footer to Facebook, Instagram, Twitter, Snapchat. Also, GibJohn company information withing the footer.
- Button to submit at end of form.

Buttons:

- Login and Register.
- Submit at bottom of the form – for POST operation to the database.
- Social media options and links in the footer.


Homepage
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INFORMATION FLOW
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Register Learner
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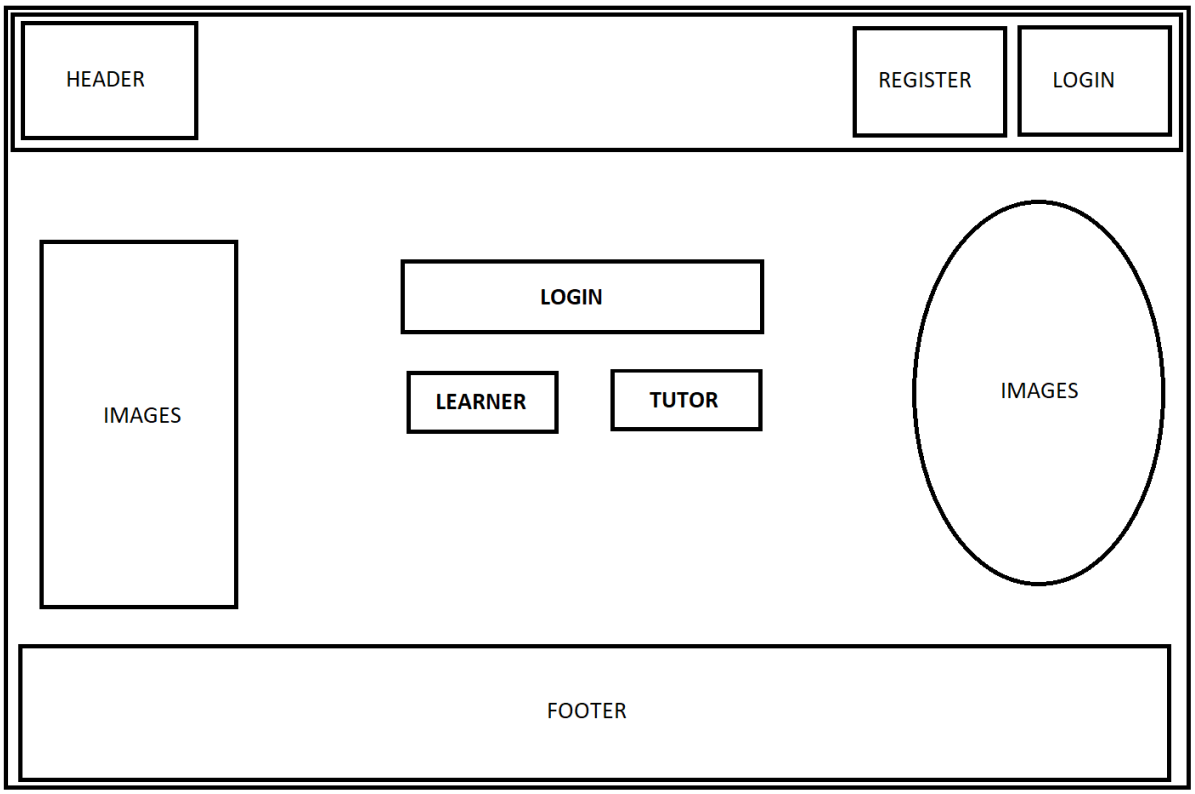
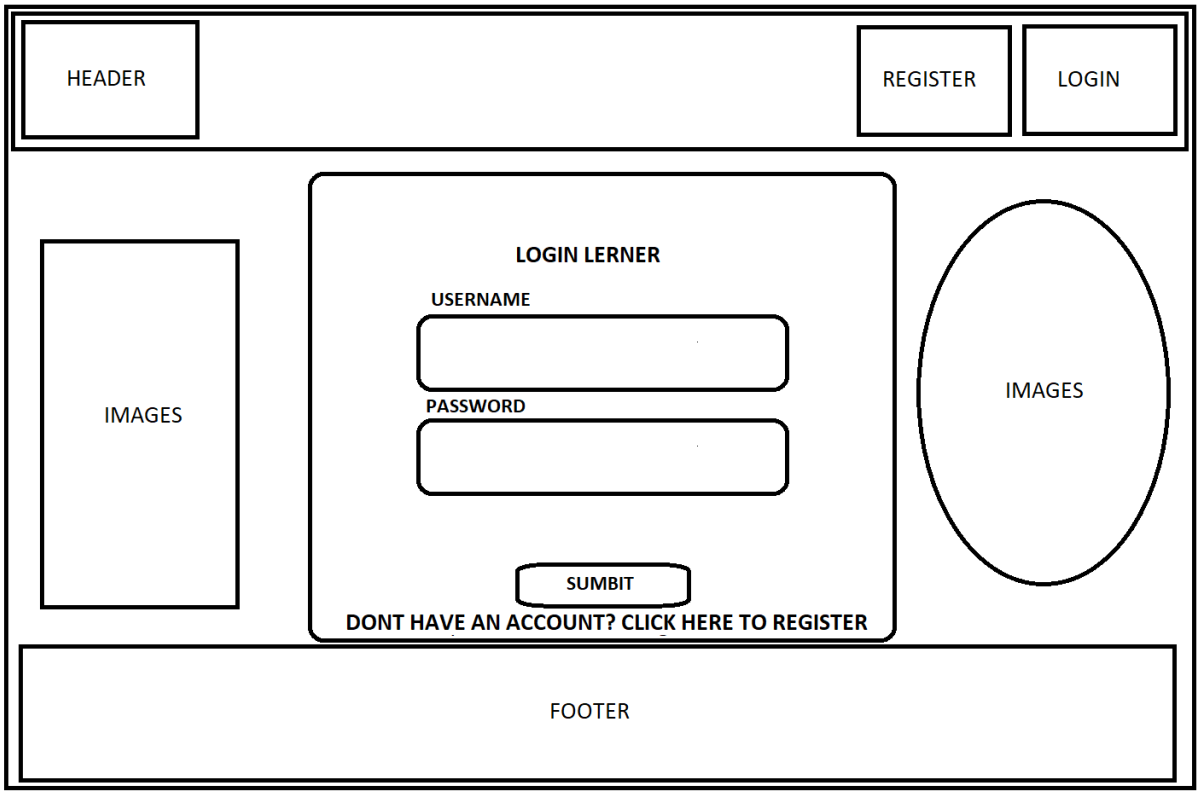
Register Tutor
This form allow users to create user accounts for learners. The required fields are: Title Full Name, Age, Email, Username, Password. If already registered click the login link below the form and it redirects you to the Tutor login page.
Login Learner
This form allows learners to login to their accounts. The required fields are: Username, Password. If not already registered click the register link and it redirects you to the Learner Register page.
Login Tutor
This form allows Tutors to login to their accounts. The required fields are: Username, Password. If not already registered click the register link and it redirects you to the Tutor Register page.
Login
Login Page
Login
Login Page

Login page


HEADER
REGISTER
LOGIN
IMAGES
LOGIN
LEARNER
TUTOR
IMAGES
FOOTER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REGISTER
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IMAGES
LOGIN LERNER
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PASSWORD
SUMBIT
DONT HAVE AN ACCOUNT? CLICK HERE TO REGISTER
IMAGES
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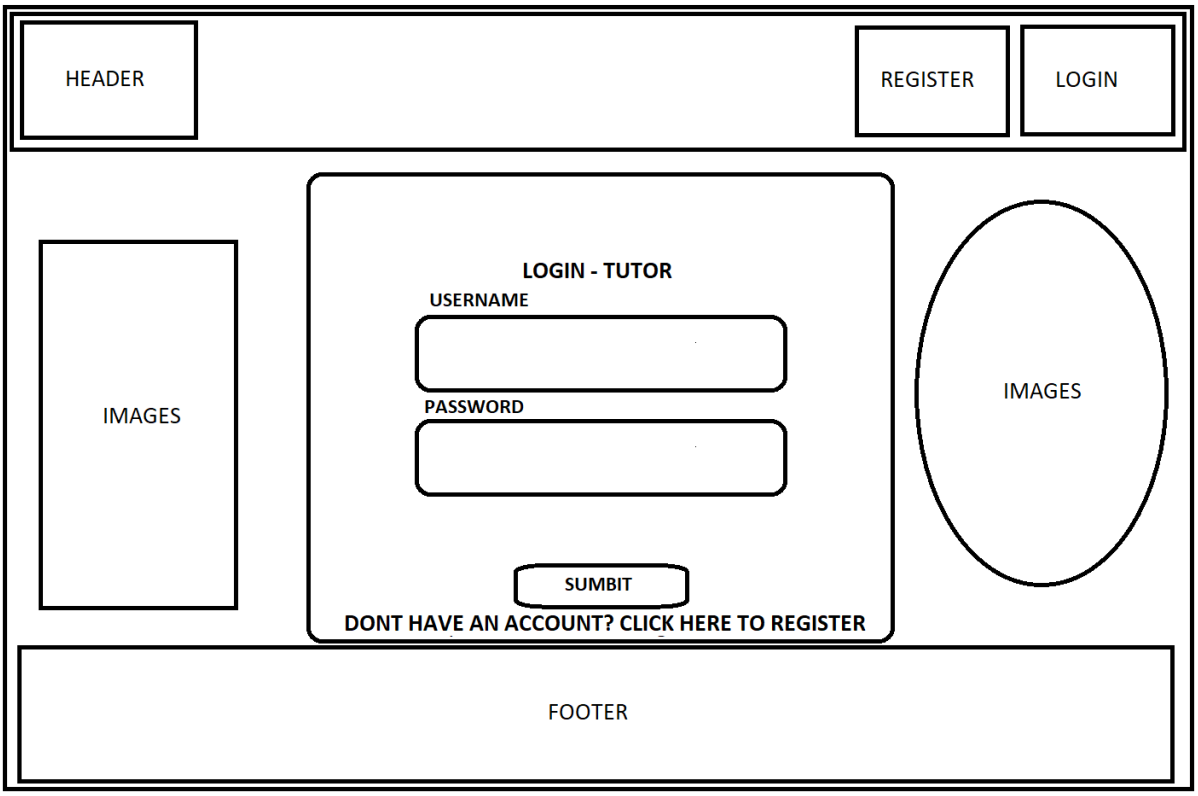

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- F pattern user interface for this page.

Page elements:

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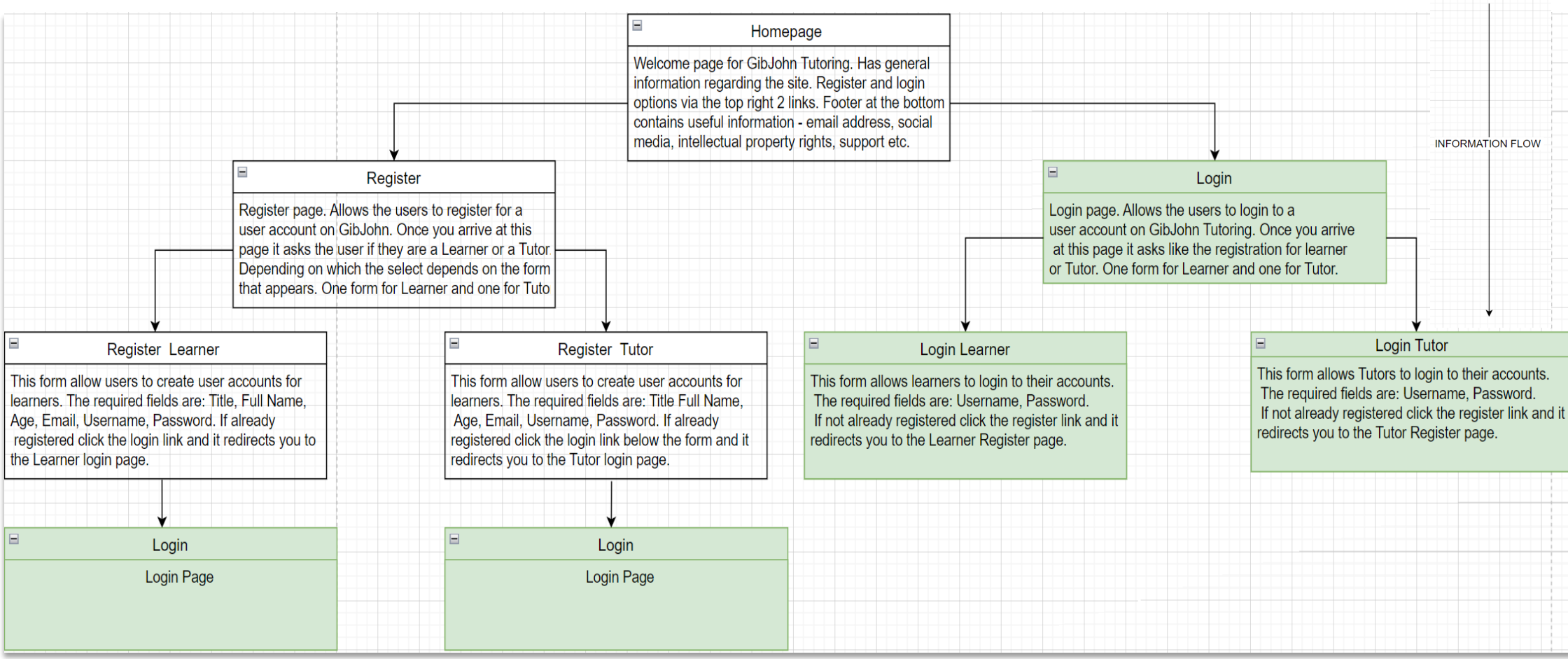
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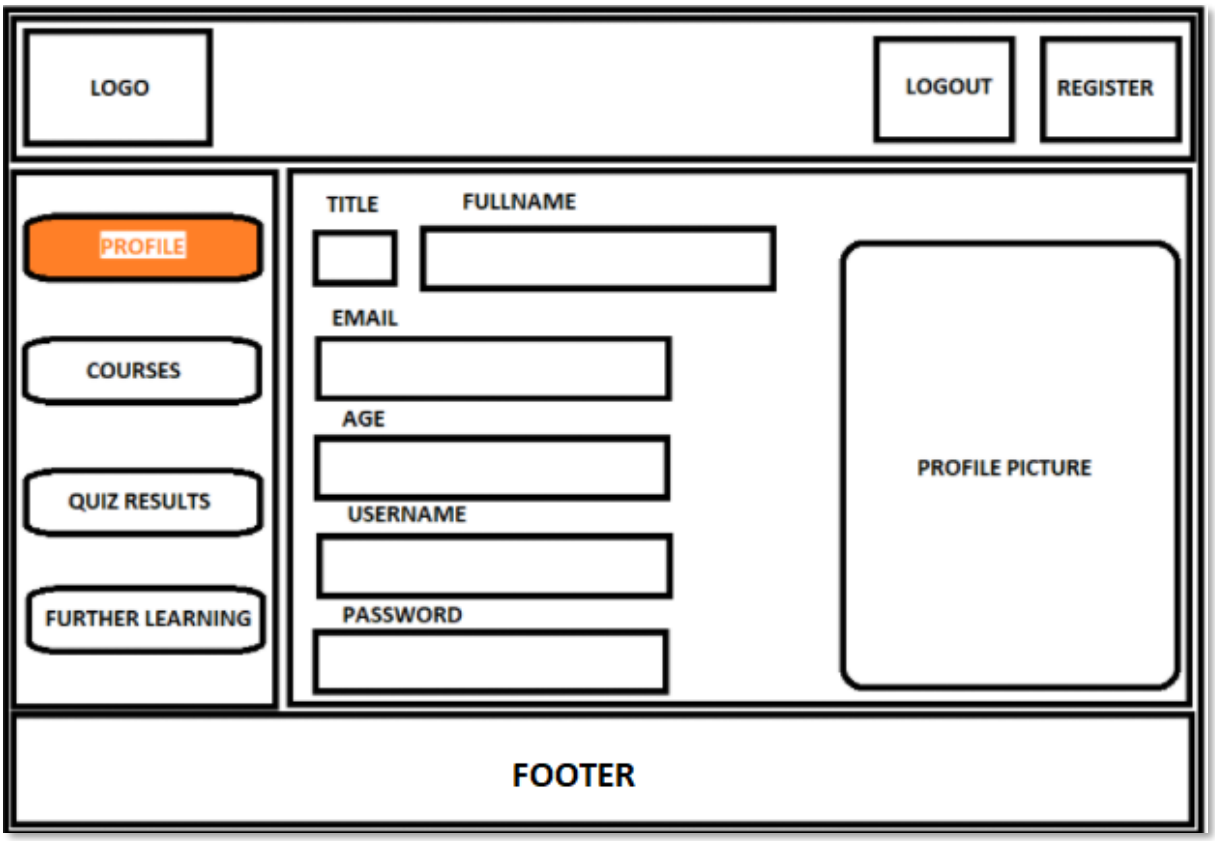
Login Learner
This form allows learners to login to their accounts. The required fields are: Username, Password. If not already registered click the register link and it redirects you to the Learner Register page.
Login Tutor
This form allows Tutors to login to their accounts. The required fields are: Username, Password. If not already registered click the register link and it redirects you to the Tutor Register page.
Login
Login Page
Login
Login Page

