

# Studios: A new e-learning system

## ABSTRACT

This project aims to create prototypes for potential improvements in displaying information and providing builtin tools for a work planner for students in one platform. It has a particular focus on ease of use, usefulness and customizability to encourage usage by students. More specifically, it combines content with organisational tools for the user.

At this stage, there are two prototypes, one high fidelity, to demonstrate and evaluate the system before it is implemented in code. The high fidelity prototype is a strong but also quite scope limited start to the system as a whole.

## INTRODUCTION

In today's modern world, especially during the current Coronavirus pandemic, e-learning platforms are an important part of education, whether as a supplement to in person teaching or replacing it. At this stage in the industry's growth, the need has outstripped the quality of life improvements that can be expected, at least for some widely used platforms. As students, we have experienced some of these problems and want to look at solutions.

While e-learning software is used in a wide variety of environments including schools, universities and workplaces, we have chosen to focus on e-learning platforms for universities. Our stakeholders include students, lecturers and other university staff. Currently these stakeholders are operating in lockdown conditions where in person teaching is not possible for most degrees. We believe that lessons learned in these conditions will be useful, both while the pandemic continues and particularly when applied afterwards, looking at the digital future of education.

Universities and teaching staff want students to engage and learn well from the material presented on their e-learning platform. As users, students want their learning material presented in a clear, simple and interesting fashion. To fulfil the goals of universities and lecturers, they depend on the goals of the students. While lecturers, tutors and maintenance staff are very important stakeholders to the problem

space as a whole, we are focusing on the learner end of the interface and so are making students our primary stakeholders. This keeps the scope manageable and indirectly helps the core university goal of engagement.

## PROPOSED VISION

Our proposed vision is to create an e-learning platform that provides users with a streamlined experience, facilitating efficient navigation and organisation amongst other things. Nowadays, it is evident that e-learning systems have become a fundamental part of education due to their enormous rise in popularity and adoption at educational institutions all over the world.

From our research we discovered the importance of perceived usefulness and perceived ease of use of a system with regards to how they influence uptake and use of e-learning systems. The final results of a study noted that 'perceived usefulness had a significant influence on e-learning system use' and that 'perceived ease of use also influences e-learning system use significantly'[1]. Using this information it is important that when designing our system we consider the usability and ease at every stage, in order to create the best possible experience for stakeholders and maximise engagement with our system. Another piece of research we read, discussed the importance of personalisation of e-learning systems and incorporating user interests. It finished off by saying that the next generation of systems should become more personalised and custom. It found that incorporating personalisation and user interests into e-learning systems has a positive effect on users [2]. When it comes to our own system we will use this information to help inform our design process and the requirements for our system, ensuring we design a system that at least, facilitates personalisation for stakeholders in order to create a better user experience.

The third piece of research investigated and explained university student's success in using e-learning systems. They identified characteristics of systems that prove beneficial to students. One notable

example was “the availability of functionalities to support interactions among students and between instructors and students” which was highlighted as being essential to the learning process [3]. Therefore by incorporating features that facilitate positive and constructive dialogue between all users into our system, we could help users feel like the system is helping them learn more effectively. Through our research, the vision of our system is becoming clearer and more informed allowing us to understand the goals for our system better. In the final piece of research we read, the paper focuses on the importance of embedding social features into e-learning systems. It highlights the need for features that go beyond the collaborative learning ones that many e-learning systems already have, saying that features in current systems do not achieve complex interaction activity. It also explores the use of social support theory to solve the shortfalls of existing systems, where social support refers to “a perception that people feel about being responded to by friends in their supportive social network.”[7].

In order to expand the vision of our system based on this research, it is important for us throughout our design process to consider social factors and appropriate requirements that would facilitate these features.

We have chosen to use technology in our solution since it facilitates the features that we want to incorporate into our system. Also, technology has played a role in learning for decades now, with the first e-learning system coming about in the 1960s [5] and so it is already a very well established concept. Nowadays there are many e-learning systems available in the world however we are going to be focussing on two existing e-learning systems, Moodle, an open source system and Blackboard a proprietary system. We will look at these two systems and their use of technology with regards to remote, e-learning and what sort of user experience it creates amongst other things.

