Knowledge Connect Next Gen Virtual Study Groups Platform

Project ID: R24_077

Project Proposal Report

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(Specialization in Information Technology)

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February 2024

Implement virtual study groups platform which groups student by their study styles.

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Declaration of Candidate & Supervisor

I declare that this is my own work and this proposal does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

Divyanjana W.A.K

.....

The above candidate is carrying out research for the undergraduate Dissertation under my supervision.

Signature of the supervisor Date

2024/02/29

....

(Ms. Anjalie Gamage)

Abstract

This research is focused on improving the study environment for first-year computing students in response to the changing nature of education and the demand for individualized learning experiences. The difficulty of forming productive study groups is the research topic that is being examined.

According to personal learning preferences. Using a questionnaire, the suggested platform divides students into study-style groups and offers a virtual space for online group sessions. Students may also ask and answer questions on a forum, and active engagement is encouraged by a grading system. The platform seeks to enhance student engagement, knowledge retention, and general academic achievement through these aspects.
The platform will be developed and implemented as part of the study design, and it will take place in a first-year computer course. After registering on the site, students will be required to answer a questionnaire that requests information about their favourite study methods. Students will be placed into study style categories according to their replies. Following that, these groups will have access to a virtual space where they may plan and carry out study sessions with one another.
All students will also have access to a forum where they may ask questions and get support from their classmates.
The platform's ability to raise student engagement and academic achievement will be assessed using both quantitative and qualitative metrics in this study. Information on academic achievement, forum activity, and student involvement rates will be gathered. The results will be examined to see how the platform affects student learning objectives and whether it may be used in other educational settings in the future.

Keywords: - Peer assistance, virtual study groups, collaborative learning, study styles, and personalized learning

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1. Introduction

1.1 Description

Personalized learning has drawn a lot of attention in the field of education because of its potential to improve academic performance and student engagement. Personalized learning can be especially helpful in the computing industry, where practical skills and intricate concepts are essential. By creating a platform specifically designed for first-year computer students, my component seeks to address this. Our goal is to offer each student a customized and productive study environment by grouping students according to how they prefer to learn. The history of personalized learning, pertinent research and methodologies, the state of the art, and the ways in which our method expands upon earlier findings are all covered in this introduction.

1.2 Background and Literature survey

Several educational contexts have investigated and adopted personalized learning environments in great detail. In their 1988 study, Felder and Silverman [1] emphasized how critical it is for engineering educators to identify and accommodate various learning styles. A thorough analysis of learning styles was done by Pashler et al. (2008) [2], who emphasized the importance of evidence-based techniques. The myth of learning styles was disproved by Riener and Willingham (2010) [3], who proposed a more sophisticated strategy for individualized learning.

It is essential to comprehend the study patterns of first-year computing students in order to design an efficient platform for them. The six most prevalent study modes are kinesthetic, visual, aural, reading/writing, social, and solitary [4]. Based on research, it has been demonstrated that assigning students to study-style groups can enhance both academic achievement and engagement [5].

Even with advances in individualized learning, current platforms frequently can't adequately group pupils. Our technology uses a questionnaire to precisely determine students' study patterns in an effort to close this gap. Our goal in assigning students to study groups with similar backgrounds is to promote peer support and collaborative learning.

State of the Art:

Current platforms frequently ignore the significance of study patterns in favor of information delivery and assessment. Our technology offers a more customized approach to group learning with the goal of improving current methods [1].

Method and Difference from Prior Work:

Previous systems have made an effort to group students according to a number of factors, such as performance information and self-evaluation. These methods' drawbacks, meanwhile, include inadequate data and subjective self-evaluation. To improve upon this, our method includes a questionnaire created especially to reliably detect study styles. Furthermore, the scoring system on our platform, which is based on reaction time and frequency of participation, is designed to encourage students to actively participate and work together [2].

2. Research Gap

The potential of personalized learning environments to raise student engagement and academic achievement has drawn a lot of interest in the field of education. Because computers is such a complicated subject, it is important in computing education to recognize and accommodate different types of learning. Although there are many tools and platforms available to help students studying computers, there is a noticeable lack of support for the different study patterns of first-year computing students on these platforms.

