

A GENERAL MANAGEMENT APPROACH TO ASSESSING THE UBT MODEL OF STUDENT MANAGEMENT INFORMATION SYSTEM USING ANOVA

Dr Ranit Kishore

Dean, Tula's Institute, Dehradun

Dr Khaliquir Ansari

Associate Professor, Tula's Institute, Dehradun

Dr Shikha Dabral

Assistant Professor, Tula's Institute, Dehradun

Dr Abdal Ahmad

Assistant Professor, Tula's Institute, Dehradun

MS Monalsha Chand

Assistant Professor, Tula's Institute, Dehradun

ABSTRACT

The primary objective of this research project is to evaluate the efficacy and impact of the Student Management Information System in facilitating student support during the registration and examination periods. The evaluation encompasses various significant dimensions, encompassing the system's performance, efficiency, and user-friendliness. For the purpose of conducting this investigation, the University for Business and Technology (UBT) has been chosen as the focal point. This institution has been specifically designed, implemented, evaluated, analyzed, and enhanced to serve as the subject of our study. The main aim of this analysis is to determine whether the UBT model has resulted in improvements in student services, centralized data administration, data security, and the general efficiency of student electronic services. We want to explore a range of factors that could potentially impact these results through the implementation of an extensive case study. Following this, we proceed to assess the level of ease and convenience experienced by users when engaging with the implemented UBT model and the solutions provided by the Management Information System. ANOVA regression analyses are utilized in order to statistically assess the impact of these solutions. The research findings have yielded useful insights and recommendations, which are derived from the outcomes of our investigation.

Keywords: *Student Management, Information System, University, Efficiency, Usability, Case study*

INTRODUCTION

In the last ten years, Information Technology (IT) has become a prominent catalyst for substantial changes in the field of education, namely in the domain of General Management. During the preceding period, educational institutions extensively depended on manual management information systems, resulting in significant delays and dissatisfaction among students and faculty members alike. The proliferation of tertiary education institutions, especially the emergence of privately-owned institutes in Southeastern Europe, has underscored the imperative need for enhanced administrative services. As a result, both public and private institutions of higher education have been making efforts to either implement open source applications or create customized management information systems. These endeavors aim to effectively address the varied needs of their students and staff, including administrative and academic personnel.