Learner profile



Interface:

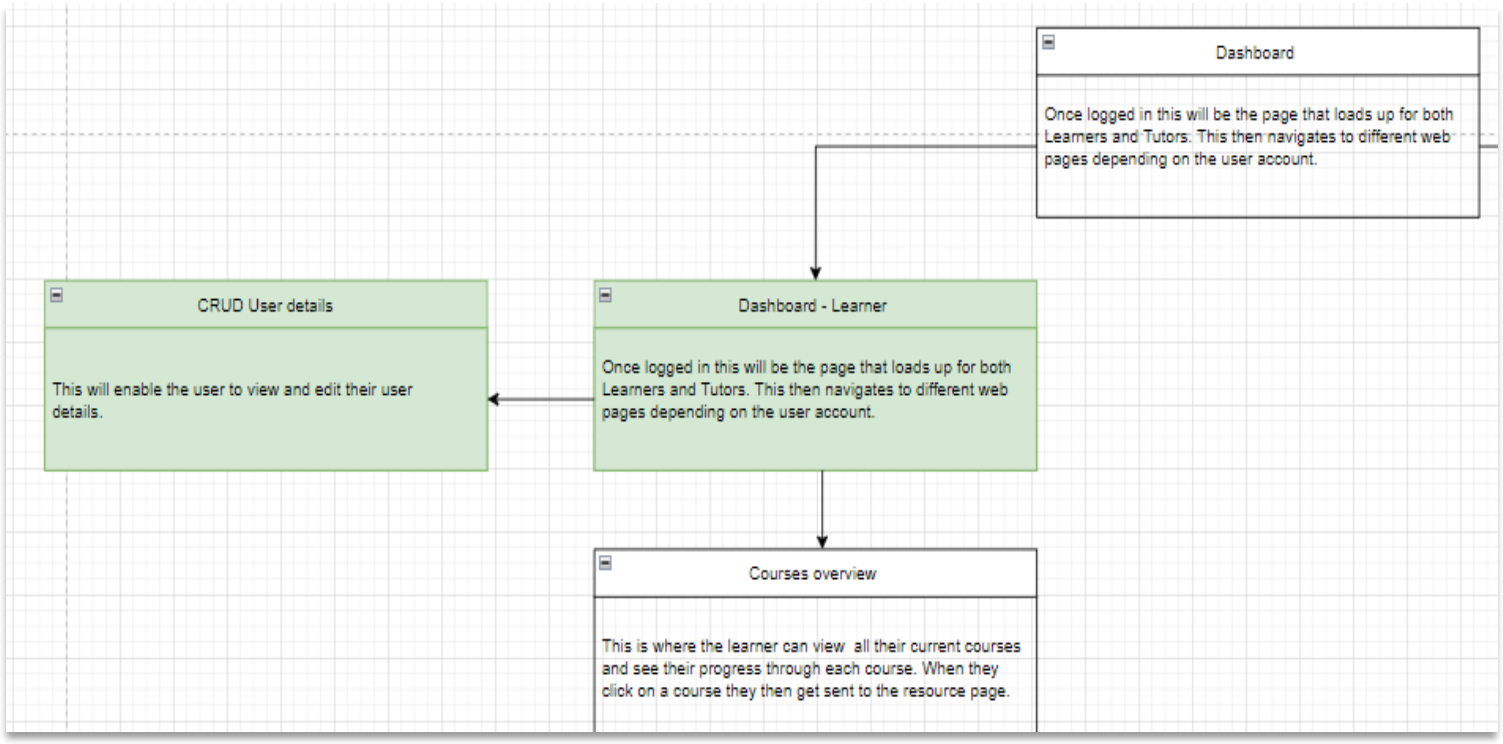
- A side navigation bar with 4 aspects on – each lead to different pages.
- On this sticky nav bar you have the logo, login and register– when scrolling down and up page it stays in top section of the screen.
- Footer at the bottom containing all company information and social media links and contact information about GibJohn.
- F pattern user interface for this page.
- This is the profile page where the use can CRUD their details.

Page elements:

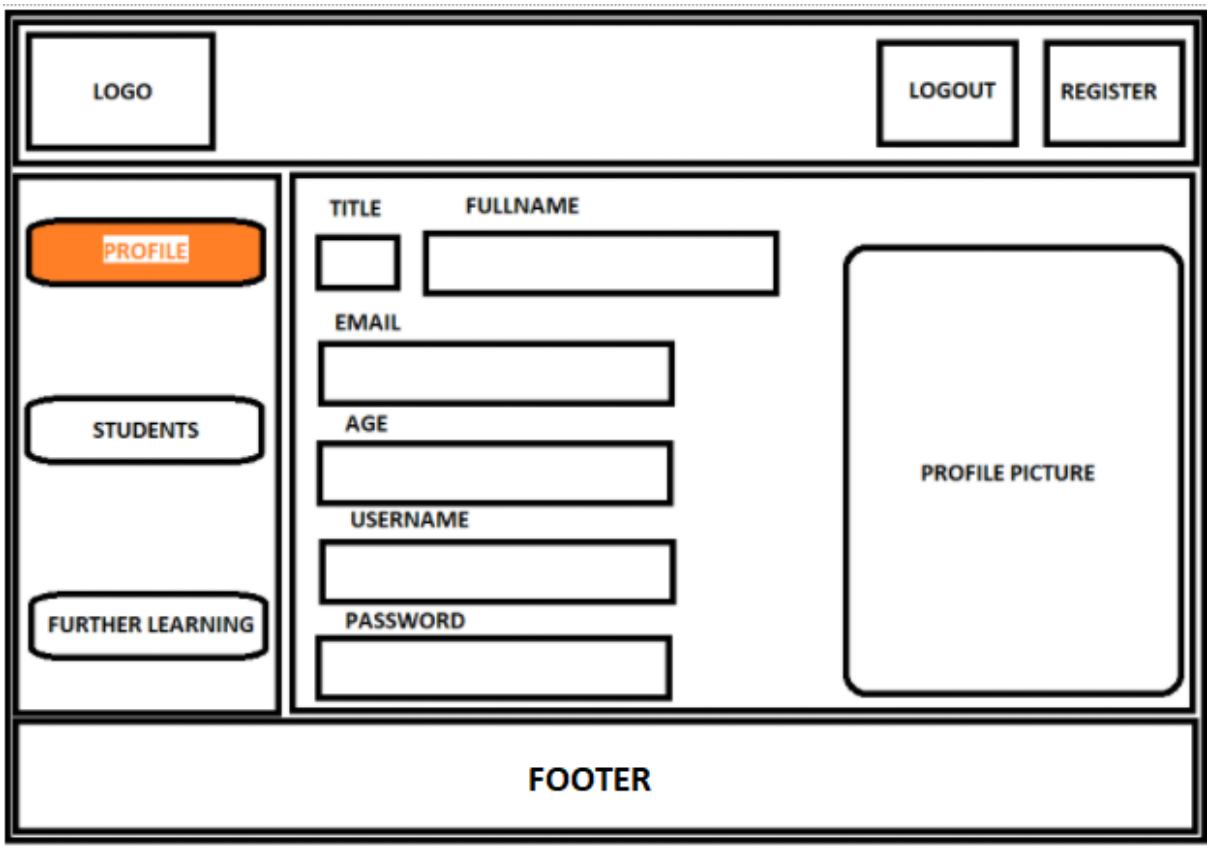
- 4 sidebar navigation buttons.
- Logo and navigation bar with webpage links (Login and Register).
- Text, buttons, image and form fields.
- Links in footer to Facebook, Instagram, Twitter, Snapchat. Also, GibJohn company information withing the footer.

Buttons:

- Logout and Register (top right)
- 4 buttons on the side navigation bar.
- Social media options and links in the footer.


Dashboard
Once logged in this will be the page that loads up for both Learners and Tutors. This then navigates to different web pages depending on the user account.
CRUD User details
This will enable the user to view and edit their user details.
Dashboard - Learner
Once logged in this will be the page that loads up for both Learners and Tutors. This then navigates to different web pages depending on the user account.
Courses overview
This is where the learner can view all their current courses and see their progress through each course. When they click on a course they then get sent to the resource page.

Tutor profile



Interface:

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- This is the profile page where the use can CRUD their details.

Page elements:

