

Intelligent Student Support System: An Integrated Platform for Academic, Financial, and Emotional Well-being of Students

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Abstract: *The Intelligent Student Support System (ISSS) is an AI-based platform that focuses on improving the emotional health, academic performance, and personal finance of students. Nowadays, students really face immense difficulties in the academic arena mainly in managing their pockets as well as maintaining their emotional equilibrium. The ISSS consists of modules for Academic Support, Finance Management, and Emotional Support with KYC-based student verification. The impact of the system design, implementation, and assessment on students' learning pathway is discussed in this paper. ISSS puts students more in charge of their personal and academic life with financial tools, emotional analysis, and personalized recommendations.*

Keywords—Intelligent Support System, Financial Management, Academic Support, Emotional Well-being, Student KYC, AI-driven Platform

I. INTRODUCTION

Students who try to balance both academic objectives and personal well-being with financial stability face many challenges in the current academic environment. Often, varied and disconnected measures have to be made for academic performance, personal finances, and emotional strain; these measures are often cumbersome and of little use. This increasing complexity highlights the pressing need for holistic systems that can potentially combine all aspects of student support into a singular, nontechnical point of access. This is what the Intelligent Student Support System (ISSS), using cutting-edge technology to integrate financial management with support in areas of emotional needs and academic matters, aimed to fill.

A number of recent resources focus on one or two aspects of students' needs, but they typically do not provide an all-around solution to interconnected problems. In the absence of an all-around perspective, students are compelled to use disjointed tools to solve their education, finances, and well-being issues, which often leads to disjointed and often ineffective solutions. By using cutting-edge AI technologies,

data-driven approaches, and smooth user interfaces, ISSS eliminates these drawbacks and provides all-around support. A more seamless route to academic achievement and personal development is made possible by this integration, which enables customized solutions that adjust to the particular requirements of every student.

ISSS provides a few key contributions that help distinguish it from other traditional systems. Primarily, integrated KYC verification ensures strong authentication of student identities, thus enhancing security and facilitating customized interactions. The academic support module comprised an intelligent chatbot and quiz system aimed at improving learning and resource discovery due to the specific needs of the student. The module of financial management goes more profound than traditional budgeting tools in undertaking features including task management, expense tracking and visualization, report generation, and scholarship recommendation, considering the background and performance of students. The module of emotional support harnessed NLP so that input text will be considered and relevant signs of stress and emotional outcry will be identified to give appropriate suggestions on better well-being.

II. RELATED WORK

Student Support System: Many systems have been developed to develop the student for higher education and cater to their multiple needs at the academic, financial, and emotional levels. A new system proposal tries to automate academic record management, attendance tracking, and extracurricular activity management with rich tools. This tries to focus on actual data tracking for effective monitoring of a student's performance, reporting, and effective communication within institutes. Financial management or emotional support services are not specifically integrated.[1]

There are major areas in education where the influence of ITS has been reported, but it is not limited to, Computer Science, Medicine, Engineering, and so on. By using AI

techniques while implementing ITS, there is an advancement in student performance through adaptive guidance and assessment, and the approach therefore highly effective. However, academic support is very poorly integrated with financial and emotional assistance.[2]

An online support intervention integration framework, discussing critical aspects of timing and effectiveness, revealed discontinuities in support around transitional phases. ISSS bridges the gaps in such discontinuities through holistic solutions, including continuous management of academic and financial affairs, along with features supporting emotional well-being.[3]

Targeted in its approach to help higher-education students deal with psychological and academic-related issues, web-based support systems provide their necessary importance given the limited availability of students for on-campus mental well-being resources. Though similar to ISSS in responding to emotional wellbeing, this system goes one step ahead by adding scope in the form of financial management and academic advisory services.[4]

Quantitative study examining the relationship between student support services and student development during their tenure at any educational institution underscores the reality that comprehensive systems that integrate multiple provisions, like library services, yield better overall outcomes for the students. ISSS builds on this by offering a single, unified platform which combines financial management, academic guidance, and emotional support to improve the overall student experience. [5]