Firstly, the use of technology to create these systems facilitates remote access and learning regardless of where you are in the world, all that is required is an internet connection and a suitable device. Students and teachers can make use of features no matter where they are. Since both Moodle and Blackboard

are online e-learning systems they both have this capability and our system will too. Additionally, due to their very accessible nature, take up of both systems is enormous, with 74,000 registered moodle sites and 86 million users [6], highlighting how well technology has carried this aspect of teaching forward.

Additionally, since both Blackboard and Moodle are online solutions, they facilitate access from anywhere whilst still maintaining the same experience. This use of technology to create such an accessible system and consistent experience regardless of your device or location is incredibly useful and vital to an e-learning system.

## REQUIREMENTS

1	<b>Requirement Name: Automatic unit content addition</b>	Author: Jakob Aylott Priority: Very High  Dependencies: N/A
	Description: When a unit lecturer adds content to their page, it must be automatically added to the users calendar	Sources: Group Discussion/ Similar Systems research
2	<b>Requirement Name: Add custom inputs</b>	Author: Jakob Aylott Priority: High Dependencies: N/A
	Description: The user should be able to manually add a custom event with a name and time to the calendar	Sources: Group Discussion
3	<b>Requirement Name: View calendar summary - Month</b>	Author: Jakob Aylott Priority: Very High Dependencies: N/A
	Description: The user must be able to view their calendar for the next month with any relevant deadlines and custom inputs	Sources: Group Discussion
3.1	<b>Requirement Name: View custom inputs only</b>	Author: Jakob Aylott Priority: Medium Dependencies: 3
	Description: The user should be able to filter the calendar by custom inputs only	Sources: Questionnaire feedback
3.2	<b>Requirement Name: View deadlines only</b>	Author: Jakob Aylott Priority: Medium Dependencies: 3
	Description: The user should be able to filter the calendar by deadlines only	Sources: Questionnaire feedback

3.3	<b>Requirement Name: View by module</b>	Author: Jakob Aylott Priority: Low Dependencies: 3
	Description: The user should be able to select specific modules to view on the calendar	Sources: Questionnaire feedback
3.4	<b>Requirement Name: View by week</b>	Author: Jakob Aylott Priority: Very High Dependencies: N/A
	Description: The user must be able to view a week planner, containing live sessions and deadlines on specific days	Sources: Group Discussion
3.5	<b>Requirement Name: Colour Coding</b>	Author: Jakob Aylott Priority: Low Dependencies: 3-3.4
	Description: The user should be able to colour code each module for clarity	Sources: Questionnaire feedback
4	<b>Requirement Name: Module pages</b>	Author: Jakob Aylott Priority: Very High Dependencies: N/A
	Description: The user must have access to each module's page, containing contact information and a basic description etc.	Sources: Group discussion/ Similar Systems research
4.1	<b>Requirement Name: Separate lecture recordings</b>	Author: Jakob Aylott Priority: Very High Dependencies: 4
	Description: The user must have access to all lecture recordings in each module, with the oldest non-completed lecture week prioritised	Sources: Group Discussion /Similar Systems research
4.2	<b>Requirement Name: Separate deadlines list</b>	Author: Jakob Aylott Priority: High Dependencies: 4
	Description: The user must have access to a concise list of all assessment deadlines, with links to relevant module pages	Sources: Questionnaire feedback
4.3	<b>Requirement Name: Lecture and deadlines confirmations</b>	Author: Jakob Aylott Priority: High Dependencies: 3, 3.4, 4.1, 4.2
	Description: The user must be able to confirm completion of a lecture or assessment, removing it from the calendar	Sources: Similar Systems research
5	<b>Requirement Name: Mental wellbeing check</b>	Author: Jakob Aylott Priority: Low Dependencies: N/A
	Description: The user should be given the option to fill in a weekly wellbeing	Sources: Similar Systems research

	questionnaire, to provide information to relevant staff	
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**Table 1. Functional requirements.**