- 3 sidebar navigation buttons.
- Logo and navigation bar with webpage links (Login and Register).
- Text, buttons, image and form fields.
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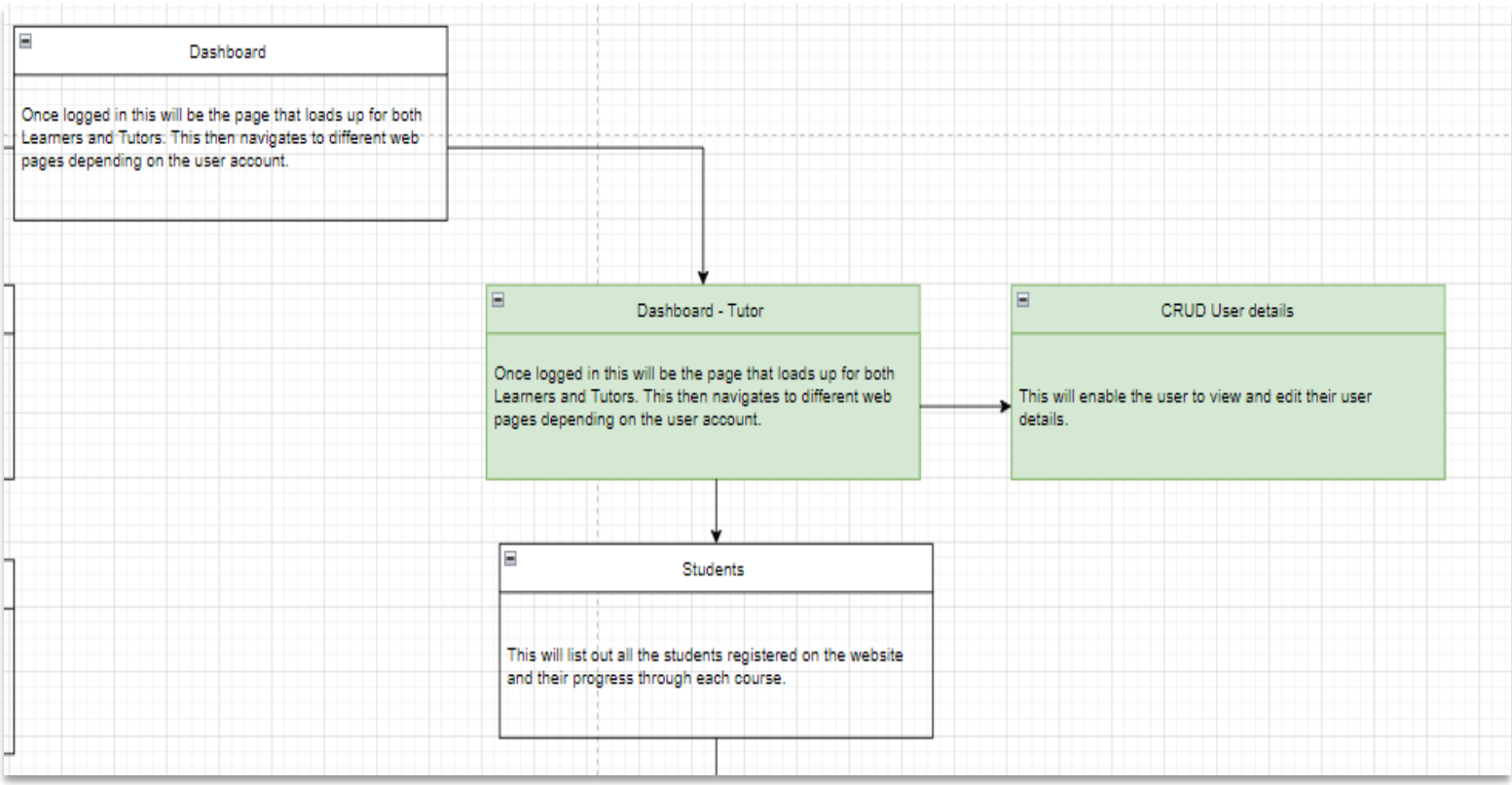
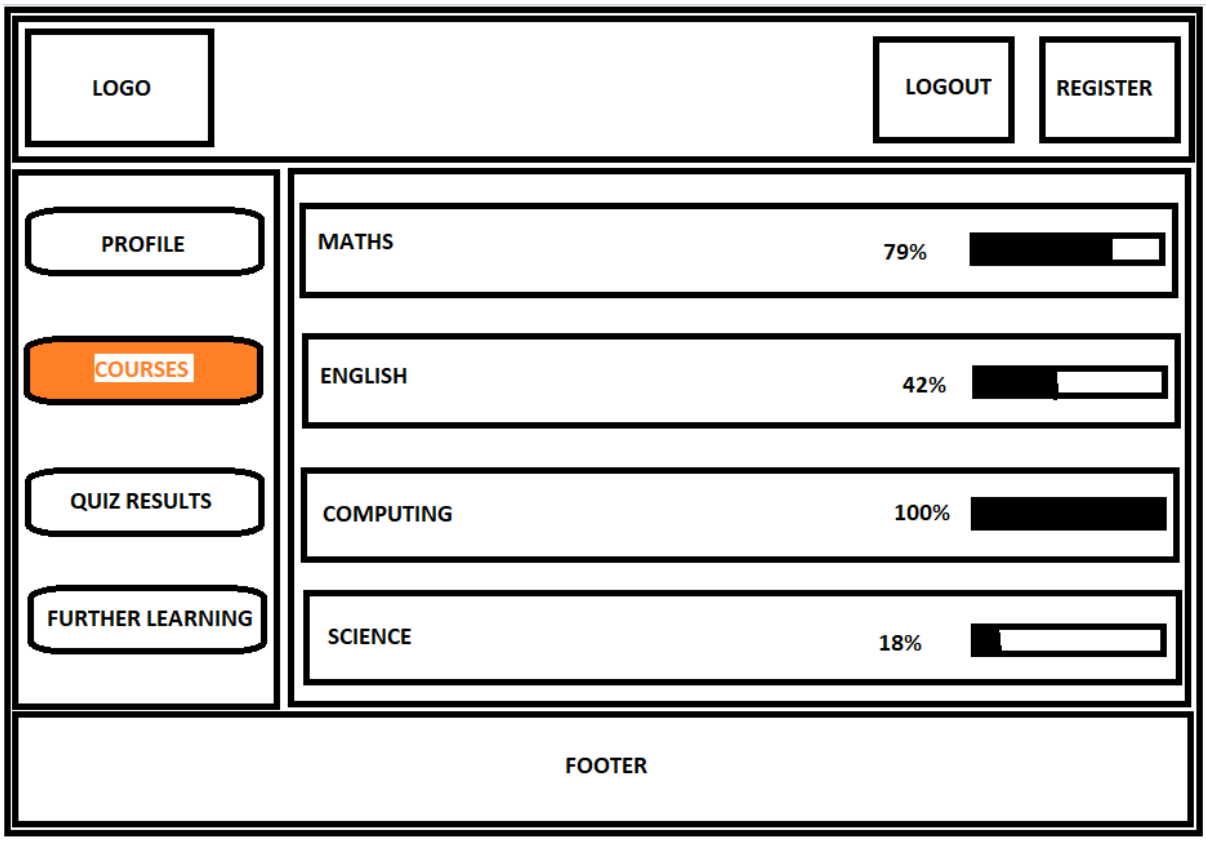
Buttons:

- Logout and Register (top right)
- 3 buttons on the side navigation bar.
- Social media options and links in the footer.


Dashboard
Once logged in this will be the page that loads up for both Learners and Tutors. This then navigates to different web pages depending on the user account.
Dashboard - Tutor
Once logged in this will be the page that loads up for both Learners and Tutors. This then navigates to different web pages depending on the user account.
CRUD User details
This will enable the user to view and edit their user details.
Students
This will list out all the students registered on the website and their progress through each course.

` **Learner Courses**



Interface:

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- On this sticky nav bar you have the logo, login and register– when scrolling down and up page it stays in top section of the screen.
- Footer at the bottom containing all company information and social media links and contact information about GibJohn.
- F pattern user interface for this page.
- This is where students can see their current courses and progress bars.

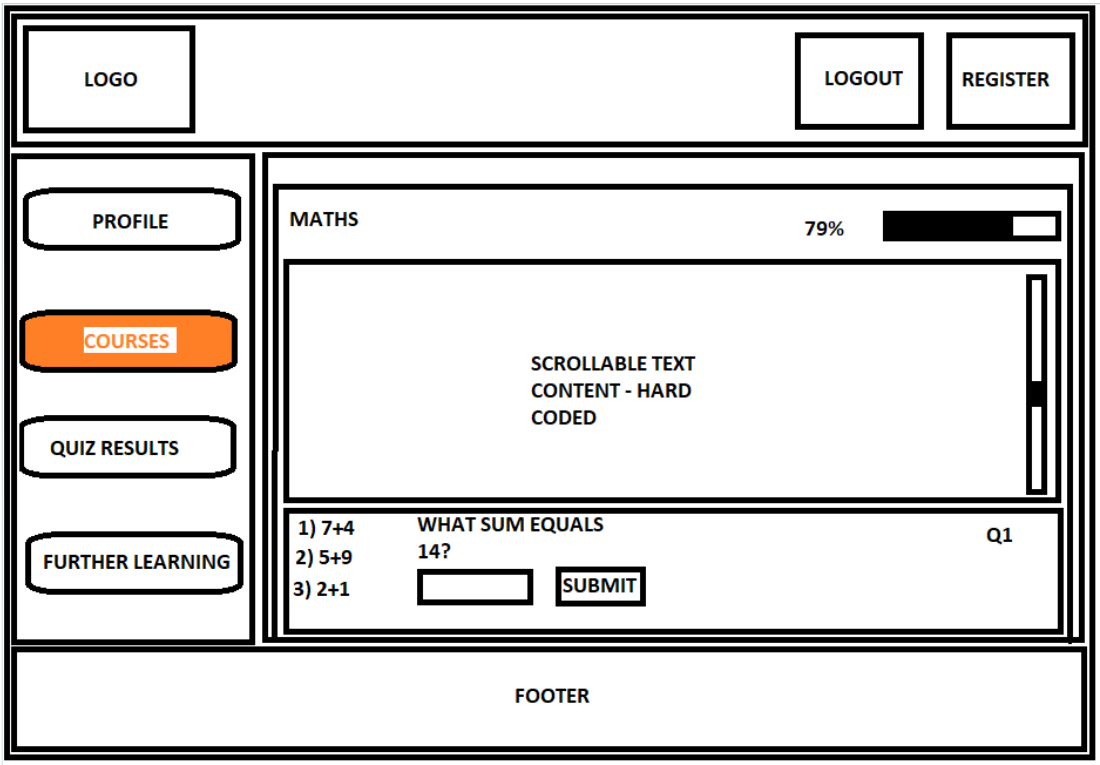
Page elements:

- 4 sidebar navigation buttons.
- Logo and navigation bar with webpage links (Login and Register).
- Text, progress bars, padded website squares.
- Links in footer to Facebook, Instagram, Twitter, Snapchat. Also, GibJohn company information withing the footer.

Buttons:

- Logout and Register (top right)
- 4 buttons on the side navigation bar.
- Social media options and links in the footer.

Learner Courses – Resources page



Interface:

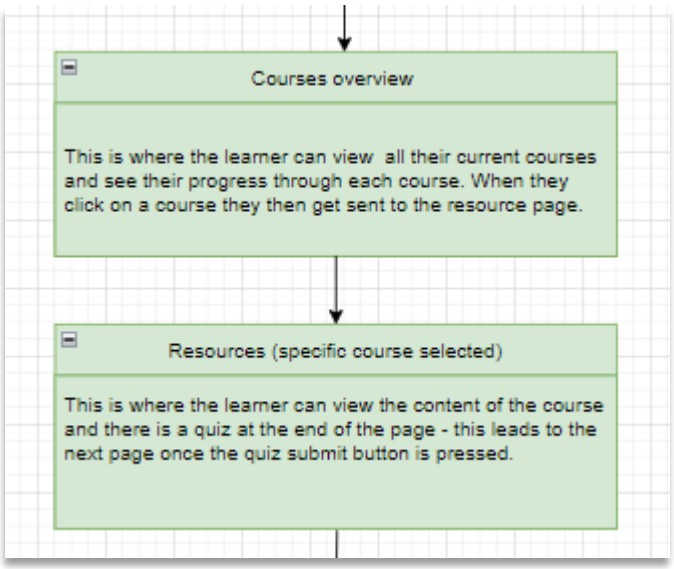
- A side navigation bar with 4 aspects on – each lead to different pages.
- On this sticky nav bar you have the logo, login and register– when scrolling down and up page it stays in top section of the screen.
- Footer at the bottom containing all company information and social media links and contact information about GibJohn.
- F pattern user interface for this page.
- This is where students can see the resources from a certain course in this instance it is maths.
- Quiz at the end of the resource.

Page elements:

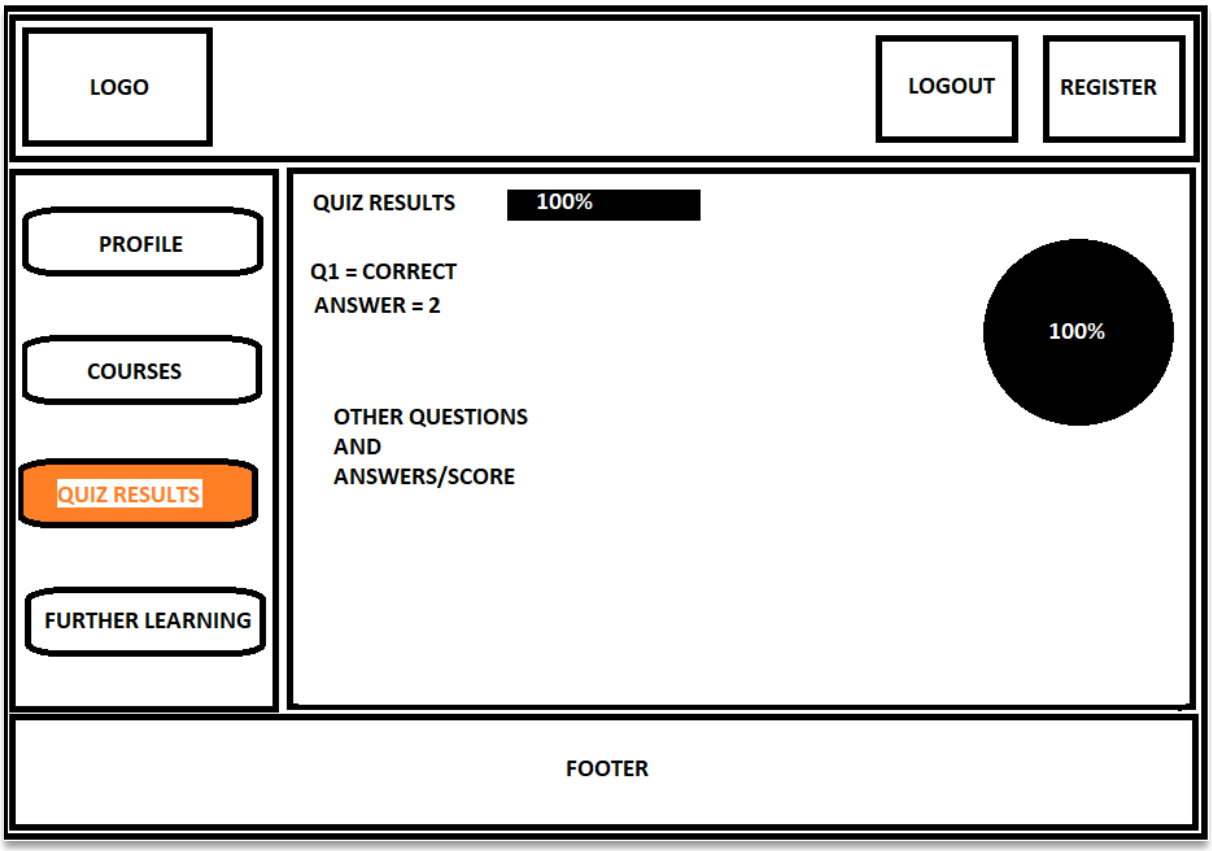
- 4 sidebar navigation buttons.
- Logo and navigation bar with webpage links (Login and Register).
- Text, progress bars, padded website squares.
- Links in footer to Facebook, Instagram, Twitter, Snapchat. Also, GibJohn company information withing the footer.
- Quiz and submit button.

Buttons:

- Logout and Register (top right)
- 4 buttons on the side navigation bar.
- Social media options and links in the footer.


Courses overview
This is where the learner can view all their current courses and see their progress through each course. When they click on a course they then get sent to the resource page.
Resources (specific course selected)
This is where the learner can view the content of the course and there is a quiz at the end of the page - this leads to the next page once the quiz submit button is pressed.