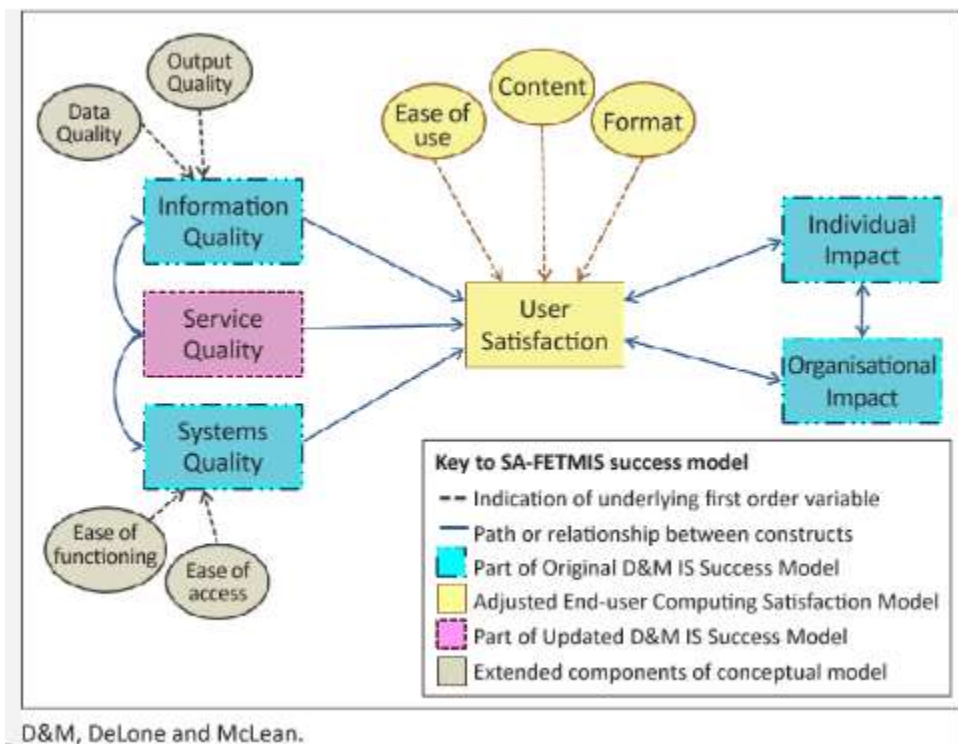


Figure 1: Model for User Satisfaction management

Although management information systems have undoubtedly resulted in significant improvements in security, data consolidation, and report design, they are not without limitations. Numerous institutions have difficulties during the deployment process, mostly due to the fact that open source systems are created on a worldwide scale to cater to broad requirements, perhaps lacking the necessary distinctiveness for individual institutions. On the other hand, bespoke systems frequently encounter shortcomings in terms of thorough study of industry-specific requirements, primarily due to their expedited creation process and occasional unsuitable choice of development technology. Given the acknowledged constraints and obstacles, the primary aim of this research study is to provide valuable insights pertaining to the optimal design, development, and assessment of a Student Management Information System. This system bears considerable

importance within the realm of General Management. The primary objective of this system is to cater to the needs and demands of both higher education institutions and their students.

As underscored in scholarly literature, it is imperative to acquire a more profound comprehension of the complexities involved in the construction of large-scale information systems within the present-day context, specifically within the domain of General Management. This comprehension comprises crucial elements, including the players involved, the necessary knowledge, and the basic obstacles inherent in the development of such systems. It serves as the foundation for producing inventive initiatives, ideas, strategies, concepts, recommendations, and methodologies that ease the process of developing information systems to address the changing needs of the educational sector and, consequently, General Management practices.

SIGNIFICANCE OF THE STUDY

Given the prevailing focus on financial investments in information technology applications within the Indian education system, it is crucial for higher education institutions to cultivate a more profound comprehension of the elements that lead to enhanced efficiency and reduced costs. Higher education institutions consistently update or adopt software in order to fulfill accreditation requirements as they work towards obtaining accreditation from relevant governing authorities. Prominent academic institutions globally are utilizing established Information Systems to enhance student services and optimize administrative procedures.

However, there exists a discernible dearth of scholarly literature pertaining to universities' understanding of influential elements, specifically in terms of fostering a connection between administrative and academic dimensions within the Indian educational framework. Previous generations of educational systems, which were designed incrementally to cater to the unique requirements of universities, frequently suffer from a lack of a unified design framework. Consequently, these systems prove to be inadequate in terms of facilitating seamless data integration and utilization. Indian universities encounter a range of obstacles, including the need to accommodate a rising number of students, expand their physical infrastructure across many sites, and meet the growing demand for remote access to information and services. The aforementioned issues have been effectively mitigated by the creation of a novel model that aims to comprehensively incorporate all relevant aspects and remedy any prevailing flaws. The conceptual framework of this Management Information System prioritizes online technologies, enabling users such as students and staff to conveniently access information across various locations and devices, thereby augmenting the overall quality of service provision.

It is imperative to prioritize the identification and examination of key determinants that exert a substantial impact on enhancing and optimizing the efficacy of a given system. The grounded theory approach is utilized as the foundation for evaluating these crucial aspects, bolstered by analysis and other methodologies in order to ascertain their levels of influence. The project showcases this methodology, as it draws upon the findings from the initial year and first cycle of fieldwork data. The project specifically emphasizes the enhancement of conditions that facilitate the smooth and efficient utilization of Electronic Information Services.