Current platforms frequently neglect the value of customized learning environments in favor of content delivery and knowledge assessment. Usually, they don't have strong systems in place to recognize and group children according to how they learn best. Students might not be interacting with study materials in a way that best fits their learning preferences as a result of this oversight, which can result in less than ideal learning experiences.

Furthermore, there is a lack of sophistication in group dynamics and collaboration among the personalized learning systems currently available to computer students. Although some systems include basic grouping tools, these sometimes ignore the subtleties of different learning methods and are based on oversimplified criteria. This restriction makes it more difficult for students to work together more productively during group study sessions when they have comparable study patterns.

Furthermore, current systems frequently fall short of giving students enough assistance for knowledge exchange and peer-to-peer learning. Discussion boards and forums are typical features, however they don't always encourage meaningful conversations or offer rewards for taking part. As a result, students may become disengaged and lose out on the chance to gain from the varied experiences and viewpoints of their peers.

Our platform seeks to close these gaps by offering a complete solution that not only precisely determines students' study preferences but also establishes customized group study spaces. Our goal is to improve first-year computing students' entire learning experience by utilizing cutting-edge methods and tools like machine learning and user behavior analysis. Our platform will give students personalized study materials, organize productive study sessions with other students, and use a rating system to encourage active involvement.

3. Research Problem

The present learning systems are not adequate in accommodating the various study habits of fresh computer students. Such systems have difficulty in sorting out the associations and also identifying these pupils' preferences, and as a result offering less educational opportunities. In addition there are few peer-to-peer learning tools and group collaboration besides, they don't give individualized support for different studying patterns.

Worse still, this problem is compounded by continued use of outdated techniques and technologies. Many platforms consequently categorize students by their learning styles or place them in classes using old-fashioned ways that may not be accurate or useful. This therefore calls for creative solutions that would use modern technology to enhance the schooling experience of first year computer science students.

In short, the research problem is about deficiencies and inefficiencies in the existing learning platforms in meeting various study styles of first year computer students. Therefore, it is important to establish a platform that can accurately identify what style of studies each student prefers, customize their study environment as well as allow effective group work and peer to peer interactions to correct this situation.

4. Objectives

4.1 Main Objective:

The primary purpose of this study is to create a learning environment that is better for first year computing students by sorting them out according to how they learn best. This system aims at realizing personal experiences in groups as well as effecting the best possible methods of studying hence improving the engagement, content retention and academic performance of the learner.

4.2 Sub Objective:

- Developing a Study Style Identification System: Create a questionnaire or assessment tool to accurately identify students' study styles.

- Implementing Group Formation Algorithms: Design algorithms towards placing students together based on their study styles allowing for team work.

- Integrating a Virtual Meeting Platform: Develop an online meeting platform within the system to allow group meetings among students with similar study style.

- Designing a Forum for Knowledge Sharing: Create an interactive platform where learners seek clarifications and share information thereby building upon each other's understanding.

- Implementing a Rating System: Develop a scheme by which participants are assessed basing on their making contributions during group sessions and forum discussions, fostering active involvement.

- Testing and Iterating the System: Conduct periodical user tests and make evolvement of platform design based on feedback rather than intuition.