Learner Quiz Results page



Interface:

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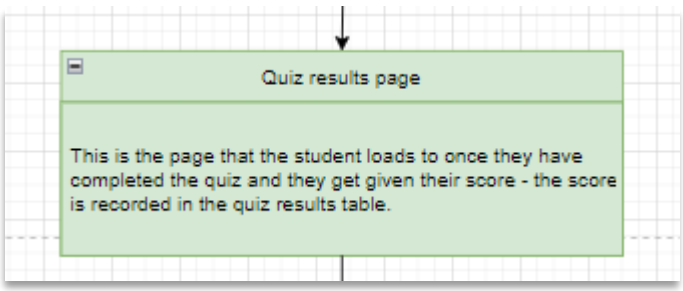
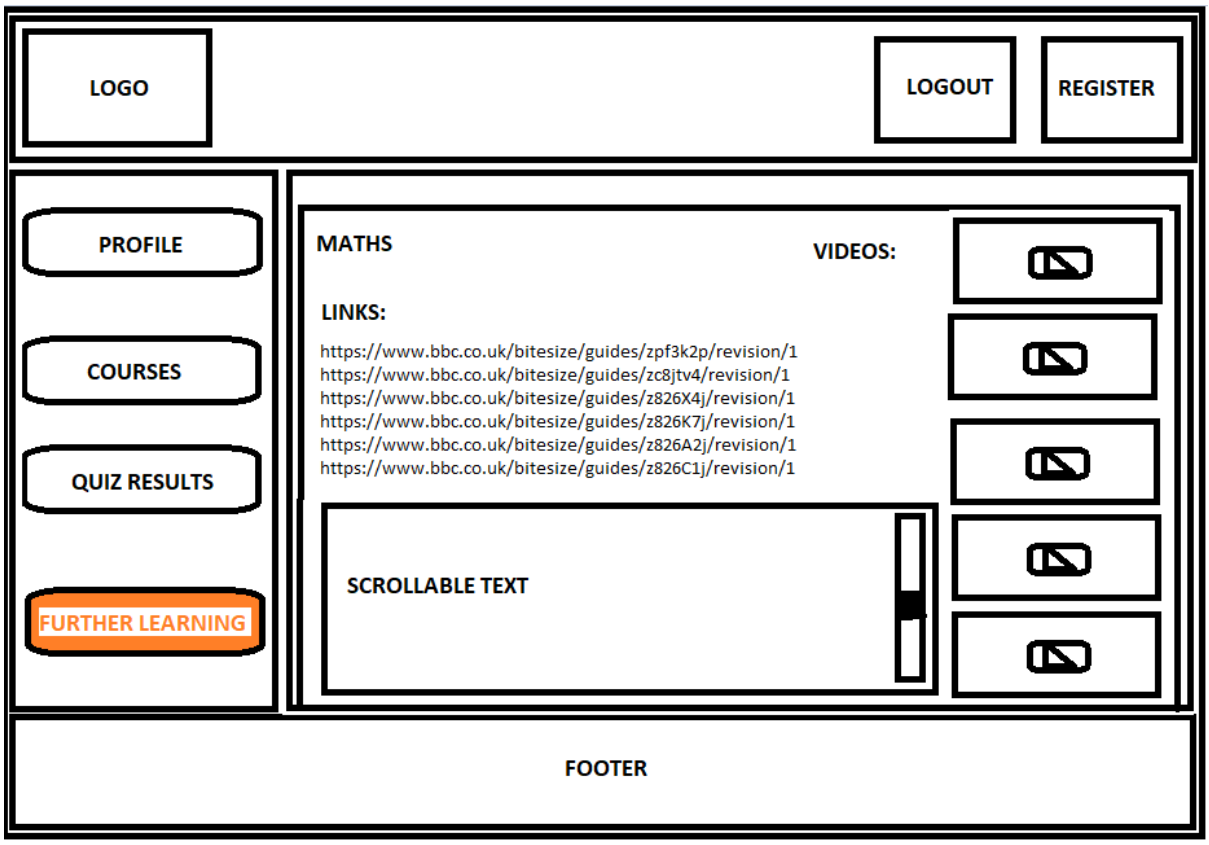
- On this sticky nav bar you have the logo, login and register– when scrolling down and up page it stays in top section of the screen.
- Footer at the bottom containing all company information and social media links and contact information about GibJohn.
- F pattern user interface for this page.
- This is where students can see their quiz results and they get a graphical representation of them also.

Page elements:

- 4 sidebar navigation buttons.
- Logo and navigation bar with webpage links (Login and Register).
- Text, graphs and bars.
- Links in footer to Facebook, Instagram, Twitter, Snapchat. Also, GibJohn company information withing the footer.
- Buttons:
- Logout and Register (top right)
- 4 buttons on the side navigation bar.
- Social media options and links in the footer.


Quiz results page
This is the page that the student loads to once they have completed the quiz and they get given their score - the score is recorded in the quiz results table.

Learner Further Learning



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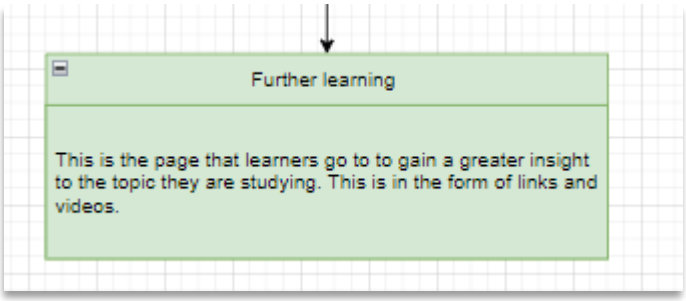
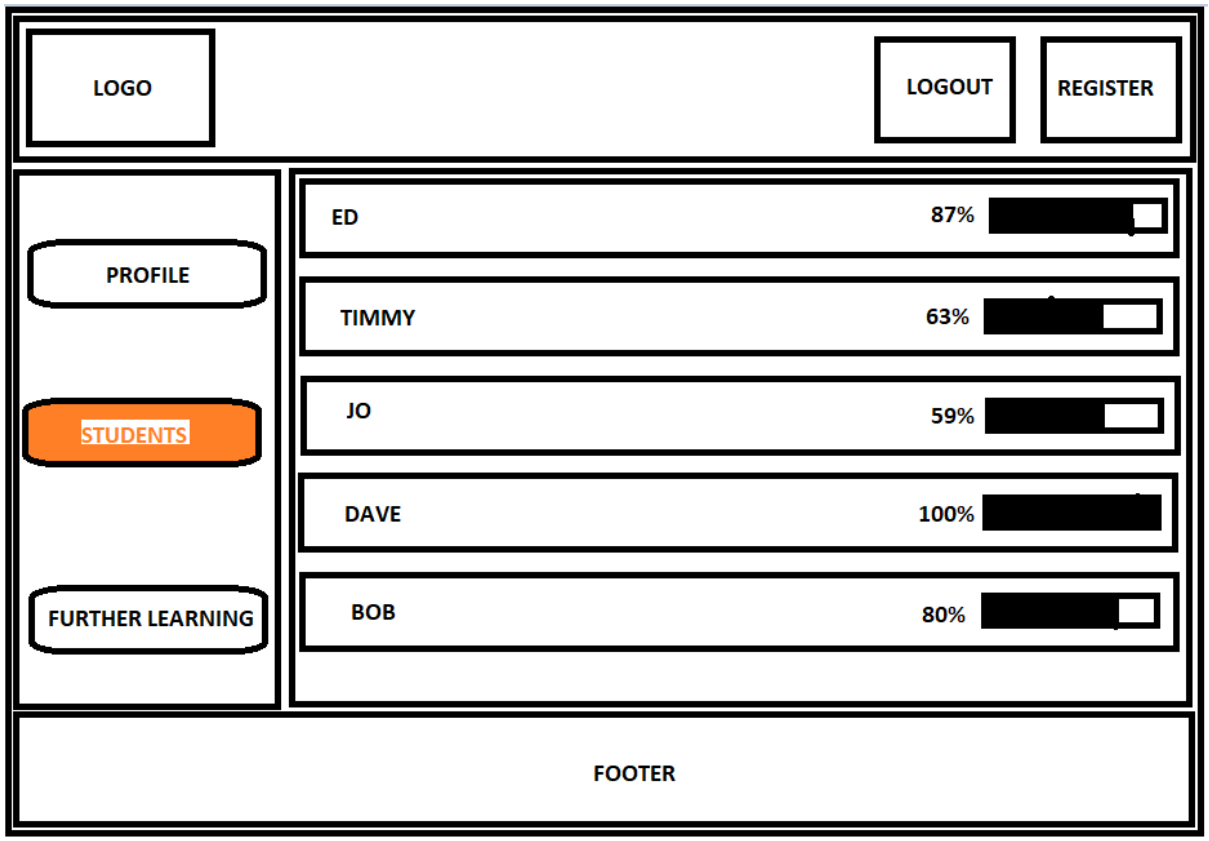
- On this sticky nav bar you have the logo, login and register– when scrolling down and up page it stays in top section of the screen.
- Footer at the bottom containing all company information and social media links and contact information about GibJohn.
- F pattern user interface for this page.
- This is where students can find further course and topic information in the form of links and videos.

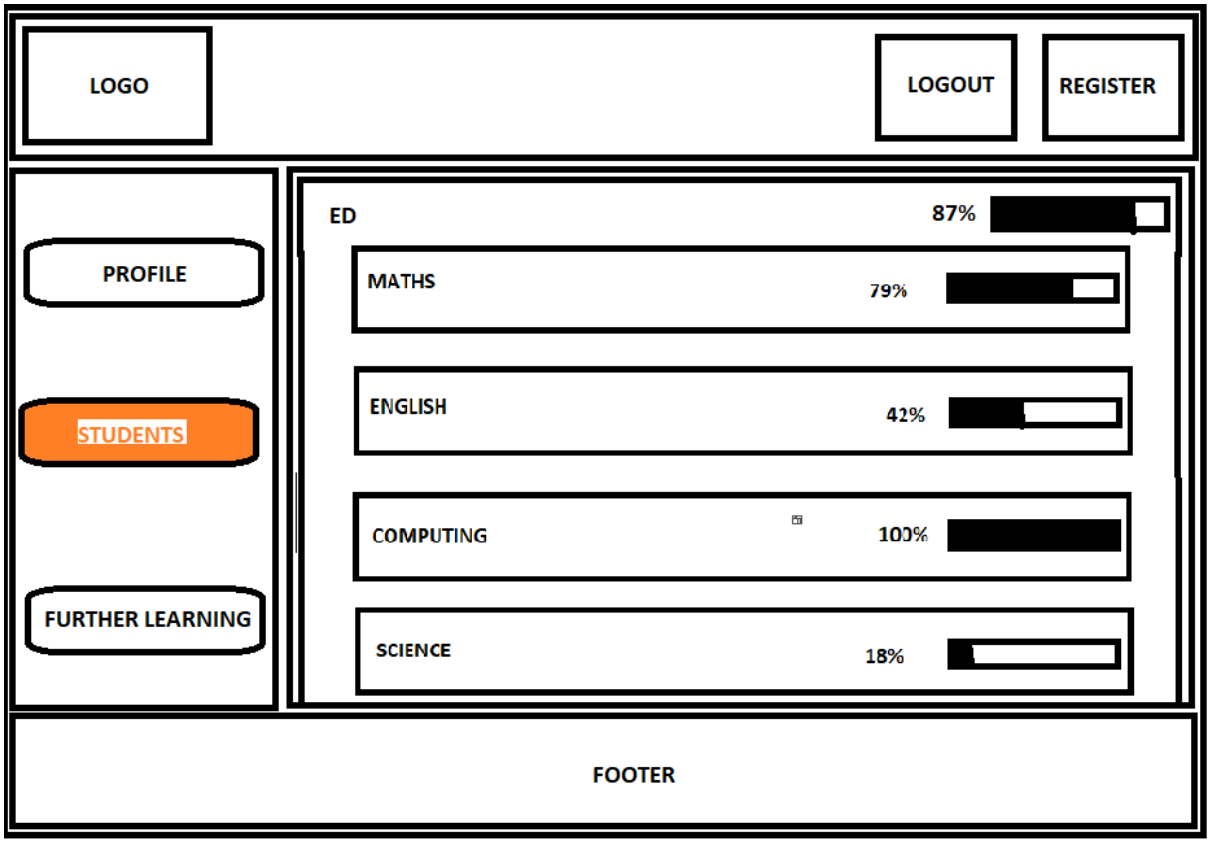
Page elements:

- 4 sidebar navigation buttons.
- Logo and navigation bar with webpage links (Login and Register).
- Text, videos, links and scrollbars.
- Links in footer to Facebook, Instagram, Twitter, Snapchat. Also, GibJohn company information withing the footer.
- Buttons:
- Logout and Register (top right)
- 4 buttons on the side navigation bar.
- Social media options and links in the footer.


Further learning
This is the page that learners go to to gain a greater insight to the topic they are studying. This is in the form of links and videos.

Tutor – learners page





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- On this sticky nav bar you have the logo, login and register– when scrolling down and up page it stays in top section of the screen.
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- F pattern user interface for this page.
- This is where Tutors can find the students names and overall progress through the course via the progress bars. Once the student is clicked on more detail appears and the courses, they are doing show up also.

Page elements:

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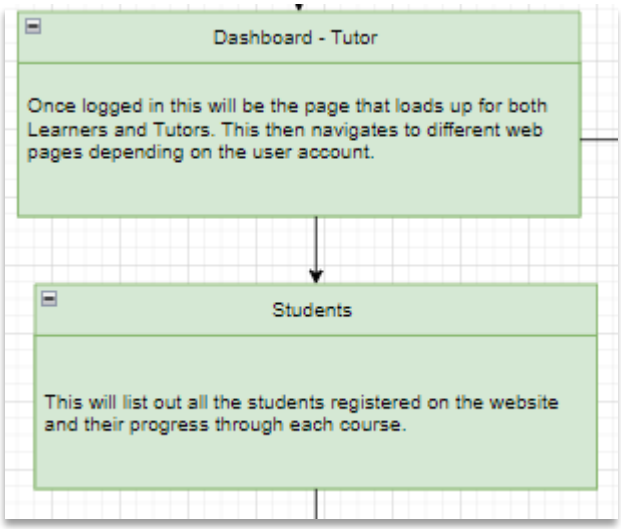
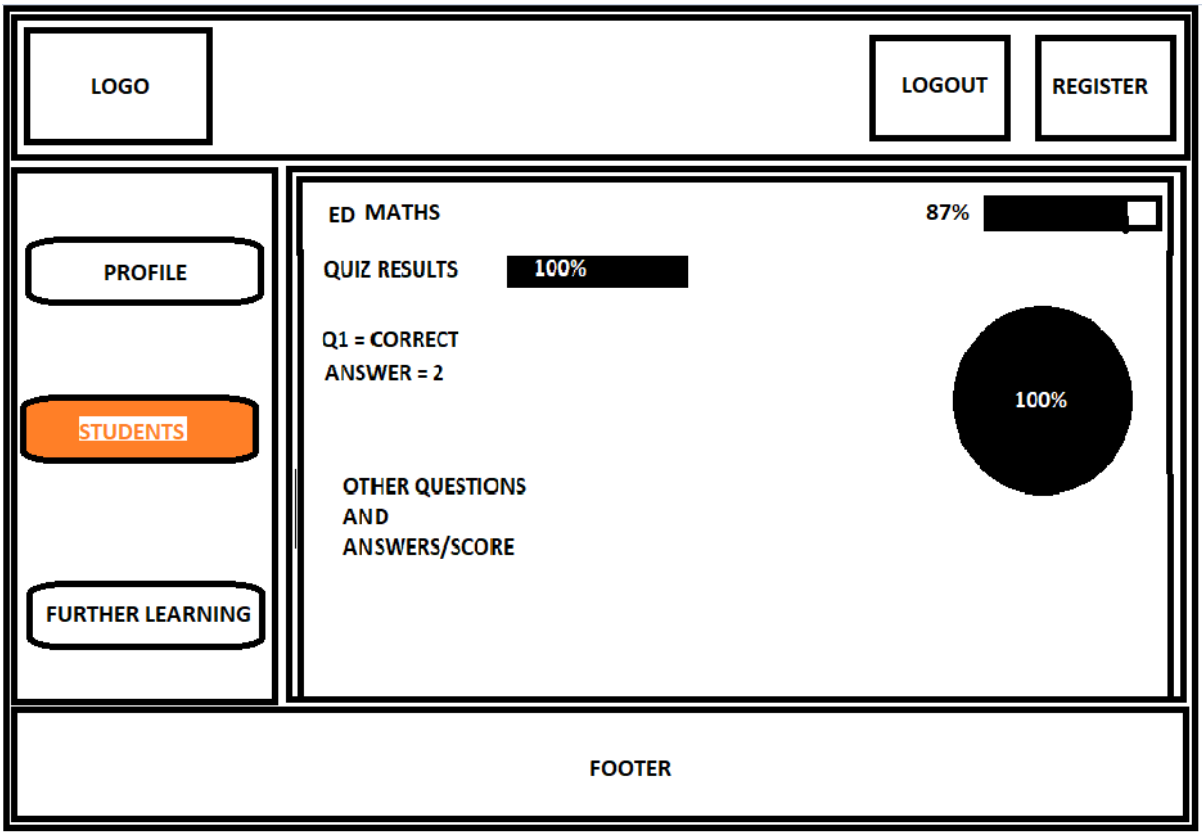
- Text, videos, links and scrollbars.
- Links in footer to Facebook, Instagram, Twitter, Snapchat. Also, GibJohn company information withing the footer.