RESEARCH METHODOLOGY

The research methodology employed in this study involves a thorough review of existing literature and the acquisition of primary data through quantitative techniques. Specifically, we utilized questionnaires and statistical analysis tools, such as "Google Analytics."

The primary quantitative data primarily stems from questionnaires tailored to this research, which were disseminated to the management and administration of a higher education institution in India. In the process of collecting primary quantitative data, we distributed 35 questionnaires to students enrolled at the analyzed higher education institution. Additionally, we handed out another set of 35 questionnaires to the administrative staff of the same institution. This resulted in a total of 70 questionnaires being used for data collection.

HYPOTHESIS

H1: The developed UBT model of Management Information Systems is expected to have a significant positive impact on the management of student-related matters, spanning from enrollment to graduation, as well as the handling of institutional affairs with external stakeholders when compared to the previous system, which relied on disparate software and, in some cases, manual data entry and processing.

H2: The UBT model of Management Information System is anticipated to improve data centralization, security, and reliability, addressing the specific needs and challenges within the Indian context.

H3: The UBT model of Management Information System is hypothesized to enhance student efficiency and satisfaction during critical periods such as registration and examination, aligning with the requirements and expectations of the Indian education system.

H4: The usability and user-friendliness of the developed UBT model and Management Information System solutions are expected to contribute to administrative efficiency, resulting in reduced processing time, which is of particular relevance within the Indian context of general management.

Null Hypothesis

H0 for H1: The developed UBT model of Management Information Systems will not significantly enhance the management of student issues from enrollment through graduation and the handling of institutional matters with external stakeholders compared to the old system, which comprised different software and, in some instances, manual entry and processing of data.

H0 for H2: The UBT model of Management Information System will not have a significant impact on data centralization, security, and reliability.

H0 for H3: The UBT model of Management Information System will not lead to a significant improvement in student efficiency and satisfaction during registration and examination periods.

H0 for H4: The usability and user-friendliness of the developed UBT model and Management Information System solutions will not significantly enhance administrative efficiency or reduce processing time.

CASE STUDY

This case study examines the functionalities of a web-based application by analyzing the data collected from Google Analytics at a period of high demand for test registration in an Indian

setting. In addition, we explore various factors that impact outcomes by conducting a comparative analysis of the academic achievements of high school students in state examinations and their selected fields of study, in relation to their subsequent success in university programs. The present examination is conducted by scrutinizing reports that are created by a certain query within the system.

Device Category	Acquisition			Behavior			Conversions		
	Sessions	% New Sessions	New Users	Bounce Rate	Pages / Session	Avg. Session Duration	Goal Conversion Rate	Goal Completions	Goal Value
	1,987 % of Total: 100.00% (1,987)	75.79% Avg for View: 75.39% (0.52%)	1,506 % of Total: 100.52% (1,498)	11.88% Avg for View: 11.00% (0.00%)	8.29 Avg for View: 8.29 (0.00%)	00:04:35 Avg for View: 00:04:35 (0.00%)	0.00% Avg for View: 0.00% (0.00%)	0 % of Total: 0.00% (0)	\$0.00 % of Total: 0.00% (\$0.00)
1. desktop	1,413 (71.11%)	79.12%	1,118 (74.24%)	7.08%	9.33	00:05:03	0.00%	0 (0.00%)	\$0.00 (0.00%)
2. mobile	554 (27.88%)	67.15%	372 (24.70%)	24.19%	5.55	00:03:15	0.00%	0 (0.00%)	\$0.00 (0.00%)
3. tablet	20 (1.01%)	80.00%	16 (1.06%)	10.00%	10.75	00:08:20	0.00%	0 (0.00%)	\$0.00 (0.00%)

Figure 2 displays the data obtained from Google Analytics, which are categorized based on the utilization of different types of equipment.