5. Methodology

5.1 System Diagram

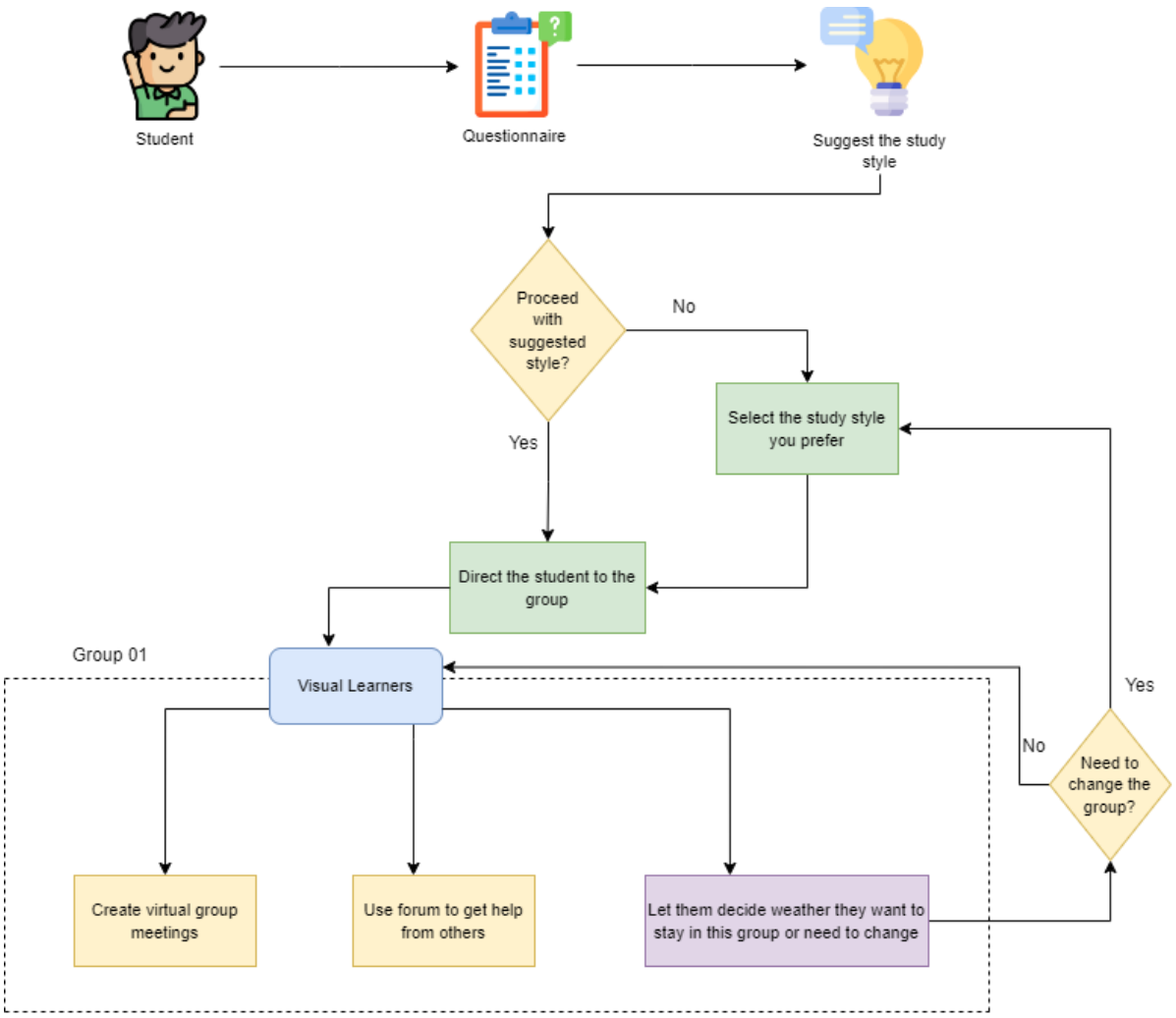

Figure 01 – Overall system diagram

5.2 Explanation

Above diagram is for only 1 study style which is “Virtual Learners” indicated by “Group 01” in diagram. For other study styles also apply the same concept as shown. Let’s walk through steps in detail to get more explanation about this.

1. User registration and identification of study styles:

- Using their email addresses issued by the university, students register on the platform. Upon registering as a member, students respond to a set of questions to establish their preferred learning styles.
- The questionnaire is designed to find out which styles of studying are most convenient for them, where they learn better or in which setting they appreciate collaboration.
- Basing on what's chosen in this questionnaire, there are six growth style groups that can be joined: Visual (V), Auditory (A), Reading/Writing (R), Kinesthetic (K), Social(S) and Solitary(So).

2. Formation of Groups:

- In terms of identified study style, learners are grouped into classes that share similar study techniques automatically.

3.Virtual Study Rooms:

- Students can use it after having been divided into groups to use virtual classrooms provided by the platform. These virtual rooms have features like chat, video conferencing etc.
- While in these rooms students can make plans for frank discussions with others about studies, make appeals for people to join them and take part in collective work on tasks.

4.Knowledge Sharing Forums:

- The forum enables students to share resources and ask questions related to their studies within the platform.
- Students may decide either to come up with new topics or read existing ones based on the same issues.

5. Identifying and acknowledging student who responds promptly and helps other students

The platform hopes to improve learning outcomes and academic success for first-year computing students by putting this methodology into practice and offering a customized and stimulating study environment.