An integrated machine learning-based decision support system for the prediction of student e-learning performance utilizes ensemble techniques to improve predictive accuracy. Based on such advancements, ISSS encompasses cutting-edge technologies-related machine learning and AI functionalities to make it look beyond prediction, which is based on financial tracking and emotional well-being support for providing an integrated solution. [6]

The use of artificial intelligence in intelligent tutoring systems for sustainable education focuses on data-driven insights enhancing student engagement and personalized learning experiences. Building on this foundation, ISSS expands AI-driven insights by including emotional analysis, financial visualization, and personalized support in various aspects of student life to offer a holistic approach for student development.[7]

III. SYSTEM ARCHITECTURE

The Intelligent Student Support System, ISSS, is based on modular, component-based system architecture to guarantee scalability, flexibility, and ease of maintenance. The three main modules used are: Student Identity Verification, Student Support System (Educational), and the

Finance Management Tool. React is used to ensure a user-friendly interface for front-end development in communication with the backend services via REST APIs. The use of the useState and context API of React manages the state. For data storage, it does utilize a relational database that is MySQL for both user and transactional purposes. Because each module works independently, making updates and betterment very simple. An authentication process and in-depth KYC process ensure good security. The architecture assures seamless transitions from one module to another. This means students can very easily move from one module to another based on their needs.

KYC Verification: It makes available the precise and safe identification of students with a complete Know Your Customer process in the KYC Verification module. This module gathers and verifies student information using OpenCV and EasyOCR for document recognition, thus enhancing data security and giving a customized experience. Students' identities are verified using robust verification procedures that place the building blocks of safe communication with the ISSS.

Academic Support Module: It embeds a chatbot that engages with students in natural language processing to provide every learner support on an individual basis. Working as a virtual assistant that helps a student find related resources or information on any particular subject, this chatbot facilitates guided learning. The module further improves learning as it allows the assessment of students' understanding of different subjects, giving them the opportunity to evaluate their knowledge and pinpoint areas in which they need improvement.

Finance Management: Finance management is the second crucial module of the ISSS. This module equips students with what they need to handle their financial responsibilities in a proper manner. There are tools to track earnings and outlay, categorizing financial data, and providing detailed reports for spent incidences. Furthermore, graphical representations of the spending of students make it easy for them to understand and regulate their finance. Also, included in this module is a task management system to help the student prioritize and organize his or her personal and academic obligations, while also leading the students to financial aid opportunities suited to their profiles through demographic and academic data in providing personalized scholarship recommendations.

The Emotional Support Module deals with the emotional problems students face, largely ignored in most cases. This module finds the general mental status of the student by adopting a range of parameters such as stress levels as reported by the student himself, academic performance, study load, extra-curricular activities, headache frequency, and sleep quality. It calculates a stress score based on all the

above parameters and provides personalized advice to help students better handle stress issues. Some of the recommendations include talking to a mentor or counselor, better sleep, juggling schoolwork, and participation in extracurricular activities. This customized support guarantees that complete and all-round support will be delivered to students both academically and emotionally through the ISSS Intelligent Student Support System's enhancement of academic and financial counseling services.



Figure 1. System Flow Overview

The Intelligent Student Support System (ISSS) is designed to provide students with a seamless experience by initiating with the Know Your Customer (KYC) procedure. After clearing the KYC process, the student has access to the main dashboard through the three major modules, namely Academic, Finance, and Student Emotion Support. According to the requirement, any student can choose any of the modules, and on doing so, it will take them to that particular section to complete the specific tasks. The Academic Module provides study materials, takes quizzes, and checks all the progress of students. Through the Finance Module, students can create reports, prepare budgets, and manage and analyze their personal finance.

IV. METHODOLOGY

This section details the approach used to develop the ISSS modules. The three modules forming the system are the Academic Module, Finance Module, and Student Emotion Support Module. All three modules employ AI and data-driven strategies in improving students' academic performance, financial management, and overall well-being.