Buttons:

- Logout and Register (top right)
- 3 buttons on the side navigation bar, all the students are clickable options.
- Social media options and links in the footer.



Tutor – learners page – learners quiz results.



Interface:

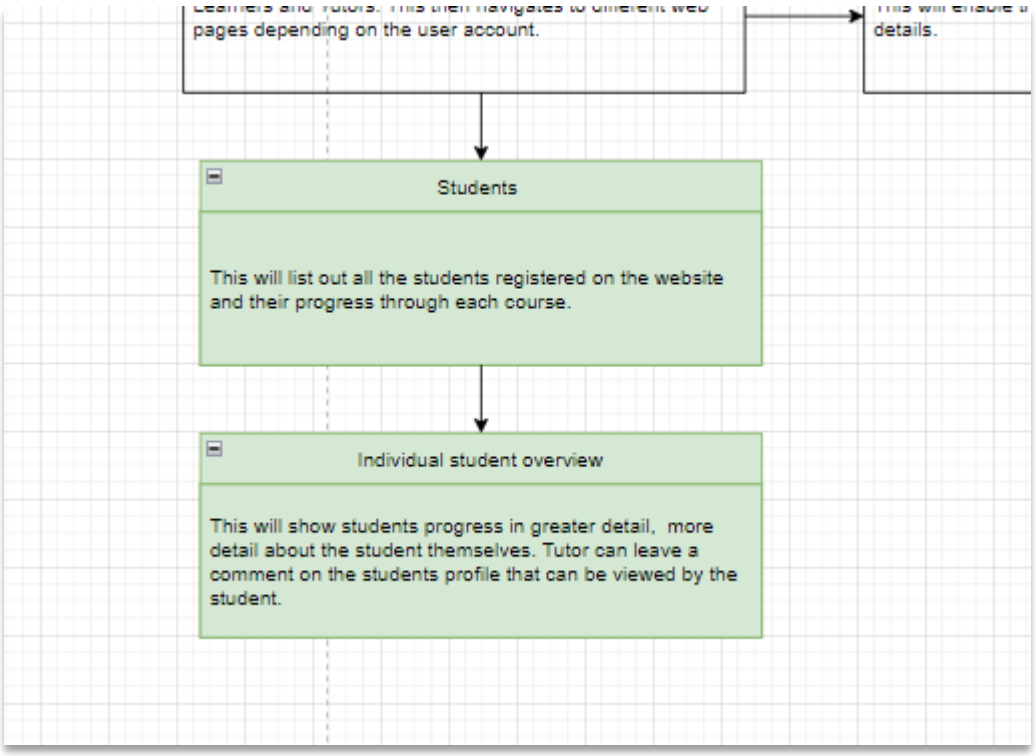
- A side navigation bar with 3 aspects on – each lead to different pages.
- On this sticky nav bar you have the logo, login and register– when scrolling down and up page it stays in top section of the screen.
- Footer at the bottom containing all company information and social media links and contact information about GibJohn.
- F pattern user interface for this page.
- This is where Tutors can find the learners quiz results from all quizzes, the same view the learners have.

Page elements:

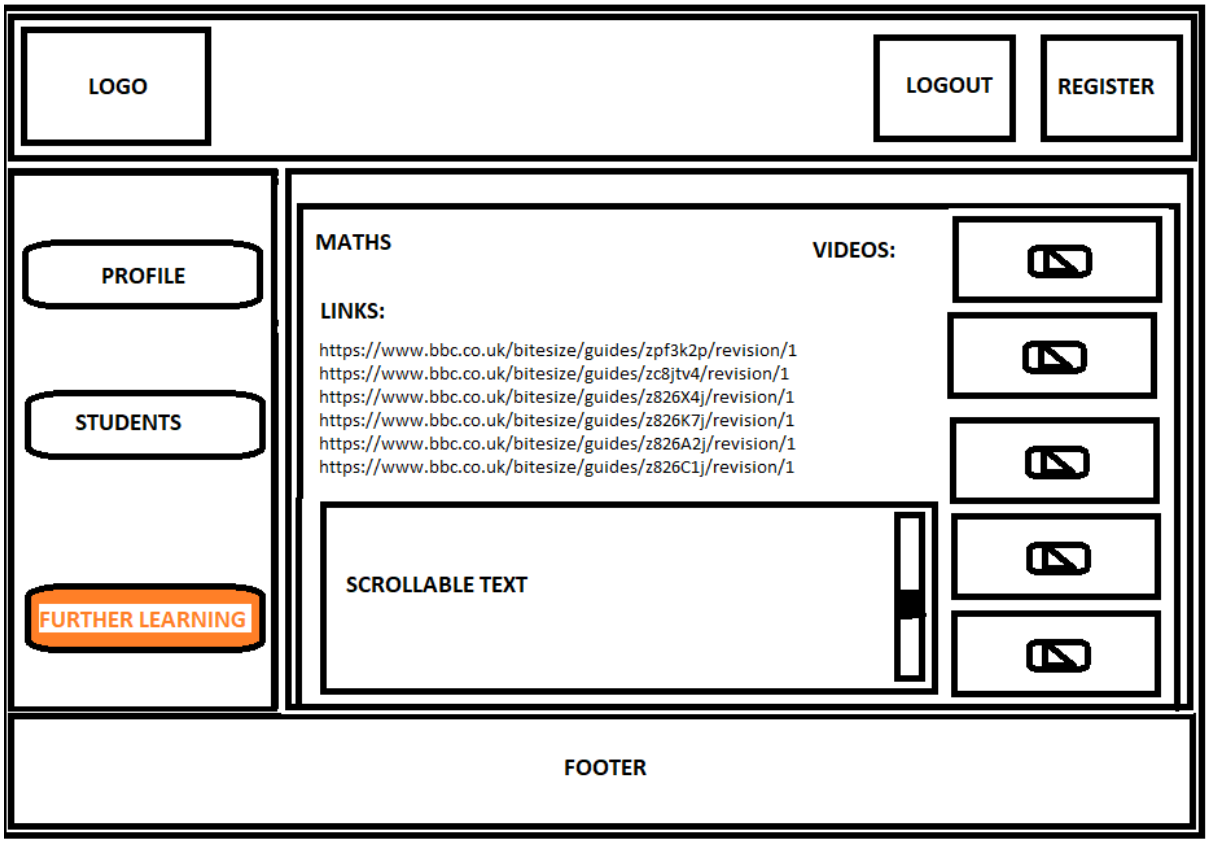
- 3 sidebar navigation buttons.
- Logo and navigation bar with webpage links (Login and Register).
- Text, videos, links and scrollbars.
- Links in footer to Facebook, Instagram, Twitter, Snapchat. Also, GibJohn company information withing the footer.

Buttons:

- Logout and Register (top right)
- 3 buttons on the side navigation bar, all the students are clickable options.
- Social media options and links in the footer.


pages depending on the user account.
details.
Students
This will list out all the students registered on the website and their progress through each course.
Individual student overview
This will show students progress in greater detail, more detail about the student themselves. Tutor can leave a comment on the students profile that can be viewed by the student.

Tutor – Further Learning



Interface:

- A side navigation bar with 3 aspects on – each lead to different pages.
- On this sticky nav bar you have the logo, login and register– when scrolling down and up page it stays in top section of the screen.
- Footer at the bottom containing all company information and social media links and contact information about GibJohn.
- F pattern user interface for this page.
- This is where Tutors can find further learning to help out the learner or for their own interest.

Page elements:

- 3 sidebar navigation buttons.
- Logo and navigation bar with webpage links (Login and Register).
- Text, videos, links and scrollbars.
- Links in footer to Facebook, Instagram, Twitter, Snapchat. Also, GibJohn company information withing the footer.

Buttons:

- Logout and Register (top right)
- 3 buttons on the side navigation bar, all the students are clickable options.
- Social media options and links in the footer.
- Links and videos to external sites and resources.

Front and back-end needs

Front End:

- Clear and easy to understand/use interface
- Non contrasting colour schemes.
- Link to the back end (developers hard coding content and Database access).
-

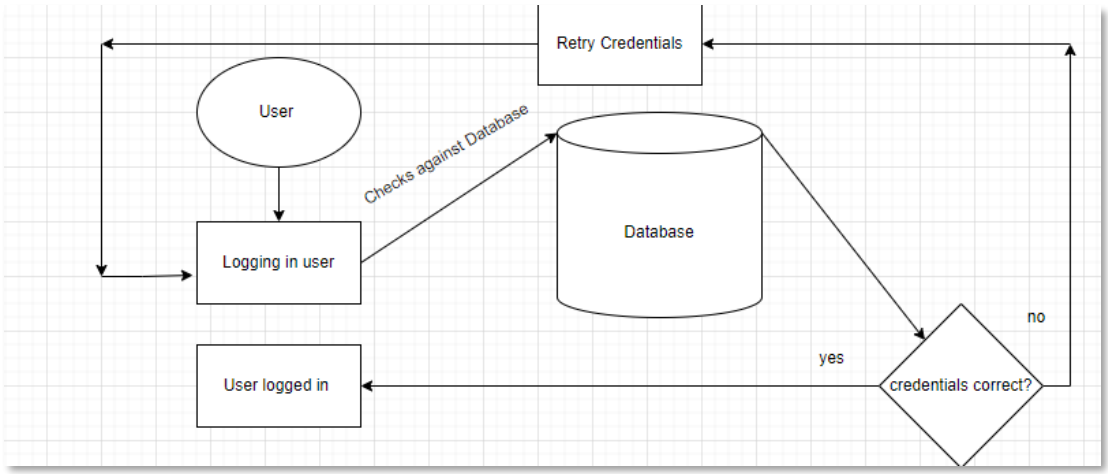
Back end:

- Security
- Data storage Read/Write
- Be reliable and relatively speedy.
- Link to front end

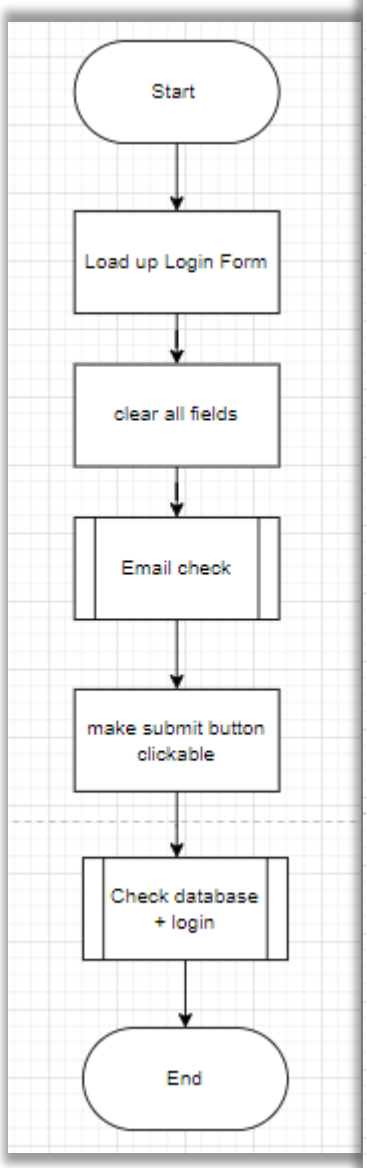
For security and data refer to the - Security and Fraud risk- in Task(I), which is part of my appendices.