The significance of prioritizing web technology and responsive design in software development, specifically to accommodate the many devices utilized in India such as desktop computers, mobile phones, and tablets, is shown by the tables derived from Google Analytics. The tables provided in this analysis offer insights into the proportion of students who have successfully completed the registration process for their examinations. Furthermore, the data differentiates between students based within India and those who have registered from outside.

Country	Sessions	% Sessions
1. Kosovo	1,927	96.96%
2. Serbia	35	1.76%
3. Slovenia	5	0.25%
4. Macedonia (FYROM)	4	0.20%
5. United States	3	0.15%
6. Albania	2	0.10%
7. Bulgaria	1	0.05%
8. Switzerland	1	0.05%
9. Germany	1	0.05%
10. France	1	0.05%

Figure 3 displays the Google Analytics outcomes pertaining to the utilization of a particular entity categorized by country.

RESULTS

Based on a comprehensive examination of the data derived from questionnaires comprising 20 inquiries, which were distributed among participants from an Indian university and encompassed three distinct sections - introductory queries, system-related general inquiries, and evaluations of the implemented system - it is evident that the survey's engagement is evenly distributed between students and staff members. The distribution of participants is depicted in Table 1 using a frequency analysis.

Table 1 – Staff Student

	Freque ncy	Percent	Valid Percent	Cumulative Percent
Staff	25	50.0	50.0	50.0
Valid Student	25	50.0	50.0	100.0
Total	50	100.0	100.0	

The survey findings provide valuable insights into the evaluation of the system's overall performance and its relevance to the research objective of investigating the significance and benefits of Management Information Systems (MIS) in Indian higher education institutions. Specifically, the study focuses on the system's role in managing student affairs throughout the enrollment to graduation process and in facilitating interactions with external stakeholders in institutional matters. Approximately 54% of the participants perceive the system to be exceptional. Furthermore, a significant proportion of respondents, specifically 32 percent, evaluate the system as highly commendable, but an only 2 percent express their satisfaction with its performance.

Table 2 - How important is the Management Information System in managing your issues within your educational process?

	Frequency	Percent	Valid Percent	Cumulative Percent
Satisfactory	1	2.0	2.0	2.0
Good	6	12.0	12.0	14.0
Valid Very good	16	32.0	32.0	46.0
Outstanding	27	54.0	54.0	100.0
Total	50	100.0	100.0	

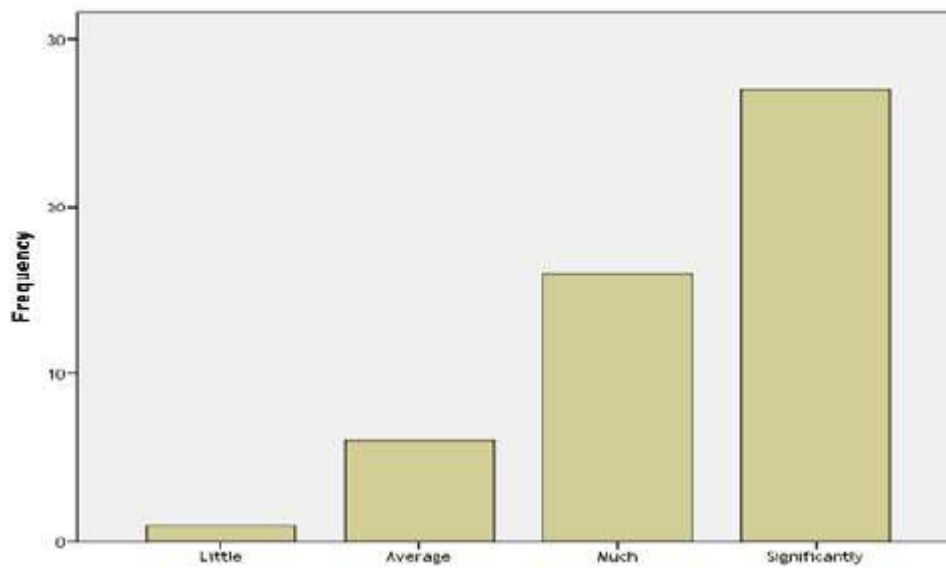


Table 2 presents an overview of the evaluation of user satisfaction for several services provided by the system. These services include the maintenance of personal information, exam enrollment, grade monitoring, extraction of various documents, and remote utilization of the system. A significant majority of participants, specifically 64 percent, reported a considerable level of satisfaction about the management of their personal information.