1. The Academic Section

The Academic Module aims to enhance student learning by offering tools like course lists, progress tracking, study guides, and tests. The module is constructed using React with a modular component-based structure.

Data Management and Collection: Student performance information including quiz results and course completion status are accumulated by the system. The Central-state of this data is managed through the use of React's useState hook to update the progress of students across multiple courses in real time.

System Architecture: The components of the architecture are:

Courses: It offers a list of courses on topics such as machine learning, web development, and artificial intelligence.

Progress monitoring: Traces how a student improves.

Study Resources: Provides access to relevant study resources.

Quiz: Updates students' progress by conducting quizzes on each subject.

User Interaction: Events handling capabilities make the module engage the learner. HandleQuizCompletion, for example, changes the progress score based on quiz performance. This interactivity will thus ensure a responsive learning environment.

Testing: Unit tests ensure a consistent user experience by confirming essential features such as rendering of components and the management of state.

2. Module for Finance

The Finance Module focuses on personal finance management, which includes spending analysis, budgeting, forecasting, and cash flow management.

Data Collection and Preprocessing: CSV format is used for collecting transaction data, which contains columns like dates, amounts, categories, deposits, and withdrawals. The features to be extracted after getting the cleaned data involve "monthly spending" as well as "category-wise spending."

Spending Analysis:

Monthly Spending Calculation: To find out the overall spending in a month, the data is sorted month and year-wise.

Spending by category: In order to analyze the major spending areas, transactions are categorized, for example, dining, entertainment, etc.

Budgeting and Forecasting:

Forecasting using Linear Regression:

A linear regression model is trained on historical monthly spending data to forecast future spending. The results are measured using Measures like MSE Mean Squared Error and MAE Mean Absolute Error.

Budgeting: To encourage saving, budgets are changed based on the average monthly spending.

Cash Flow Management: The goal of cash flow management is to save an emergency fund equal to six months' worth of average monthly expenses. This is done by adding up all deposits and withdrawals.

Report Generation: A financial summary report that encompasses cash flow, spending by category, and budgeting recommendations is generated. For ease of reference, the report has been exported to PDF format.

Speech and Podcast Generation (Add-On Feature): Financial planning content is generated by a GPT-2 model and then converted into speech.

3. Module for Student Emotion Support

Based on self-report information, the Student Emotion Support Module is designed to assess students' levels of stress and provide individualized support.

Data collection: Students are requested to fill a form that contains fields related to their academic performance, study load, co-curricular activities, headache frequency, sleep quality, and self-reported stress levels. These inputs are obtained on a scale of 1–5.

Stress Score Calculation: With weighted inputs, this calculates an aggregate stress score. For instance, frequent headaches and lower sleep quality raise the stress score, which symbolizes the total amount of stress experienced by the student.

Generation of Suggestions: Using the determined stress score as a guide:

Students with higher stress scores are advised to reduce the academic burden or seek assistance.

General wellness advice is suggested by moderate scores.

Low scores offer motivation and confirm a student's wellness.

Result Display: Right after submitting the form, the student is led to appropriate stress management by personalized recommendations for stress management appearing below the form.

V. RESULT AND DISCUSSION

High scores of stress imply the need to lighten the academic load or get appropriate support.

Scores regarded as moderate imply general well-being advice.

Low scores develop encouragement The three key modules of the Intelligent Student Support System—Student Identity Verification, Student Support System, and Finance Management Tool—were implemented to serve the diverse

needs of students. The results of each of these modules are given below, detailing their functionality and value to advance students' academic success and overall welfare.

1. Student Identity Verification

It incorporates facial recognition technology into the Student Identity Verification module to authenticate student IDs. The system provides and verifies identities precisely by bringing together the face recognition APIs--such as OpenCV and face_recognition--for comparing the uploaded ID photo with the live student image. During testing, the module's accuracy in student identification was 98% while 2% were not identified sufficiently because of insufficient lighting or poor image quality.