1.1	<b>Requirement Name: Quick navigation</b>	Author: Jakob Aylott Priority: Very High Sources: Similar Systems research/ Group discussion
	Description: The user should only be 2 or 3 clicks away from any specific location in the application	
1.2	<b>Requirement Name: Intuitive Navigation</b>	Author: Jakob Aylott Priority: High
	Description: The user should be able to easily figure out how to reach any one place on the page relatively easily	Sources: Group discussion
2.1	<b>Requirement Name: Visual Clarity</b>	Author: Jakob Aylott Priority: High
	Description: The user must be able to easily identify different days/weeks and modules etc, with little clutter	Sources: Similar Systems research/ Group discussion
2.2	<b>Requirement Name: Visually pleasing</b>	Author: Jakob Aylott Priority: Medium
	Description: The user should not find the page unattractive	Sources: Group discussion/ Similar Systems research
2.3	<b>Requirement Name: Consistency</b>	Author: Jakob Aylott Priority: High
	Description: The unit pages should all be forced to follow the same format for consistency throughout the system	Sources: Similar Systems research
3.1	<b>Requirement Name: Input Editing</b>	Author: Jakob Aylott Priority: Very High
	Description: The user must be able to edit any inputs they have made in case they make a mistake	Sources: Group discussion
4.1	<b>Requirement Name: Security</b>	Author: Jakob Aylott Priority: Very High
	Description: The user must have a login system to protect personal assessment work from plagiarism	Sources: Similar Systems research/ Group discussion

5.1	<b>Requirement Name: Adaptability</b>	Author: Jakob Aylott Priority: Very High
	Description: The system must be adaptable to adding new modules and postponing deadlines etc.	Sources: Considering future uses in group discussion
6.1	<b>Requirement Name: Reliability</b>	Author: Dan White Priority: High
	Description: The system must continue to provide service even under heavy usage	Sources: Questionnaire feedback

Table 2. Non-functional requirements

REQUIREMENT ELICITATION

The primary methods we used to create our requirements list were user feedback from a survey we distributed online and analysis of similar systems. Through exploring features of a similar system such as moodle, we could build a strong foundation of requirements for a similar general functionality. This would include things such as module pages, having access to lecture recordings and access to coursework information. We could then improve upon and add new requirements to this foundation, via our user feedback. We wanted to have a strong sense of direction for our system so this feedback was gathered very early to ensure we were following what our potential users would want out of our system from the very start. This meant that we didn't create our own requirements purely out of group discussion, which could result in having to make large changes to suit the needs of our users, further into the development process. This user feedback led us to adding requirements such as custom inputs, colour coding etc.

DESIGN & IMPLEMENTATION

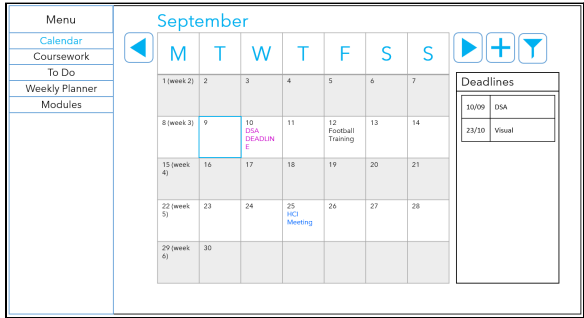


Figure 1. Initial prototype calendar view screen



Figure 2. Final prototype calendar view screen

When it came to the design of the interface, we made sure to keep Jakob Neilson's 10 usability heuristics[4] in mind throughout development to ensure our final prototype provides a good user experience.

Keeping with the visibility of system status heuristic, any changes to the status of our system are represented by visible changes to the user interface, for instance changing to a different page or a pop-up menu appearing.

In figure 1 the final prototype calendar view screen can be seen, designed to be easy to navigate with familiar symbols used and only the essential text written on screen. This page's design changed from the first (Figure 1) to the final prototype (Figure 2). In the second prototype, the events for each day are not displayed at first glance, but can be viewed by clicking on the day's box, which takes the user to the day view screen (Figure 3) with hourly slots. This made the calendar view less cluttered with text, so it looks more minimal, in line with the usability heuristics.