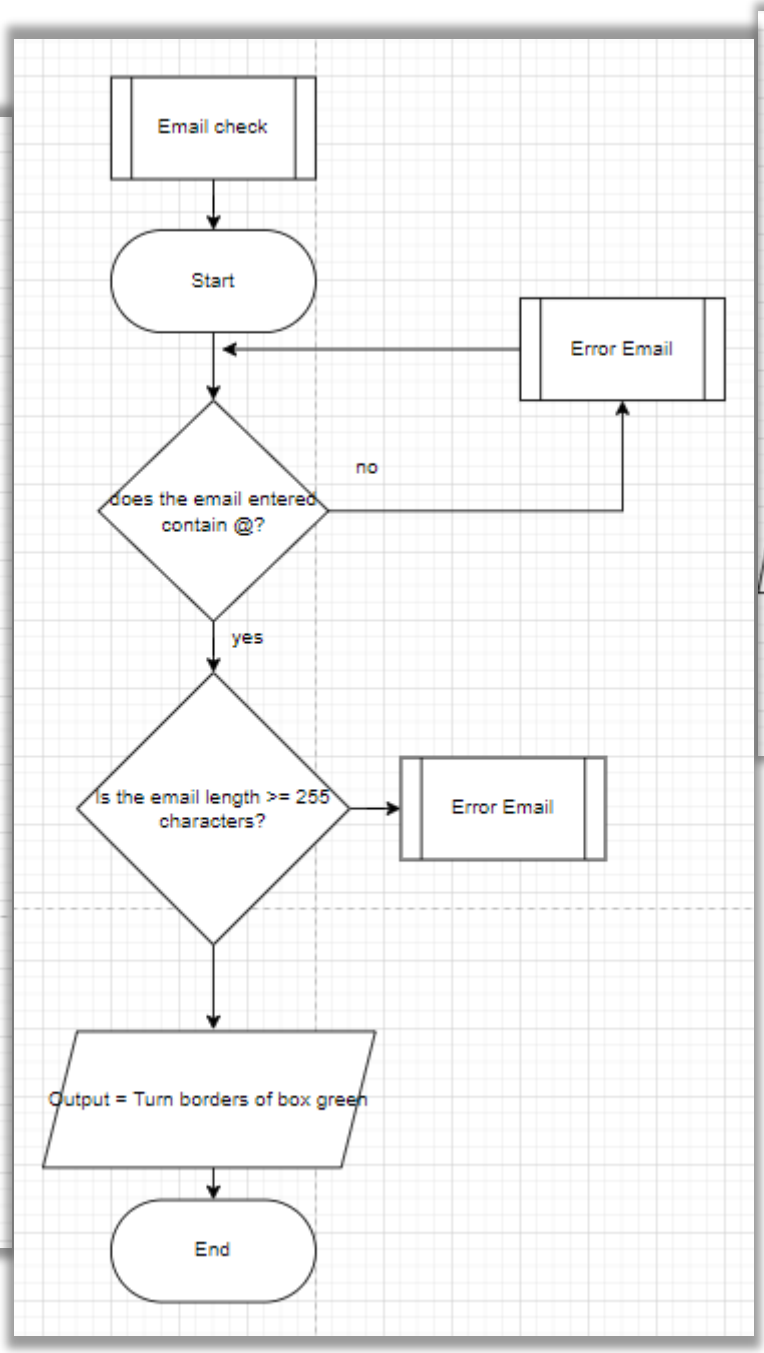
Algorithms

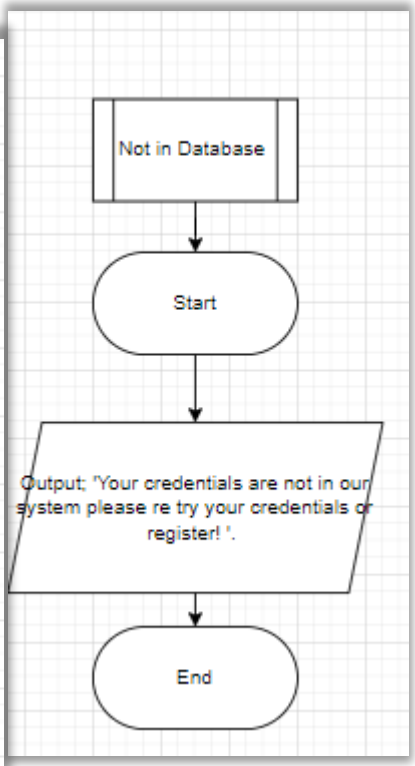
Login process

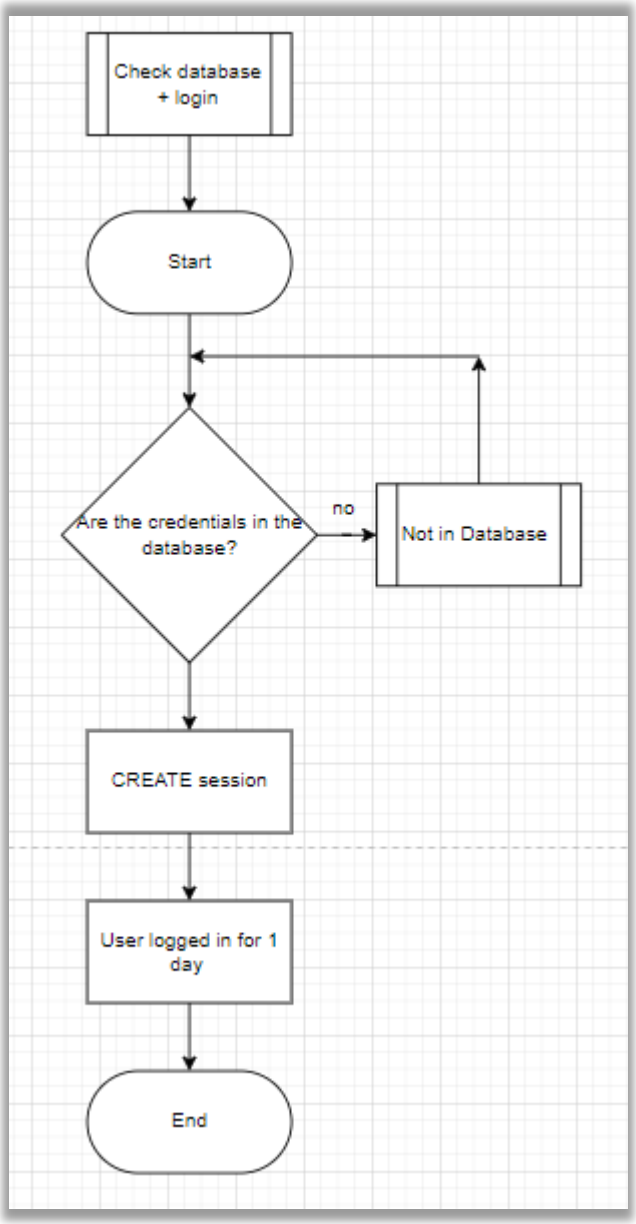


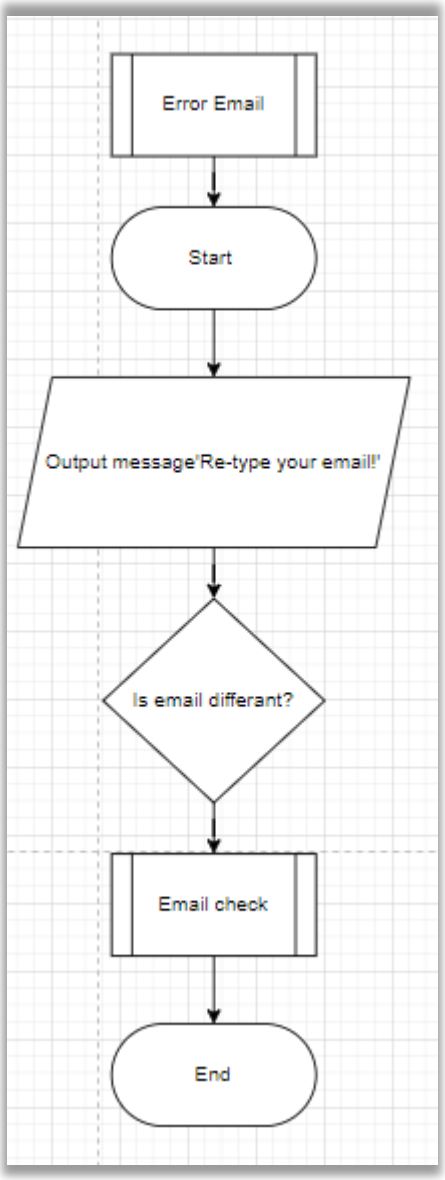
Flowchart of Login Process - This flowchart has 5 processes to it ranging from error checking to checking against the database. This is in a flowchart format which is a clear way that is simple and easy for users and third-party sources to get a grasp of. This helps stakeholders who aren't as techy and other individuals to understand the login process without getting stuck with hard to read code.


Start
Load up Login Form
clear all fields
Email check
make submit button clickable
Check database + login
End


Email check
Start
Error Email
does the email entered contain @?
no
yes
Is the email length >= 255 characters?
Error Email
Output = Turn borders of box green
End


Not in Database
Start
Output; 'Your credentials are not in our system please re try your credentials or register! '.
End





The SQL for checking against the database would be a line of code like –
SELECT * FROM EXAMPLEDATABASE WHERE Username=” Username” and Password=” Password”

<u>Pseudo code of php establishing a connection to a database –</u> this is a slightly more advanced way of writing algorithms, for the more technically minded and less customer/stakeholder friendly that perhaps a flowchart. This shows the pseudo code for connecting to a database and how to hash a password.

Key = lines in yellow are comments

```
<php

        $servername = “example”;
        $username=”example”;
        $password=””;
        $dbname=”example”;

This is a php function that cant be converted to pseudocode that connects to the database
                ^^^
$conn = mysqli_connect($servername, $username, $password, $dbname)
        Or OUTPUT (‘Sorry cannot connect to Database!”);

If ($conn) if connection is established
THEN OUTPUT “You have connected to the database!”;


?>
```

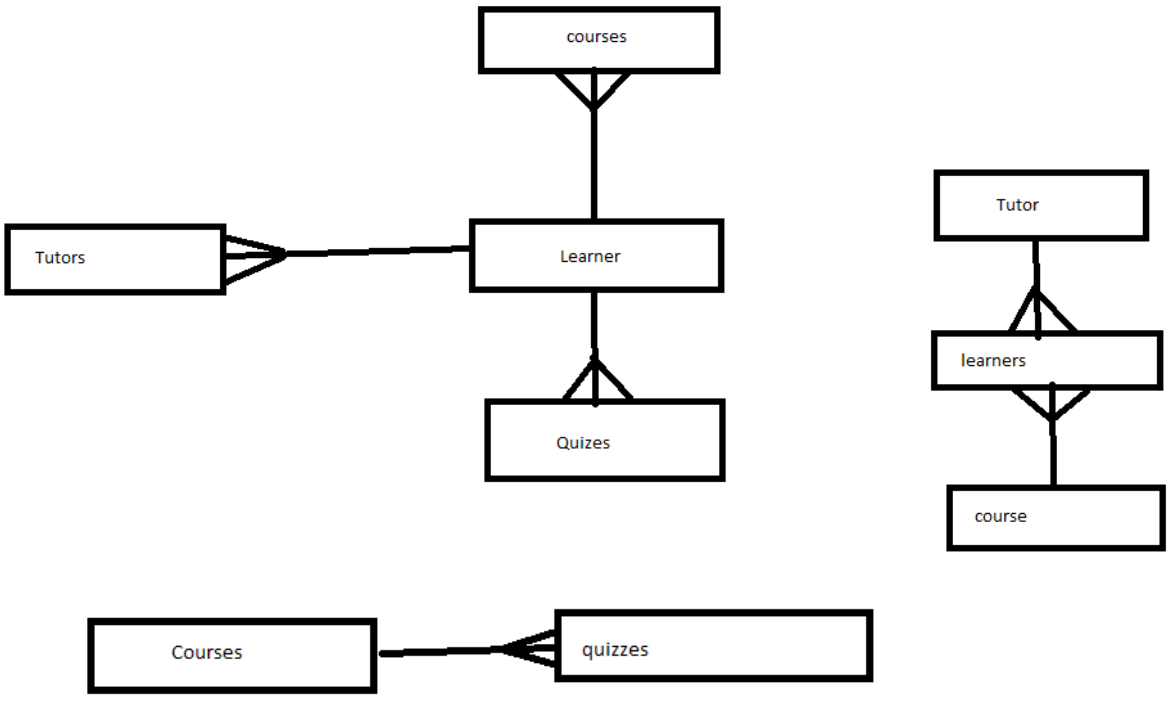
If you want to hash user’s password, you need to use the inbuilt password hash function to turn the user’s password into something along the lines of - $2y$10$.vGA1O9wmRjrwAVXD98HNOgsNpDczlqm3Jq7KnEd1rVAGv3Fykk1a.

```
$examplevariable = password_hash($password, PASSWORD_DEFAULT);
OUTPUT/ECHO $examplevariable
```

Data requirements to connect to a database

Variable name	Function	Data type	Reason
$servername	Servername – where the application can look for to find the database. Localhost is commonly used.	String	So the application knows where specifically to look for the database on the machine / server.
$username	A name of a database field.	Varchar/string	The application checks the data fields are correct on both ends.
$password	A name of a database field.	String	The application checks the data fields are correct on both ends.
$dbname	The name of the database.	string	The application can find the exact database by its specific name.

Entity Relationship Diagrams



Approach to testing

To test my digital solution, I will be performing both black and white box testing to test the entirety of the website. I will list a couple of test cases/plans, a testing strategy, a template of a test log. By performing both white and Blackbox testing I will be able to get a well-tested application as Ill be testing both with a prior knowledge of the application and its backend processes and as a user with no experience and knowledge of the system at all.

Test Plans

Test Reference.	Type of Test	Purpose of Test	Expected Outcome	Test Data
1	Functional Test. Usability test	To test numerous ways of adding data to the register and login form and test to see how usable it is from a user's point of view. This will be readability, size, colour and anything about the form itself that makes it usable/not usable.	Not sure yet	Form Data. E.g. – name, age, email address, etc.
2	Functional test. Security test	Test that the forms validate themselves properly – don't allow incorrect data to be posted to the database and stop database attacks like SQL injection.	Not sure yet	Form Data. E.g. – name, age, email address, etc.

Test Logs Template

Test Reference:		**Name of Tester:**		**Date of Test:**	
Purpose of Test:					
Test Type:					
Test Data:					
Expected Outcome:					
Actual Outcome:					
Pass/Fail/Skipped:					
Comments and/or Recommendation					

Testing Strategy – blackbox

This form of testing is testing the applications system as if me (the developer) has no prior knowledge of its internal system (both back and front end). This analyses things that a developer would not normally pick up on as they are only thinking as a developer and not as an end user. Developers perform Whitebox testing (I will be doing both in the testing phase.). I will be testing lots of aspects with tests like usability, functionality, stress, unit, module. I will not be performing regression testing as it is only going to have 1 rollout phase. All tests will be documents in the templates above.

Appendices

Task A (I) – GibJohn Tutoring

In preparation for developing a proposal for the digital solution, you have been asked to carry out research. Your research should consider how digital solutions are used to meet the needs of different users within the education sector, including:

- How hardware and software are used within the context of the education sector
- Newly emerging technologies
- How digital solutions could be used to meet different user needs
- The industry specific-guidelines and regulations

Any notes you produce should be kept and submitted as an appendix.