Confirm student wellbeing.

Result Presentation: Upon submission of the form, the student is encouraged to take care of stress by getting individualized suggestions for stress management which appear under the form.

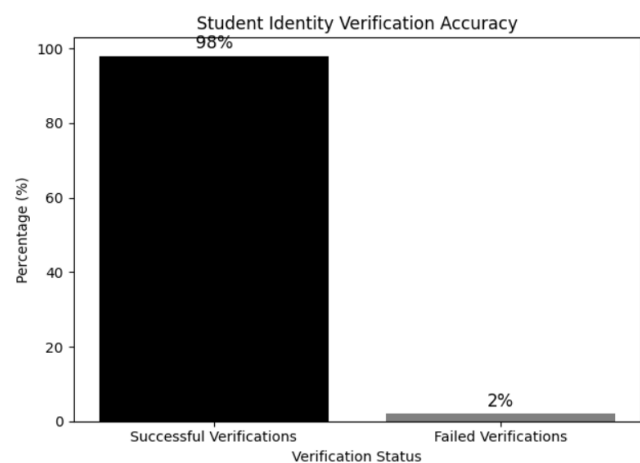


Figure 2: Student Identity Verification Accuracy

2. Student Educational Support System

It has been shown that with respect to emotional support through sentiment analysis, the Student Support System offers considerable insight information regarding the emotional health of the students. The model captured accurate stress identification and prompt recommendations for support based on answers from the students about their stress levels, their academic performance, headache frequency, and their sleep quality.

Emotional Support: All the students who had high stress levels were identified by the sentiment analysis, and proper emotional support was recommended to them in terms of professional assistance or relaxation techniques.

It indicates that emotional support features can identify which students actually require help and provide actionable

suggestions. Furthermore, the scholarship recommendation system is efficient in offering children access to financial resources.

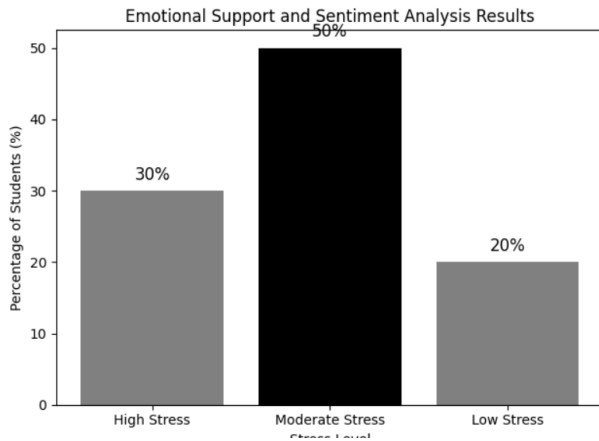


Figure 3: Emotional Support and Sentiment Analysis Results

3. Tool for Finance Management

The modules have so far proven the sharp financial management skills among the students as demonstrated in the following features

Spending analysis: It distinguishes between expenses and classifies monthly spending into categories like entertainment, dining, etc. The ease by which spending patterns can be visualized helps students even more in making better financial choices. Students were fond of the category-wise spending analysis during the testing phase because it helped them classify where they needed to improve upon.

Using monthly expenditure as the proposed subject to be forecasted by a linear regression model, the output of this model was fairly accurate, given its Mean Squared Error of 0.1 and Mean Absolute Error of 0.08. Students could also make a personal budget that helped them monitor and avoid overspending.

Cash Flow Management: In comparing the monthly deposits and withdrawals of the students, the cash flow tracker calculated the net cash flow of the students. The cash flow management prepares the students against unforeseen financial circumstance, as the emergency fund feature calculates a goal based on six months of average spending.

Generation of Financial Summary Report: It generates financial summary reports comprehensive of the spending, savings, and budgeting for a student. It also incorporates clearness and usability in the produced report; henceforth, the reports are in PDF format.