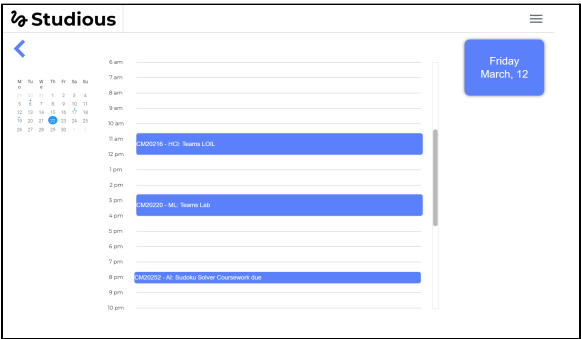
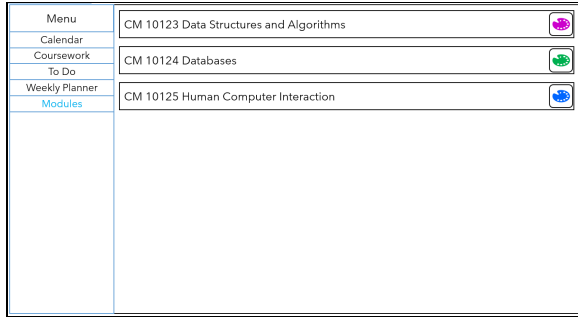


Figure 3. Final prototype day view screen

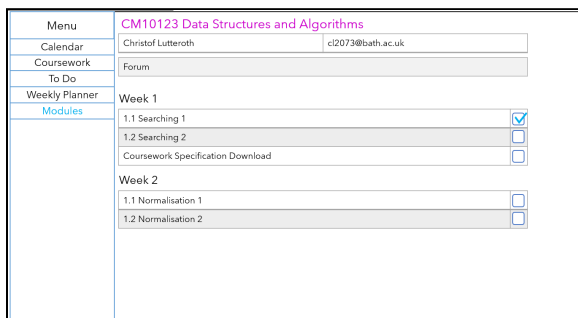


**Figure 4. Initial prototype module view screen**

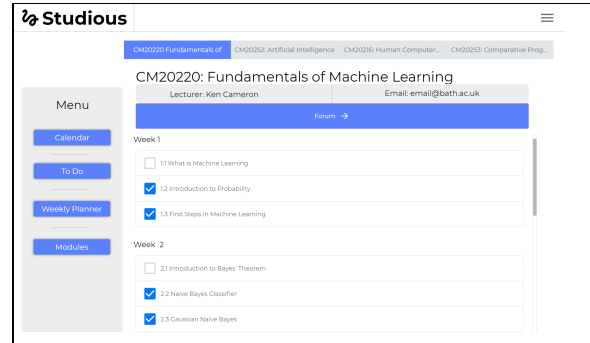
The menu uses short and simple words to denote the pages, so the system can be navigated quickly and efficiently. We felt that the change in our menu between the initial and final prototype was a significant improvement to the design. As this menu would appear on every page of the system, it was integral to get it right. We decided it should be larger, reducing the amount of unused space on each page, along with adding some clarity to the navigation of the system by separating the page titles.

Our choice to highlight the page links in blue boxes was driven by the need for this menu to stand out, despite the current page being displayed. These spaced out blue buttons are relatively dissimilar to any other buttons in terms of size, shape and position, making them consistently recognisable to the user throughout their use of the system, fitting to the recognition over recall usability heuristic.

The initial prototype module screens can be seen in Figure 4 and 5, and the final prototype module screen in figure 6. While the initial design had two separate screens, one for selecting the module and another for viewing the contents of it, we decided it would allow for faster access between modules if the selection and the content were on the same page.