Table 3 – Evaluation of different categories of the system

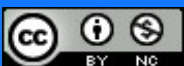
	Very Little	Little	Average	Significant	Very much
Management of personal information	2.0	2.0	10.0	22.0	64.0
Exam enrollment	2.0	0	12.0	24.0	62.0
Grade monitoring	2.0	2.0	12.0	28.0	56.0
Extraction of various documents	0	8.0	10.0	26.0	56.0
Distance usage of the system	2.0	0	6.0	36.0	54.0

A majority of respondents, specifically 62 percent, expressed satisfaction with the Exam Enrollment services. A majority of respondents, specifically 56 percent, expressed satisfaction with both the Grade Monitoring and Extraction of Various Document services. Ultimately, a majority of 54 percent express contentment with the utilization of the Distance method. The findings indicate a notable degree of contentment among participants from both the student and staff cohorts regarding the overall performance of the system. The findings of this study effectively align with the research objective and provide evidence to substantiate the validity of our initial hypothesis. The aforementioned data indicate that the Management Information System (MIS) has had a significant influence on the administration of student and institutional matters within the framework of higher education in India.

REGRESSION ANALYSIS

An extensive analysis was undertaken to evaluate the validity and applicability of various factors examined within the context of the case study. The central variable of interest, serving as the dependent variable in this analysis, was the first-year student grade average. The study sought to measure the influence of different factors on this particular dependent variable. These factors included the field of study in high school, high school state exam results, gender, and age, all of which are detailed in the Variables Entered/Removed table.

To investigate the individual impact of each independent variable (factor) on the dependent variable, we employed an ANOVA statistical analysis. The ANOVA table clearly indicated that the F statistics were statistically significant, signifying the relevance and practical significance of the study. However, it is worth noting that this analysis could account for only 11.8% of the variation in the grade average, as shown in the Model Summary table. To enhance the



interpretation of the data and the accuracy of the results, we created a table that provides insight into the significance and meaning of each factor within the model.

This table revealed that the field of study in high school did not have a significant impact on the regression analysis and did not affect the average grade of students during their first year at university. In contrast, the analysis indicated a positive correlation between high school state exam results and a student's grade average. Students who achieved higher scores on the high school state exam tended to have a higher grade average in their first year at university compared to those who scored lower.

Furthermore, gender, another factor within the model, exhibited a positive correlation with student success during their first year of studies. According to the analysis, male students tended to have a higher grade average in their first year compared to female students. However, the impact of age on a student's grade average during their first year at university was found to be insignificant. The analysis revealed no correlation between age and grade average, suggesting that age does not impact a student's performance in their first year.

In terms of the correlation between high school state exam results and the grade average of first-year students, a positive correlation was observed with a value of 0.260, which can be considered a low correlation coefficient. Therefore, it can be concluded that the results of the high school state exam have minimal impact on the average grade of first-year students.

Table 4 - Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	Age, Gender, High School State Exam, Field of Study	.	Enter

a. Dependent Variable: Grade Average

b. All requested variables entered.

Table 5 - Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.344 ^a	.118	.104	.82959

a. Predictors: (Constant), Age, Gender, High School State Exam, Field of Study

A frequency analysis of students' previous fields of study, conducted using the Statistical Package for Social Sciences (SPSS), revealed that the total number of students analyzed was 263. The

majority of students had a previous field of study in natural sciences (38.8%), followed by IT technicians (26.2%), while the remaining 35% came from various other fields.