Research

Hardware and software used within the education sector

Hardware

In terms of hardware and software used in the education sector, there is a vast amount that has become the norm within today's society and a basic requirement for all schools and education centres around the world. Almost everything nowadays is in a digital form where it be teaching, homework, parents evening, remote classes and meetings, online modules and quizzes etc. Hardware features such as these listed are used throughout the education sector:

- **Smartboard** –Smartboards are an interactive whiteboard that can be used in various ways: such as mirroring / screensharing a computer screen when linked up; to draw on and make notes with a pen and digital ink; host meetings and virtual classes; run its individual applications that are within the software itself.
- **Laptop –** Laptops are very similar to a Desktop PC however they are much more portable and are used as a computer for all computer related things. These can be things like researching a project with a web browser; emailing; creating/reading/writing/transferring files to a storage device; joining virtual meetings and be able to interact via a camera and microphone providing they are built in etc.
- **Tablets and mobile phones** – These can be used for reasons listed above and tasks like on the go photography; quick internet activity bursts; music and podcasts.
- **Cameras** – Cameras would be used to take professional pictures and video at a high quality, much more specialised than a tablet or mobile phone camera above.
- **Desktop PC's (including mouse + keyboard)** – Desktop PCs are a computer, exactly like a laptop however all interactive hardware devices are external to the computer

like monitor keyboard etc. These can be used for all computer related things – displaying content, reading and writing files, browsing the internet, emailing, etc.

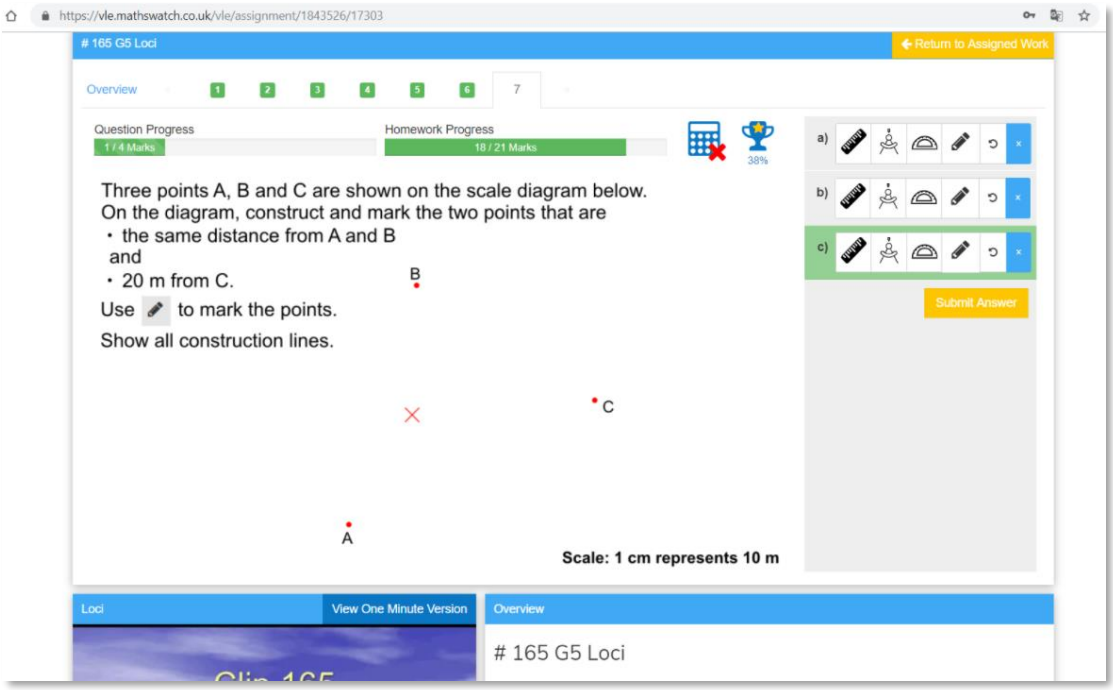
- **Printers** – These are a commonly overlooked hardware device however they serve a very important purpose of printing out documents and media sent by a computer that is then physically printed out. Common examples of printed out work include exam papers, task sheets for a lesson, poster, certificates etc.
- **USB Flash Drives and other storage mediums (Hard disk drives and solid-state drives)** – A USB flash drive would be used to store files and folders and other data upon it and be entirely portable and when plugged in to a USB port all files on the physical medium can be accessed.
- **Wireless Access points / Routers** – These are used to share a wireless connection over a large distance and through tough objects (WAPs). This allows all portable and non-cabled devices to establish an internet connection. Routers allow an access to the internet by connecting to a modem and connects with the buildings wireless network enabling all connected devices to speak together.
- **Ethernet Cable** – Ethernet cable would be used to connect all devices and hardware that is not portable and stays on site locally. This cable links into the back of a PC/ and or laptop with compatible ethernet port. This is generally a faster connection than wireless.
- **Servers / Switches / Hubs** – Servers are used to channel all types of things from user logons all the way to storing educational data e.g. -student results, names, address' etc. Switches are used to ensure that data sent along the network

These Hardware devices are used to both educate and others are used support certain hardware devices to enable them to function which in-turn allows the devices to be used to educate and other relevant purposes.

Software

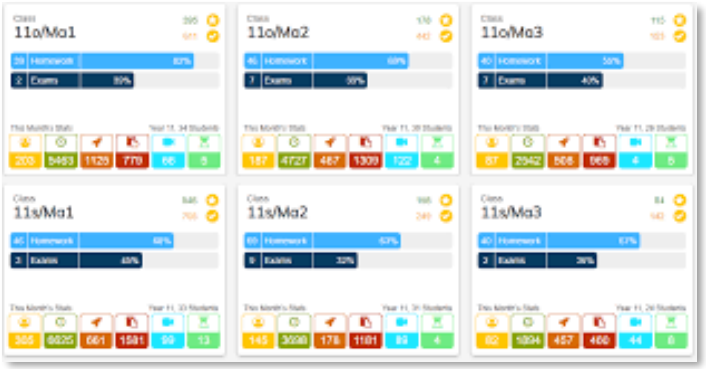
On another hand, the education sector uses an even bigger selection of software than hardware. Each institution uses its own preferred software's, and I will be listing a few that I'm familiar with and have personal experience with myself. There are so many software applications that

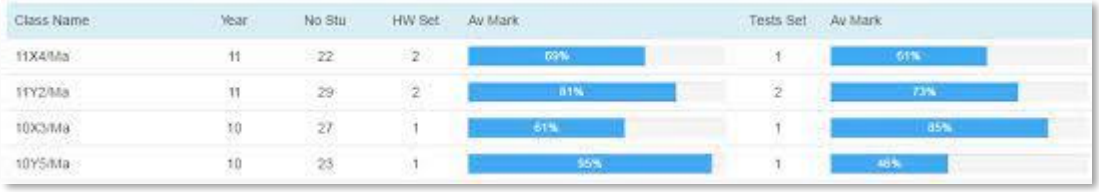
Maths Watch



Description

Maths' watch is a maths website used for educational qualifications as far as AS/A levels ages 4 – 18. That allows teachers to submit a task/assignment and the students need to complete it prior to the due date. After the date has passed the assignment is not clickable/editable. The site itself has interactive questions that record and show current progress. This is good for both sides - student and teacher, as it keeps the learners updated on their progress and motivates them to finish the task. It's good for the teacher as it gives them a clear and very easy to understand portal of progress for each student and the class. It saves





Class Name	Year	No Stu	HW Set	Av Mark	Tests Set	Av Mark
11X4/Ma	11	22	2	69%	1	61%
11Y2/Ma	11	29	2	81%	2	73%
10X3/Ma	10	27	1	61%	1	85%
10Y5/Ma	10	23	1	95%	1	46%

the teacher having to manually input the scores into an excel document and create a RAG sheet – Maths Watch has this certain functionality built in.

It also allows for students to carry out independent study by watching videos and answering interactive questions. The interactive questions are available from a link off the video selected. These problems can then be worked through before / after / whilst watching the video explaining how to use the methodology to work out the answer.

User Interface/Experience

The graphical and colourful nature of this software makes it very easy to understand the results just by the progress of the bar and or the colour scheme of the bar itself. The colour scheme works well also, there are no conflicting colours so this means that people who are colourblind would not struggle to use the application. The only thing they may need to adjust is the colour settings so that users with colour-blindness can see the correct corresponding colour for the value on the screen. The user interface of the software is very clear and not pressing to understand/figure out. It is quite self-explanatory. The buttons are very clear, and the text is of a font that is universally understood and like I mentioned earlier the colour scheme is clear. The sites navigation system follows the F pattern which starts off at the top left of the site on the navigation bar, all the way across the screen to the right side and then down to the next horizontal text or graphic and to the right and so on all the way down the screen. The sites colour scheme, contrast and navigation remain consistent throughout the entirety of the site. This leads me onto my next point of user experience.

The sites user experience is good, it follows both Nielsen's 10 heuristics and Schneiderman's 8 golden rules, in most of the areas. They both compress down to:

- Consistency
- Universal usability
- Informative feedback
- Prevent errors
- Easy reversal of actions
- Keep users in control
- Reduce short term memory load
- Help and documentation

Maths Watch meets both Nielsen, J. (2020) and Wong, E. (2018) heuristics. The site covers close to all the points from both heuristics. The site remains consistent in all its colour schemes, fonts, text contrasts, navigation – everything is normalised. The site provides adequate error prevention and produces error messages explaining what the user needs to do in order to rectify the mistake. When completing tasks and selecting different videos etc,

the site has back arrows that allow you to revert to the previous page/action without logging the user out. Due to the sites continuous progress monitoring the user does not have to work out at what point they finished off last time, the questions will appear green if done and you are able to move to the next question – this reduces memory load.

However, I don't believe the site has shortcuts for more specialised users, I think it's just 1 type of use suits all. The site does not offer customisation either, but then again there isn't a need due to its simplistic design already. There can be times where the error messages displayed do not inform the user enough and you struggle to understand what is wrong with your answer. Sometimes you can get hints if you are well and truly stuck.

The site offers up to 1500 user accounts per bundle purchased for the use of their service, and the prices range from £100 all the way up to £500 per annum. The site currently hosts over 2000 education centres worldwide and over 1.6 million total users. On an average day they have over 100, 000 users interacting with their services.

Industry specific guidelines and regulations

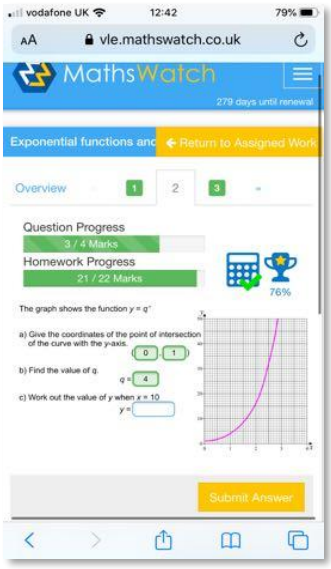
In terms of legislation and legal considerations the main one that comes into play is GDPR. This protects the entirety of user data and gives users a right to request a copy of all the data a company holds about them. GDPR also ensures that any data stored on a machine must be physically located within the same country that it came from otherwise this leads to serious legal and financial challenges. As this site is a Software as a service they will be up to scratch on the current regulations and will adhere to them. Education centres will need to ensure that the service they are using is legitimate before sending over student data and information.

Under the act of - 1974 Family Educational rights and piracy students' data must be handled in a secure manor and only seen by the correct individuals. This can be done by basic methods like password protection, group policies, not making data/files sharable etc.

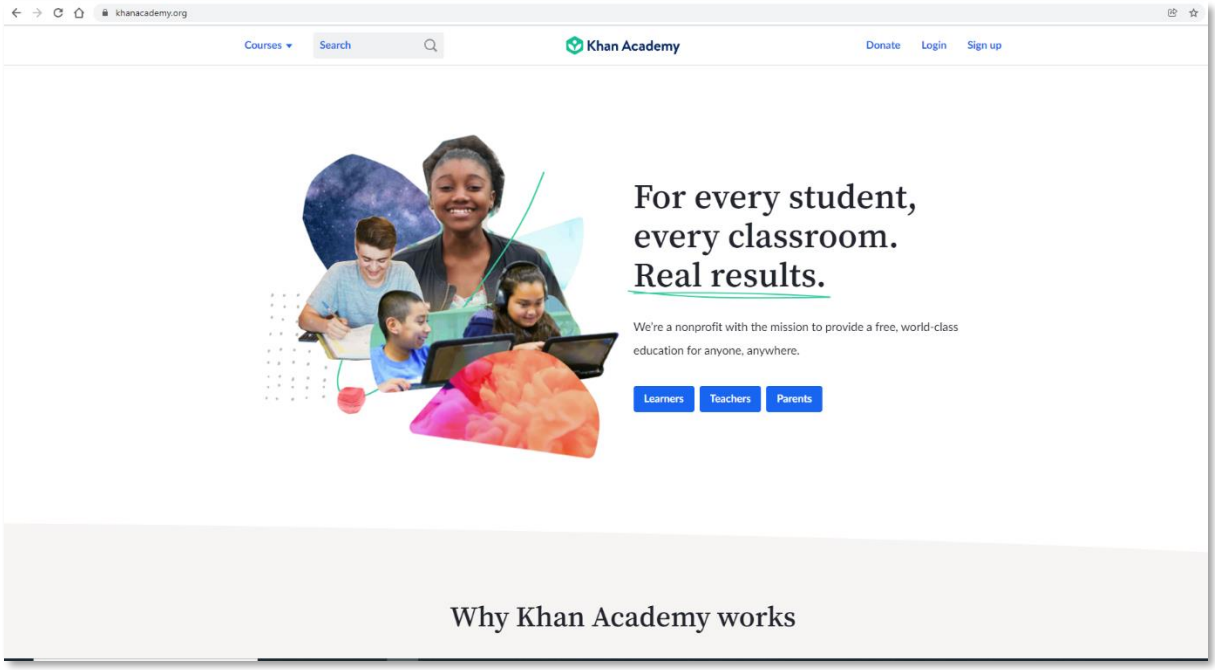
The site would need to be compliant with these rules and guidelines otherwise they would find themselves facing serious legal and financial trouble, and the loss of their once 'reputable' reputation.