5.3 Project Execution:

1. Task Identification:
   - Develop the registration module.
   - Design and implement the study style identification questionnaire.
   - Create algorithms for grouping students based on study styles.
   - Develop the virtual study room interface with video conferencing and collaboration tools.
   - Implement the forum for knowledge sharing.
   - Design and implement the rating system.
   - Develop the feedback mechanism.

2. Materials Needed:
   - Computer systems for development and testing.
   - Graphics design tools for user interface development.
   - Web development frameworks and libraries.

3. Data Collection:
   - Student registration information.
   - Study style questionnaire responses.
   - Forum posts and responses.
   - Usage data for the rating system.
   - Feedback from students and instructors.

4. Project Timeline:
   - Registration module: 2 weeks
   - Study style questionnaire: 1 week
   - Group formation algorithm: 2 weeks
   - Virtual study room interface: 3 weeks
   - Forum development: 2 weeks

- Rating system implementation: 2 weeks
- Feedback mechanism: 1 week
- Testing and refinement: 2 weeks

5. Schedules:

- Task charts will be used to track progress and allocate resources.
- Each team member will be responsible for specific modules or components, with regular meetings to coordinate efforts.

6. Anticipated Conclusion:

- The platform is expected to improve student engagement, knowledge retention, and academic success by providing personalized study environments.
- Real-world application could extend to other educational institutions or fields where personalized learning is beneficial.

6. Technologies to be used

Our platform was developed for 1st year computing students to facilitate their studies in a seamless and personalized manner. To achieve this purpose, the front-end and back-end development processes, as well as data management, authentication and real time communication involve cutting-edge technologies.

1. Frontend Development:

   • HTML, CSS, JavaScript: These fundamental web technologies are used to create the structure, style and interactivity of our platform's user interface.

   • React.js: It is a javascript library that helps us build dynamic user interfaces making use of which we can create reusable components.

2. Backend Development:

   • Node.js: An efficient JavaScript runtime built on Chrome’s V8 JavaScript engine for building scalable network applications.

   • Express.js:It is a minimalistic web application framework with rich features set that provides tools to build web applications in Node.js effectively.

3. Database:

   • MongoDB: A flexible NoSQL database suitable for storing user information such as study styles, forum posts and ratings as it has great performance characteristics allowing high scalability.

4. Authentication and Authorization:

   • JWT (JSON Web Tokens): This is a standard way of transmitting secure information between parties and often used during user authentication.

   • Passport.js: An authentication middleware for Node.js which provides a

5. Real-time Communication:

- Socket.IO: A library that enables real-time, bidirectional and event-based communication between clients and the server, essential for live interactions in study groups.

6. Data Visualization:

- Chart.js

7. Testing:

- Jest and Supertest
- React Testing Library

8. Deployment:

- Heroku
- MongoDB Atlas

9. Version Control:

- Git

10. Project Management:

- Trello

7. Project Requirements

1. Functional Requirements:

- User Registration: Students can register on the platform using their email or social media accounts.
- Study Style Questionnaire: The platform includes a questionnaire to identify students' study styles during registration.
- Group Formation: Based on study styles, the system automatically groups students into study groups.
- Group Meetings: Students can initiate and join virtual group meetings with members from the same study group.
- Forum: A forum feature allows students to post study-related questions and receive answers from other students.
- Rating System: The platform includes a system to rate students based on their participation and response times in the forum.

2. User Requirements:

- Students should be able to easily navigate the platform.
- The platform should be accessible from various devices, including desktops, laptops, and mobile devices.
- User interface should be intuitive and user-friendly.

3. System Requirements:

- Web-based platform accessible through modern web browsers.
- Responsive design for compatibility with different screen sizes.
- Scalable architecture to accommodate a growing user base.

4. Non-functional Requirements:

- Performance: The platform should load quickly and respond promptly to user interactions.
- Security: User data should be securely stored and protected against unauthorized access.
- Reliability: The platform should be available and reliable for use at all times.
- Scalability: The platform should be able to handle a large number of users and data.
- Usability: The user interface should be intuitive and easy to use for students with varying technical abilities.

8. Budget and budget justification

Resource	Price (LKR.)
Web Hosting	3000.00
Development Tools	3400.00
Electricity	3000.00
Paper Publish Cost	7000.00
Total	16400.00

Table 1 – budget

The above table shows the budget for the research solution. The overall cost is expected to be around LKR 16400.00

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