Table 6 - ANOVA^a

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	23.766	4	5.941	8.633	.000 ^b
Residual	177.559	258	.688		
Total	201.324	262			

a. Dependent Variable: Grade Average

b. Predictors: (Constant), Age, Gender, High School State Exam, Field of Study

Table 7- Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error			
(Constant)	8.795	1.611		5.458	.000
Field of Study	.005	.021	.017	.255	.799
High School State Exam	.010	.003	.203	3.283	.001
Gender	-.472	.150	-.188	-3.155	.002
Age	-.108	.070	-.103	-1.548	.123

a. Dependent Variable: Grade Average

The regression equation summarizing the relationship between the grade average and the various factors is as follows:

$$\text{Grade Average} = 8.80 + 0.0054(\text{Field of Study}) + 0.01034(\text{High School State Exam}) - 0.472(\text{Gender}) - 0.1082(\text{Age})$$

Table 8 - Regression Analysis Interpretation

	Is the p-value significant?	What does this mean?
F Statistic=8.633	Yes, Because it's p-value is 0.00, less than 0.05	It means that at least one of the independent variables have an effect on the depended variable
R-Squared = 11.8%	It does not have a p-value	11.8% of a student's average grade is explained by the model
Adjusted R-Squared = 10.44%	It does not have a p-value	11.44% of a student's is explained by the model
Coefficient field of study = 0.005	No, because it's p-value is 0.799, which is higher than 0.05	The dependent variable field of study has a p-value higher than 0.05, which shows that it is not significant and does not affect the dependent variable
Coefficient high school state exam = 0.01034	Yes, because its p-value is 0.001, which is less than 0.05	Holding other variables constant, for each additional point in the high school state exam, a student's average grade will be higher for 0.01034

CONCLUSION

In the context of the Indian educational landscape, the feedback received from various stakeholders suggests a very favorable reception of the Student Management Information System (SMIS). This positive response indicates a statistically significant correlation between stakeholders' confidence in using the system, underlining the importance of our research objective. Our primary goal in this research was to identify the most effective approach for analyzing, designing, and evaluating the SMIS model developed for higher education institutions. We then put this approach to the test in a practical setting at the University for Business and Technology (UBT) in India.

The core of our SMIS lies in its Infrastructure Services, which adhere to the latest API standards for web applications. These services can seamlessly retrieve data in XML or JSON formats, catering to the diverse needs of our customers. Furthermore, this framework is engineered to facilitate integration with third-party systems, making it a valuable asset for the e-school system. In the context of the Indian education sector, where institutions often rely on a variety of tools and platforms, this integration capability is of utmost importance. The SMIS offers an efficient solution for higher education institutions in India to streamline their data management.

In India, the use of technology in education is rapidly growing, and the Presentation/UI layer of our SMIS aligns with these advancements. It complies with the latest front-end technology standards, incorporating key technologies that power dynamic web applications, enhancing the user experience through Ajax capabilities. Additionally, fundamental JavaScript libraries are integrated to foster user interaction and create a user-friendly interface. This adaptability to modern technology trends is especially pertinent to the Indian educational context, where students and educators increasingly rely on digital tools. To further enhance the user experience in e-applications within the Indian context and boost confidence in these applications, we recommend a proactive approach. Organizing training sessions tailored to various stakeholders, including teachers, parents, and administrative staff, is vital. These sessions aim to familiarize users with the tangible benefits of e-management in the Indian education system, showcasing how our SMIS can streamline processes, save time, and provide valuable insights for educational institutions. This personalized training approach can help users make the most of the SMIS and embrace its advantages, further contributing to the success of the system in the Indian higher education landscape. In conclusion, the positive response from stakeholders and the adaptability of the SMIS to Indian education needs make it a valuable asset for higher education institutions in India. It provides a robust infrastructure, modern user interfaces, and the potential to revolutionize educational data management. By offering training sessions to different user groups, we can ensure that our system is not only adopted but also effectively utilized, ultimately benefiting the Indian education sector.