Accessibility

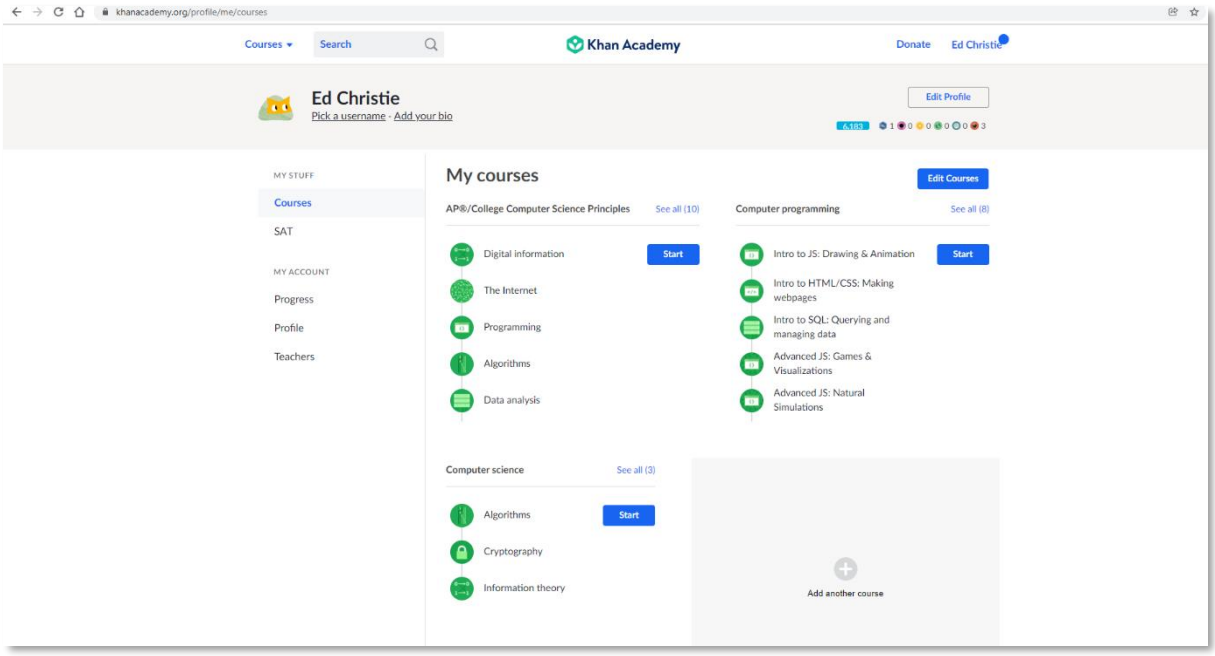
In terms of accessibility, the application is already very good as it is compatible with computer operating systems (windows), and mobile operating systems. Certain users may have specialist needs for limitations like blindness, movement limitations, dyslexia, etc. The website can only be so accommodating, and any specialist limitations will need to be handled externally. For individuals who are blind but have hearing you can use googles in built text to speech tool to hear the layout of the screen and you can use a brail keyboard etc. And for individuals who have body movement limitations they would have to use a device that is tailored to their needs which can interact with the website in the way that a conventional keyboard and mouse would. The site itself doesn't provide more accessibility options that I have already listed. It's been made as accessible as possible, however people with specialist limitations will need external help if they require the access of the Maths Watch application.



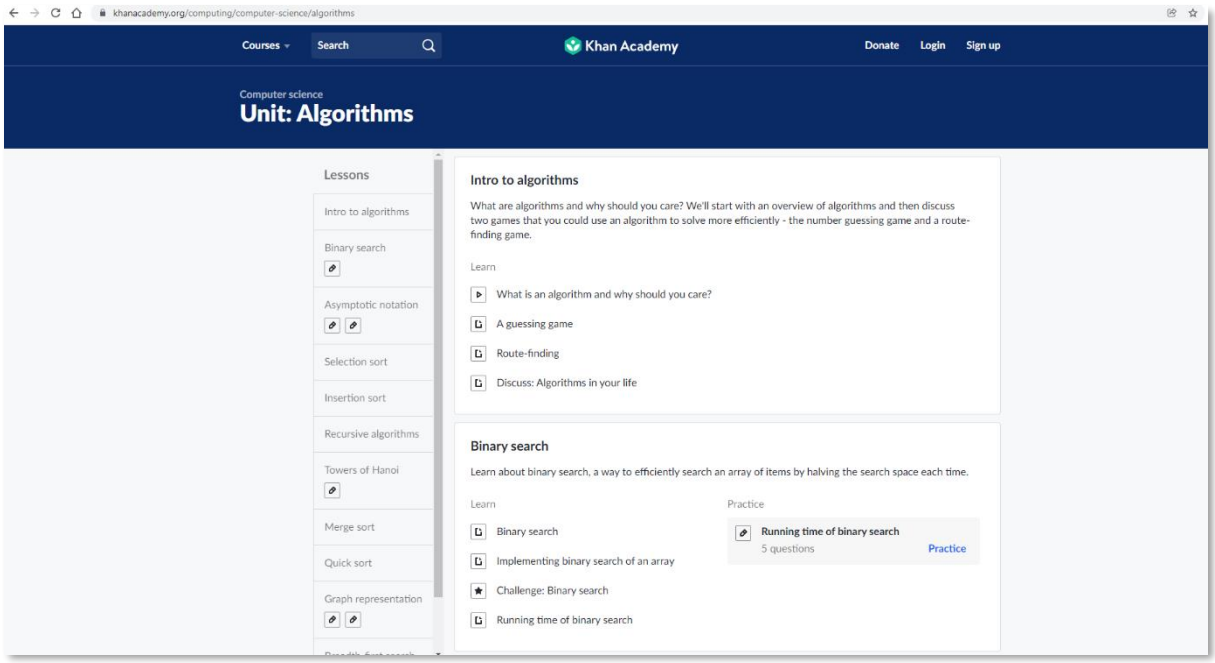
Khan Academy



This is the homepage of Kahn Academy where you have multiple login options and a very clear laid out GUI. It has a very nice colour scheme and use of images in the correct places also.



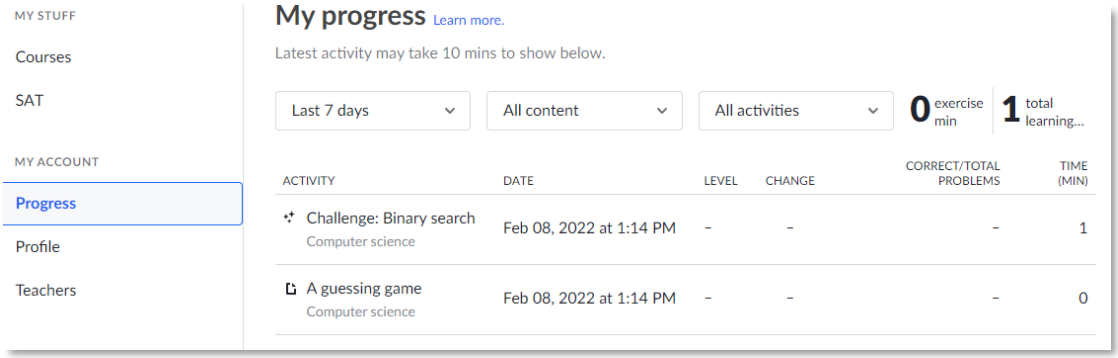
Once you login you get posted to your dashboard in which you can select the course you are doing and view relevant user information etc. I have logged in as me hence my name in the top left corner. You can see your progress and currently active modules.



Once you have selected the course on the dashboard you get sent to the relevant page containing all the data and unit related questions.

Description

Khan Academy is a website that is used for learning a whole range of topics, not just maths like the previous example - Maths Watch. It can be used by students, teachers and parents. It is completely free to register and create an account. All the modules are free to use for both students and teachers and the content is that of an entire school curriculum. It is a non-profit organization that runs off volunteers and donators.



Once you have logged on you get options to view your progress, profile, teachers and courses. This website goes into a great deal of depth to track your progress and make the user experience and interaction exceptionally easy. It also has links with SATs, and you can revise and study for those exams through this application also. When you are reviewing modules and content at the end of the content it directs you to a link for further research of the topic if the user feels the need to research further. Teachers can view student data and students can add/view/edit teachers via their dashboards. Teachers/Tutors can assign students work and can monitor their progress similarly to Maths Watch. Parents can add a child and view their child's progress through a module and make practice recommendations to their child and teacher (mainly learner).

User Interface/Experience

This website is like Math Watch however has more of a functionality range and is free to use. In terms of its interface, it has a good proportion of whitespace to text and images. It's laid out in a format that is very user friendly and easy on the eyes. Its colour scheme is well thought out and easy to make out the important parts of the website. The sites navigation system follows the Z pattern which starts off at the top left of the site on the navigation bar, all the way across the screen to the right side and then down diagonally to the bottom left of the screen and then to the far bottom right of the screen. All buttons and drop-down menus are defined and easy to navigate. The entire user interface is very extravagant and can offer plenty of options for the user to select, it does this in a way that doesn't confuse the user and produces lots of data in a very understandable and simplistic way.

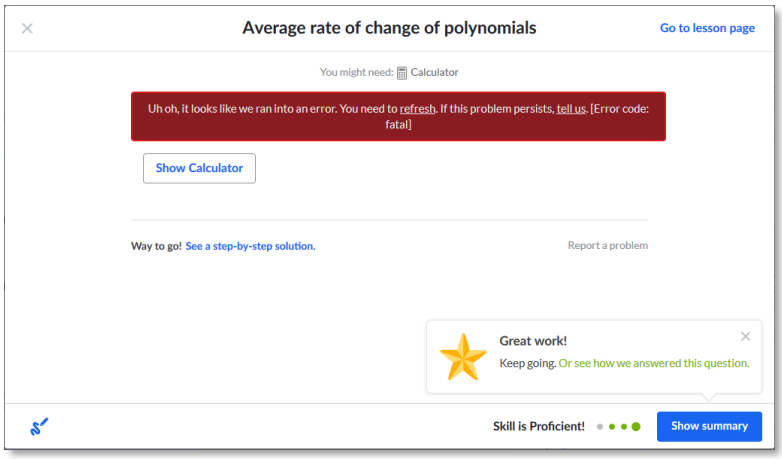
The sites user experience is of a high standard, it follows both Nielsen's 10 heuristics and Schneiderman's 8 golden rules, in nearly all the areas. They both compress down to (however can find them in the appendences):

- Consistency
- Universal usability
- Informative feedback
- Prevent errors

- Easy reversal of actions
- Keep users in control
- Reduce short term memory load
- Help and documentation

Maths Watch meets both Nielsen, J. (2020) and Wong, E. (2018) heuristics. The site covers close to all the points from both heuristics. The fonts and colours of the website do remain consistent however there is a different colour scheme for certain webpages on the site, yet they do still work together and match the entirety of the site overall. The site provides adequate error handling and prevention by alerting the user when an error has occurred and lists a way of how to rectify the mistake. When completing tasks and selecting different videos etc, the site has back arrows that allow you to revert to the previous page/action without logging the user out. Due to the sites continuous progress monitoring the user does not have to work out at what point they finished off last time, the specific module or unit you were working on can be found on the user's dashboard up to a custom range (years depending on how long you have had the account).

However, the site has no extra shortcuts for more specialised users, it's just 1 type of use suits all. The site does not offer customisation either, this would most likely over complicate things logically and graphically for the user due to the system being very complex already. The site produces relevant error messages that tells the user clearly what to do – and with a bit of extra information on the error itself. You get informative feedback through prompts at each question for instance the message displayed on the bottom right corner and the 4 progress green dots showing the user at what point they are in the module.



Khan Academy has around 100 million users globally and around 10 million of that subscribe to the site. The site has users from over 190 countries.

Industry specific guidelines and regulations

In terms of legislation and legal considerations the main one that comes into play is GDPR. This protects the entirety of user data and gives users a right to request a copy of all the data a company holds about them. GDPR also ensures that any data stored on a machine must be physically located within the same country that it came from otherwise this leads to serious legal and financial challenges. As this site is a Software as a service they will be up to

scratch on the current regulations and will adhere to them. Education centres will need to ensure that the service they are using is legitimate before sending over student data and information.

Under the act of - 1974 Family Educational rights and piracy students' data must be handled in a secure manor and only seen by the correct individuals. This can be done by basic methods like password protection, group policies, not making data/files sharable etc.

The site would need to be compliant with these rules and guidelines otherwise they would find themselves facing serious legal and financial trouble, and the loss of their once 'reputable' reputation.

General Security for both sites – and all internet tech companies

Both sites will need to ensure that their security is up to scratch as that is the most important thing both legally and generally. They cannot be open to all the types of network attacks – obviously network attacks will happen, but it will depend on what standard the company's security practices are at as to the effect of network attacks. If their networks are attacked that can mean a whole range of things:

- Downtime of their services (affects users who require the use of their site and resources).
- Possible leaks of user and other sensitive data.
- Legal action.
- Theft of user information and held at ransom.
- Loss of overall network control and functionality (DDOS including botnet attacks).

So, to prevent all the above Maths Watch and Khan academy will need to ensure a possible range of things like using VPS – virtual private networks, network segmentation, user access control, use an intrusion prevention system to examine and prevent incorrect network traffic and prevent exploits. To prevent against DDOS attacks the company can increase the capacity of their servers and resources to something like 110% – 115% in emergencies so they can handle the extra stress. This would be something basic to test in the testing stage of the business via a stress test.

Another problem is not on the technical side but the user and staff side. Methods like phishing – spear and angler, social engineering, trojan horses, honey trap, scareware and

adware. Staff and the applications users need to be educated in the various social engineering methods that scammers and less favoured individuals can use to try and cause havoc to a company/organisation – and how to prevent against it. Education is the method that requires the least money, time and maybe a little effort but it's completely worth it as it can save your company **entirely**. Simple methods like knowing when not to click a link in an email via an internal computer can save your company from a severe network attack.

The sites also must ensure that they are secure for the user to enter their details onto so there is no hacker using a KPI to draw out user details once they are entered into a form. To defend against this the company must ensure there are no gaps that can enable hackers to do this. The site also needs to be protected against SQL Injection as this can cause a ridiculous amount of damage from one or two SQL statements like DROP Users etc. To prevent against this the company would simply need to get the developers to sanitise the input fields on the forms before letting the page post and the interaction with the database occurring.

Newley Emerging Technology

Virtual reality is an entirely new and upcoming technology that is used currently in the education sector worldwide and externally for sectors like healthcare etc. Students in education benefit hugely from the use of this technology as it can provide a greater insight to the wider word, much more than the conventional pen on paper method. Students would become more encouraged to go to school if they received VR education. It also increases their creativity and productivity levels greatly as the students become more and more engaged with what is going on Infront of them.

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