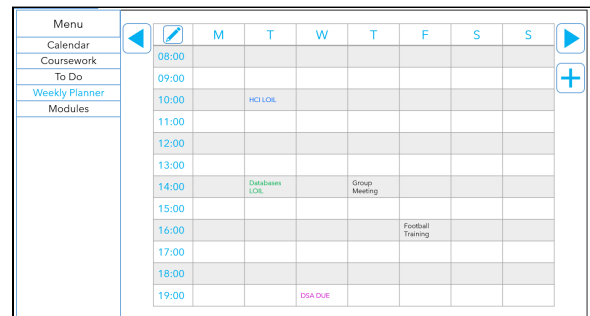
**Figure 5. Initial prototype individual module view screen**



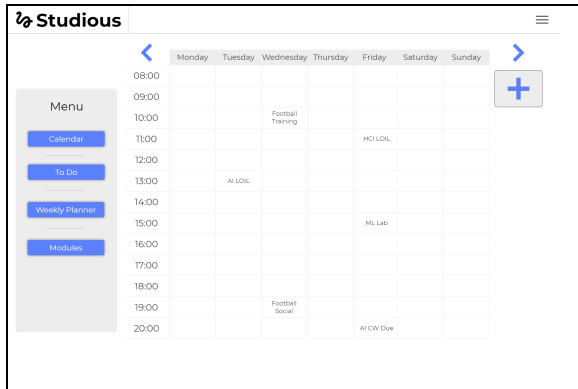
**Figure 6. Final prototype module picker view screen**

This way, switching from one module to another takes 1 click rather than 2. We kept the checkbox functionality to monitor progress, along with the separation of content by week.

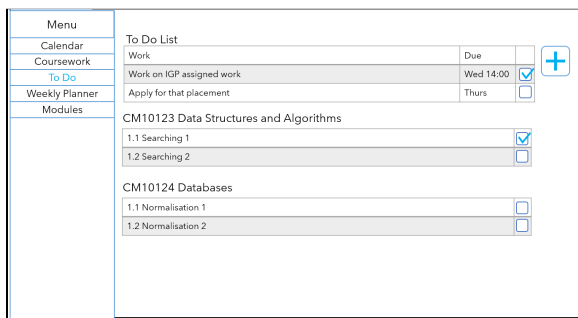
The initial weekly planner screen can be seen in figure 7 along with the final prototype in figure 8. The main focus of this page has not been altered a huge deal, instead just cleaned up to look more professional and a bit more minimalist, such that it is less overwhelming for the user. This new design also better catered for our colour scheme implementation, as we did not want too much of the page to change with each design (days and times). This would maintain a better level of consistency throughout the appearance of the pages, while also allowing user customizability.



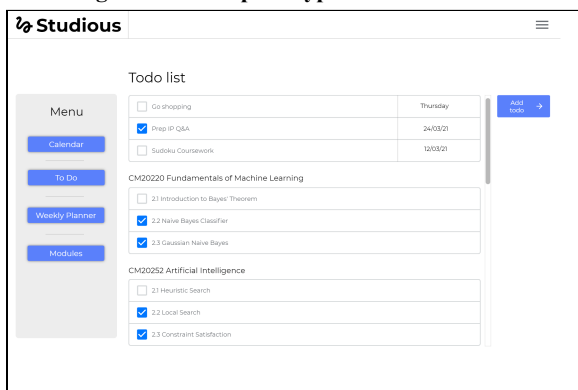
**Figure 7. Initial prototype weekly planner screen**



**Figure 8. Final prototype weekly planner screen**  
Finally, the last screen is the to do list screen, a very common but very useful concept. Since it is such a widely used concept it was important to keep this page as familiar as possible so that it was easier for users to understand and pick up quickly. Using tick boxes to mark completed tasks matches to the real world and makes it clear to users what tasks have been completed. The simple division of tasks by modules helps break up tasks and prevents overloading of information on screen. Between our initial and final prototype, minor changes were made, mainly to keep the final page inline with the new aesthetic of the prototype as the functionality was already solid enough.