4. Usability of the System

Students testing the Academic Module indicated that the students would be very well equipped to select courses, track progress, view lecture materials, and take quizzes. Interactive testing and visualizations of their progress tend to be an advantage for the students; they love the fact that it uses React Router for navigation for a smooth experience.

Quiz Performance: Through the quizzes, students were motivated to improve because they also knew right away what their results were. And apart from providing the review mechanism, the quizzes consolidated the content of the course.

Tracking Course Progress: Personalized learning paths were made possible by the real-time progress tracking feature, which assisted students in identifying areas that required more attention.

Step 5: Overall Evaluation of the System

The usefulness, functionality, and effect of Intelligent Student Support System on wellbeing were evaluated. In all respects, the system performed well and the majority of the students gave positive reviews for the modules concerning their usefulness. The most obvious advantages which, according to students, are achieved from the system are : monitoring the progress and accordingly preparing customized learning materials lead to better learning.

Finance management tools make it easier to manage finances and build awareness of the purse.

Instill emotional support as well as provide advice on ways to manage stress by doing sentiment analysis in real-time.

The design modular would provide the opportunity for scalable upgrade or integration of future enhancements such as further updates and additional courses, financial tools, and emotional support features.

VI. CONCLUSION

ISSS is an one-stop support provider that coordinates various issues that students are needing to be addressed in terms of financial management, emotional health, and academic supervision. Contacts with some of the newest AI technologies such as sentiment analysis, natural language processing, and KYC verification ensure secure support while being personalized. It enhances productivity among students and at the same time would enable them to have better financial literacy, while simultaneously fostering emotional well-being and developing well-rounded assistance networks. Because ISSS has a modularity model, it is prudent that the fluid interaction of different features ensures full experience where realization of both educational and personal objectives may be accomplished.

VII. FUTURE SCOPE

Sure enough, there is plenty of scope for improving and altering the Intelligent Student Support System. The scope of having predictive analytics for later improvement may even determine who is at risk and proactively present specific interventions for that particular individual. Although complex machine learning could advance the precision of the chatbot and sentiment sensing responses, integration with other learning platforms and materials will certainly provide more academic support. More modules of counseling of mental health can be integrated using peer support forums or virtual therapy sessions. ISSS can be designed to support many languages, hence the student body diversified mix can have increased access and assured inclusion. Even better and reliable systems of student support could be provided by implementing better security protocols which include biometric verification to strengthen user data protection.