Limitations of the Study:

1. **Limited Scope:** The study primarily focused on the evaluation of the Student Management Information System (SMIS) at the University for Business and Technology (UBT). This means that the findings and recommendations may not be directly applicable to different educational institutions in the Indian context, which might have unique requirements and constraints.
2. **Single Case Study:** The research implemented the identified effective approach in a single real-life case at UBT. A broader range of case studies across various types of educational institutions in India would provide a more comprehensive understanding of the applicability of the proposed approach.
3. **Generalizability:** The positive reception of the SMIS by UBT's stakeholders may not necessarily be indicative of its success in other institutions. Local culture, administrative structures, and student demographics can significantly impact the adoption and effectiveness of such systems.
4. **Time Sensitivity:** The technology landscape is rapidly evolving. While the study incorporated cutting-edge web technologies, the rapid pace of change may affect the longevity of the system's relevance and usability. Frequent updates and maintenance are required to keep the system up to date.

Recommendations:

1. **Diversified Case Studies:** To overcome the limitation of a single case study, future research should encompass a wider range of educational institutions in India. This would provide a more holistic understanding of the challenges and opportunities associated with SMIS implementation across the diverse Indian education landscape.
2. **Long-Term Evaluation:** Continuous evaluation of the SMIS is essential. Regular surveys and feedback collection from various stakeholders will help identify evolving needs and areas for improvement. This ongoing assessment will ensure that the system remains relevant and effective in the long run.
3. **Customization and Localization:** Recognizing the unique characteristics of Indian educational institutions, it is advisable to create systems that can be easily customized and localized. This will enable institutions to adapt the SMIS to their specific needs, cultures, and regulatory requirements.
4. **Cybersecurity and Data Privacy:** With the increasing reliance on technology, special attention must be given to cybersecurity and data privacy. It is essential to continually update security measures to protect sensitive educational data and maintain the trust of stakeholders.
5. **User Training Programs:** As recommended in the original discussion, investing in user training programs should be a priority. These programs can be tailored to the specific needs of teachers, parents, and administrative officers to ensure they fully understand and utilize the advantages of e-management systems.
6. **Research on Evolving Technologies:** Stay updated on emerging technologies and trends in education. Research and incorporate innovations that could enhance the SMIS and its features, keeping it competitive and efficient in a rapidly changing technological landscape.
7. **Collaboration with Stakeholders:** Encourage continuous dialogue and collaboration with various stakeholders in the education sector. This ensures that the SMIS remains aligned with the evolving needs and expectations of the Indian education community.

REFERENCES

- [1] Carstensen, H. P., Vogelsang, L. (2011) 'Design of Web-Based Information Systems - New Challenges for Systems Development?', Bled.
- [2] Dennis, A., Wixom, H. B., Roth, M. R. (2008) Systems Analysis and Design, 4th edition, New York: John Wiley & Sons, Inc.
- [3] Education, O.S.f. (2008) Open Source Student Information System (SIS), [Online], Available: <http://www.opensis.com/> [1 Dec 2014].
- [4] Gorton, I. (2011) Essential Software Architecture, 2nd edition, Berlin: Springer.
- [5] Love, S. (2005) Understanding Mobile Human-Computer Interaction, 1st edition, Oxford: Elsevier Ltd.

- [6] Marczyk, G., DeMatteo, D., Festinger, D. (2015) *Essentials of Research Design and Methodology*, 1st edition, Project Management, Cengage Learning, ISBN-10: 1285452348.
- [7] Saadé, R.G. (2003) 'Web-Based Educational Information System for Enhanced Learning, EISEL: Student Assessment', *Journal of Information Technology Education*, vol. 2, no. 1, pp. 267-277.
- [8] Yew, B.K. (2008) 'A Perspective on a Management Information Systems (MIS) Program Review', *Journal of Information Technology Education*, vol. 7, no. 1, pp. 299-314.