**Figure 9. Initial prototype to do list screen**



**Figure 10. Final prototype to do list screen**

## WHY STUDIOUS WILL LIKELY MEET STAKEHOLDER NEEDS

Having gathered stakeholder requirements from our questionnaire and feedback from our initial prototype, we believe our system will meet our stakeholders' needs of an easy-to-navigate planner for work. The students surveyed wanted a simplistic, organised design, so we used a dashboard-type layout, with each page only being one to two clicks away for swift access to everything. A calendar containing due dates and manually added events was highly desired, so we made this the main page of the prototype. Having a list of unwatched lectures organised by module was also requested, so users can see exactly what they need to watch in order, no matter how many weeks they are behind. Lectures and courseworks are automatically added to the system so forgetful users won't miss anything. Each module page will also be uniformly organised, so users can find specifications, lectures and past papers in the same place no matter the module. Checkboxes allow users to monitor their own progress of content and coursework to better plan their time. Forums for each module are available as requested to give users a way to communicate with fellow students and unit leaders in order to get useful responses, as was desired.

## EVALUATION

Looking back on the requirements specification, of the 13 requirements, 8 were completed as specified, 2 were out of scope for this prototype and 3 are missing. The missing ones are adding user customisable colour coding for modules, filtering by custom inputs in calendar view and filtering by module in calendar view. We have also added features that are not in the initial requirements specification based on feedback from the first prototype, such as the todo list. This shows we should have updated our requirements specification better as we iterated. For example, there are several additional useful filters but they don't match the requirements specification. The flexibility to react quickly to stakeholder feedback has certainly been a positive in enabling us to make our prototypes better reflect our stakeholders' needs.

For heuristic evaluation, we arranged to use one of our peers as an independent "expert" and used Jakob

Nielson's 10 usability heuristics[4] as the criteria to evaluate on.

9 and 10 are not especially relevant at this stage of prototyping, especially 9 as it concerns error handling where this prototype doesn't have crashing kinds of errors. Further formal documentation needs to come, as well as making sure the system is naturally self-explanatory for 10, but neither have already been covered. As per the review, error prevention is not a major current issue but it is something we can be aware of, even at this stage. While the review did not turn up any particular issues, we want to continue investigating this as we make further progress with the system.

The system is largely consistent in terminology, internally, with other common products and with real world usage. The biggest issue is no explicit clarification of the difference between a to-do item and an event. Calendars, to-do lists, timetables and modules are all familiar concepts that should be recognised by all users so should allow recognition instead of recall.

The system is currently lacking in shortcuts and other assistance for experienced users, this should be added with further development of the system, and with research on which tasks are repeated frequently enough for shortcuts to be worthwhile.

The system shows which screen and other status clearly, though it would be useful to indicate the current screen in the left menu. There are no hidden status changes. The system is straightforward and the user can always back out by returning one of the screens on the menu but one specific shortcoming raised was a lack of back arrow buttons within the website. Some popup type screens are also missing crosses to dismiss them.

The overall design is clear and streamlined however some screens don't live up to the high standards of the others, for example the modules screens have large amounts of white space that detracts from the appearance, as well as a slightly misplaced menu, these are both very fixable in future iterations. As more features are added, keeping the simplicity will be an important challenge.

Features to be changed or updated:

- Highlight current menu button
- Improve calendar filters
- Allow colour coding modules and categories
- Add back arrows and exit crosses
- Clarify difference between to-do and event
- Add documentation
- To-dos and events should be editable and deletable.
- Provide shortcuts and flexibility
- Make a more consistent aesthetic and use of space

## CONCLUSION

Our system meets the overall vision of an easy-to-navigate work planner, with a few originally planned features missing. However, this is compensated by a few added features that were not in the original vision, that stakeholders were interested in. Our expert had an overall positive review of our system, as did our stakeholders, so we believe our design meets our goal. Our limitations for this project were that we did not program any back-end functionality ourselves, so the automatically added courseworks and lectures could not be tested in a dynamic way as they would if the system was complete. This means that we do not know the full extent of how useful these features are. In future iterations, we would add the features mentioned in the evaluation, along with analysing stakeholders using the system to complete tasks, in order to add any seemingly useful shortcuts or adjust common errors. Another potential consideration for the future is when designing more back end functionality, generalising the system such that it could be adapted in the future. By doing this, the system could be easily changed to fit any work environment, as opposed to just our original student target stakeholders.

## REFERENCES

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