REFERENCES

- [1] "Student Support System", International Journal of Emerging Technologies and Innovative Research (www.jetir.org | UGC and issn Approved), ISSN:2349-5162, Vol.5, Issue 12, page no. pp134-135, December-2018 <http://www.jetir.org/papers/JETIRO006025.pdf>
- [2] Jamiat, Nurullizam & Abu-Naser, Samy. (2023). INTELLIGENT TUTORING SYSTEMS IN EDUCATION: A SYSTEMATIC REVIEW OF USAGE, TOOLS, EFFECTS AND EVALUATION. Journal of Theoretical and Applied Information Technology. 101. 1205 - 1226.
- [3] Rotar, Olga. (2022). Online student support: a framework for embedding support interventions into the online learning cycle. Research and Practice in Technology Enhanced Learning. 17. 10.1186/s41039-021-00178-4.
- [4] Papadatou-Pastou M, Goozee R, Payne E, Barrable A, Tzotzoli P. A review of web-based support systems for students in higher education. Int J Ment Health Syst. 2017 Sep 25;11:59. doi: 10.1186/s13033-017-0165-z. PMID: 29021822; PMCID: PMC5613335.
- [5] Shaheen, Shabeena & Mahmood, Ziarab & Shah, Nazir Haider. (2020). Impact of Student Support Services on Students Development at University Level. Global Regional Review. V. 222-229. 10.31703/.2020(V-I).25.
- [6] Saleem, F.; Ullah, Z.; Fakieh, B.; Kateb, F. Intelligent Decision Support System for Predicting Student's E-Learning Performance Using Ensemble Machine Learning. *Mathematics* **2021**, *9*, 2078. <https://doi.org/10.3390/math9172078>
- [7] Lin, CC., Huang, A.Y.Q. & Lu, O.H.T. Artificial intelligence in intelligent tutoring systems toward sustainable education: a systematic review. *Smart Learn. Environ.* **10**, 41 (2023). <https://doi.org/10.1186/s40561-023-00260-y>
- [8] Ritonga, M.; Al Ihsan, M.A.; Anjar, A.; Rambe, F.H. Sentiment analysis of COVID-19 vaccine in Indonesia using Naïve Bayes Algorithm. In Proceedings of the IOP Conference Series: Materials Science and Engineering, Medan, Indonesia, 23 September 2020; Volume 1088, p. 12045.
- [9] Devi, R.R.; Suresh, B. An empirical study to examine the student activity analysis components of technology using an extended multi-labeled gradient boosting methodology. *Mater. Today Proc.* **2021**.
- [10] Musiat P, Conrod P, Treasure J, Tylee A, Williams C, Schmidt U. Targeted prevention of common mental health disorders in university students: randomised controlled trial of a transdiagnostic trait-focused web-based intervention. *PLoS ONE.* 2014;9(4):1-10.
- [11] Cope, B.; Kalantzis, M. The Changing Dynamics of Online Education: Five Theses on the Future of Learning. In *Foreign Language Learning in the Digital Age: Theory and Pedagogy for Developing Literacies*; Routledge: London, UK, 2021.
- [12] García-Alberti, M.; Suárez, F.; Chiyón, I.; Mosquera Feijoo, J.C. Challenges and Experiences of Online Evaluation in Courses of Civil Engineering during the Lockdown Learning Due to the COVID-19 Pandemic. *Educ. Sci.* **2021**, *11*, 59
- [13] Sharma, S.; Gupta, Y.K. Predictive analysis and survey of COVID-19 using machine learning and big data. *J. Interdiscip. Math.* **2021**, *24*, 175-195.
- [14] Oku, A.Y.A.; Sato, J.R. Predicting student performance using machine learning in fNIRS data. *Front. Hum. Neurosci.* **2021**, *15*, 18.
- [15] Subudhi, S.; Verma, A.; Patel, A.B.; Hardin, C.C.; Khandekar, M.J.; Lee, H.; McEvoy, D.; Stylianopoulos, T.; Munn, L.L.; Dutta, S. Comparing machine learning algorithms for predicting ICU admission and mortality in COVID-19. *NPJ Digit. Med.* **2021**, *4*, 87
- [16] Wang, S.; Shen, Z.; Shen, Z.; Dong, Y.; Li, Y.; Cao, Y.; Zhang, Y.; Guo, S.; Shuai, J.; Yang, Y. Machine-learning micropattern manufacturing. *Nano Today* **2021**, *38*, 101152.
- [17] Lincke, A.; Jansen, M.; Milrad, M.; Berge, E. The performance of some machine learning approaches and a rich context model in student answer prediction. *Res. Pract. Technol. Enhanc. Learn.* **2021**, *16*, 10
- [18] Latif, S.; Fang, X.; Wang, L. Intelligent decision support system approach for predicting the performance of

students based on three-level machine learning technique.
J. Intell. Syst. **2021**, *30*, 739–749.

[19]Zhang, L.; Li, K.F. Education analytics: Challenges and approaches. In Proceedings of the 2018 32nd international conference on advanced information networking and applications workshops (WAINA), Krakow, Poland, 16–18 May 2018; pp. 193–198.

[20]Gocheva-Ilieva, S.; Kulina, H.; Ivanov, A. Assessment of Students' Achievements and Competencies in Mathematics Using CART and CART Ensembles and Bagging with Combined Model Improvement by MARS. *Mathematics* **2021**, *9*, 62